

# COMPENDIUM

on

**State Specific  
S&T Interventions**

by

**State S&T Councils  
2018**



**Department of Science & Technology**  
Ministry of Science & Technology, Govt. of India



## **FOREWORD**

Science and Technology have always been an integral part of Indian culture. Natural philosophy, as it was termed in those ancient times, was pursued vigorously at institutions of higher learning. The Department of Science and Technology plays a pivotal role in promotion of Science and Technology in the country. In this endeavour, significant contributions have been made by the State Science and Technology Councils (SSTC) in the country. The objective of the State Science and Technology (S&T) councils has been to popularize Science and Technology in the region and create awareness about the benefits of S&T which lead to solving the regional challenges is worth mentioning.

The success of these programmes and the enthusiastic interactions of the participating communities clearly indicate that a well-defined information and depiction of the projects and programmes need to be compiled and disseminated. In this regard, Department of Science and Technology (DST), Government of India (GoI), New Delhi, has always brought out publications which inspire the masses to look at S&T interventions as the logical solution for any problem that affect the societal growth.

It gives me an immense pleasure to mention that a similar endeavour has been made by Himachal Pradesh Council for Science Technology & Environment (HIMCOSTE), Shimla this year in compiling all the important areas of S&T arena identified by State S&T councils in the country with the continuous association and guidance of the Department of Science and Technology (DST), GoI, New Delhi. I would like to convey my warm regards and appreciation to the entire team of DST, New Delhi specifically Dr. Neeraj Sharma, Advisor and Head SSTP and Er. Ravinder Gaur, Scientist and Member Secretary, SSTP, Department of Science and Technology, Govt. of India, New Delhi and HIMCOSTE, Shimla and who have taken the initiative to bring out this compendium and also host the S&T Conclave in a befitting manner. I do hope that Shimla Conclave will set a new agenda and strategy to take Science and Technology to the common people for the benefit of the society.

**(Prof. Ashutosh Sharma)**

**New Delhi**

**Dated : 05.06.2018**

# Arunachal Pradesh

## 1. Details of State S&T Council

Name of the Secretary & Member Secretary/Director General

**Er. Gaken Ete**

Secretary, Department of Science & Technology

Govt. of Arunachal Pradesh

Civil Secretariat

Itanagar-791111, Arunachal Pradesh

Phone: 0360-2215634, 9436040649 (M); E-mail: goteoffice@gmail.com

## Er. C. D. Mungyak

Director cum Member Secretary

Arunachal Pradesh State Council for Science & Technology

(Dept. of Science & Technology), Govt. of Arunachal Pradesh

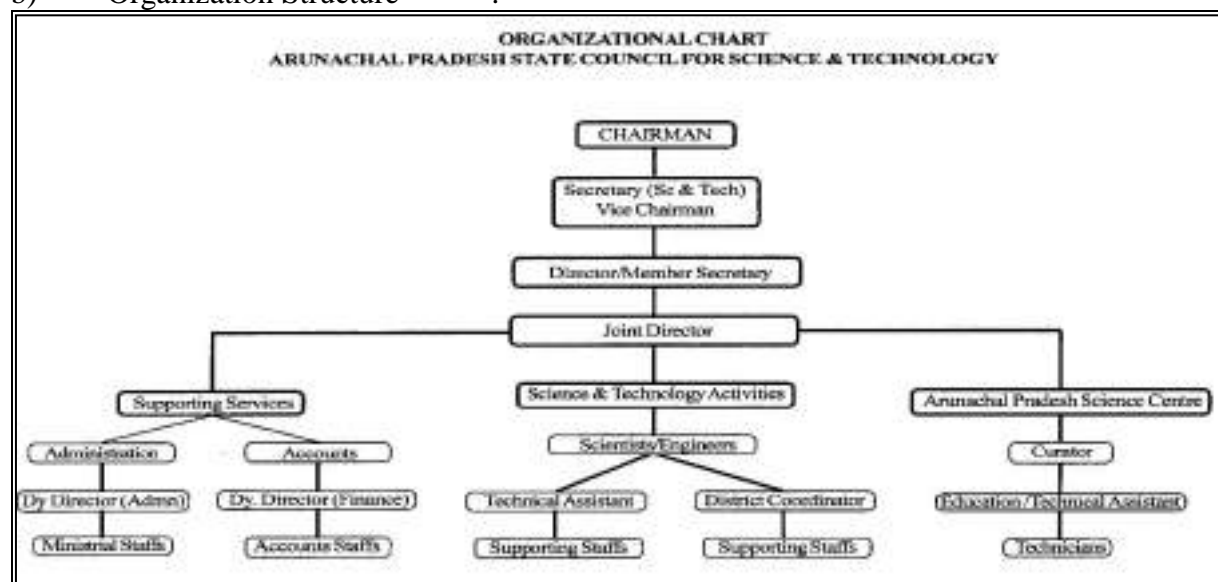
ESS-Sector, Itanagar-791113

Phone: 09485235197(M), E-mail: [cd.mungyak@gov.in](mailto:cd.mungyak@gov.in)

## 2. Structure of the Council:

a) Date of Establishment : 31<sup>st</sup> December, 1992

b) Organization Structure :



c) Strength of approved manpower (both central (DST) and state supported)

### Central (DST) approved manpower

Sl. No.	Name	Designation	Pay scale	Approximate monthly emoluments
<b>Scientific and Technical Manpower</b>				
1	Shri C. D. Mungyak	Director & Member Secretary	Rs.86,100 (Pay matrix L-12)	Rs. 96,271.00
2	Dr. Debajit Mahanta	Joint Director	Rs.99,800 (Pay matrix L-12)	Rs. 1,10,936.00
3	Shri Pakngu Lombi	Deputy Director	Rs. 69,000	Rs. 81,580.00

		(Tech.)	(Pay matrix L-10)	
4	Er. Tenzin Sherap	Scientist -B	Rs. 69,000 (Pay matrix L-10)	Rs. 84,047.00
5	Ms. Yumbi Yomgam	Scientist-B	Rs.59,500 (Pay matrix L-10)	Rs. 72,036.00
<b>Administrative Manpower</b>				
6	Shri S. R. Khochey	Deputy Director (Admin.)	Rs.71,800 (pay matrix L-11)	Rs. 80,976.00
7	Shri Rupjyoti Konwar	Sr. Accounts Officer	Rs.61,300 (Pay matrix L-10)	Rs. 74,747.00
8	Ms. Damtu Romin	Assistant. Accounts Officer	Rs.59,500 (pay matrix L-10)	Rs. 73,578.00
9	Shri Yijo Yomgam	Section Officer	Rs.59,500 (pay matrix L-10)	Rs. 71,415.00
10	Shri Birendra Kumar	UDC	Rs.49,000 (pay matrix L-6)	Rs. 57,818.00
11	Shri Manoj Kumar Rai	UDC	Rs.37,000 (pay matrix L-5)	Rs. 45,270.00
12	Shri Kejang Tsering	UDC	Rs. 39,200 (pay matrix L-5)	Rs. 47,699.00
13	Shri Dado Tadung	Driver	Rs.39,200 (pay matrix L-5)	Rs. 47,580.00
14	Shri Tilok Pokhrel	Driver	Rs.31,400 (pay matrix L-4)	Rs. 39, 049.00
15	Shri Dulal Ch. Dhar	Peon	Rs. 29,300 (pay matrix L-2)	Rs. 36,739.00
16	Ms. Nguri Yajak	Peon/Attendant	Rs. 25,200 (pay matrix L-1)	Rs. 31,264.00

**State Govt. supported manpower (State Council for Science & Technology)**

Sl. No	Name	Designation	Pay scale	Approximate monthly emoluments
1	Shri Terpo Ronya	Project Scientist	Rs. 65,000 (pay matrix L-10)	Rs. 73,700.00
2	Shri Ranjan Das	Junior Enggr.	Rs. 53,600 (pay matrix L-8)	Rs. 63,049.00
3	Shri Nitish Das	Junior Enggr.	Rs. 41,100 (pay matrix L-6)	Rs. 48,886.00
4	Shri Sange Tsering	Tech. Asstt.	Rs. 38,700 (pay matrix L-6)	Rs. 46,242.00
5	Shri Toter Poyom	JE (Elect.)	Rs. 35,400 (pay matrix L-6)	Rs. 41,278.00
6	Ms. Belong Doni	Jr. Accountant	Rs. 32,900 (pay matrix L-5)	Rs. 39,844.00
7	Ms. Oken Markio	Assistant	Rs. 30,100	Rs. 36,743.00

			(pay matrix L-5)	
8	Shri Sange Dawa	Project Officer	Rs. 32,900 (pay matrix L-5)	Rs. 39,844.00
9	Ms. Pill Massom	PA to Director	Rs. 35,400 (pay matrix L-6)	Rs. 41,278.00
9	Shri Lobsang Tsering	LDC	Rs. 28,700 (pay matrix L-4)	Rs. 35,193.00
10	Ms. Jumcha Ligo	LDC	Rs. 28,700 (pay matrix L-4)	Rs. 35,193.00
11	Ms. Ngima Penzom	LDC	Rs. 28,700 (pay matrix L-4)	Rs. 35,193.00
12	Shri Mintum Jokik	LDC	Rs. 27,900 (pay matrix L-4)	Rs. 34,305.00
13	Ms. Rippi Tali	LDC	Rs. 27,900 (pay matrix L-4)	Rs.34,305.00
14	Ms. Phurpa Lamu	LDC	Rs. 27,900 (pay matrix L-4)	Rs. 34,305.00
15	Ms. Nyasum Gamlin	LDC	Rs. 27,900 (pay matrix L-4)	Rs.34,305.00
16	Shri Karma Tsering	LDC	Rs. 27,900 (pay matrix L-4)	Rs.34,305.00
17	Shri Tosar Ronya	LDC	Rs. 27,900 (pay matrix L-4)	Rs. 34,305.00
18	Shri Rejum Gamlin	Driver	Rs. 27,900 (pay matrix L-4)	Rs. 34,305.00
19	Ms. Shanti Hare	Sweeper	Rs. 29,300 (pay matrix L-4)	Rs. 35,839.00
20	Ms. Yapet Nyitan (Tali)	Peon	Rs. 18,000 (pay matrix L-1)	Rs. 22,660.00
21	Ms. Niter Yinyo	Helper	Rs. 18,000 (pay matrix L-1)	Rs. 22,660.00
22	Ms. Dechen Lhamu	LDC	Rs. 25,500 (pay matrix L-4)	Rs. 30,685.00

### Arunachal Pradesh Science Centre

Sl. No	Name	Designation	Pay scale	Approximate monthly emoluments
1	Shri Vivek Kumar	Curator	Rs. 80,900 (pay matrix L-11)	Rs. 90,713.00
2	Ms. Gem Peri	Education Asstt.	Rs. 47,600 (pay matrix L-6)	Rs. 56,097.00
3	Ms. Khoda Yader	Tech. Asstt.	Rs. 35,400 (pay matrix L-6)	Rs. 41,278.00
4	Shri Neelam Maj	Technician	Rs. 32,900 (pay matrix L-5)	Rs. 38,603.00
5	Shri Mom Omo	Technician	Rs. 32,900	Rs. 39,818.00

	Polo		(pay matrix L-5)	
6	Shri John Tayeng	Technician	Rs. 32,900 (pay matrix L-5)	Rs. 38,603.00
7	Ms. Dugi Kami	LDC	Rs. 28,700 (pay matrix L-4)	Rs. 34,109.00
8	Shri Luksar Ronya	Driver	Rs. 27,900 (pay matrix L-4)	Rs. 34,337.00
9	Ms. Toko Nyakum	Peon	Rs. 19,100 (pay matrix L-1)	Rs. 24,537.00
10	Ms. Neelam Yadi	Tech. Assistant (Civil)	Rs.35,400 (pay matrix L-6)	Rs. 41,278.00
11	Ms. Tsering Yanjom Khochey	LDC	Rs. 25,500 (pay matrix L-4)	Rs. 30,685.00
12	Ms. Likha Yair	Peon	Rs. 18,000 (pay matrix L-1)	Rs. 22,660.00

**3. Budget allocation to your state S&T council for last five financial years including central government, State government & any other sources.**

**(In Lakh)**

Allocation	2013-2014	2014-15	2015-2016	2016-2017	2017-18
<b>Central Govt.</b>	100.20	116.53	118.53	118.53	2005.46
<b>State Govt.</b>	25.61	57.19	83.53	169.26	1094.12

**4. Key activities under taken during the last two years in the area of:-**

**4.1 Technology Development**

**4.1.1. Establishment of Sea Buckthorn Nursery at Boha village of Kalaktang Circle, West Kameng District, Arunachal Pradesh**

Sea buckthorn (*Hippophae rhamnoides* L.) plant offers an amazing opportunity to mountain farmers for sustainable livelihood by protecting their fragile eco-system through soil and moisture conservation. It also has tremendous value addition properties. Growing of this plant is the best option to mitigate the problems of fragile eco-system which will help in maintaining the economic sustainability of marginal farmers in these mountain areas.

The project has been taken up with the basic objectives to develop a modern sea buckthorn nursery at Boha village of Kalaktang circle in West Kameng District of Arunachal Pradesh for participating in horticultural programmes/schemes in high altitude areas of Arunachal Pradesh (b) Promoting economic development of village community (c) Employment generation and capacity building at local level and (d) Encouraging community action for operation and maintenance of assets.

One hectare of land has been taken up for establishment of the Sea buckthorn nursery. Jungle clearance and site preparation has been completed. Fencing raised to cover the nursery area with barbed wire and irrigation has been arranged from nearby spring and stream source with the help of diesel pumpset and pipeline. Approach road and nursery path has been made. Nursery shed has been prepared with the help of shade nets. Seeds (25 kg.) have been purchased from reliable agency and mother beds have been prepared where sowing of seeds have been done for growing of seedlings. The

project is being implemented through a local reputed NGO of Kalaktang with the technical back up of CSK Himachal Pradesh Agricultural University, Palampur and the works are progressing smoothly and successfully.

Major output of the project is to produce quality planting material and improve the socio economic condition of the villagers by providing scopes of self employment through cultivation of Sea buckthorn and also conservation of the degraded jhum lands and making use the wastelands.

#### **4.1.2. Establishment of Modern Nursery for Forest Regeneration and Conservation of Economically Important Plant Species at Sibi & Rilung village of Koloriang Circle, Kurung Kumey District, Arunachal Pradesh.**

The project is being implemented by Arunachal Pradesh State Council for Science & Technology in association with a reputed local registered NGO in two selected villages of Kurung Kumey district with the main objectives (a) develop modern nurseries for participating in forest regeneration programmes and conservation of economically important red listed plants (b) promoting the economic development of village community (c) employment generation and capacity building at local level and (d) encouraging community action for operation and maintenance of assets.

Establishment of the nursery at Sibi village has been completed and the same is under progress at Rilung village. Priority species grown in the nursery are:

- i. *Cinnamomum tamala* (vulnerable, CAMP report 2003)
- ii. *Swertia chirayita* (vulnerable, CAMP report 2003)
- iii. *Illicium griffithii* (Near threatened, CAMP report 2003)
- iv. *Livistona jenkinsiana* (Endangered, Red Data Book Plants of India (Nayar & Sastry 1987-88).
- v. *Albizia arunachalensis*
- vi. *Alnus nepalensis*
- vii. *Sapindus emarginatus*
- viii. *Mesua ferrea*
- ix. *Elaeocarpus floribundus*
- x. *Schima wallichii*
- xi. *Bambusa balcooa*, *Bambusa nutans*,
- xii. *Calamus erectus*, *Calamus flagellum*, *Calamus floribundus*

Maintenance of the nursery and seedling growing of the aforementioned plant species are going on.

Interactions with line departments, NGOs and common public for marketing of produce are also being continued smoothly. State Forest Research Institute, Dept. of Environment and Forest, Govt. of Arunachal Pradesh, Chumpu, Itanagar is providing technical support towards implantation of the project.

#### **4.1.3. Improving Traditional Water Mills for Income Generation and Improvement of Livelihood of Tribals in Arunachal Pradesh**

This activity was taken on project mode with the basic objective to improve the efficiency of the traditional water mills and also generate electricity for better livelihood. Water Mills have been used from time immemorial in the State for grinding wheat, rice, maize etc. Efficiency of Traditional water mill is very less hydraulically as locally available materials like wooden shaft, wooden blade, wooden chute and stone were used. In the absence of appropriate technology, water mills were never used for any other purpose on which they run. With the technology intervention the efficiency will improve and also generate electricity. Thus IWM has bearing in the socio-economy improvement of the tribal people. The model developed through this project can be replicated in the entire Himalayan region for income generation and production of electricity in remote locations.

## **4.2 Technology Demonstrations**

### **4.2.1. Demonstration of Three Tier Agro-forestry System and Bamboo Drip Irrigation along with Allied Activities for Self Sustainability of Tribal People of Doko Putu Village, West Siang District, Arunachal Pradesh.**

The project is being implemented by Arunachal Pradesh State Council for Science & Technology in Doko Putu village of West Siang District with the main objectives, which are (a) Demonstration of the three tier agro-forestry system (Agro-horti-silvi-pasture) and using Agri- horticulture and post Harvesting Technology (b) Demonstration of integrated farming system through establishment of fisheries duckeries poultry piggeries and bee keeping units (c) Developing Bamboo drip irrigation system for hill area development and (d) Introduction and demonstration of energy option through utilization of hydel, biomass and solar energy to reduce the drudgery of rural women.

The project is under implementation progressing satisfactorily. The works accomplished till date are (1) Site clearance and its development (2) Plantation of tree seedlings, horticulture crops and paddy farming in three tiers agro-forestry system (3) Three units of fish ponds are being developed.

The follow up programmes being carried out are (a) Establishment of one unit of duckery with 25 nos. of ducks and 5 drakes per unit (b) Establishment of one unit poultry farm with 3000 birds per unit (c) Establishment of 150 beehives and (d) Agri-horti value added product intervention and training to the villagers.

### **4.2.2. Installation of Micro Hydel projects of 2 X 100 kW & 3 X 100 kW capacities at different selected locations of Arunachal Pradesh**

These projects were implemented on demo R & D mode with the basic objective to provide electricity to the remote villages of Arunachal Pradesh for a better livelihood through replication of the cross flow turbine technology developed by IISC, Bangalore especially designed for low head projects. The development of Mini Hydel projects are quite favourable due to availability of proven technology, short gestation period of project, cheap and simple operation due to proximity of other similar projects, no escalation in cost of production, long service life and no impact on environment. The cross flow technology can be replicated in the entire Himalayan region for generation of electricity in remote locations.

### **4.2.3. Scientific Evaluation of Water Purification System (Selection, Installation and Assessment)**

The project was implemented with the basic objective towards assessment of performance of different types of water purification systems/ technologies commercially available based on ultra filtration, adsorption, reverse osmosis, Ion exchange, resin technology, UV, Ozonation etc. for providing safe drinking water in Schools/ Institution. Through this project, new facilities have been created in the form of water storage tanks for both raw and treated, filtered safe drinking water in the schools. Installation of suitable and need based type of water purification units have addressed the much needed basic requirement of having safe drinking water available to the students, teachers in the remote schools. The project needs to be replicated so that more numbers of schools in remote areas can be covered and facilities for providing safe drinking water created in these schools of Arunachal Pradesh.

### **4.2.4. Banana and Pineapple Fibre extraction and processing**

The use of "Banana" fiber for textile and other purpose as natural material is a new concept for India. Research work done by textile research organizations including KVIC (Khadi Village Industry Corporation) and NRCB (National Research Centre for Banana-Trichy) has been found that banana fiber can be a very promising source of natural fibre. Wild banana is abundant and are available almost free of cost in Arunachal Pradesh which can be sustainably exploited income generation and self employment for the youths of the State. The project is being implemented to facilitate meaningful



utilization, value addition of otherwise least important, resources discarded as wastes through demonstration and application of appropriate technologies available. Further, it would also help towards developing entrepreneurship, self employment by youths through production and marketing of the end products.

#### **4.2.5. Installation of Geo-thermal based Heating and Cooling System at Science Centre, Itanagar**

Arunachal Pradesh in its attempt to adopt to the fast growth of technology in India has implemented the geothermal-based heating and cooling system, a pilot project in collaboration with The Energy & Resources Institute (TERI) in Arunachal Pradesh Science Centre (APSC), Itanagar that offers more than 30% energy saving, cooling and heating facility without loss of water.

### **4.3. Popularization of science**

#### **4.3.1. National Children's Science Congress Activities**

Activities of 24<sup>th</sup> and 25<sup>th</sup> National Children's Science Congress 2016 & 2017 was organized both at the Districts and State level by Arunachal Pradesh State Council for Science & Technology, Itanagar as per the directives, guidelines issued by National Council for Science and Technology Communication (NCSTC), Dept. of Science & Technology, Govt. of India, New Delhi. The activities of NCSC continued in the state for over a period of 120 days. In CSC 2016, one hundred fifty four (154) nos. of projects were presented with participation of one hundred twenty nine (129) nos. of schools from both government and private sectors from all the twenty (21) districts of the state in the programme. There was participation of 636 nos. of child scientists of which 322 nos. and 314 nos. were male and female child scientists respectively.

In CSC 2017, in total one hundred seventy eight (178) nos. of projects were presented with participation of one hundred fifty five (155) nos. of schools from both government and private sectors from twenty (20) districts of the state in the programme. There was participation of 711 nos. of child scientists of which 364 nos. and 347 nos. were male and female child scientists respectively.

At the State level CSC 2016, Ten (10) projects in order of their merit and relevance to the focal theme were adjudged and selected for presentation at the 24<sup>th</sup> National Children's Science Congress 2016 held at Vidyapratishthan's Institute of Information Technology(VIIT), Baramati, Maharastra during 27<sup>th</sup> -31<sup>st</sup> December, 2016.

At the State level CSC 2017, Ten (10) projects in order of their merit and relevance to the focal theme were adjudged and selected for presentation at the 24<sup>th</sup> National Children's Science Congress 2017 held at the Science City, Ahemadabad, Gujrat during 27<sup>th</sup> -31<sup>st</sup> December, 2017.

The second group member of the best two project selected at the State Level NCSC 2016 and 17 were deputed and participated in the Indian Science Congress-2016 and Indian Science Congress 2017 held at the University of Mysore, Mysore, Karnataka and the Manipur University, Manipur during March 2018 respectively along with their guide teachers.

#### **4.3.2. Multidisciplinary Workshop on Science & Technology for VIPNET Science Clubs of North-East Region**

Three days duration "Multidisciplinary Workshop on Science & Technology for VIPNET Science Clubs of North-East Region" was organised at Arunachal Pradesh Science Centre Itanagar from 9<sup>th</sup> to 11<sup>th</sup> February 2015. Workshop was organized by VIGYAN PRASAR, DST, GoI, Noida, and Arunachal Pradesh State Council for Science & Technology, Department of Science and Technology, Govt. of Arunachal Pradesh.

The main objective of the project was to strengthen the arms of VIGYAN PRASAR by activating and forming a new VIPNET Science Clubs in the NE Region to take up its science popularization activity at remotely place schools and to create scientific temperament, curiosity towards understanding the Science & Technology. The main emphasis was laid on the concept of "Learning by Doing". The

participants were Vipnet Science Club Members and school teachers from different states of North East Region and all districts of Arunachal Pradesh.

#### **4.3.3. Science Outreach Programme**

Science Outreach programme was organised and conducted at Govt. Higher Secondary School, Kimin, Papum Pare district during 19<sup>th</sup> -20<sup>th</sup> August, 2017. Explaining science behind so called Miracles, Mathematics, Biodiversity, Astronomy were the themes which was addressed for the benefit of the students and general mass.

Taramandal shows were also conducted during the programme which was the major attraction among the students and local populace. Resource persons drawn from Tezpur University, APSCS&T and Science Centre addressed the issues through presentations, demonstrations and hands on experiments.

Outreach programme on Scientific Awareness among Students was organised and conducted at Donyi Polo Govt. College, Kamki, West Siang district during 24<sup>th</sup> -25<sup>th</sup> February, 2016. Explaining science behind so called Miracles, Biodiversity, Astronomy were the themes which was addressed for the benefit of the students and general mass.

Three days duration Awareness Campaign on Disaster Management was organized in Darak Circle of West Siang District during 12<sup>th</sup> to 14<sup>th</sup> March, 2016 in association with Students of Disaster Management Programme, Department of Geography, Rajiv Gandhi University, Rono Hills, Doimukh, Arunachal Pradesh. The awareness campaign was based on the selected theme viz. safety measures during earthquake, landslide fire accident, school safety, drug addiction. Students, teachers, general public of Darak circle attended the programme.

#### **4.3.4. Nature Study Orientation Workshop cum Camp**

Nature Study Orientation Workshop and Camp (s) was organised with the basic objectives towards (i) Creating scientific awareness among the student community on bio-resources, understanding of nature and environment in which they live (ii) Increase awareness on the importance and usefulness of the natural resources and basic science and (iii) Enable the school students to develop simple kits and to demonstrate scientific phenomena using locally available materials.

With the above basic objectives a workshop cum camp was organised during 7<sup>th</sup> - 11<sup>th</sup> April, 2017 at Vivekananda Public School, Daporijo, Upper Subansiri District. More than 60 students and teachers from various schools of the district participated in the three days camp. The programme was implemented in association Vigyan Prasar, Noida.

#### **4.4. Patents**

The Patent Information Centre at Arunachal Pradesh State Council for Science and Technology has been established with the support of TDT Division, Department of Science and Technology, Govt. of India. Through the PIC, IPR cells have been established in the following selected institutions of the State, which are;

1. Rajiv Gandhi University, Rono Hills, Doimukh, Itanagar.
2. North Eastern Regional Institute of Science & Technology (NERIST), Nirjuli.
3. National Institute of Technology, Yupia.
4. College of Horticulture and Forestry, Pasighat
5. Rajiv Gandhi Polytechnic, Itanagar

The PIC has initiated steps for exploring the agricultural, natural products, indigenously manufactured goods, handicrafts of different tribes which is unique to the State and can be registered as

Geographical Indication and protected. List has been prepared of the identified and probable GI for Arunachal Pradesh. Survey on *Coptis teeta* (Mishmi Teeta) have been done and Khamti rice is being under taken.

Inventors are being provided technical support in carrying out Patent searches and facilitate in patent filing applications of their innovations. State level workshops and exhibitions are conducted to give awareness to students, researchers, stakeholders etc.

Three Patent applications filed for the grant, registration of patent for the invention made by National Institute of Technology, Yupia Arunachal Pradesh through the Patent Facilitating Centre (PFC) TIFAC, DST, New Delhi.

The invention for which patent applications has been filed are;

1. Creative Modification of Aggressive Packet Combining Scheme to Achieve Reasonable Higher Throughput and good Conclusively Better efficiency.
2. First Ever Noble Implementation Scheme of Perfect Security: Automatic Variable Key (AVK) in Various Forms.
3. Semi-circular curved Rhombohedra Passive Micromixer.

#### **4.5 Any new innovative activities**

##### **4.5.1. Establishment of Centre for Bioresources and Sustainable Development in Arunachal Pradesh as a Centre of Excellence (CoE)**

The proposal for establishing a Centre for Bio resources and Sustainable Development in Arunachal Pradesh was taken up by Arunachal Pradesh State Council for Science & Technology (APSCS&T), Department of Science & Technology, Govt. of Arunachal Pradesh with Department of Biotechnology (DBT), Ministry of Science & Technology, Government of India during December, 2016 with the mission “Development of Bio-Resources and their sustainable utilization through biotechnological interventions for socio-economic growth in Arunachal Pradesh.”

##### **Objectives:**

- To set up state-of-art biotechnology research facilities at Arunachal Pradesh for work on sustainable development of bio resources, using tools of modern biology,
- To study and document the unique biodiversity and bio resources of Arunachal Pradesh,
- To undertake biotechnological interventions for sustainable development and utilization of bio resources of Arunachal Pradesh,
- To generate technological packages for employment generation and economic progress of the state in particular,
- To undertake capacity building (human resource development) in bio resources conservation, development and utilization and
- To collaborate with other institutions/organisations/universities regionally/nationally in further research pursuits in bioresources.

##### **Potential Areas of Focus and Intervention:**

- (i) Medicinal and Wild Edible Plant Resources.
- (ii) Orchid Resources (Ornamental, Medicinal, nutraceutical etc. value of orchids for commercialization.
- (iii) Mountain and High Altitude Microbiology.
- (iv) Aquatic Bio resources (Fish Genetics and Breeding).

- (v) Insect Bio resources.
- (vi) Bio resources Database & Bioinformatics

Land measuring an area of 29,306 Sq. Mts. has been made available by Arunachal Pradesh State Council for Science & Technology at Kimin, Papum Pare District for establishing the Centre for Bioresources and Sustainable Development.

Hon'ble Union Minister, Science & Technology, Earth Sciences, Environment, Forest and Climate Change Dr. Harsh Vardhan had laid foundation stone of the Centre in the plot of land at Kimin on 22<sup>nd</sup> December, 2016 during his maiden visit to Arunachal Pradesh.

The project has been sanctioned by Department of Biotechnology, Government of India during March, 2018 and the first installment of grant released and received. The site development works, construction of boundary wall has been taken and are under progress being done through the State PWD. Construction work of centre will start very soon.

#### **4.5.2. Setting up of Rural Appropriate Technology Demonstration Centre in Arunachal Pradesh**

The proposal for Setting up of Rural Appropriate Technology Demonstration Centre in Arunachal Pradesh was taken up by Arunachal Pradesh State Council for Science & Technology (APSCS&T), Department of Science & Technology, Govt. of Arunachal Pradesh with Department of Science and Technology Ministry of Science & Technology, Government of India during December, 2016 with the objectives;

- To introduce innovative science and technological component, ideas accessible to the village community and enable the villages to acquire knowledge, information through training and demonstrations and develop their skills for initiating income generating activities for creating sustainable livelihood.
- To adopt, demonstrate various rural technologies developed by different organizations, research institutions and to impart training to villagers using the trained manpower for their skill and technological advancement.
- To help the village community and cater proper societal development avenues program by establishing linkages with various rural development agencies for socio-economic development of the villagers.
- To give the necessary guidance and information, counseling to the people on the proven, innovative, cost-effective and appropriate technological options and transfer these technologies for application.
- To enhance confidence and capability of the rural people by involving them in micro-level planning and providing central facilities for managing and processing of the locally available natural resources for its value addition.
- Up-gradation of indigenous traditional technologies, skills for utilization of available resources for improving the quality of life of the economically weaker sections of society and providing scopes for starting entrepreneurial ventures.

The centre will be at Kimin, Papum Pare District. Hon'ble Union Minister, Science & Technology, Earth Sciences, Environment, Forest and Climate Change Dr. Harsh Vardhan had laid foundation stone of the Centre in the plot of land at Kimin on 22<sup>nd</sup> December, 2016 during his maiden visit to Arunachal Pradesh.

The project has been sanctioned by Department of Science and Technology, Government of India during March, 2018 and the first installment of grant released and received. Implementation of the project is under progress. CSIR institutions are providing technical support and their technologies for demonstration through the centre.

**5 List 5 success stories with brief about 1 page each including photograph, if available.**

**5.1. Demo based Dori 2 x 100kW R&D Micro Hydel Project at Dokoputu, West Siang District**

**Introduction and Background:**

Arunachal Pradesh lies in the Eastern Himalayas Range bounded by international boundaries bordering Myanmar in the East, China in the north and Bhutan in the West. Arunachal Pradesh has the highest unexplored hydropower potential of India.

In Arunachal Pradesh the electricity, a key ingredient for improving the socio-economic status of the local populace and fuel for development process, is in short supply and the inhabitants are depending only on local natural resources of fuel-wood and other biomass to meet their daily needs till today. The undulating topographical features and remoteness of Arunachal Pradesh is the major constraint for providing power through the conventional system. In spite of having huge hydro power potential, there is huge gap between demand and supply of electricity all over the state of Arunachal Pradesh and West Siang district in particular.

The Dori Mini Hydel Project over Dokoputu river is situated at 10 km from Yomcha, the Administrative Sub-Divisional HQ in West Siang district of Arunachal Pradesh. The project envisages the tapping of water from Sika river, which shall be conducted through a power channel to forebay tank and then would be carried to the power house located in plain area on right bank of Dokoputu.

**Vision and Goals:**

To provide electricity to the remote villages of Arunachal Pradesh for a better livelihood

**Objectives:**

- i. Improve basic living conditions and educational standard in nearby areas.
- ii. Reduction of Carbon emission caused due to burning of fuel, wood and petroleum products to meet heating and cooking energy requirements.
- iii. Improve agricultural productivity by getting assured reliable power supply for their irrigation need, cottage industries and other commercial activities.

Establishment and sustenance of cottage, small-scale and rural agro based industries. The development of Dori Mini Hydel project is quite favourable due to availability of proven technology, short gestation period of project, cheap and simple operation due to proximity of other similar projects, no escalation in cost of production, long service life and no impact on environment. This would only stimulate the economic activity in the area but would also help in preserving and developing a well balance environment. The cross flow technology can be replicated in the entire Himalayan region for generation of electricity in remote locations.

**5.2. Improving Traditional Water Mills for Income Generation and Improvement of Livelihood of Tribals in Arunachal Pradesh**



## **Introduction and Background:**

Traditional Water Mill is used for grinding, husking paddy, maize, rice only and is hydraulically very less efficient due to use of locally available materials like wooden shaft, wooden blade, wooden chut and stone for grinding. With the technology intervention the efficiency will improve and also generate electricity. Thus IWM has bearing in the socio-economy improvement of the tribal people.

### **Vision and Goals:**

Improve the efficiency of the traditional water mills and also generate electricity for better livelihood.

### **Objectives:**

- a. Water Mills have been used from time immemorial for grinding wheat, rice, maize etc.
- b. Efficiency of Traditional water mill is very less hydraulically as locally available materials like wooden shaft, wooden blade, wooden chute and stone were used.
- c. In the absence of appropriate technology, water mills were never used for any other purpose on which they run is the same as that of hydro-electric project.
- d. Upgradation of watermills would help rural household to have access to electricity for indoor lightning, cooking purpose and economic enterprise.
- e. Increasing of output of these mills with technological intervention undoubtedly increase the socio-economic status of the society.

The model can be replicated in the entire Himalayan region for income generation and production of electricity in remote locations.



## **5.3. Scientific Evaluation of Water Purification Systems in Arunachal Pradesh (Selection, Installation and Assessment)**

### **Introduction and Background:**

As an outcome of Phase-I of the project, the Council has obtained the test results of water quality of 20 identified schools. This phase focused on time bound selection and installation of commercially available water filters of appropriate capacity and their scientific assessment.

### **Vision and Goals:**

- (i) Performance analysis of different types of commercially available domestic drinking water purification system to provide safe drinking water to school children.

(ii) Performance of water purification system over a period of twelve months covering various seasons monitoring the quality of treated water & raw water, total quantity of treated water of potable quality, power consumption, backwashing, impact of non use, continuous running, unit cost of treated water, and other related observations.

(iii) Performance reliability of system under field conditions at varying turbidity levels, extreme conditions of biological loads, total dissolved solid loads, different microbial strains such as protozoa cysts, bacteria etc.

**Approach/Strategy:**

(a) Installation of suitable filters, based on the results obtained of water test analysis at identified schools. System instrumented with flow meters and energy meters.

(b) The system with suitable test kit, standard observation templates and training provided to each school to monitor the identified parameters as per the prescribed time interval.

(c) Monthly analysis of the identified parameters of raw water and treated water of each school analyzed in laboratory.

(d) Testing of raw water and treated water samples of each school for all parameters as per BIS norms at NABL accredited laboratory with three months interval.

(e) Scientific evaluation and analysis of observations with recommendations and suggestions.

**Achievement:**

Installation of suitable and need based type of water purification units have addressed the much needed basic requirement of having safe drinking water available to the students, teachers in the remote schools. Implementation of the project have brought awareness among the students towards importance of safe drinking water for being healthy and as well as understanding the procedures and methods of testing and monitoring water quality through hands on activities. Demonstration and experimentation have infused curiosity and awareness among the students for testing of water samples of nearby water bodies and sources.



**5.4. Study on Wild Edible Plants and Documentation of Ethnobotanical Knowledge of Utilization Practices associated with different Tribes of Arunachal Pradesh**

**Introduction and Background:**

The tribal communities of the State were found to be consuming wild edible leaves and fruits extensively. However, other plant parts like seeds, flowers, tubers, stem, and whole plant etc. are also utilized infrequently. A number of the wild edible plant species, more frequently consumed by the local people were also found to have some other ethno botanical importance and medicinal uses.

**Objectives:**

- Survey, observation, identification and data collection of wild plant species used as food.

- Data collection on availability, distribution, growth, cultivation requirements and practices, propagation methods, habitat, ecological notes, raw materials and market trends etc.
- Documentation of traditional knowledge practiced by tribal communities of the state regarding extraction, utilization and conservation of these plants.
- Chemical analysis of some selected plant species using modern techniques for knowing their chemical constituents.
- Developing a database on the plants incorporating all the above information for revitalizing the indigenous knowledge system and safeguarding the IPR relates issues would be given priority.
- Assessment for community link up with self help group for marketing of these wild edible plants.

**Achievement:**

About 70 wild plant species used as food have been recorded and were identified from their vernacular names and ethnobotanical information recorded. Out of the collected 70 wild plant species, 58 were scientifically identified.

Ethnobotanical knowledge utilization, practices on wild edible plants associated with different tribes have been recorded and documented. Five (5) unexplored wild edible plant species of Arunachal Pradesh having ethnomedicinal uses which, being used in their fresh form by the local people was selected for phytochemical analysis, antioxidant and free radical scavenging properties and also antibacterial properties of these plants have been studied.



The *Plantago major*



*Zanthoxylum armatum*

of  
  
are

**5.5. Organizing of National Children’s Science Congress 2017 Activities in Arunachal Pradesh**

**Background:**

Organizing of National Children’s Science Congress 2015 activities at the Districts and State level 2015 in Arunachal Pradesh is part of the science popularization and communication programme, activities undertaken by Arunachal Pradesh State Council for Science & Technology, based on the selected focal theme, guidelines and instructions provided by National Council for Science and Technology Communication, Dept. of Science & Technology, Govt. of India.

**Objective:**

The main objective of the project is to create scientific temperament, curiosity and nurture creativity among children between the age group of 10-17 years of the state. The main emphasis was laid on the concept of “Learning by Doing” such that it renders the children for taking up projects, studies for solving the area specific local problems as selected by them related to the focal theme of NCSC 2015 with infusion of scientific thinking and attitude. Basically the Children’s Science Congress 2015 provided a forum to the children of the state between the age group of 10-17 years to address the



problems identified by them and express their scientific perception, views and share their knowledge among themselves both at the districts and state level and finally at the National level CSC 2015.

**Achievement:**

In the district(s) level CSC 2017, in total one hundred seventy eight (178) nos. of projects were presented with participation of one hundred fifty five (155) nos. of schools from both government and private sectors from all the twenty (20) districts of the state in the programme.

In the two days long State level Children’s Science Congress 2017 all together fifty three (53) projects were presented by child scientists of eighteen out of the nineteen districts covering all the seven sub-themes under the selected focal theme of the 25<sup>th</sup> National Children’s Science Congress 2017. In total one hundred eighty three (183) group members of whom 73 and 110 were female and male respectively representing the 36 schools participated.



Out of the fifty three (53)

projects presented and scrutinized at the State level CSC 2017, ten (10) projects in order of their merit and relevance to the focal theme were adjudged and selected for presentation and representing Arunachal Pradesh at the 25<sup>th</sup> National Children’s Science Congress 2017 held at Science City, Ahmedabad, Gujrat during December 27-31, 2017.

**6. Has the council developed any specific state related S&T and innovation policy? If so the details to be provided.**

The Council has drafted the State Science & Technology Policy – Vision 2030 and has submitted to the State Government for consideration.

**7. How strong are the links between other state government /departments If so provide details?**

The State S&T Council has developed linkages with the line departments of the State Government and other institutions to boost up need based science and technology intervention in the State for sustainable development of the resources available and socio-economic development in the rural areas. Strong linkages have been developed by the Council with the Education Department for popularization and communication of science in the state.

**8. How strong are the links of the council with local industry units/associations?**

Arunachal Pradesh as such is devoid of major industrial units. There are countable numbers of cottage and small industry units established for utilization of the available natural resources. The Council has developed linkages with some of these industry units for intervention and replication of appropriate technologies in the state.

**9. List 5 major technology area, where the council can play an important role by finding convergent technological solutions.**

- i. Renewable and Alternate Energy Development.
- ii. Biotechnology Applications
- iii. Bio-resources Development and Management.
- iv. Rural technologies and Indigenous Knowledge Systems.
- v. Food, fruit processing and preservation.

**10. Proposed programme and budget outlay for the 2018-19**

The budget outlay proposed for by the State S&T Council Secretariat from DST, GOI and State Government for 2018-19 is Rs. 1064.10 Lakh.

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# Assam

## 1. Details of State S&T Council

Dr. A.K. Misra

Director, Assam Science Technology & Environment Council

Bigyan Bhawan, G.S. Road, Guwahati, Assam, 781005

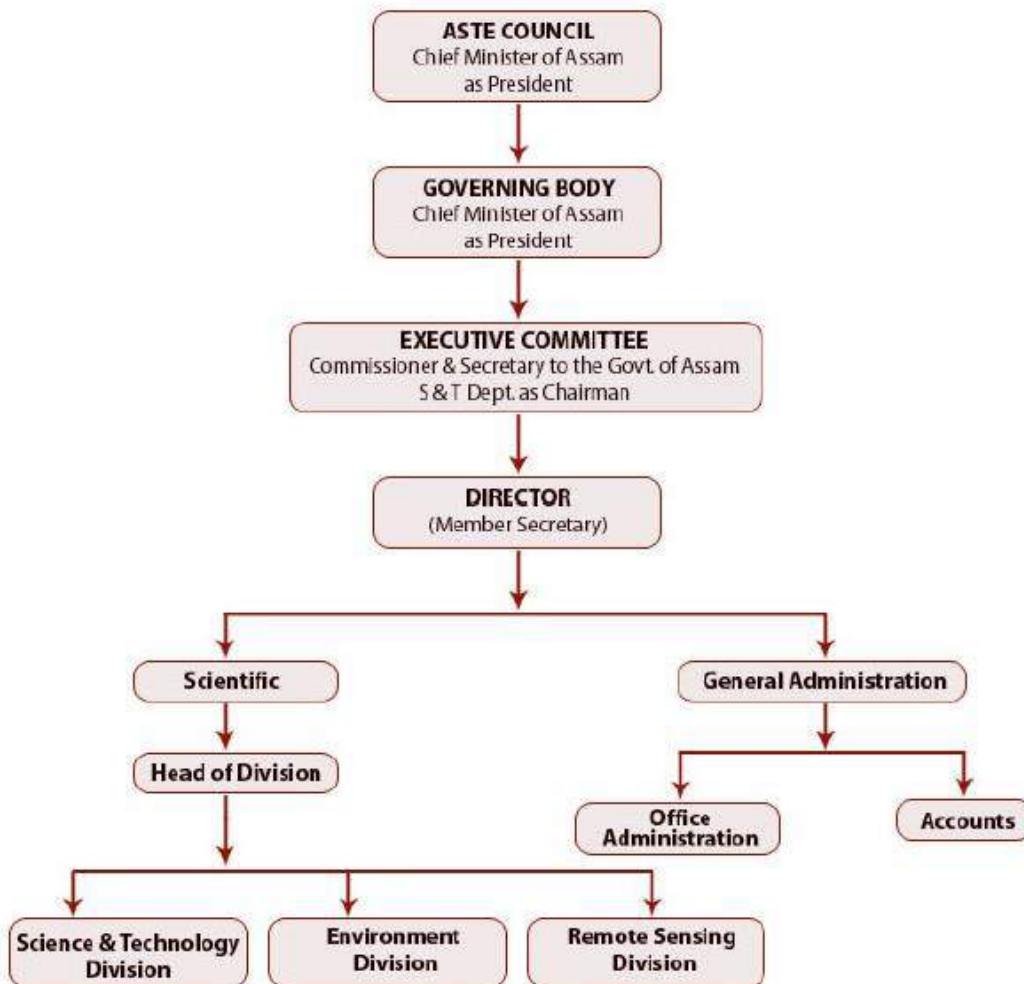
Phone- 0361 – 2464621/2450646, Fax No. - 0361 – 2464617

Email – [astec@rediffmail.com](mailto:astec@rediffmail.com)

## 2. Structure of the Council

a) Date of Establishment: 22<sup>nd</sup> April, 1986

b) Organization Structure-



c) Strength of approved manpower (both Central, DST and state supported)

**DST, GOVT OF INDIA SUPPORTED:**

Sl. No.	Name of Employee	Designation	Pay Scale (in Rs.)	Approx. Monthly Emoluments (in Rs.)
<b>SCIENCE &amp; TECHNOLOGY DIVISION</b>				
1	Dr. Ranjit Kr. Barman	Head(i/c) of Division	30000 – 110000 GP- 15100	102696.00
2	Er. Biman Baruah	Scientific Officer	30000 – 110000 GP- 13300	73667.00
<b>ENVIRONMENT DIVISION</b>				
3	Sri Jaideep Baruah	Head (i/c) of Division	30000 – 110000 GP- 14500	77865.00
4	Dr. Chandra Barooah	Scientific Officer	30000 – 110000 GP- 13300	75858.00
5	Sri Saptarshee Bhattacharjee	Scientific Officer	30000 – 110000 GP- 13300	73667.00
<b>ASSAM REMOTE SENSING APPLICATION CENTRE</b>				
6	Sri Utpal Sarma	Head(i/c) , ARSAC	30000 – 110000 GP- 15100	115529.00
7	Dr. Chitta Ranjan Deka	Senior Scientific Officer	30000 – 110000 GP- 15100	115529.00
8	Ms. Bharati Sarania	Senior Scientific Officer	30000 – 110000 GP- 15100	102696.00
9	Sri Pankaj Prakash Deka	Senior Scientific Officer	30000 – 110000 GP- 15100	99753.00
10	Ms. Runjun Baruah	Senior Scientific Officer	30000 – 110000 GP- 15100	93956.00
11	Sri Prasanna Baruah	Senior Scientific Officer	30000 – 110000 GP- 14500	90104.00
12	Sri Arunjoyoti Sarma	Junior Technical Officer	30000 – 110000 GP- 13300	75846.00
13	Ms. Runjun Gogoi	Scientific Officer	30000 – 110000 GP- 13300	73691.00
14	Sri Ramen Sarma	Scientific Officer	30000 – 110000 GP- 13300	73667.00

**DST, GOVT. OF ASSAM SUPPORTED:**

Sl. No	Name	Designation	Pay Scale (in Rs.)	Approx. Monthly Emoluments (in Rs.)
1	Dr. A.K. Misra	Director	30000 – 110000 GP-17500	80710.00
2	Atanu Kr. Goswami	Dy. Administrative Officer	30000 – 110000 GP-15100	99753.00
3	Khargeswar Goswami	Dy.Finance and Accounts	30000 – 110000 GP-15100	99753.00

<b>Sl. No</b>	<b>Name</b>	<b>Designation</b>	<b>Pay Scale (in Rs.)</b>	<b>Approx. Monthly Emoluments (in Rs.)</b>
		Officer		
4	Dilip Kr. Barman	Sr. Accountant	30000 – 110000 GP-13300	80381.00
5	Bijay Krishna Mahanta	Sr. Scientific Assistant	30000 – 110000 GP-12700	55820.00
6	Sarat Dutta Goswami	Scientific Assistant	14000 – 49000 GP - 8700	44784.00
7	Basanta Kr.Nath	Scientific Assistant	14000 – 49000 GP - 8700	43546.00
8	Dipali Chakrabarty	Superintendent	22000 – 87000 GP - 10300	56588.00
9	Hitesh Das	STENO-(GR.II)	22000 – 87000 GP - 9100	56108.00
10	Niranjana Das	Upper Division Assistant	22000 – 87000 GP - 10300	53377.00
11	Jintu Moni Talukdar	Jr. Accounts Assistant	14000 – 49000 GP - 7400	27991.00
12	Jyotshna Kalita	Lower Division Assistant	14000 – 49000 GP - 6200	25826.00
13	Ranjan Deka	Lower Division Assistant	14000 – 49000 GP - 6200	25826.00
14	Manjit Sarma	Lower Division Assistant	14000 – 49000 GP - 6200	25826.00
15	Ranjit Kr. Rabha	Gr. IV.	14000 – 49000 GP - 5000	33579.00
16	Gopal Kalita	Gr. IV.	14000 – 49000 GP - 5000	36608.00
17	Gajen Goswami	Gr. IV.	14000 – 49000 GP - 5000	35594.00
18	Bipin Talukdar	Driver	14000 – 49000 GP - 5600	36647.00
19	Paresh Das	Driver	14000–49000 GP-5600	37746.00
20	Paramesh Kalita	Driver	14000–49000 GP-5600	37746.00
21	Sandeep Bhattacharjee	Senior Technical Assistant	30000–110000 GP-12700	55820.00
22	Mrinmoy Urang	Senior Technical Assistant	30000–110000 GP-12700	55820.00

Sl. No	Name	Designation	Pay Scale (in Rs.)	Approx. Monthly Emoluments (in Rs.)
23	Tankeswar Deka	Gr. IV.	14000-49000 GP-5000	30714.00
24	A.H.Mazumdar	Gr. IV.	14000-49000 GP - 5000	29017.00
25	Achyut Barman	Gr. IV.	14000 – 49000 GP - 5000	27382.00
26	Dwijen Deka	Gr. IV.	14000 – 49000 GP - 5000	29863.00
27	Ranjit Sarma	Scientific Officer	300000 – 110000 GP - 13300	73667.00
28	Brajendra Nath Sarma	Senior Technical Assistant	30000 – 110000 GP-12700	64536.00
29	Bisheswar Goswami	Senior Technical Assistant	30000 – 110000 GP-12700	64536.00
30	Bipin Goswami	Upper Division Assistant	22000 – 87000 GP - 10300	56588.00
31	Sankar Dev Sarma	Technical Assistant	14000 – 49000 GP - 8700	47535.00
32	Ramen Lahkar	Technical Assistant	14000 – 49000 GP - 8700	47535.00
33	Ranjit Rabha	Driver	14000 – 49000 GP - 5600	37748.00
34	Dadhiram Deka	Driver	14000 – 49000 GP - 5600	37746.00
35	Nasira Begum	Gr. IV.	14000 – 49000 GP - 5000	36611.00
36	Nagen Goswami	Gr. IV.	14000 – 49000 GP - 5000	35620.00
37	Dwipen Das	Gr. IV.	14000 – 49000 GP - 5000	33579.00
38	Prabhat Kalita	Gr. IV.	14000 – 49000 GP - 5000	34536.00

**3. Budget allocation to your state S&T council for last five financial years including central government, state government and any other sources:**

**(a) State Government (DST, GOA)**

**[in Lakhs]**

Sl. No.	During 2013-14	During 2014-15	During 2015-16	During 2016-17	During 2017-18
1	1285.06	1194.00	201.44	1765.51	1578.25

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**(b) Central Government (DST, GOI)**

**[in Lakhs]**

Sl. No.	During 2013-14	During 2014-15	During 2015-16	During 2016-17	During 2017-18
1	137.62	157.92	142.14	240.98	181.95

**(c) Central Government (other than DST, GOI) & any other sources**

**[inLakhs]**

Sl. No.	During 2013-14	During 2014-15	During 2015-16	During 2016-17	During 2017-18
1	193.76	176.92	108.03	542.94	35.74

**4. Key activities undertaken during the last two years in the area of**

**4.1 Technology Development:**

**4.1.1. Innovation, Technology Generation and Awareness:**

Aims to generate a culture of innovation and technology generation among the state innovators and the benefit there upon. It helps the state innovators to generate technology in the areas of traditional technology, agriculture, transportation, housing, education, food processing, information technology and in other fields of science and technology. The state innovators are also encouraged to file IPR based on their innovation and technology.

**During 2017-18, 9 (nine) nos. of innovative projects were taken up as follows:**

Sl. No.	Title of the Project
1.	“Conceptualization, Design & Development of a pedal propelled vehicle to collect and dispose of household solid waste in municipal areas considering ergonomic & usability factors” by Dr. Vikramjit Kakati, Associate Professor, Department of Mechanical Engineering, School of Technology, Assam Don Bosco University
2.	“Developing paper strip sensor for naked eye detection of fluoride in drinking water” by Prof. Diganta Kumar Das, Department of Chemistry, Gauhati University
3.	“Vehicle Security Device” by Bhaskar Barman, Gumaijher, Simlabari, Goalpara
4.	“Development of Optical fibre sensor to measure the degradation and breakdown of non-polar hydrocarbon oils” by Dr. Sandip Bordoloi, Department of Applied Electronics and Instrumentation (AEI), Girijananda Chowdhury Institute of Management and Technology, Hatkhowapara, Azara
5.	“Surface engineered graphene based prototype sensor for soil moisture detection for agriculture applications” by Dr. Hemen Kumar Kalita ,Assistant Professor, Department of Physics, Gauhati University
6.	“Machine for construction of brick wall” by Alvish Gogoi, Industrial Training

	Institute, Nagaon, Assam
7.	“Preparation and Evaluation of Herbal Lipstick from <i>Magnolia hodgsonii</i> (Hook. f. & Thomson) by H. Keng (Borhomthuri): A Potential Ethnomedicinal Plant of Assam” by Dr. Mousmi Saikia, Assistant Professor & Head, Dept. of Herbal Science and Technology, Anandaram Dhekial Phookan College (A.D.P College), Haibargaon, Nagaon
8.	“Design and Development of a Depression Detection System for Assamese Speaker” by Dr. Uzzal Sharma,, Assam Don Bosco University , Assistant Professor (Senior), Deptt. of CSE & IT, School of Technology
9.	“Valorization of Culinary Banana Flower: waste to value addition using green technologies” by Prof. S.C. Deka, Dept. of Food Engineering & Technology, Tezpur University

**Photographs of some successfully developed technologies:**



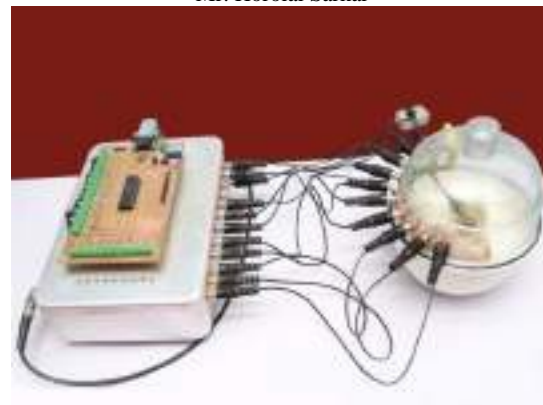
“Self designed high efficiency gasifying bio-mass stove” by Mr. Ravi Jyoti Deka



“A motor driving kit for specially-abled persons” by Mr. Horolal Sarkar



“A fluidized bed paddy dryer with waste heat recovery suitable for NER, India” by Dr. Pankaj Kalita



“A humidity sensor for woods of NER, India” by Ms. Kunjalata Kalita

**4.1.2. Project Related Grant (PRG), DST, Govt. of India:**

Under the scheme “Project Related Grant (PRG)”, DST, GOI, the Science & Technology Division of ASTE Council invited concept notes for potential projects towards technology generation with an aim to promote and generate technology in the state against the fund received of Rs.40.00 lakhs from DST,



GOI during 2016-17. 59 nos. of projects received were subjected to screening by panel of experts. Accordingly 8 nos. of projects were finalised and sent to DST GOI for final approval and support.

The list of the projects is as follows:

Sl. No.	TITLE OF THE PROJECT	INVESTIGATOR/ORGANISATION
1.	Development of Natural Fibre Reinforced Epoxy Based Composite Material	Dr. Jyotishmoy Borah, Assistant Professor, Dept. of Chemistry, B.B. Engineering College, Kokrajhar
2.	Utilization of flyash on geotechnical engineering applications	Mr. Pranjal Barman, Assistant Professor, Dept. of Civil Engineering, CIT, Kokrajhar
3.	Nutritional evaluation and shelf-life study of the value-added products prepared from Ou-tenga (Elephant apple): An underutilized fruit of Assam	Prakash Kumar Nayak, Assistant Professor, Dept. of Food Engineering and Technology, Central Institute of Technology (CIT), Kokrajhar
4.	A compact-portable cost-effective solar powered waste-water treatment plant for Indian households	Dr. Dilip Sarma, Indigenous Assamese Women's Identity, Uzanbazar, Guwahati
5.	Deflouridation of water by using banana (Musa sapientum) peel	Dr. Susmita Sen Gupta, Associate Professor, Dept. of Chemistry, B.N. College, Dhubri
6.	Design and Fabrication of a portable friction stir welding machine	Manash Jyoti Borah, Assistant Professor, Dept. of Mechanical Engineering, Assam Down Town University, Guwahati
7.	Design and Development of Coir fiber modified Recycled Polypropylene Green Polymeric Composites for Injection Moulding Products	Dr. Harekrishna Deka, Technical Officer & Training In-charge, Research & Development & Testing Department, CIPET, Guwahati
8.	A study on thunderstorm genesis processes & development of thunderstorm warning System	Dr. Hirakjyoti Goswami, Assistant Professor, Dept. of Physics, Gauhati University, Guwahati

#### 4.2 Technology Demonstrations:

- The technology generated out of the scheme- “Innovation, Technology Generation and Awareness” are being demonstrate in technical festivals , exhibition etc at IIT Guwahati, India International Science Festival, Chennai and other state level programmes of the state.
- The Hybrid Ultra Capacitor (HUC) technology was developed by Prof. A. K. Shukla, Solid State Structural Chemistry Unit (SSCU), Indian Institute of Science, Bengaluru and the technology is licensed to the Industrial Partner M/s MESHA Energy Solutions Pvt. Ltd. Bengaluru. DST, GOI has sanctioned the project titled “Field testing of Hybrid Ultra Capacitor (HUC) powered solar PV lighting kits and street lights for grid deprived rural area for lighting in varying climatic zones of India” for field testing the performance of the HUC Technology. Accordingly, 80 nos of such HUC Solar

Lighting Kits received from KSCST have been inducted in a grid deprived area of Assam namely Amerigog, Dhantala Village of Kamrup District for field trial and assessment.



Distribution of HUC Solar lighting kits in a grid deprived area of the state.



Beneficiaries of HUC solar lighting kits at Amerigog, Dhantala village.

### 4.3 Popularization of Science:

- The observation of National Science Day, National Technology Day, World Environment Day are regular programmes of the council.

- Established 219 Aryabhata Science Centres, one in each development block of the state are serving as S&T activity hubs at the grass root level of the state with visible impact. Apart from regular activities viz. block, district and state level competitions of science based poster drawing, extempore speech and model making, other S&T activities like popular talk, seminar, demonstration program and the night sky observation with the telescope have also been carrying out by the centres. Grooming of students and mentoring of selected students from each development block are also being taken up by Aryabhata Science centres.

Aryabhata Science Centres are also being taking up technology generation projects in Karbi Anglong and Goalpara District of the state viz “Design and Development of a portable thermo electric generator, Firolite” and “Vehicle security system” respectively.



STATE LEVEL ACTIVITIES OF ARYABHATTA SCIENCE CENTRE, 2018



ASC,PACHIM KALIABOR BLOCK, NAGAON



ASC,BOKO BLOCK, KAMRUP



ASC,NEW SANGBAR BLOCK, DIMA HASAO



ASC,SAIKHOWA BLOCK, TINSUKIA

## HOUSING FACILITY PROVIDED TO ARYABHATTA SCIENCE CENTRE

- **Science and Mathematics Facilitators:** Promoting the teaching method of Science and Mathematics, 45 Science Facilitators and 45 Mathematics Facilitators have been engaged in 71 high and higher secondary schools of the state. Grooming and Mentoring of Students by a group of science and mathematics facilitators are also being conducted among selected 20 students from each Legislative Assembly Constituency of the state. National Science Day and National Mathematics Day are also being celebrated by the facilitators in their schools involving schools of the locality.



Training –cum–review meeting of Science & Mathematics Facilitators

- **National Children’s Science Congress (NCSC)** is a programme of the National Council for Science and Technology Communication, (NCSTC), Department of Science and Technology, Govt. of India. In Assam, this programme is supported and catalyzed by Department of Science and Technology, Govt. of Assam, and it is organized by Assam Science Technology and Environment Council (ASTEC). It is held at three levels, District, State and National. It is a programme for the children in the age group of 10-17 years.

- **Activities involved in the programme:**

State Level Resource Persons Training held in 3 zones ;District Level Teachers’ Training ; District Level Children’s Science Congress ; District Level Mentoring of projects ;State Level Children’s Science Congress ;State Level Mentoring of projects

National Children’s Science Congress: Participation of 26 member delegation

	2016	2017	Increase
No. of projects presented	2151	2985	834
No. of schools participated	1346	1591	245
No. of children participated	7743	9801	2058
No. of Guide Teachers	1607	2148	541
No. of Evaluators at District level	246	349	103
No. of Guide Teachers Trained	3190	3911	721



Inaugural function of state level NCSC 2017



Assam state contingent for participation in national level NCSC held at Science City, Gujrat 2017

- **State Science Award :** State Science award conferred in three categories as Young Scientist Award, Lifetime achievement award to Eminent Scientist and Institutional Award
- ENVIS (Environmental Information System) Centre (Now ENVIS Hub): Taking up programmes on dissemination of environmental information of the state in 17 categories. Published a book on “Vertebrates of Assam”. ENVIS is a programme of MoEF&CC, Govt. of India.
- Set up School Plant Diversity Centres in 16 Schools in the year 2017-18
- 5407 Eco-Clubs in schools under the National Green Corps Programme are continuing their activities. This is a programme of MoEF&CC.
- A new scheme titled, “Mukhya Mantrir Bigyan Darshan” has been taken up.

#### 4.4. Patents:

The Patent Information Centre (PIC) is the only facility in the public domain of the state which provides Intellectual Property Rights (IPR) services to local innovators. The PIC extends support to the inventors/innovators in registering their Intellectual Property (IP) and also creates awareness on IPR. The Centre supports the innovators of the state of Assam and neighbouring region in matters ranging from basic IPR consultation to filing and post-filing work of Patent, Copyright, Trademark, Industrial Design, Geographical Indication etc. The PIC has filed 75 patents for the inventors of the state since its inception. Apart from rendering IPR services, the centre is also encouraging people to innovate. The following table shows the activities of PIC during 2017-18:

Sl. No.	Items	F.Y. 2017-18
1.	IPR Camps/Workshops/Seminars	26
2.	Patent filed	7
3.	Industrial Design registered	1
4.	Trademarks applied	3
5.	Trademarks registered	1
6.	Copyrights and Related Rights applied	1
7.	Copyrights and Related rights registered	1
8.	Patent filed with complete specification after provisional filing	2
9.	Patent Searches conducted	21
10.	Trademark Searches conducted	10
11.	GI Authorised User registrations applied	15
12.	IPR Publications	1
13.	Total People Visits to PIC Regarding IPR Support	296
14.	Total People Sensitized From Workshops & IPR Camps	2600 (approx.)



IPR Camp on Geographical Indication (GI) and Authorised Users at Tingkhong and Khawang Block, Dibrugarh district during 4<sup>th</sup> and 5<sup>th</sup> June, 2017



'Regional Workshop on Intellectual Property Rights' jointly organized by Patent Information Centre, ASTEC and Gauhati University IPR Cell at Gauhati University during 22<sup>nd</sup> – 23<sup>rd</sup> March, 2018

#### 4.5 Any new innovative activities:

**4.5.1** Science & Technology Division of Council is going to establish new 35 Block Level Aryabhata Science Centres with the increase of new Development Block of the state.

**4.5.2** By building up coordination with all the R&D based institutions of Assam, an attempt has been made to strengthen Research and Development activities in the state.

**4.5.3** District Science Centres

**4.5.4** School Plant Diversity Centre

**4.5.5** After Assam State Meet on Promoting Space Technology Based Tools and Applications in Governance and Development held at Guwahati on 3<sup>rd</sup> Dec., 2016 as a follow up and keeping in view, importance of the technology, Govt. of Assam has notified Assam Remote Sensing Application Centre (ARSAC) as State Nodal Agency for RS, GIS and GPS related works for all line departments of Govt. of Assam vide Notification STE/86/20116/93 dated Dispur 23<sup>rd</sup> March, 2018. It is designated as Nodal Agency considering its substantial growth over the years to execute programmes in the field of RS & GIS.



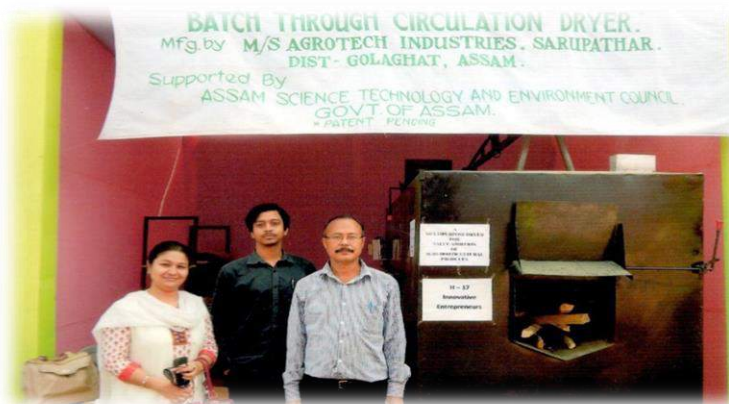
**4.5.6** Under EPRIS 200 Gaon Panchayat Officials were trained in Sonitpur District for Geo tagging of Assets using Android based Mobile Application. The Assets will get geotagged with BHUVAN Portal. State Node BHUVAN has been established at ARSAC for visualisation and load balancing of Central Server of BHUVAN, hoisted at NRSC, Hyderabad.

**5. List 5 success stories with brief about 1 page each including photograph, if available.**

**5.1. “Bhut Jolokia (Naga King Chilli) Dryer”; “Standardized technology to produce good quality & durable natural dye” and “Motor Driving Kit for specially-abled persons” have been successfully commercialized among the generated technology.**

**Bhut Jolokia (Naga King Chilli) drier:**

Bhut Jolokia is the hottest chilli in the world and has a great demand in the international market in the dry form. Electrical dryer has been used to dry them but there is constant power failure and currently used dryers can accommodate only 50% of its capacity. So an innovative method to dry the chillies has been taken up in this project by Sri Chetia of Golaghat District of Assam



design

been  
Ranjit  
Assam

under the scheme, “Innovation, Technology Generation and Awareness (ITGA)” of S&T Division, ASTEC. Chillies are kept over stainless steel net of a twin tunnel system and the hot air is allowed to pass through the bed of chillies. The dryer consists of inbuilt heat exchanger with wood fire furnace, 0.55kw electric hot air blower, 3 no. trays with bottom made of ss-304 wire net (L: B: H, 12 ft: 4 ft: 4”), mild steel structural body with 12 mm thick heat proof ply board and outside insulated with aluminum cladding, fresh air entry and humid air exhaust system, electrical panel board with two dial temperature meters. The dryer has two main chambers, furnace & dryer\_chambers. In the dryer chamber the trays are kept in the middle of two tunnels and the blower is attached to a lifting system to bring the blower to upper position and lower position for delivering hot air through the bed of chillies. The developed product has been highly acclaimed and successfully commercialized.

➤ Patent pending (No.126/KOL/2015).

## **5.2. Standardized Technology To Produce Good Quality & Durable Natural Dye:**

After successful implementation of the project by the PI, Chandan Keshab under the scheme, “Innovation, Technology Generation and Awareness (ITGA)” of S&T Division, ASTEC the idea of natural dye has become very popular among the producer, buyers, sellers etc. and many products developed by using this process has been commercialized. It has given a new pace to the movement of production and uses of natural dye. Also new opportunities have opened up for expansion of the activity which may help in rural economic growth as people may go for cultivation of natural dye in commercial way.



## **5.3. A motor driving kit for Specially abled persons**

A solution to people with disability in the legs to drive a vehicle developed by Horolal Sarkar, a scooter mechanic by profession with a highly innovative mind under the scheme, “Innovation, Technology Generation and Awareness (ITGA)” of S&T Division, ASTEC. Using the kit, a person can operate both the accelerator and brake pedal by one hand only. The kit can be fitted to any vehicle with automatic transmission without damaging any parts. The kit fitted vehicle can be also be driven by a normal person using his legs. Moreover, the kit can also be removed easily without leaving any marks on the vehicle. The invention can also be used in both right and left handed driving vehicles.

➤ Patent pending (No.1215/KOL/2015).

## **5.4. Skill development training programme was conducted to train the inmates of Central Jail, Guwahati in the field of electronics.**

As per rules laid down in the “Assam Prisons Act, 2013”, the objectives of this project is to provide training to the inmates, within the framework of the prison as per capacity of the inmates, they were trained for production of electrical and electronics goods which are saleable in road side market to facilitate their rehabilitation as law abiding, responsible and useful members of the society.



**5.5. A basic training on mushroom cultivation was conducted to encourage entrepreneurship among high schools students of Chandrapur area of Kamrup District of Assam.**

**5.6. Set up of 16 nos of School Plant Diversity Centres to motivate students in biodiversity conservation**

**5.7 Participation of nearly 10,000.00 children in district level children's science congress events in 2018, which is highest in 25 years.**

**6. Has the council developed any specific state related S&T and innovation policy? If so the details to be provided.**

ASTECC is in a process to prepare a State Science, Technology and Innovation Policy. A consultation involving different stakeholders already been organised and draft policy has including a broad vision, mission and policy has been prepared. State Biotechnology Policy has been prepared and adopted by the State Cabinet in year 2017.

**7. How strong are the links between other state government/departments? If so provide details.**

The council is implementing the S&T plan schemes of Deptt. of S&T, Govt. of Assam. The council has linkages with Deptt. of Planning and Development Deptt. of Education, Govt. of Assam etc. for projects.

The council also has activity links with other state Governments like Meghalaya, Mizoram, Arunachal Pradesh, Nagaland through the S&T Councils of the states. The council also has linkages with state academic, scientific and technical institutions.

Formation of Project Implementation Committee (PIC) SIS-DP; 22<sup>nd</sup> FEBRUARY'2010; PIC Chairman – Chief Secretary to the Govt. of Assam; Commissioner & Secretaries of line departments are members; Other members include: ISRO, ASTEC Main Stakeholders are P&RD, Revenue & Disaster management, Agriculture, Water Resources, Soil conservation. Regular links and collaborations with Environment & Forest Departments of Govt. of Assam, Different Universities, Education Departments, etc for various programmes.

**8. How strong are the links of the council with industry units/associations?**

The council has linkages with local industry and associations through IPR activities. The ENVIS Centre in ASTEC collaborates with Industries for Internees training.

**9. List 5 major technology areas, where the council can play an important role by finding convergent technological solutions.**



- In the field of Transportation and Agriculture by Generation of New Technology
- In the field of Education ( learning made easy by developing kits as per school course curriculum)
- In the field of Rural Electrification (grid deprived areas)
- In the field of Food Processing and other agro based industries
- Application of Remote Sensing and GIS in Natural Resource Management for need based action plan for developmental activities.

**10. Proposed programme and budget outlay for the year 2018-19**

**(Under State Plan)**

<b>Sl. No.</b>	<b>PROGRAMMES</b>	<b>AMOUNT (Rs. IN LAKH)</b>
1	Research & Development Programme	30.00
2	Instrument Repair & Development Centre (IRDC)	5.50
3	Radio Astronomy Centre	11.00
4	Patent Information Centre (PIC)	11.00
5	Aryabhata Science Centre (Block Level)	380.00
6	Science & Mathematics Facilitators in Schools	385.00
7	State Science Fair	50.00
8	Promotion of Science , Technology & Innovation	110.50
9	Innovation, Technology Generation and Awareness for Karbi Anglong	7.00
10	ISRO Centre at Setting up of ISRO Centre at Guwahati	20.00
11	Bhuvan State Node	16.00
12	Creation of GIS based state Resource Information System at Gaon Panchayat Level using High Resolution Remote Sensing Satellite Data	25.00
13	Upgradation of Software and Hardware Licences	11.00
14	District and State Level National Children's Science Congress	58.00
15	School Plant Biodiversity Centre	55.00
16	Assam Bio-Resource Centre	35.00

17	National Science Day and State Science Award	11.00
18	Mukhya Mantrir Bigyan Darshan	100.00
19	Sodau Asom Maina Parijat - Scientific Awareness Programme	15.00
20	Climate Cell	20.00
21	Planetarium at Lakhimpur, Nalbari & Kokrajhar	150.00
22	New Planetarium at 6 (Six) locations	200.00
23	Science City Guwahati	350.00
24	District Science Centres	200.00
25	Bigyan Bhawan Building Grant	35.00
<b>TOTAL</b>		<b>2291.00</b>

## Bihar

### 1. Details of State S&T Council

Name of the Secretary & Member Secretary

**Secretary Name** Smt. Anshuli Arya, IAS

**Address** Principal Secretary, Dept. of Science & Technology  
Govt. of Bihar, Technology Bhawan, Bailey Road, Patna

**Phone/Fax** 0612-2546598

**Email** [prsec\\_sctech@bihar.gov.in](mailto:prsec_sctech@bihar.gov.in)

### Member Secretary

**Name** Sri Atul Sinha, ITS

**Address** Director, Dept. of Science & Technology  
Govt. of Bihar, Technology Bhawan, Bailey Road, Patna

**Phone/Fax** 0612-2545330

**Mobile No.** 9473197801

**Email** [directordst@bihar.gov.in](mailto:directordst@bihar.gov.in)

### 2. Structure of the Council

a) Date of Establishment: 21 June, 1984

b) Organization Structure :

### The General Body

The Chief Minister, Bihar is the President and the Minister and the State Minister, Science & Technology, Bihar are the Vice Presidents of the Council. The Principal Secretary, Science & Technology is the Secretary of the Council. There are 26 members in the council which included representatives of various State Government Departments, reputed industries, organizations and institutions from all over the country.

### Executive Committee

The Development Commissioner, Bihar is the Chairman and the Principal Secretary, Science & Technology, Bihar is the Vice Chairman of the Executive Committee. There are 12 members of the Executive Committee which include Principal Secretaries of various State Government Departments.

c) Strength of approved manpower (Central (DST) supported)

S. No.	Designation	Pay scale	Approx. monthly emoluments	Remarks
1.	Adviser (01)	39200-67000 (GP-9000)	1,29,284.00	Appointment under process
2.	Project Director (01)	39200-67000 (GP-9000)	1,29,284.00	Filled on deputation
3.	Special Officer (01)	15600-39100 (GP-8300)	65,618.00	Appointment under process
4.	PSO (01)	15600-39100 (GP-8300)	65,618.00	Appointment under process
5.	Scientific Officer (02)	15600-39100 (GP-5400)	58,020.00	Appointment under process
6.	Technical Officer (02)	15600-39100 (GP-5400)	58,020.00	Filled
7.	Senior Scientific Assistant (01)	9300-34800 (GP-4200)	68,960.00	Filled
8.	Junior Scientific Assistant (02)	9300-34800 (GP-4200)	64,742.00	

3. Budget allocation to your state S&T council for last five financial years including central government, state government and any other sources

Financial Year	Central Govt.	State Govt.(Activity Development of BCST, BIRSAC, IGSC-P)
2013-14	34,50,000.00	1,01,95,430.00
2014-15	37,95,000.00	34,96,68,779.52
2015-16	39,95,000.00	32,90,06,763.50
2016-17	43,00,000.00	
2017-18	42,00,000.00	34,67,28,285.09

4. Key activities undertaken during the last two years (2016-17 & 2017-18) in the areas of:-

4.1 Popularization of Science

4.1.1 State Level Children Science Congress organized by Science for Society, Patna University, Patna sponsored by DST, GOI and coordinated by BCST

This programme is catalyzed and supported by RVPSP, DST, GOI and is coordinated at National Level by NCSTC-Network and at state level by Science for Society, Bihar in collaboration with BCST. This is only countrywide programme which is held every year in which a large number of students at district level in the age group 10-17 years participate and present their science based

experiments/studies related to focal theme. These are screened by academics at the local level which are finally selected for state and national events.

- The 24<sup>th</sup> State Level Children's Science Congress was organized during 22-24 October, 2016 at S.S. High School, Gopalganj. The focal theme of the congress was "Science, Technology and Innovation for Sustainable Development". A financial assistance of Rs. 2.00 lakh was released by BCST for the purpose. A souvenir of projects was published on the occasion.
- The 25<sup>th</sup> State Level Children's Science Congress was organized during 1-3 November 2017 at Sri Lakshmi High School, Sitamarhi. The focal theme of the congress was "Science, Technology and Innovation for Sustainable Development with special emphasis on accessibility for persons with disability". A financial assistance of Rs. 1.00 lakh was released by BCST for the purpose. A souvenir of projects was published on the occasion.

#### **4.1.2 Partial financial assistance to academic Institutions/Departments/Universities of the state for organization of Seminar/Symposium/workshop etc.**

In order to inculcate scientific temper among the students, researchers and teachers of the state, BCST provides partial financial assistance to academic institutions/ departments/universities of the state for organization of seminars/workshops etc.

- Three day National Level on "Science and Technology for National Development" was organized in collaboration with Indian Science Congress Association (ISCA), Patna Chapter during 16-18 December, 2016 in the auditorium of IGSC-Planetarium.
- In the financial year 2016-17, financial assistance of Rs. 40,000.00 was released to University Dept. of Physics, BRA Bihar University, Muzaffarpur for organizing "11<sup>th</sup> Asia Pacific Conference on Sustainable Energy and Environmental Technologies" held during 6-10 March, 2017 at Muzaffarpur.
- In the financial year 2017-18, financial assistance of Rs. 30,000.00 was released to P.G. Dept. of Biotechnology, Tilka Manjhi Bhagalpur University, Bhagalpur for organizing national conference on "Plant Systematics & Biotechnology: Challenges and Opportunities" held during 28-30 November, 2017 at Bhagalpur.

#### **4.1.3. Partial financial assistance to teachers for presenting invited research paper in International Conferences abroad**

In order to encourage and inculcate scientific temperament among the teachers of the colleges/universities of the state, BCST provides partial financial assistance for presenting invited research papers for presentation in conference/seminar abroad. In the financial year 2016-17, financial assistance of Rs. 20,000.00 was provided to Dr. Rakesh Kumar Singh, Asstt. Professor, Aryabhata Centre for Nanoscience & Nanotechnology, Patna for paper presentation in "European Advanced Material Congress 2016" (EMAC-2016) held during 23-26, August, 2016 at Stockholm, Sweden.

#### **Organization of Technical Bonanza**

A day long Technical Bonanza was organized in association of University of Engineering and Management, Kolkata on 17.01.2017 in the auditorium of IGSC-Planetarium, Patna. About 250 school students from Class IX to XII of various schools of Patna. The event constituted of Quiz, Debate, Mathematics, GK, Science Model and Photography competition. Citations were distributed to all participants. Cash awards were also given to the winners in each category.

A one day Technical Bonanza "Connectech2018" was organized in association of University of Engineering and Management, Kolkata on 18.01.2018 in the auditorium of IGSC-Planetarium, Patna. About 600 school students from Class IX to XII of various schools of Patna, Muzaffarpur, Vaishali, Gaya, Jehanabad and Barh participated in the event. The event constituted of Quiz, Debate, Mathematics, GK, Science Model and Photography competition. Citations were distributed to all participants. Cash awards were also given to the winners in each category.

#### **National Science Day 2018 Celebrations**

On 28<sup>th</sup> February, 2018 on the occasion of “National Science Day”, in collaboration with Patna Women’s College, Patna, a Science Awareness Rally was organized in memory of great Indian scientist and Nobel Laureate Sir C.V. Raman. The rally started from Patna Women’s College passing through Bailey Road culminated at Planetarium complex. A large number of students, teachers and officials of S&T Dept. participated in the rally.

## **4.2 Research and Development**

### **4.2.1. Establishment of Central Instrumentation cum Robotics Centre**

The Indian Institute of Technology, Patna was offered the consultancy work for preparation of DPR of proposed Central Instrumentation Facility cum Central Robotics Centre (CIF-CRC) in the premises of IGSC-Planetarium, Patna. The DPR have been submitted to Dept. of Science & Technology, Govt. of Bihar for its approval.

## **4.3 Technology Development & Innovative Activities**

### **4.3.1. Sponsorship of Students Projects**

- In the financial year 2016-17, on the recommendations of Innovation Promotion Appraisal, financial assistance of Rs. 30,000.00 was released to “Team INVINCIBLES”, a team of students of IIT, Patna for design and manufacturing of All Terrain vehicle for Enduro Student India 2017 competition held during 4-9 January, 2017 in Geedee Driving School, Eachaneri, Coimbatore.
- In the financial year 2017-18, on the recommendations of Innovation Promotion Appraisal Committee, partial financial assistance of Rs. 90,000.00 was released to “Team ASHWA”, a group of 25 students of Birla Institute of Technology, Patna for design and manufacturing of All Terrain vehicle in Baja SAE India 2018 competition held during 5-9 March, 2018 at IIT, Ropar, Punjab.

## **5 List 5 success stories with brief about 1 page each including photograph, if available:**

- Establishment of Indira Gandhi Science Complex – Planetarium
- Bihar Remote Sensing Application Centre
- District Science Centre, Muzaffarpur
- District Science Centre, Saharsa
- Bihar State Edusat Network

## **6 Has the council developed any specific state related S&T and innovation policy? If so the details to be provided.**

In order to support grass-root innovators to convert their innovative ideas into prototype (field trial) model, BCST has formulated policy guidelines for promoting and accelerating young and aspiring innovators of the state, primarily from rural background. The policy guideline is waiting for notification from the state government.

## **7 How strong are the links between other state government/departments, if so provide details.**

BIRSAC under BCST has linkages with several State and Central Govt. departments namely, DOS, NRSA, Agriculture, PWD, Irrigation, Road Construction, PHED etc.

BCST jointly in coordination with NCSM, Kolkata and Ministry of Culture, Govt. of India is executing work for establishment of Dr. APJ Abdul Kalam Science City, Patna and Sub-Regional Science Centre at Bodh Gaya.

## **8 How strong are the links of the council with State line Departments, local industry units/associations?**

BIRSAC has been declared as the State Nodal Agency for Remote Sensing and GIS services including purchase of hardware and software in the field of Remote Sensing and GIS.

**9 List 5 major technology area, where the council can play an important role by finding convergent technological solutions.**

Application of Remote Sensing and GIS in various fields

**10 Proposed budget outlay for the 2018-19 commensurate with the plan of activities.**

## **Chhattisgarh**

### **1. Details of State S&T Council**

#### **Secretary**

**Name** Dr. Kamal Preet Singh

**Address** Room No.S-1/29, Mantralaya, Mahanadi Bhawan, Naya Raipur (C.G.).

**Phone/Fax** Phone No: 0771-2510255; Mobile No: 9893800001

#### **Director General**

**Name** Dr. K. Subramaniam

**Address** Vigyan Bhawan, Vidhan Sabha Road, Daldalseoni, Raipur (C.G.)

**Phone** Mobile No: 9826148944

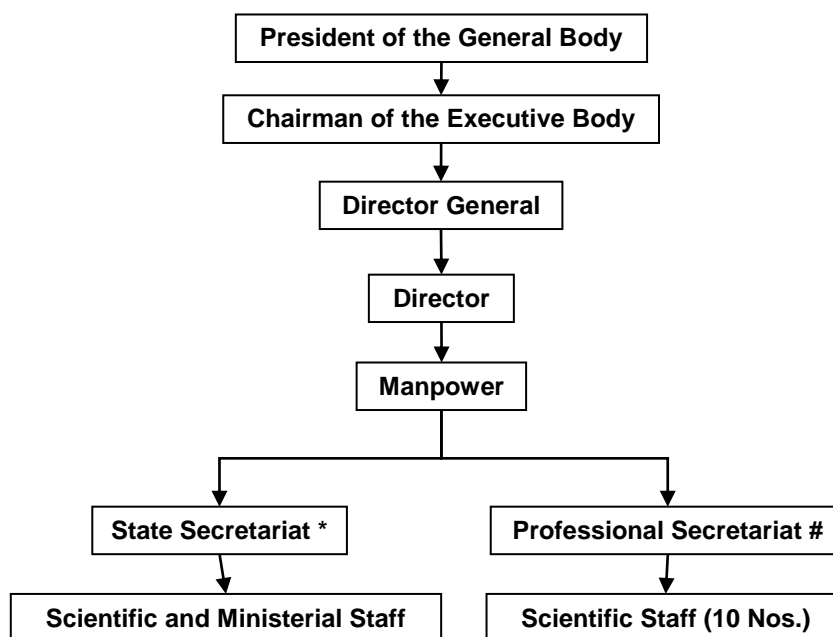
**Email** [dgccost@gmail.com](mailto:dgccost@gmail.com)

### **2. Structure of the Council**

a) Date of Establishment: Year 2001

b) Organization Structure

Council being a registered body under the Firms & Societies Act, 1973 and is an autonomous body functions under the overall supervision and direction of General Body headed by the Chief Minister of the State and Executive Body headed by the Minister in-charge of Science & Technology. The organizational structure is given herein under:-



\* State Secretariat refers to those personnel who are paid out of State Fund

# Professional Secretariat refers to those personnel who are paid out of Core Grant of DST

**c) Strength of approved manpower (Central (DST) supported)**

As per the present set-up of the Council, total number of the sanctioned posts by the State Government is 51 which comprises of 15 Scientific Staff & 36 Administrative Staff. Against these sanctioned posts, there are 13 posts of Scientific Staff and 42 posts of Administrative Staff are presently filled and staff working. The details of the Manpower paid from DST Core Grant Support is given in **Annexure-2.3**

**3. Budget released to your state S&T Council for last five financial years including Central Government, State Government & any other sources.**

Council's last five year budget allocations are shown below:

Sl.	Financial Year	Budget Allocation (in Lakh )			
		State	DST	Others	Total
1	2013-14	1125.00	88.00	68.78	1281.78
2	2014-15	1158.00	96.80	27.00	1281.80
3	2015-16	1454.50	98.80	198.60	1751.90
4	2016-17	1245.00	134.22	302.13	1681.35
5	2017-18	1275.00	103.35	413.71	1792.06

**4. Key activities undertaken, during the last two years, in the area of:-**

**4.1. Popularization of Science**

The Science & Technology popularization programs are designed to disseminate scientific knowledge, create scientific awareness and to develop scientific temper amongst the people of the State in general and younger generation in particular. The key activities are as follows:

- **National Children Science Congress:** Children Science Congress is organized to kindle curiosity in the minds of children, provide them opportunity to unfold their creativeness and stretch their imagination. This helps to show how they can play useful and productive role for betterment of the society and to make the society knowledge driven. Keeping this aim in mind Children Science Congress is organized as a yearly affair at District and State level. In state level children science congress, 16 State awardees were selected to participate in National Children Science Congress
- **Chhattisgarh Young Scientist Congress:** With an objective to identify **budding** scientists and to encourage them for pursuing innovative research and novel ideas, events like Chhattisgarh Young Scientists Congress are organized every year in the state.
- **Western Science Fair:** Science fairs are organized to stimulate students of VIII<sup>th</sup> –XII<sup>th</sup> standard to take active interest in different streams of science and to provide a platform to nurture their creativity and innovativeness. Events are organized at block, district, zone and state levels and then selected few are sent to participate in the national event.
- **Science Quiz Competition:** Science Quiz Competitions are organized at District, Zone and State level to inculcate competitive spirit among students and help in sharing knowledge from their peer group. This helps in making them keen to know different **streams** of science and to memorise the concept behind each theme and activity. Only bright first divisionary of standard IX & X are eligible to take part in the competition.
- **National Science Seminar:** National Science Seminar is organized to **inculcate** scientific temper amongst school students up to 10<sup>th</sup> standard, which is sponsored by National Council of Science Museum, Kolkata. Council organizes this seminar every year at Block, District, Zone and State level.
- **State Level Science Exhibition:** State Level Science Exhibition is organised to stimulate students from standard IX -XII to take part in science based exhibition and actively take interest in making working models on themes which are assigned to them and to seek guidance from their teachers and mentors while they make such working models and prepare posters and charts. This helps them in understanding the basics of theory and its practical applicability. State Level Science Exhibition is organised with the support of State Council of Educational Research and Training (SCERT), Raipur every year at four levels: Block, District, Zone and State level.
- **Science Park:** The idea behind this scheme is to create an ecosystem **around** educational institutions to draw the attention of children to certain themes which have some scientific relevance and closer to their curriculum. This would enable them to learn and understand different scientific theories in a play way method and come to know the why and wherefore of every activity, which creates further interest in them and draw them closer to science. Such parks are useful even to people in general to get to know the basic principles behind each model or exhibit which are made functional in the park. These parks have played a very important role in rural areas to bring scientific concepts closer to people and thereby bringing paradigm shift in their approaches to life.
- **Mathematical Olympiad:** The main objective of the programme is to create interest and love for the subject of mathematics which is otherwise considered to be a dry and dreaded subject. This event helps in locating and nurturing mathematical talent among school going children of class X<sup>th</sup> to XII<sup>th</sup>. Organizing Mathematical Olympiad in the state level helps in supporting the National Board for Higher Mathematics (NBHM) which is the nodal agency for organizing Mathematical Olympiad at



National level. In the state this event is organized up to the regional level and response of students to this event is growing year after year.

- **National Science Day:** The vision behind celebrating National Science Day is to prepare the budding scientists of the State to face newer challenges which are posing threat to the peace and prosperity of its citizens and to find scientific solutions to combat them head-on. Only through research and innovation path of progress, peace and prosperity can be achieved in the nation and here the young scientist may play crucial role. Just to encourage them and to bring out their research solutions, this day is celebrated in the state by the Council. National Science Day is organized from 28<sup>th</sup> February onwards and Academic Institutions & Government Organisations are called upon to participate in good number. Various programmes such as Lectures by eminent scientists, Poster Making Competition, Inter-departmental Quiz competition, Debate, Essay competition, popular science video show etc. are organized to mark the occasion. The target beneficiaries are the Students, Teachers and general mass.
- **National Mathematics Day:** Department of Science & Technology, Govt. of India had decided to celebrate National Mathematics Day on 22<sup>nd</sup> December every year to mark the contribution of renowned mathematician Sir Shrinivasa Ramanujan and to develop interest in students towards Mathematics. Various programmes like lectures, quiz contests, group discussions, power point presentations, mathematical exhibitions etc are organized under this program.
- **Mobile Science Lab:** Council has launched a programme to provide practical facility through mobile science lab to school students of rural areas, where lab facilities are not available. Van is equipped with lab instruments related to the subjects of Physics, Chemistry and Biology which are part of school curriculum. Practical facilities were provided to Government High and Higher Secondary Schools through mobile science lab with the help of experts and teachers.
- **Mobile Planetarium:** Council has provided Mobile Planetarium to Higher Secondary School, Kotmisonar, Dist-Janjgir Champa to create interest in students towards Astro- science. In addition to this Council organises planetarium shows in different high & higher secondary schools of Dhamtari & Kondagaon Districts through mobile planetarium.
- **World Space Week:** Indian Space Research Organisation (ISRO) celebrates 'World Space Week' during October 4-10 of every year. As a part of celebration, various programmes were organised by Regional Remote Sensing Centre (RRSC), Nagpur with the help of this Council. This year the programme included lectures by Scientists which was followed by painting competition on the Theme: 'Exploring the New World in Space' and quiz competition in schools. In the final contest of quiz, the winning team were sent to participate in national level programme held at ISRO, Hyderabad on 9<sup>th</sup> and 10<sup>th</sup> October 2017.
- **Community Science Club & Popular Science Book Corner:** District Science Clubs and Popular Science Book Corners are established in leading Government School of the State, with an objective to develop infrastructure for popularization of Science & Technology activities and to develop analytical, creative and innovative capacity of students. Beneficiaries of this scheme include teachers and students of Chhattisgarh.
- **Science & Technology Communication Centre:** This programme is designed to promote innovative and experimental activities through minds on exposure and hands-on learning process. For the above purpose Science & Technology Communication Centre is established at Govt. Boys H.S.S., Masturi, Dist- Bilaspur. Edusat (SIT) 'See and learn activities' is shown to promote innovative and experimental activities through exposure and hands-on learning process.
- **Mobile Van:** Council has a mobile van based on the theme "Source of Energy" which comprises 24 working models. These models are shown in different schools as they are mounted on mobile van.

## 4.2. Research & Development Activities

Council supports Research and Development activities in Universities/ Colleges/ S&T Institutions of the state in the form of Mini Research Projects. Even for organizing Conferences/Seminars/Symposia/ Workshops on scientific themes financial assistance is granted by the Council. Deserving researchers who are invited by renowned institutions and Universities of any part of the globe for paper presentation are given financial assistance towards travel cost, Financial assistance for printing/publication/ documentation of proceedings of conference/ seminar/symposium/workshop or books are also provided after due vetting of proposal.

1. **Mini Research Project:** Chhattisgarh Council of Science and Technology supports R&D activities in Universities / Colleges/S & T Institutions in the form of Mini Research Projects. The broad disciplines under which the Mini Research Projects are sanctioned are as follows:

- Life Sciences
- Engineering Sciences
- Physical Sciences
- Chemical Sciences
- Earth & Atmospheric Sciences
- Atmospheric Science
- Earth Science
- Social Sciences
- Sociology
- Economics
- Mathematical Science
- Mathematics & Statistics

Mini Research Projects are sanctioned for a period ranging from one to three years depending on the requirement of the research work with a upper cap of Rs. 5.00 lakhs. Every year a number of researchers drawn from a variety of disciplines are taking advantage of this scheme. Priority is given to those researches which have translational significance.

2. **Seminar/ Symposia/Workshop** – Council has a scheme under which financial assistance is provided for organizing Conference/ Seminar/ Symposium/ Workshop/ Training Programme for budding scientists and students. Under this scheme, special lectures are also organised for teaching community to enable them to know the latest happenings in the area of science and technology and to enable them to exchange new ideas and knowledge with subject matter experts who are invited from reputed institutions and universities. Under this scheme, financial assistance to the tune of Rs. 35,000/- is granted for organizing regional level event and Rs.50,000/- for national level event. In case of International level workshops/ symposia an amount of Rs.1, 00,000/- is sanctioned.

3. **Travel Grant-** Council has a scheme under which financial assistance towards travel cost is considered for presenting research paper in International Seminar/Symposium/Workshop/ Conference etc. The council provides cent-percent international air fare subject to an upper limit of Rs. 50, 000/-

4. **Publication Activities:** Chhattisgarh Council of science & Technology provides financial assistance for printing/publication of proceedings of conference/ seminar/ symposium/ workshop/ popular science books (non-commercial) *etc.* for wider circulation among relevant stakeholder institutions. For this purpose grant-in-aid is sanctioned up to Rs.10, 000/ -.

#### 4.2.1. Science for Society

The programme envisages supporting Universities, Science & Technology Institutions in the state to undertake innovative projects related to local needs and to develop appropriate technologies for filling the gaps and then transferring such technologies for adoption by the local community. This programme also aims at creating awareness among people about use of technology for overall growth and development of people and to make them accept technology in their day to day life. This would enable and empower specific target group and thereby improve quality of life of ST/SC, women and other weaker section of the society and their immediate neighbourhood.

#### 4.2.2. Technology Development/Transfer/Demonstration:

The various technologies developed/upgraded within and outside the state are transferred for the welfare of the people particularly in tribal districts and other identified rural areas of the State and skilling and re-skilling the people to adopt and adept to the new technology for their welfare.

#### 4.2.3. Technology Intervention (Technology Village) Programme

The basic objective of technology village vision is to improve the quality of life of rural population, alleviate poverty and unemployment through awareness, training and demonstration of proven technologies including biotechnologies. To attain sustainable development of rural masses, a well thought strategy for rural development has been evolved. Improvement in every sector which are of immediate concern of people like: agriculture, health and hygiene, safe drinking water, unemployment, poverty, environment etc. are targeted .With these objectives in mind Council has established four technology villages as on a pilot basis at Bhadha in Bilaspur District; Sirri in Dhamtari District ; Thathapur in Kabirdham District and Sanawal in Balrampur District of the state.

#### 4.2.4. Central Laboratory Facility

Chhattisgarh Council of Science and Technology has established a state of art Central Laboratory to provide instrumentation facility to scientists, researchers, students and innovators of the state. CLF provides testing facility of samples by using advanced instrumentation available in the facility. This CLF is providing services to various organizations of the state with the following major objectives:

- ❖ To provide state of the art instrumentation facility to research community in the state.
- ❖ Serve as an incubator for specific research programmes pertaining to the modern science and application oriented research.
- ❖ To cultivate the instrumentation culture in the scientific community in the state.
- ❖ To provide the Animal Testing Facility for performing research with animal models for all researchers, academicians, innovators of the state.
- ❖ The CLF also provides facility to the industries of the state for making assessment and quality control of their final product.

Following facilities are presently available in the CLF:

- ✓ Spectroscopy: UV-Vis, NIR, FTIR, Flame Spectroscopy, Mass Spectroscopy (GC-MS and ICPMS)
- ✓ Chromatography: Gas Chromatography, Liquid Chromatography and Layer Chromatography
- ✓ Microwave Sample Preparation System
- ✓ Animal Testing Facility
- ✓ Along with other ancillary equipments and lab requirements.

### 4.3. Patent Information Centre

The objective of PIC is to create awareness about Intellectual Property Rights (IPRs), enable patent searches, analyze the patent information on a regular basis and suggest new programmes for R&D Institutions and to guide the inventors in respect of patenting their invention. Patent Information Centre benefits Researchers / Inventors in Industry / R&D Organization / University, Industry, Business Enterprise, Consultants and Planners, Financial Institutions, School Students and General masses.

### 4.4. Grass root Innovation Augmentation Network Cell (GIAN-cell)

GIAN Cell primarily aims at sustaining the spirit of innovation, encouraging experimentation and nurturing creativity at the grassroots level of knowledge-rich, economically poor people, through transition of innovation into enterprises and facilitating diffusion of grassroots green innovations through commercial as well as non-commercial public, private and voluntary channels. The main objective of GIAN Cell is to identify grassroots innovations from Honey Bee database structure that can be scaled up, to establish links with research and design institutions to add value so that efficiency can be enhanced and socio-economic and environmental efficiency can be enhanced, to protect the Intellectual Property Rights of Innovators and operationalize their prior informed consent and to mobilize resources to strengthen the capacity of grassroots innovators in undertaking large-scale expansion of their innovations. The GIAN centre is established with the help of National Innovation Foundation, Ahmedabad.

**Innovation Funds:** Under this programme grass root innovations in the state will be facilitated and also assistance will be provided for innovation and to strengthen and protect intellectual rights of technology generated at the grass root level in the State. This programme will ensure motivation for new innovation and product formulation within the state.

### 4.5. Coordinator Cell

This Cell is established to ensure intervention of S & T for streamlining the activities of the Council with State Universities, Colleges and institutions related to Engineering & Medical education. 15 coordinator cells are presently established and made functional.

This Cell act as bridge in scientific endeavours among institutions for the overall development of the state with a focus on promoting research to popularize Science with strengthening of existing network and expanding it further, through organizing Seminars/ Symposia/ Workshops/ Science Exhibitions/ Popular Science lecture/ Debates etc. The Cell helps the institutions to make meaningful interventions in bringing science closer to people in general and student community in particular.

### 4.6. Chhattisgarh Space Application Centre

Chhattisgarh Space Application Centre is providing technical support to government departments of the state and other agencies in matters related to GIS and Remote Sensing Application. Natural Resources Management and other infrastructural developments of the state require information on GIS platform with overlay of satellite images for drawing meaningful inferences for scientific planning and methodical execution. The decision support systems are evolved on the basis of tabular statistical data available with the departments and are married to spatial data for precision planning based on requirement.

## 4.7. LIST OF SUCCESS STORIES

### 4.7.1. Popularization of Science

❖ **25<sup>th</sup> National Children Science Congress:** Organised at District and State level to ignite the minds of children towards science and scientific theories and to provide them an opportunity to unfold their creativeness and stretch their imagination. In the year 2017-18, 24 out of 27 districts participated in the district level event. State Level Children Science Congress-2017 was organised on 18th and 19th November 2017 at Salem English Medium Higher Secondary School, Raipur. From the state 73 projects by senior group and 40 projects by junior group were presented. 16 State awardees were selected to participate in the National Children Science Congress and 2 were selected to participate in the 105th Indian Science Congress. List of State Awardees are annexed at Annexure-I



❖ **6<sup>th</sup> Chhattisgarh Young Scientist Congress-2018:** Organised in collaboration with Durg University, Durg on 27<sup>th</sup> & 28<sup>th</sup> February 2018 at Govt. V.Y.T P.G. Autonomous College, Durg (C.G.) to identify budding Scientists of Chhattisgarh and to provide encouragement to their research work. In this congress 160 research papers were presented by the researchers and 18 Young Scientists were awarded for best paper presentation in 18 disciplines.. List of Chhattisgarh Young Scientist Awardees are annexed at Annexure II.





❖ **Celebration of World Space Week:** As a part of Indian Space Research Organization (ISRO) celebrates 'World Space Week' during October 4-10, 2017 every year, various programmes were organised through Regional Remote Sensing Centre (RRSC), Nagpur in Government schools of the state to make students aware about Space Technology and create interest in them about this subject. One painting competition on the theme: 'Exploring the New World in Space' and one quiz competition in Govt. Higher Secondary Schools on 20<sup>th</sup> and 21<sup>nd</sup> September 2017 was organized for 9<sup>th</sup> and 10<sup>th</sup> class students. Three best paintings from each school were selected for participation at national level and similarly in quiz competition, the winning team of three students from each school participated in Final quiz contest at J.R. Dani Govt Girls H.S.S., Raipur on 22<sup>nd</sup> September 2017. The winning team of final quiz contest participated in national level programme scheduled at Shad Nagar, ISRO, Hyderabad on 9<sup>th</sup> and 10<sup>th</sup> October 2017.



❖ **Science Park:** Science Park is a forum to provide facilities for activity of learning, inculcating a spirit of enquiry, foster creative talent and generating scientific temper and attitude in the students and community as a whole. As a part of this effort Science Parks have been set up at Chhattisgarh. These Centres comprises of exhibits, supported by the various activities on Science Popularization. The outdoor exhibits supplied by B. M. Birla Science Centre, Hyderabad in the park are interactive and cover wide variety of exhibits which are broadly linked with Science. The Novel feature is that the students are encouraged to operate these self-help exhibits, which lead them to do it themselves and learn the impact of scientific principle. This takes them away from monotony of books to operational toys and models.

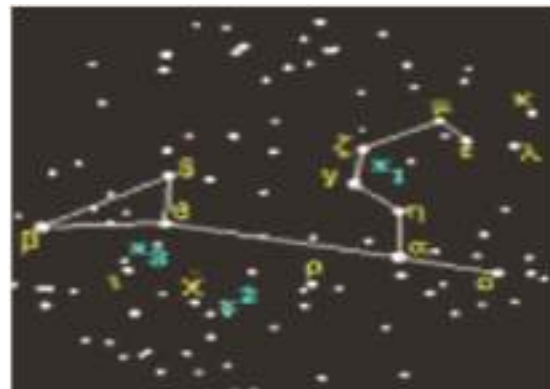
**Science Parks established in Chhattisgarh:**

- ❖ Vivekananda Vidyapeeth, Raipur
- ❖ Ramkrishna Mission Ashram, Narayanpur

- ❖ Jawahar Navodaya Vidyalaya, Kurud, Dist-Dhamtari
- ❖ Higher Secondary School, Kotmisonar, Dist-Janjgir Champa
- ❖ Audhyogik Prashikshan Sanstha (ITI), Sakari, Dist-Balodabazar
- ❖ Jawahar Navodaya Vidyalaya, Bhupdevpur, Dist-Raigarh
- ❖ Govt. Boys Higher Secondary School, Utai, Dist-Durg
- ❖ Jawahar Navodaya Vidyalaya, Saraipali, Dist-Mahasamund
- ❖ Govt. Higher Secondary School, Pharasgaon, Dist-Kondagaon
- ❖ Govt. H.S.S., Bartori, Block-Bilha, Dist-Bilaspur
- ❖ Jawahar Navodaya Vidyalaya, Mana Camp, Raipur



❖ **Mobile Planetarium:** Procured from NCSM, Kolkata with an objective to acquaint the students with the celestial body and solar system and to create interest in them for Astro-science. During the year, 100 Schools and around 25,000 students were benefitted by this mobile planetarium and the response of teachers and students were quite encouraging and demand for such shows are pouring in from other parts of the state.



❖ **Mobile Science Exhibition Van (MSEV):** Mobile Exhibition Van containing 24 Energy based exhibit windows were taken to different schools in the remote parts of the state and shown in the schools to educate student community about different forms of energy and how one form of energy can be transformed into other form and taken advantage. This is shown with an aim to make them understand about the law of conservation of energy and change of energy. This is essential to bring them closer to scientific theories through working models and teach them the subject in the most interesting and interactive way. A total No. of 3500 students from Standard VI to XII visited the Van and exhibits.







❖ **Western India Science Fair, Science Quiz etc:** Western India Science Fair organized at the state level in Balod. 9 students and 3 teachers were selected and short-listed for participating in the National Science Seminar at Nehru Science Centre Mumbai. Science Quiz Competition; Science Exhibition; Mathematical Olympiad were organized at different places in the state. Lab facilities through Mobile lab provided to Govt. Higher secondary Schools of various blocks of Bilaspur District for conducting demonstration of science experiments for students National Mathematics Day and National Science Day were celebrated in 10 institutes of the state.

#### 4.7.2. Research & Development

❖ **Mini Research Project:** 9 new & 91 running from previous year proposals are financed during the financial year to facilitate research work in the State. Care is taken to sanction only those research subjects which have translational potential for the society.

❖ **Seminar /Symposium /Conference/ Workshop:** 41 proposals were sanctioned under the activity to bring science closer to people in general and student community in particular on different themes on Biological Science, Mathematical Science, Physical Science and Chemical Science and Applied aspects of these subjects.

❖ **Travel Grant:** 6 proposals were sanctioned under travel grant for attending International Seminar / Symposia / Workshop for promising scientists and academicians associated with institutes of higher learning of the state.

❖ **Publication Grant:** One Publication grant was sanctioned for publication of proceedings of the seminar for larger benefit of student community.

Details are given in the Annexure-III

#### 4.7.3. Science for Society

Project proposal entitled 'Screening & Awareness programme on Malnutrition in women and children' was sanctioned under this programme.

#### 4.7.4. Technology Village

❖ Training program on making of Sanitary Napkins were conducted in each of the technology village for 80 women by engaging a reputed NGO which have wide experience in dealing with young rural women and making them aware about the menstrual hygiene and how to use sanitary napkins . This NGO had trained them in making sanitary pads with simple machine and material and to do packaging and selling in the local market by earning a reasonable profit.

- ❖ Mushroom Production and Organic Farming training was provided in each of the Technology Village with the help of Krishi Vigyan Kendra and Indira Gandhi Krishi Vishwavidhyalaya, Raipur.



- ❖ Training on Bamboo processing and bamboo decorative curtain making was given to 30 youths of technology village Sirri.



#### 4.7.5. Technology Transfer

- ❖ **Sanitary Napkin Training:** Initiated training for making handmade Sanitary Napkin to tribal women and girls and created awareness among them for using sanitary napkin to maintain menstrual hygiene. This programme is started in 1 block of Bastar Revenue Division and preparations are being made to scale it up in 7 blocks falling in districts: Bastar, Sukma, Dandewada, Narayanpur, Kondagaon, Bijapur, Kanker by the end of this year.



❖ **Rock Bee Honey Harvesting:** Two Rock Bee Honey Harvesting Centres at Dantewada district were made operational to collect honey in the most scientific and sustainable manner taking adequate precaution to minimally damage honey bee colony so that after the collection same hive may produce honey in shorter time. During this period more than 2000 Kg rock-bee honey was collected, refined and commercialised by beneficiaries under the brand name 'Bastar Honey'





#### 4.7.6. Central Laboratory Facility

During the year 2017-18 the CLF of the Council had used its facility to carry out following R&D activities:

- ❖ Analysed Water samples from Chronic Kidney Disease affected Village of Supebeda, of Devbhog Block of Gariyaband District and also from Thirliguda and Nishthiguda was carried out for heavy metals and report submitted to Public Health Engineering Department, Government of Chhattisgarh for further necessary action.
- ❖ Chemical analysis for Tendu leaves from Chhattisgarh State Minor Forest Produce Co-operative Federation Limited, Raipur was tested and report submitted for further prosecution in the matter.
- ❖ Plants and Soil samples from Guru Ghasidas Central University, Bilaspur were tested for heavy metals and report provided.
- ❖ Water samples from industry - ACME Raipur Solar Power Pvt. Ltd. (Chhattisgarh) were tested for heavy metals and other analysis and report provided.
- ❖ Samples were tested for Arsenic for research work pertaining to Post doc student from Department of Biotechnology, Pt. Ravishankar Shukla University, Raipur and report provided.
- ❖ Water samples were tested for National Institute of Technology; Raipur under the Council sponsored Mini Research Project.
- ❖ Bone Fracture Healing activity of some herbal formulation was carried out on animal models for Guru Ghasidas Central University, Bilaspur.
- ❖ Water samples received under Department of Science and Technology, Government of India sponsored “Village Information Project” was carried out for 15 parameters at CLF.
- ❖ Water samples collected from Ratanpur Panchayat under Chhattisgarh Environment Conservation Board sponsored project entitled “Identifying Ratanpur as Ramasar Wet Land Nagar” are being tested at CLF.
- ❖ An Animal Testing Facility is also established with the clearance of CPCSEA, New Delhi and Bone Fracture Healing activity by using specific herbs on animal models is being carried out for Guru Ghasidas Central University, Bilaspur.
- ❖ Further to ensure instrumentation culture in the researchers of the state the CLF provides facility for Ph.D. and Dissertation work of students registered in different Universities of the state to be carried at CLF.
- ❖ As a research facility under CLF the following are the publications in various journals that have been published by the students and scientists of the Council:
  - Vibhuti Chandrakar, Bhumika Yadu, Rakesh Kumar Meena, Amit Dubey, Keshavkant Sahu, “Arsenic induced genotoxic responses and their amelioration by diphenylene iodonium, 24-

epibrassinolide and proline in *Glycine max* L.”; *Plant Physiology and Biochemistry* (Elsevier Masson), Vol.-112, Pg.: 74-86, 2017

- Vibhuti Chandrakar, Suruchi Parkhey, Amit Dubey, Keshavkant Sahu, “Modulation in arsenic-induced lipid catabolism in *Glycine max* using proline, 24-epibrassinolide and diphenylene iodonium”; *Biologia*, Vol. 72, Issue- 3, Pg. 292-299, 2017
- Wasim Raja, Amit Dubey and Mahesh Gopal Patel, Antitumour Activity of *Phyllanthus Niruri* Root Extract Against 7, 12- Dimethylbenz (A) Anthracene Induced Mouse Skin Carcinogenesis” *European Journal of Biomedical and Pharmaceutical sciences* 2017, Volume 4, Issue 9, 471-477.
- Amit Dubey, Wasim Raja and Yashasvi Bairagi “Evaluation of Antimicrobial Activity of *Thuja occidentalis* Extract against Some Human Pathogenic Bacteria” *World Journal of Pharmaceutical and Life Sciences*, 2017, Vol. 3, Issue 10, 97-103.
- Tejaswini Reddy, Beena Sharma and Amit Dubey “Comparative study of heavy metal pollution in road side soil of Saron and New Raipur highway at District Raipur in Chhattisgarh”, *International Journal of Green and Herbal Chemistry*, E-ISSN: 2278-3229, December 2017 – February 2018; Sec. A; Vol.7, No.1, 054-061.



#### 4.7.7. Patent Information Centre, Gyan Cell & Innovation Fund

- ❖ 5 Institutional Patents were forwarded to Technology Information, Forecasting and Assessment Council (TIFAC), Department of Science and Technology, Government of India.
- ❖ 4 institutional Patent searches were done along with 1 Individual Patent application for local industrialist was forwarded to NRDC, DSIR, GoI for assistance in filing.
- ❖ 8 Popular IPR lectures were organised at different Universities and Colleges in the state which helped in sensitizing about 1200 academicians, researchers and general masses.

- ❖ Workshops were organised, one at Shri Shankaracharya Mahavidyalaya, Junwani, Bhilai and second at Rungta College of Pharmaceutical Sciences and Research, Bhilai, Chhattisgarh which helped in sensitizing about 600 academicians, students and special invitees.
- ❖ Council in its suo-moto wisdom circulated a draft Institutional Intellectual Rights Policy to the 25 leading academic and research institutions of the state and sensitized them in framing their own institutional intellectual rights policy.
- ❖ Under 'Innovation fund programme' Council has provided financial assistance to two innovators for their prototype development project of 'OPTER Two in One' bike for harvesting of water hyacinth by releasing first grant. The project is being executed with the support of Department of Farm Machinery and Power Engineering, Faculty of Agricultural Engineering, IGKV, Raipur.

Details are given in Annexure –IV



#### 4.7.8. Coordinator Cell

This year Council had sponsored 06 Universities /Institutions to organize programme like Seminars / Symposia / Workshops / Science Exhibitions / Popular Science lecture/Debates/ Essay writing on various subjects of science.

- ❖ Pt. Ravishankar Shukla University, Raipur had organized 'Science Promotion Activity' on 27th Jan 2018. The activity comprised of two competitions, a multiple choice based quiz on 'Environmental Problems' and a poster competition on 'Renewable Energy Sources'.



- ❖ SKS College of Agriculture and Research Station, Rajnandgaon had organized one day students seminar on "Sustainable Agriculture through Integrated Farming System Approach

27.03.2018 to popularize science based activities among student community of the different constituent and affiliated colleges of IGKV, Raipur.



- ❖ The Research and Development (R&D) Cell of Christian College of Engineering and Technology (CCET), Bhilai under the aegis of the Coordinator Cell of Chhattisgarh Council of Science and Technology (CCOST), Raipur, organized an expert lecture on “Modern Trends in Industrial Automation” at its Kailash Nagar campus on 24<sup>th</sup> of August, 2017.
- ❖ Inter-college Essay writing on “Global warming and climate change- A serious threat to our environment” and Debate competition on “Digital India- A boon or bane”, was held at CCET, Kailashnagar, Bhilai campus on 15<sup>th</sup> of February, 2018.

#### **4.7.9. C.G. SPACE APPLICATION CENTRE**

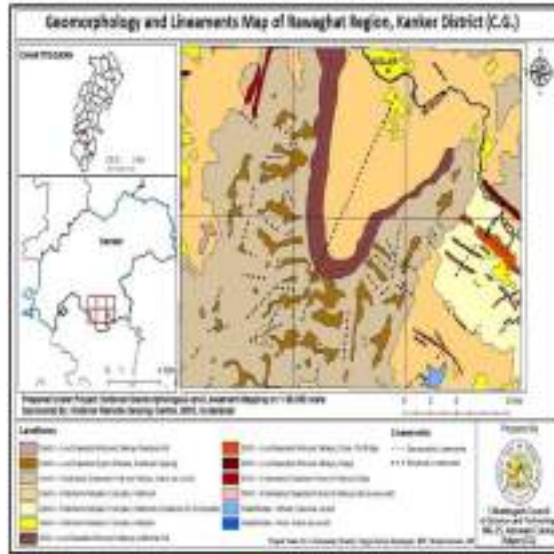
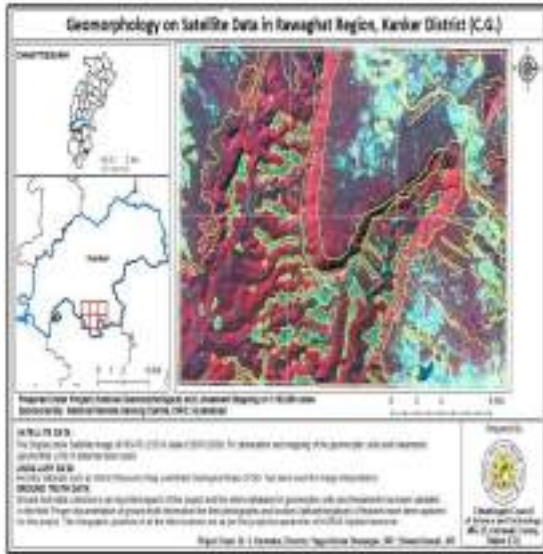
Certain projects which are undertaken by the Council in the year 2017-18 are listed below:

- ❖ Landuse / Landcover 50K mapping project 3rd Cycle of NRSC, ISRO is undertaken and is presently in submission stage.
- ❖ Sericulture Phase –II project has been taken for two districts: Balrampur and Surguja. The work is completed and is in submission stage.
- ❖ Under EPRIS (Empowerment of Panchayati Raj Institutions Spatially) project 9 block level and 1 district level workshop and training for asset mapping completed for officials of Panchayat and Rural Development Department and peoples' representative like Sarpanch and others.
- ❖ Under Experiments on Estimation of Forest biomass using Aerial LiDAR data with high point density and using High Resolution Satellite Image for 30 blocks of 10 Ha each demarcation completed.
- ❖ Assessment of Tree outside forest work was undertaken for the forest department, preliminary results provided to CCF Rajnandgaon working plan for field validation by District officers;
- ❖ Under Minor Mineral Trigger Generation Project- Geo-referencing & Digitization of lease area completed for 11 leases of Raigarh, 8 leases of Mahasamund and 21 leases of Bilispur. Satellite data is being processed for trigger generation.
- ❖ Transformation of Master Plans of 9 towns on GIS platform - Rectification, geo-referencing & landuse allocation of Rajnandgaon, Balodabazar & Sarangarh for Master Plans completed, Rectification & geo-referencing of Bhatapara, Sepath, Kondagaon & Kawardha also completed & landuse allocation is in process; Digitization and geo-referencing of 270 cadastral sheets of Land Record Department has been completed;
- ❖ GIS data base created for 12 villages located in Dhamtari and Raipur district under Village Information System (VIS) for 'E' Governance project.;

- ❖ Space based high resolution mapping for drought affected 154 Villages of Khairagarh, Dongargarh and Rajnandgaon block of Rajnandgaon district has been completed and report sent to public health engineering department for further action.
- ❖ Under Feature extraction and mapping of 10 major cities of Chhattisgarh on 1:500 scale using aerial photo project, 210 scenes of ortho-photo of Raipur district has been completed.
- ❖ For Groundwater quality mapping on 1:50,000 scale quality data of 27 districts is organised, segregated and pre-monsoon and post monsoon point data layer has been prepared.
- ❖ DGPS survey for 4 coal block and 4 limestone block were carried out for forest clearance
- ❖ Under Land degradation mapping 2nd cycle final database and all the deliverables along with the project report has been submitted to NRSC;
- ❖ National Wasteland Change Analysis projects: final database and all the deliverables along with the project report has been submitted to NRSC;
- ❖ Under the project "Monitoring of Integrated Watershed Management Programme (IWMP) using Geospatial Technologies" 18 project reports pertaining to Jashpur, Kanker and Balod districts have been completed and submitted to NRSC;
- ❖ Project on "Preparation of Village wise A0 size Cadastral and Satellite maps of IWMP Projects" for technical support to IWMP projects of Chhattisgarh state is in progress;
- ❖ Under the FASAL project , Kharif Rice crop digital data analysed with MNCFC, New Delhi for F1 (Forecasting ) and F2 analysis has been done and Ground truth data collection work completed for this project in collaboration with Agriculture Department of Chhattisgarh.







#### 4.8. STATE SPECIFIC POLICY

- ❖ Council is in the process of preparing S&T policy for state and for this larger consultation process was already conducted and draft policy shall be circulated soon to all the departments for their comments and suggestions for incorporation.
- ❖ State data policy for sharing data: statistical and geo-spatial among different departments and other stakeholders with requisite security features are in the making process and shall be circulated among all stakeholder departments for comments and suggestion.

#### 4.9. LINKAGES

- ❖ **With School Education:**
  - For the establishment of Science Parks, Science book corners, Science Clubs etc.
  - For organising National Children Science Congress, Mobile Science Lab, Mobile Planetarium Programmes etc.
- ❖ **With State Council of Educational Research and Training (SCERT), Raipur:**
  - For conducting Western India Science fair, National Science Seminar, Science Quiz, Science exhibition programmes.
- ❖ **With National Council for Science & Technology, Communication (NCSTC), DST, New Delhi and Vigyan Prasr:**
  - For conducting National Children Science Congress, National Mathematics Day, National Science Day and other programmes implemented from time to time.
- ❖ **With Other Departments**
  - ISRO, Dept. of Space, Govt. of India, Department of Science and Technology, Govt. of India, Geological Survey of India, Govt. of India and various development departments of Govt. of Chhattisgarh like Agriculture Department, Forest Department etc.
  - Council has established linkage with 19 development departments (Tourism & Culture, Urban Administration, Housing Board, Mining, Higher Education, Health Department, Revenue & Land Records, Home, PHED, WRD, Panchayat and Rural Development, Technical Education, Agriculture, Fisheries, Forest, School Department) of the state and national agencies like NRSC, ISRO, MNCFC, SAC.
- ❖ **For Transfer of Technology**

- Centre of Science for Villages, Wardha, Maharashtra
- Centre for Bee Development, Wardha, Maharashtra
- Priyanshi Educational & Cultural Society , Bhopal
- ❖ **For Research & Development Activities**
- State & Central Universities, Department of Higher Education, NIT, AIIMS, Medical Colleges and Other related institutions and industries
- ❖ **For Central Laboratory Facility**
- In an effort to provide conducive research environment and to enable exchange of research ideas with subject matter specialists and to make instrumentation facility available to the scientific community in the overall interest, Memorandum of Understanding has been signed with the following institution of higher learning in the State:
  - Pt. Ravishankar Shukla University, Raipur
  - Indra Gandhi Agriculture University, Raipur
  - Government D.B. Girls College, Raipur
  - Dr. Radha Bai Government Naveen Girls College, Raipur
  - Shri Rawatpura Sarkar Institute of Pharmacy, Kumhari, District Durg Etica Clinpharma Pvt. Ltd., Raipur
- Also the CLF have developed linkages with the various department of Government of Chhattisgarh for providing testing and training facility.
- Under the aegis of CLF a project entitled “Identifying Ratanpur as Ramasar Wet Land site” was submitted to Chhattisgarh Environment Conservation Board and has been sanctioned.

#### **4.10. OTHER LINKAGES**

Local Self Help Groups and other NGOs in each District who have a proven track record in the field.

#### **4.11. LIST OF MAJOR TECHNOLOGY AREAS**

##### **4.11.1. Central Laboratory facility**

❖ For the development of indigenous technology and also to provide incubation to the innovators and start-up CLF has provided lab facility to M/s. Bsheshaj Innovations Pvt. Ltd. This company’s primary goal is to develop innovative formulations to address the challenges related to Hospital Acquired Infections. The project being carried out at CLF is sponsored by Biotechnology Industry Research Assistance Council (BIRAC), Government of India.

❖ Keeping in view the potential of Bamboo for rural employment and as per the initiative taken by the Central and State Government under Bamboo Mission Council under the umbrella of CLF has formulated and submitted a project proposal for establishment of state of art tissue culture lab for research and mass scale planting material production for bamboo and also creation of bamboo resource inventory and decision support system on GIS platform for the state of Chhattisgarh.

##### **4.11.2. Popularization of Sanitary Napkins**

❖ Population of the State is mainly comprised in Rural & Back ward areas where health and hygiene is a major concern, especially of women. To inculcate menstrual hygiene among them and use of sanitary napkin is considered an important task and hence efforts were made which was detailed in the preceding paragraphs.

### 4.11.3. Rock Bee Honey Harvesting

❖ Rich forest areas of the State provide an ideal habitat for honey bees to make hives and thus provide an opportunity to local villagers to collect honey. Council had stepped in to provide them training to collect honey without damaging the hives and to make it a sustainable honey collection activity. Skilling and re-skilling them on safer collection is taught to them and all the requisite safety gears were made available them. Training was not confined to only collection but also on filtering, removing wax and primary processing of honey with bottling and marketing was also imparted.

### 4.11.4. Low Cost Water Filters

❖ Providing safe potable water in the rural areas especially in remote tribal villages is a big challenge before the state. Many of the water sources around hamlets face the problem of iron, fluoride, nitrate, arsenic etc in the water which are much above the permissible limits leading to water borne diseases and calls for immediate action. To meet this challenge it was thought fit to address this problem on a pilot basis. Water filters which can be manufactured by local artisans with locally available material and which have a proven filtering capacity was considered to be the immediate solution. This would provide additional employment to local potters & SHG women and encourage villagers to use these filters for getting safe water. Initially schools are targeted for installing these low cost filters and after getting success the project will be scaled up.

### 4.11.5. Bamboo Furniture & Crafts

❖ State is rich in forest wealth and about 44 percent of the geographical area of the state is having forest. These forests support bamboo in good measure but over the years owing to grazing, forest fire and illicit felling bamboo areas have come under stress. To revive such areas to its fullest potential and to make the local villagers positive stakeholders, it was thought prudent to equip the village youth with necessary skill and upgrade their native skill in basketry and bamboo craft. This would help them to earn a decent livelihood and protect their resource base i.e. forests.

### 4.11.6. Chhattisgarh State Application Centre

❖ The Major technology areas of CGSAC are Remote Sensing, GIS and Capacity building of state officers in the effective utilization of space technology in planning and managing resources of the state, both man-made and natural.

## 4.12. PROGRAMMES PROPOSED FOR 2018-19.

In addition to the ongoing programmes, the Council is planning to undertake certain activities this year i.e. 2018-19 which are listed below:

- ❖ Establishment of 02 new Science Parks in the state.
- ❖ Establishment of 05 new coordinator cells in state.
- ❖ Dissertation and Ph.D. facilities would be enhanced as the Council has taken initiative and has invited indents from various Universities, Colleges and research institutions of the state to instrumentation requirements depending on the research domain in which work is being carried out at the respective institutions.
- ❖ Establishment of Telescopes in the tourist places of Chhattisgarh.
- ❖ For the expansion of the laboratory to Biotechnology a Technical Proposal for Establishment of Tissue Culture Lab, Bamboo Resource Inventory and Decision Support System for an amount of Rs. 492.03 lakhs has been formulated and submitted to State Bamboo Mission.

- ❖ Establishment of Chhattisgarh State Spatial Data Infrastructure (CG-SSDI)
- ❖ Monitoring of World Bank funded Neeranchal National Watershed Project for Jashpur District for State watershed mission.
- ❖ New study on Annual forest cover and biomass loss is being initiated in association with NRSC.
- ❖ Preliminary study has been initiated to assess Tree outside forest in 10 plots of Durg district under Rajnandgaon Forest Division. These trials shall be extended for the entire Rajnandgaon Forest Division area.
- ❖ Mapping of Assets & Livestock for Veterinary Department.
- ❖ RS/GIS intervention for Horticulture Department
- ❖ Catchment area treatment plan for Gevra, Kusmunda and Dipka Coal Mine, for South Eastern Coal Fields, Chhattisgarh.
- ❖ Wetland inventory of the state for Forest department
- ❖ Pre-feasibility study for iron ore deposits in the identified 4 blocks in Chhattisgarh

#### 4.13. PROPOSED BUDGET OUTLAY FOR 2018-19

##### Budget Abstract

Sl.	Item	Amount (In Rs.)
I	<b>Non-Recurring Expenditure</b>	
	Furniture, Computers, Generator etc.	5,00,000=00
	Balance of 2017-18 (including interest earned)	(-) 42,014
	<b>TOTAL (I)</b>	<b>4,57,986=00</b>
II	<b>Recurring Expenditure</b>	
	Grant For existing manpower for Year 2018 – 19	1,35,73,564=00*
	Excess expenditure of 2017 – 18	31,75,405 = 00
	<b>Office Expenses</b>	<b>4,00,000=00</b>
	<b>TA/DA</b>	<b>4,00,000=00</b>
	<b>TOTAL (II)</b>	<b>1,75,48,969=00</b>
	<b>Grand Total I+II</b>	<b>1,80,06,955-00</b>
	<b>Say</b>	<b>1,80,00,000=00</b>

\* Details as per Annexure - V

**List of Awardees for National Children Science Congress**

Sl.	Name of the Student	Title of the project	School
<b>Senior group</b>			
1.	Rikesh Kumar Sahu	Popularizing Science and Fighting against Superstitions	Govt. H.S. School, Kopra, Dist-Gariyaband
2.	Girijashankar Sahu	Swachh Bharat Abhiyan: Waste Management and Health	Govt. Blind Deaf School, Mathpurena, Dist-Raipur
3.	Domeshwari Sahu	Sakhi, Napkin: One Step Toward Healthy and Green Earth	Govt. High School, Sunderkera, Dist- Raipur
4.	Sanjana Baghel	Currency Notes Can Cause Diseases	Govt. Girls H.S School, Abhanpur, Dist-Raipur
5.	Vinay Chandravanshi	Dubble Income Generation by Integrated farming (II)	Govt. H.S. School, Raveli, Block, Kawardha, Dist-Kabirdham
6.	Kirtikant	Study of the Use of Herbal Medicine for the Treatment of Many Diseases	Govt. H.S.S., Badgaon, Dist-Balod
7.	Nidhi Sahu	Treatment and Diagnosis of Diseases by Traditional Ayurvedic Treatment	Govt. Girls H.S.S., Dist-Gariyaband
8.	Avantika Singh Tomar	Biogas Future Saver for Earth	IMST English Medium School, Dist-Sukma
9.	Nikita Dubey	Health, Hygiene and Nutrition	Secret Heart H.S.S, Dist-Balodabazar
10.	Pravesh Deshlahre	Open Defecation Free in Sarguja	Sidharth H.S.S., Ambikapur, Dist-Sarguja
<b>Junior group</b>			
11.	Priyanshu Gangvanshi	Livelihood Dairy Farming	Govt. Eklavya Residential School, Dist-Gariyaband
12.	Gesika Komerra	Vishesh Pichhadi Janjati (Kamar Bhunjia) Ke Jeevan Shaili Ka Adhyan	Govt. Eklavya Residential School, Dist-Gariyaband
13.	Bhishmdev Dewangan	Body Mass Index	Govt. Middle School, Saragaon, Dist-Raipur
14.	Priyanka Agrawal	Effects of Bottled Water on the Society and Its Solution	N.H.Goel World School, Nardaha, Dist-Raipur
15.	Mansi Pradhan	A way to Convert Mechanical Energy to Electrical Energy in Flour Mill	D.A.V. Public School, SECL, Chhal, Dist-Raigarh
16.	Niraj Dani	E- Waste Awareness & their Reuse	Pyarelal Yadav Govt. Hindu H.S.S., Dist-Raipur

Sl	Subject Area	Title of Research paper	Name of Awardees	Name of Institute
1.	Agriculture Engineering and Technology	Design, development and evaluation of multi crop planter for intercropping	Piyush Pradhan	Dept. of Farm Machinery and Power, IGKV, Raipur (C.G.)
2	Agriculture Sciences	DNA sequencing (NGS) based development of unique identification barcodes for rice genotypes of Chhattisgarh	Jyoti Singh	Dept. of Plant Molecular Biology and Biotechnology, College of Agriculture, IGKV, Raipur (C.G.)
3.	Biology (Botany, Zoology, Chemical Biology)	Genomic association among sickling, G-6PD deficiency and malarial incidences in population of Chhattisgarh	Lohit Raj Shivwanshi	Govt. V.Y.T. P.G. Autonomous College, Durg (C.G.)
4.	Biotechnology, Biochemistry, Bioinformatics, Biomedical Sciences	Antifungal efficacy and multiple targeting potential of sodium lignosulfonate against human pathogenic fungi <i>Candida albicans</i>	Anubhuti Jha	Dept. of Biotechnology, National Institute of Technology, Raipur (C.G.)
5.	Chemical Engineering	Adsorption of Cu (II) ions by using lysine functionalized magnetic nanoparticles entrapped calcium alginate beads	Renu	Govt. V.Y.T. P.G. Autonomous College, Durg (C.G.)
6.	Chemical Sciences	Incorporation of silver into the Cu <sub>2</sub> ZnSnSe <sub>4</sub> nanocrystalline film: synthesis and characterisation	Mitisha Baid	Dept. Of Chemistry, Govt. V.Y.T. P.G. Autonomous College, Durg (C.G.)
7.	Civil and Architecture Engineering	Ground water potential zone mapping of Arpa river basin using RS & GIS	Yash Duggad	Dept. of Civil Engineering, National Institute of Technology, Raipur (C.G.)
8.	Computer Science, Electronics, IT and Telecommunication	A single trial character detection in Devanagari script input based P300 speller using deep convolution neural network.	Ghanahshyam B. Kshirsagar	Dept. of Electrical Engineering, National Institute of Technology, Raipur (C.G.)
9.	Earth and Atmospheric Sciences	Subduction initiation and arc magmatism: a neoproterozoic vestige from the sonakhan greenstone belt, Bastar craton	M.P. Manu Prasanth	School of Studies in Geology & WRM, Pt. Ravishankar Shukla University, Raipur (C.G.)
10.	Electrical and Electronics	Implementation of real-time energy management	Shraddha Kaushik	Bhilai Institute of Technology, Durg

Sl	Subject Area	Title of Research paper	Name of Awardees	Name of Institute
	Engineering	strategy for hybrid electric vehicles		(C.G.)
11.	Environmental Sciences, Engineering and Forestry	Analysis of Phenanthrene biodegradation pathway in novel bacterial strain Pseudomonas otitidis P4	Pallavi Singh	Dept. of Biotechnology, Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)
12	Home Science and Behavioural Sciences	Effect of mobile phone use on stress parameters	Mahendra Kumar	School of Studies in Psychology, Pt. Ravishankar Shukla University, Raipur (C.G.)
13	Life Sciences	Desiccation promoted ROS accumulation and deterioration of Recalcitrant Madhuca Latifolia seeds	Jipsi Chandra	School of Studies in Biotechnology, Pt. Ravishankar Shukla University, Raipur (C.G.)
14	Mathematical and Statistical Sciences	Stationary analysis of an infinite-buffer discrete-time queueing system	Rakesh Nandi	Dept. of Mathematics, National Institute of Technology, Raipur (C.G.)
15	Mechanical, Mechatronics and Production Engineering	Effect of cutting tools and environment on machined Surface integrity of a Nickel-based super alloy	Aruna Thakur	Dept. of Mechanical Engineering, Chouksey Engineering College, Bilaspur (C.G.)
16	Medical and Pharmaceutical Sciences	Synthesis and hemocompatibility studies of a pegylated chemotherapeutic drug, Lphenylalanine mustard	Gunjan Jeswani	Faculty of Pharmaceutical Science, Shri Shankaracharya Technical Campus, Bhilai (C.G.)
17	Physics	An investigation of structural, microstructural and electrical behaviour of $\text{Eu}^{3+}$ ions substituted $\text{BaZr}_{0.05}\text{Ti}_{0.95}\text{O}_3$ ceramic	G. Nag Bhargavi	Dept. of Physics, National Institute of Technology, Raipur (C.G.)
18	Veterinary Science, Animal Husbandry and Dairy Technology	Pathology of bovine pasteurellosis and field evaluation of immune response to Haemorrhagic septicaemia vaccine	Neha Sahu	College of Veterinary Science and Animal Husbandry, Anjora, Durg (C.G.)

## Mini Research Project:

List of sanctioned Mini Research Project proposals during financial year 2017-18:

Sl.	Title of the Mini Research Project
1	Treatment of waste water by advanced oxidation process
2	Development of rice husk feedstock supported nonmaterial's for the synthesis of privileged medicinal scaffolds
3	Performance enhancement of single slope solar still by cooling glass cover with an intermittent flow of waste hot water in basin
4	Towards improvisation of hybrid biomass by gelation technique for preparing an integrated de-fluoridating unit to alternative the contaminants from groundwater of fluoride affected area
5	Efficiency of Encapsulated Soil Bacterial Consortia in Reducing Arsenic Toxicity and Growth Promotion of <i>Oryza sativa</i> L
6	Testing of microdeletions of genes on Y chromosome in male partner of infertility cases
7	Development of microcontroller based online condition monitoring system for 11/0.440 KV distribution transformer
8	Pathology of infectious bursal disease of poultry in Chhattisgarh
9	Studies on prevalence and characterization of bovine tumors in Durg and Rajnandgaon district of Chhattisgarh state

## List of Ongoing Mini Research Project

Sl	Subject wise Title of Mini Research Project
<b>Engineering &amp; Technology, Computer Science</b>	
1	Implementation of laboratory scale micro grid incorporating renewable energy source
2	Microcontroller based implementation of mathematical model of insulin secretion for automated glucose regulation
3	Design of dynamic speech recognition system with fusion of audio and video signals
4	Design and development of $\alpha$ bidirectional dc-dc converter for energy management
5	Modelling of autonomous software agents' behaviour to defend HTTP request attacks
6	Development of framework for web based intelligent dictionary for learning Chhattisgarhi Language
7	Computer aided technique for diseases diagnosis: A non invasive approach of disease detection using Iris Image
8	Removal of dyes and chemical oxygen demand of dye bearing effluent
9	Interactive mechanism of green corrosion inhibitor and mild steel in alkaline medium containing chloride ion
10	A hybrid artificial neural network and fuzzy logic approach with wavelet transform based multi resolution analysis for fault detection, classification and location in six phase transmission line
11	Computer added analysis and interpretation of mammographic image for early diagnosis of breast cancer in Chhattisgarh
12	Development characterization of functionally graded material with self lubrication property for cutting tool applications
13	Crash (Accident) prediction model (CPM) for Durg-Raipur four lane highway
14	Parametric Study of eco-friendly concrete/composite by partial replacement of sand and cement with locally available industrial by products



<b>Sl</b>	<b>Subject wise Title of Mini Research Project</b>
15	Effect of concrete carbonation on replacement of fine aggregate by locally available industrial by product
16	Adaptive rood pattern search for fast block-matching motion estimation
17	Scientific studies on impact of Idols on water quality
18	Monitoring of fluoride in underground water of Jagdalpur District of Chhattisgarh and its removal
19	Development and implementation of software based automatic heart monitoring system through speech signal analysis
<b>Mathematics</b>	
20	Matrix splitting of rectangular/singular matrices and its application to system of linear equations
21	Convergence analysis of of some iterative algorithms for nonlinear mapping
22	Stability of the oblate infinitesimal in the elliptic restricted three body problem with oblate radiating primaries
23	Application of fixed point theory in fractal theory
24	Cell models for micro polar fluid past porous particles
25	Modelling pattern from formation in spatial aquatic system: mathematical model and applications
<b>Physics</b>	
26	Synthesis and characterization of rare earth doped GdAlO <sub>3</sub> phosphors
27	Luminescence studies of different silicate phosphors doped with Dy <sup>3+</sup> for light emission
<b>Chemistry</b>	
28	Studies on interaction of surfactants and surfactant mixtures with serum albumin
29	Studies on interaction of surfactants and surfactant mixtures with serum albumin
30	Analytical study on some domiciliary lethal pesticides in the selected environments of C.G.
31	Aspect of Cr(VI) pollution in various environmental matrices of Chhattisgarh state
32	Hydrolytic cleavage of organ phosphors pesticides by oximate and hydroxamate ions in self-organized assemblies
33	Analytical investigation of some food additive and toxic adulterants employing DRS/ATR-FTIR spectroscopic technique
34	Nanostructured organo-functionalized mesoporous silica materials:Synthesis and catalytic applications
35	Development of carbonized agro granules for the removal of surfactants from waste water/environmental sample
36	Assessment of fluoride, nitrate, sulphate and physic-chemical quality in drinking water of Pondi-Uproda tehsil of Korba district (CG) and its impact on the public health
<b>Botany</b>	
37	Soil fungal diversity: search for an effacement phosphate solubilizer in the paddy fields of Sargaon area (Mungeli) of Chhattisgarh
38	Screening of anti sickling property of some plants used for the treatment of sickle cell anaemia
<b>Zoology</b>	
39	Patterns of cave biodiversity, endemism and its conservation strategies in Chhattisgarh
40	Histopathological and histochemical studies on the effect of malathion on various tissues of the freshwater crab <i>Barytelphusa cunicularis</i> (Westwood-1836)
<b>Bioscience</b>	

Sl	Subject wise Title of Mini Research Project
41	Exploration of endophytic actinomycetes for antibiotic potential from some medicinal plants of Raipur district
<b>Biotechnology &amp; Bioinformatics</b>	
42	Comparative study of physicochemical properties of reserved and nonreserved pond and its effect on microbial diversity in Durg Bhilai Twincity, Chhattisgarh
43	Production of Bio ethanol from deoiled rice bran by <i>Saccharomyces cerevisiae</i> MTCC 4780
44	Phytochemical investigation of <i>Moringa oleifera</i> plant extract and its protective role on cisplatin nephrotoxicity
45	Morphological, Biochemical and molecular characterization of poisonous and non-poisonous mushroom
46	Marker assisted breeding for development of gynoeocious Indian Bitter Gourd
47	Lignocellulosic -poly (lactic acid) based composites for multifaceted applications
48	Evaluation and identification of elite Kalmegh genotypes with high endographolide content from the Northern Hill of Chhattisgarh
49	Characterization of conidial antigens isolated from aeromicroflora of Chhattisgarh
50	Computer added drug design of peptide based drugs: lipopeptides
51	Decision support system for the diagnosis of asthma burden using artificial intelligence
52	Enumeration and antimicrobial activity of actinomycetes in Keshkal forest region of Chhattisgarh
<b>Microbiology</b>	
53	Exploration of economic biovalorization potential of rice husk for bio ethanol production
54	Screening of microbes isolated from soil samples of Chhattisgarh for potential invertase production by utilization of agro-industrial wastes from resident industries
55	Identification of potential ground artificial recharge zones for rainwater harvesting in Raipur Municipal Corporation Naya Raipur area, Chhattisgarh
<b>Agriculture</b>	
56	Development of rice varieties for high temperature tolerance & higher milling recovery through physiological, physico-biochemical & genetic approaches
57	"Identification and validation of candidate SNPs markers for drought tolerance in rice
58	Strain improvement through selection for mating competence in monokaryotic isolates derived from <i>Pleurotus</i> spp.
59	Technology development for hairy root culture for the production of andrographolide from <i>Andrographis paniculata</i> for entrepreneurship
60	Exploration of crop beneficial bio agents for fast degradation of pesticides for good soil health and crop productivity
61	Preliminary studies on survey, epidemiology and management of false smut of rice under field condition of Chhattisgarh
62	Maximizing seed yield of gum producing Guar ( <i>Cyamopsis tetragonoloba</i> (L.) Taub) through vertical selection and agro management practices under rainfed ecology of Chhattisgarh
63	Refinement in planting method of rice using different machines
64	Development of suitable management tactics for the management of sugarcane leaf hopper under Kabirdham region
65	Collection evaluation and characterization of Cassia tora for quality seed production for farming communities

<b>Sl</b>	<b>Subject wise Title of Mini Research Project</b>
66	Formulation of soil inhabiting microbial consortia for enhancing plant growth of Chick Pea
67	Identification and promotion of best genotype on the basis of agromorphology, phytochemical, molecular and development of packages in ashwagandha ( <i>Withania somnifera</i> ) for income generation by the farmers of CG
68	Wheat breeding for wider adoptability
<b>Forestry</b>	
69	Exploration of genetic diversity in bamboo species in Bastar plateau of Chhattisgarh
70	Study of structure and function of different agro forestry practices existing in Chhattisgarh Plain
<b>Pharmacy</b>	
71	QSAR analysis of some derivatives of quinoxaline as antimalarial agent
72	Development and characterization of corticosteroid loaded topical nanocolloidal carriers for treatment of inflammatory ocular disorders
73	Evaluation of ethnomedicinal plants of Chhattisgarh against breast cancer
74	Design synthesis and evaluation of drug conjugate for CNS drug delivery via endogenous transport system at blood brain barrier
75	Pharmaceutical screening of some anti diabetic formulations prepared indigenously by local healers of Chhattisgarh
76	A search for herbal anti cataract drugs from Achanakmar Forest area of Chhattisgarh
77	Formulation and development of quercetin-loaded poloxamer based in situ thermosensitive injectable hydrogel for the cure of breast cancer
78	Development and characterization of pegylated conjugates for some poorly soluble plant extracts
79	Development Characterization and validation of analytical method for quantification of lipid nanoparticles loaded with alkylating agents for treatment of ovarian cancer
80	Development of novel delivery systems for curing lymphatic filariasis from indigenous herbal sources of Chhattisgarh State
<b>Medical Sciences</b>	
81	Glutathione peroxidase (GPx1) and Preoxiredoxin-2 (Prx2) as mediator of antisickling effect of human erythrocytes
82	Innovation of mobile artificial kidney easy dialysis (MAKE-D)- A revolutionary change in dialysis therapy
83	In vitro screening of Chhattisgarh herbs for countering diarrhea with special emphasis on cholera
84	Development and registration of thoracic 3D image of a fully-clothed subject for wireless non-contact sensors in self –operable, fully-automated device to access cardiac-vital parameters
85	Identification and correlation of B-globin gene cluster haplotypes with clinical and haematological features of sickle cell anaemia in Chhattisgarh
86	Establishment of reference interval for thyroid hormones in the first trimester of pregnancy-a hospital based study
87	Prevalence of MTHFR polymorphosim and its impact in patients of sickle cell disease and trait in Chhattisgarh-a pilot study
<b>Anthropology</b>	

Sl	Subject wise Title of Mini Research Project
88	Predicators of cardiovascular risk in chronic obstructive pulmonary disease (COPD) patients
	<b>Social Sciences</b>
89	Chhattisgarh ke anusuchit jati-Janjati Sarpancho ka gram in vikas me yogdan (Adiwasi evam gair adivashi jile ke sanderbh me)
90	Prevalence and awareness of chronic disease among women of different profession in relation to life style and activity level

Seminar /Symposium /Conference/ Workshop

Sl	Title of programme
1	Conference on 'Microbiology beyond the petri plates'
2	International Seminar on 'Low cost eco-friendly housing system for rural development in India'
3	National Symposium on 'Quality management in laboratory investigations and hematological disorders & hands on workshop on quality control and NABL accreditation'
4	Seminar on 'Generation gap and family integration' from
5	National conference on 'Advances in nanotechnology and their applications'
6	International conference on 'Environmental Changes in South and South -East Asia: Challenges and Prospects' from
7	National level workshop on 'Cyber Disease & Whatsapp Hack'
8	Workshop on 'Principals and Application of Analytical Instruments for Pharmaceutical Analysis'
9	II <sup>nd</sup> International conference on 'Frontier in Pharmaceutical Sciences and Research with theme: Advances in Development, Delivery Systems and Clinical Monitoring of Drugs'
10	Workshop on 'Hands on Training on Working with Cancer Cell Lines for Preliminary Screening of Chemo Preventive Agents'
11	National Workshop on 'Plant Molecular Techniques & Phytochemistry'
12	International Seminar on 'Emerging Skill Development trends in the field of Sciences, Social Sciences and Education'
13	International seminar on 'Recent Trends in Pharma Research from Laboratory to Patents'
14	National conference on 'Prospects of Innovation in Life Sciences and Socio- Economic Challenges'
15	National seminar on 'Intervention of Information and Communication Technology for Productive Management in Higher Education'
16	International conference on 'Innovative Trends in Engineering, Science & Management
17	National conference on 'Emerging Role of Plant Physiology for Food Security and Climate Resilient Agriculture '
18	Workshop on 'Development of Agriculture Graduates as an Agripreneurs: Issues and Challenges'
19	National conference on 'Innovation Solutions for Rural Development of Chhattisgarh'
20	Seminar on 'Environmental Conservation and Sustainable Development in Chhattisgarh'
21	22 <sup>nd</sup> CRSI National symposium in Chemistry and 12 <sup>th</sup> CRSI-RSC
22	National seminar on 'Recent Advancement in Iron and Steel Production'
23	Seminar on ' Current Need of Patent and Publication in Research for Global Recognition'
24	National Workshop on 'Medical Lab Technology: Recent advances in lab diagnostics '
25	5 <sup>th</sup> National workshop on 'Innovative Digitization Techniques Towards Mission Digital India
26	65 <sup>th</sup> National conference of Anatomical Society of India (NATCON-65)
27	National Workshop on 'Animal Cell Culture: Technique and Applications-2018'

<b>Sl</b>	<b>Title of programme</b>
28	National Workshop on 'Awareness about Patent'
29	National Seminar on 'Sustainable Rice Production Technology for the Farmers Income
30	National Conference on 'Data Analysis Machine Learning and Security'
31	National Seminar on 'Pharmaceutical Industries in Chhattisgarh, Need & Opportunities'
32	International Conference on 'Mathematical Sciences and Applications (ICMSA-2018)
33	Seminar on 'Electronic Media and Social Change'
34	Workshop on 'Emerging Trends in Computer Science'
35	Workshop on "S & T" for Harnessing Natural Resources towards Sustainable Development'
36	National Workshop on 'Entrepreneurship Development through Cultivation, Processing and Value addition of MAPs and NTFPs',
37	National Seminar on 'Water Conservation: Need of the Time '
38	National Seminar on 'Nanotechnology to Translational Nanomedicine: Status Assessment, Challenges and New Horizons'
39	National Seminar on 'Relevance of Medical Anthropology and Tribal Health Care Systems in the Globalizing World (REMATH)'
40	Conference on 'Indigenous Foods: How to promote it'
41	National Conference on 'Trauma- Recent Trends' on

#### Travel Grant

<b>Sl</b>	<b>Name of Programme &amp; Date and Place</b>	<b>Title of Research Paper</b>
1.	International conference on Innovative approaches in applied sciences and technologies' at Singapore	Development of low cost adsorbent from common weeds from removal of hazardous material
2.	International conference on 'Natural Science & Environment' From 02 <sup>nd</sup> -03 <sup>rd</sup> Nov., 2017 at Abu Dhabi in UAE	Direct rhizogenesis, photochemical analysis and antimicrobial activity of <i>Bryonia laciniosa</i>
3.	International conference on 'Natural Science & Environment' From 02 <sup>nd</sup> -03 <sup>rd</sup> Nov., 2017 at Abu Dhabi in UAE	Enzymatic screening and antibacterial potential of actinomycetes from soil of Bastar India
4.	08 <sup>th</sup> International conference on Applied Human Factors and Ergonomics' From 19 <sup>th</sup> to 21 <sup>st</sup> July, 2017 at Los Angeles, USA	Precise placement of pericardial electrodes with 15 an accuracy for recording ECG in self-operable diagnostic devices
5.	XVII <sup>th</sup> International conference on 'Origin and evolution of life (ISSOL)' From: 16 <sup>th</sup> to 21 <sup>th</sup> July, 2017 at Sandiego, USA	Photochemical synthesis of bio inspired inorganic-organic hybrid photo-cell-like self sustaining super molecular assemblies in a laboratory simulated atmosphere
6.	37 <sup>th</sup> Asian Conference on Remote Sensing' From: 17 <sup>th</sup> to 21 <sup>th</sup> October, 2016 at Colombo, Sri Lanka	Application of geo-informatics in creation of web water & irrigation resource information system

#### Publication Grant proposal for publication of proceeding

<b>Sl.</b>	<b>Title</b>
1	State level Seminar on 'Generation Gap and Family integration' From 07 <sup>th</sup> - 08 <sup>th</sup> Sept. 2017

## A. Patent Information Centre

<b>Institutional Patent facilitated</b>			
<b>Sl.</b>	<b>Name of the applicant</b>	<b>Patent related to</b>	<b>Name of the Inventor</b>
1.	Pt. Jawaharlal Nehru Memorial Medical College, Raipur	MAKE - D (Wearable Dialysis for Kidney Patients)	Dr. Puneet Gupta, JNM Medical College, Raipur
2.	Pt. Jawaharlal Nehru Memorial Medical College, Raipur	Self-Operable, Non-Invasive, Non-Contact Bio-signal Monitoring	Dr. Kavita Gupta, JNM Medical College, Raipur
3.	Guru Ghasidas Central University, Bilaspur and ICMR, GOI	Novel 5-[4-(2-biphenyl-4-yl-2-oxo-ethoxy)-benzylidene]-thiazolidine-2,4-diones, their synthesis and uses thereof	Dr. Suresh Thareja, Assistant Professor, School of Pharmaceutical Sciences, Guru Ghasidas Central University, Bilaspur

<b>Individual Patents facilitated</b>		
<b>Sl.</b>	<b>Name of the applicant/Inventor</b>	<b>Patent related to</b>
1.	Shri Laxman Tibdewal, Raipur	Tractor Driven Cultivator (Shovel)

<b>Popular Lecture Series</b>				
<b>Sl.</b>	<b>Workshop / Lecture</b>	<b>Date</b>	<b>Venue</b>	<b>No of participants</b>
1.	Lecture on IPR and Institutional IP Policy	19 <sup>th</sup> July 2017	Columbia Institute of Pharmacy	50
2.	IPR in agriculture for doubling the farmers income	12 <sup>th</sup> September, 2017	ICAR-NIBSM, Raipur hosted a short term training on 'New Frontiers in Biotic Stress Management for Doubling Farmers Income' from 11-20th September, 2017	50
3.	IPR enablement and Trade Mark Rules and Procedure	13 <sup>th</sup> October 2017	One day Awareness/ Sensitization programme on Intellectual Property Rights organised by MSME at Raipur	100
4.	IPR lecture	15 <sup>th</sup> November 2017	NCERT's Jawaharlal Nehru National Science, Mathematics and Environment Exhibition 2017, RCVP Noronha Academy of Administration	500

<b>Popular Lecture Series</b>				
<b>Sl.</b>	<b>Workshop / Lecture</b>	<b>Date</b>	<b>Venue</b>	<b>No of participants</b>
			and Management, Bhopal	
5.	IPR lecture for refresher course on Botany	26 <sup>th</sup> November 2017	Guru Ghasidas Vishwavidyalaya (A Central University), Bilaspur (Refresher Course in Botany)	50
6.	IPR Lecture on Importance & advantages of protection of IPR and Patentability Criteria in One day joint workshop on “Professional skilled development specialized Training Program on introduction to Indian Patenting Procedures	6 <sup>th</sup> January 2018	College of Dairy Science and Food Technology, Kamdhenu University, Raipur	100
7.	Lecture on IPR (RUSA programme)	12 <sup>th</sup> January 2018	Government Kavyopadhyay Hiralal College, Abhanpur	60
8.	Lecture on IPR and Plagiarism on National Level Paper Presentation Meet	22 <sup>nd</sup> February 2018	Bhilai Institute of Technology, Raipur	150

<b>IP awareness workshops organized</b>				
<b>Sl.</b>	<b>Title</b>	<b>Date</b>	<b>Venue</b>	<b>Participants</b>
1.	National Workshop on Awareness about IPR	31 <sup>st</sup> January and 1 <sup>st</sup> February 2018	Shri Shankaracharya Mahavidyalaya, Junwani, Bilai	200
2.	National Seminar on “Current Need of Patent & Publication in Research for Global Recognition”	09 <sup>th</sup> – 10 <sup>th</sup> March 2018	Rungta College of Pharmaceutical Sciences and Research, Bilai, Chhattisgarh	249

## Annexure - V

## BUDGET FOR MAN POWER - (2018-19) (As per 6th Pay Commission Scales), (Based on 01.04.2016)

Sl	Name of the Official	Designation	Pay in Pay Band	Grade Pay	DA	HRA	CC A	Tele	Total
1	Dr. S. Karmakar	Scientist "E-2"	71616 0	120000	11371 78	12542 4	900	6000	210566 2
2	Dr. B.K. Rai	Scientist "E-2"	64652 0	120000	10424 67	11497 8	900	6000	193086 4
3	Shri. P. Kawishwar	Scientist "E-1"	58470 4	106800	94044 6	10372 6	900	6000	174257 5
4	Shri. M.K. Beg	Scientist "E-1"	58470 4	106800	94044 6	10372 6	900	6000	174257 5
5	Dr. T. Singh	Scientist "D"	32852 0	91200	57081 9	62958	900	6000	106039 8
6	Dr (Smt) J.K. Rai	Scientist "D"	32852 0	91200	57081 9	62958	900	6000	106039 8
7	Er. K. Srinivas Rao	Scientist "D"	32484 8	91200	56582 6	62407	900	6000	105118 1
8	Dr. A.K. Pathak	Scientist "D"	34064 0	91200	58730 2	64776	900	6000	109081 8
9	Dr. Amit Dubey	Scientist "D"	31273 6	79200	53303 2	58790	900	6000	990658
10	Dr.M.K. Chandravanshi	Scientist "C"	25055 2	64800	42887 9	47303	900	6000	798434
		TOTAL	44179 04	962400	73172 14	80704 6	900 0	6000 0	135735 64

NOTE Basic Pay and other admissible allowances are calculated for the above 10 officers on the basis of their positions as on 01.04.2016 as per the guidelines of DST vide letter no DST/SSTP/Review\_SSTP/2017-18 dated 04.01.2018. For the calculation purpose B.P. as on 01.04.2016+ increment given on 01.07.2016, 01.07.2017 & proposed on 01.07.2018+ prevailing D.A. of 136 % in the sixth pay commission as per the orders of Government of Chhattisgarh is taken into consideration.



## EXPENDITURE FOR THE YEAR 2017-18 (ON ACTUAL BASIS)

S l	Name of the Official	Designation	Pay in Pay Ban d	Grade Pay	DA	HRA	CC A	Tel e	Total
1	Dr. S. Karmakar	Scientist "E-2"/ Director	6941 20	120000	11150 30	1221 24	900	600 0	2058174
2	Dr. B.K. Rai	Scientist "E-2"/ Director	6265 20	120000	10226 42	1119 80	900	600 0	1888042
3	Shri. P. Kawishwar	Scientist "E-1"	5666 40	106800	92027 8	1010 20	900	600 0	1701638
4	Shri. M.K. Beg	Scientist "E-1"	5666 40	106800	92027 8	1010 20	900	600 0	1701638
5	Dr. T. Singh	Scientist "D"	3180 40	91200	55923 8	6138 8	900	600 0	1036766
6	Dr (Smt) J.K. Rai	Scientist "D"	3180 40	91200	55923 8	6138 8	900	600 0	1036766
7	Er. K. Srinivas Rao	Scientist "D"	3144 80	91200	55437 0	6085 2	900	600 0	1027802
8	Dr. A.K. Pathak	Scientist "D"	3298 00	91200	57531 0	6315 6	900	600 0	1066366
9	Dr. Amit Dubey	Scientist "D"	3027 20	91200	53830 6	5909 2	900	600 0	998218
10	Dr. M.K. Chandravanshi	Scientist "C"	2424 80	79200	43958 6	4825 6	900	600 0	816422
<b>TOTAL</b>									<b>1,33,31,832</b>

## DST SUPPORTED APPROVED MANPOWER

Sl .	Name of the Post	Date of creation of the post	Name of the incumbent working	Promotion if given date of promotion	Date of joining (Initial appointment)	Present Designation	Pay scale	Approximate monthly emoluments (As per 6 <sup>th</sup> pay commission)
1	Scientist "E-2"	15-07-13	Dr. S. Karmakar	17-06-15	30-07-1987	Scientist "E-2"	3740-0-	164855
2	Scientist "E-2"	15-07-13	Dr. B.K. Rai	17-06-15	01-08-1990	Scientist "E-2"	6700-0+1000-0	151221
3	Scientist "E-1"	15-07-13	Shri. P. Kawishwar	10-03-15	01-01-1993	Scientist "E-1"	3740-0-	136474
4	Scientist "E-1"	15-07-13	Shri. M.K. Beg	10-03-15	26-09-1994	Scientist "E-1"	6700-0+8900	136474
5	Scientist "D"	15-07-13	Dr. T. Singh	01-01-14	16-07-2003	Scientist "D"	1560-0-3910-0+7600	83148
6	Scientist "D"	15-07-13	Dr. (Smt) J.K. Rai	01-01-14	18-07-2003	Scientist "D"		83148
7	Scientist "D"	15-07-13	Er. K. Srinivas Rao	30-12-14	01-08-1990	Scientist "D"		82431
8	Scientist "D"	15-07-13	Dr. A.K. Pathak	30-12-14	26-09-1994	Scientist "D"		85519
9	Scientist "D"	15-07-13	Dr. Amit Dubey	20-09-16	11-09-2006	Scientist "D"		80060
10	Scientist "C"	15-07-13	Dr. M.K. Chandravan shi	21-09-16	21-09-2011	Scientist "C"	1560-0-3910-0+6600	65487

NOTE: Basic Pay and other admissible allowances are calculated for the above 10 officers on the basis of their positions as on 01.04.2016 as per the guidelines of DST vide letter no DST/SSTP/Review\_ SSTP/2017-18 dated 04.01.2018.

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## GOA

### 1. Details of State S & T Council

- Name of the Secretary & Member secretary/ Director General

Member Secretary : Shri. Deepak K. Parab

Address : Goa State Council for Science & Technology  
: Opposite Saligao Seminary, Saligao Bardez,  
Goa - 403511

E-mail : [ms-gscst.goa@nic.in](mailto:ms-gscst.goa@nic.in)

Phone : (0832) 2407189

Fax : (0832) 2407012

Mobile : 9834553931

### 2. Structure of the Council:

a) Date of Establishment: 29/04/1993

b) Organization Structure

**Member Secretary: Deepak K. Parab**

**Asst. Accounts Officer: Shri. Ramkrishna B. Kanolkar**

**Scientific and Technical section**

**Chief Scientist: Dr. Joseph S. Rauto de Souza**

**Presently posted as Director, Goa State Remote Sensing Centre)**

**Project Scientists:**

1) Mrs. Brenda Fernandes (Water Resource)

2) Deepak K. Parab ( Environment)

**Technical Assistant**

1) Mr. Sanjeev Chodankar

**Junior Cartographer**

1) Mr. Pravin T. Parab

2) Mr. Francisco Lucas

**Project Assistant**

1) Miss. Madhuri Shetye (On contract)

**Administration and Accounts section**

**Accounts Clerk – Mrs. Rajika Naik**

**Lower Division Clerk – Mrs. Minaxi Naik**

**Driver – Mr. Ramesh Pednekar**

Peon – Mr. Vishram Naik

Sweeper - Mrs. Rasika R Kerkar (on contract)

**3. Budget allocation to your State S & T Council for last financial years including central government, State government & any other sources.**

<b>FY-2017-18</b>	<b>Schmes /projects</b>		<b>Total in lakhs</b>
State Govt.	Patent Information Centre	5.00	13.40
	Study Cum exposure Visit	1.40	
	Observance of Scientific Days	3.20	
	Tribal development programme	2.60	
	Geo-Feast-2018	1.20	
Central Govt	National Green Corps	26.15	31.36
	National mathematics day	01.77	
	National science day	03.44	
<b>Total</b>			<b>44.76</b>

**4. Key activities under taken during the last two years in the area of:-**

a) **Technology development:** cashew feni being one of favourite alcoholic drink provide major income generating source for the rural peoples and also generate employment. A special cashew feni policy was framed , with the support of Goa Institute of Management and with the support of BITS-Pilani a mechanized process is devise for the distillation of the cashew feni which will help to maintain the one standard of the liquor in entire state. The technology developed is presently under series of testing and will be made available for the feni distilars..

b) **Technology Demonstrations;** State Council played a important role in demonstrating processing of Jackfruits and Cocum amongst the various SHGs. In Goa monsoon starts by the first week of June, wherein the late vareities of Jackfruits and cocum gets ready for harvesting during this periods goes waste, as its not possible to consumed it nor sundry it for preservation and in order to avoide its wastage few programmes were conducted jointly with Agri dept wherein the jackfriuit can be process for varius 10 additional items for its usage in off seasons. State Council also in association with Goa Energy development is prepared a action plan for solar drying of Chilles and Cocum sole.

Demonstration of Vermicomposting and Composting is a common activity of the state Council and state Council organizes regular programmes for farmer and School students.

c) **Popularization of science** is a routine activities of the State Council, wherein two district level and four taluka level science exhibitions we organies on annual basis.

State Council developed various informative exhibits for display during such programmes.

**d) Patents**

State Council is shortly planning to initiate the work in patent with the support of DST, GoI, New Delhi.

However, with the support of State Government We have initiated work on GI and application for Coconut feni is filed and Statement of case is ready for following items/ produce and shortly we are filing the GI for following items/fruits.

Coconut vinegar

Khola Mirchi (Chilli)

Harmal mirchi

Halsano (pea)

Goa mankur (mango)

e) **Any new innovative activities.**

State Council is working to promote a new process initiated for wet waste management in schools. Through NGC programme two waste bins were provided to 500 schools and now to overcome the problems of wet waste we are assisting schools to install a cost effective methods.

**5. List 5 success stories with brief about 1 page each including photograph, if available.**

**1) Taluka Level Science Exhibition to National Important Days**

The programme is specially designed to provide an opportunity for the school students to get the exposure to the various science & technology related issues and to encourage them to pursue higher education in Science and exhibits their talent.

**Objectives:**

- To provide an opportunity to students to learn and understand latest development in Science.
- To provide an opportunity to students to show their talent
- To encourage students to participate in the various quizzes/competitions organised during the programme
- To provide an opportunity to students to put their own ideas in the working models.

Considering the above objectives, and in order to achieve the desired goals the Goa State Council for Science and Technology, Saligao with the financial support from Department of Science & Technology, Govt. of Goa all together four exhibition were conducted, three Science Exhibition was organised in association with the selected schools having the suitable infrastructure and the one is organised in the GSCST office premises at Saligao.

**1) Pernem Taluka**

At Harmal Panchyakroshi High School, Harmal Pernem Goa

**2) Salcete Taluka**

At Goa Our Lady of Health High School, Cuncolim

**3) Bicholim Taluka**

At Gomantak Gausevak Mahasangh, Sikeri, Mayem, Bicholim

**4) Bardez Taluka**

At Goa State Council for Science & Technology Office, Saligao Bardez



2) Address by Hon'ble Chief Minister Shri. Laxmikant Parsekart for inaugural function and Judges evaluating Science Model for taluka level Science Exhibition

**The Goa State Council for Science & Technology (GSCST), Saligao, Goa is the State Nodal Agency for Implementing the National Green Corps (NGC) programme in the State of Goa. In this direction, various environments related events have been organised by the Nodal Agency. The State of Goa has received the Grant-in-Aid for the year 2017-18 from the Ministry of Environment & Forest, Govt. of India, New Delhi to implement this programme. The Ministry has enhanced the Grant-in-Aid from Rs. 2500/- to Rs. 5,000/- per Eco-club, which were released to 432 schools out of 500 Eco-club.**

**Since Ministry proposed to take up the issues pertains to waste management to make the school premises plastic free three Teachers interactive workshops were organised on 07/02/2018, 09/02/2018 and 15/02/2018 at Margao, Porvorim and Ponda respectively to guide the teachers and work out the modalities to implement the scheme effectively in the State by involving Eco-clubs.**



Resource person from GSBB delivering lecture during the



Participants for the Workshop at Porvorim (North Goa)



Participants for the workshop at Ponda

### **3 National Mathematics Day**

National Mathematics Day is known for Srinivas Ramanujan. A self-taught mathematician who made extraordinary contributions to the world of mathematics. S Ramanujan was one of the most influential mathematicians of his time. He was considered as doyen of number theory, infinite series, mathematical analysis and making formulas and equations without any formal training in pure mathematics. As a mathematical genius, he had compiled more than 3900 mathematical results and equations and getting discoveries named after him. His numerous assertions in mathematics opened up new vistas of mathematical research. Along with British Mathematician Hardy, Ramanujan had discovered the smallest number represented as sum of two cubes 1729 which is known as Hardy-Ramanujan number.

He didn't live long but in his short life he compiled more than 3900 mathematical results and equations, and his discoveries namely Ramanujan Prime and Ramanujan theta inspired further research on the subject.

An unparalleled genius and a self-taught mathematician, Ramanujan found his true calling in numbers and made extraordinary contributions to mathematical analysis, number theory, infinite series, and continued fractions.

#### **Objectives-**

- 1) To create awareness and develop love and compassion for Science.
- 2) To enhance creativity of students.
- 3) To develop curiosity for various natural phenomenon taking place and to satisfy the same Through hands on activities.
- 4) To promote development of Science talents through quizzes, competitions and screening of audio-visual programmes.

To give wide publicity of these programmes, Goa State Council for Science & Technology, Saligao Goa and other funded Educational Institution with the financial support of Department of Science & Technology, GoI, New Delhi taken a keen interest and organised these programmes in the state in a grand way.

The details of the programme organised by GSCST and other funded Institutions are as under:

#### **National Mathematics Day**

The Goa State Council for Science and Technology celebrated (observed) Mathematics day on 20<sup>th</sup> February 2018 at Menezes Braganza Auditorium Panaji Goa. At the beginning the State Coordinator Sh. Sanjeev Chodankar welcomed the gathering and briefed out the importance of the days and the contribution of great mathematician Srinivas Ramanujan. To give respect and tribute to a great man Srinivas Ramanujan offer garland to their photos with the hands of Member Secretary, participating teachers, Students and the officials of State Council.

On this occasion a competition such as power point presentation on contribution of Indian Mathematicians was highlighted by the various Schools of Goa. The below mentioned schools were presented their PPT.



Students delivering PPT and prize winning participants

#### **4 Exposure Visit to Kisan Fair (Moshi, Pune)**

**Kisan Fair is the India's largest trade fair for Agriculture in Pune is the place where Indian government officials, policymakers, and media representatives meet farmers. It's the place to get new contacts and to start new trends. This trade fair is an important communication and information stage for this branch. It offers the exhibiting companies the chance to present themselves to a professional audience. Here the visitor can catch up on the latest developments and trends on services and products from numerous different areas.**

**Kisan Fair is the India Largest Agricultural Show and is a 5 day agriculture trade exhibition, scheduled from 13th December to the 17th December 2017 in Moshi, Pune, Maharashtra. This event showcases products from Agriculture, Dairy, Water, Irrigation, Bio, Organic, Fertilizers and allied industries. Kisan Fair is organized with an objective to create a single platform for the Indian Agri-community. It is the only fair of its kind where agri professionals, policy makers, like-minded individuals, government officials and media from all parts of India come together to have a dialogue with the who's and who of Indian agriculture sector.**

**Visitors are coming from the field of Agriculture equipment & machinery, farm implements, seed and planting materials, fertilizers, pesticides and irrigation systems, material handling equipments, agro processing & packaging and agri business services, Poultry equipments, Poultry Machinery, Dairy equipment, Dairy Machinery, agriculture, aquaculture, animal husbandry and bio technology, green house & accessories, horticulture, organic farming and agro forestry.**

#### **Objectives:**

- 1) The main objective of the programme is to keep the farmer's in-tune with latest developments in agricultural sector.
- 2) To provide an opportunity specially to ST farmers to get acquainted with the latest technology development in the agricultural sector.
- 3) To make farmers aware about the knowledge pertains to the value addition for various agricultural produce to fetch good market price.



- 4) To learn and know about the latest high yielding and disease resistant seeds and crop variety developed along with organic pesticides for the control of pest & diseases.
- 5) To provide opportunity to farmers interact with other Experts/Farmers to overcome the problem in the Goa State.
- 6) To learn about Preservation techniques and processing perishable produce especially in vegetables.

Considering the above views the Goa State Council for Science & Technology, Saligao, Bardez, Goa with financial support of Department of Science & Technology, Govt. of Goa, Porvorim was organized a 4 days Exposure visit at Kisan Fair, Moshi, Pune, Maharashtra from 14/12/2017 to 17/12/2017. Around 31 progressive farmers of Tribal background, 5 GSCST officials and one Zonal Agriculture Officer a total of 37 participants took the benefit of the programme. The list of the farmers for this visit was called from the Director, Directorate of Agriculture, Tonca, Caranzalem, Goa. The programme was successfully organized by GSCST, Saligao.



Progressive farmer participating in Kisan fair at Moshi,

### **5. Observance of National and international Important Scientific Days**

The proposed programme is specially designed to provide an opportunity for the school students, teachers, general public, self-help members to get the knowledge of awareness of importance of various national and international days. The programme was funded by State Government. Considering the above the following important days has been shortlisted namely:

#### **1. National Science Day (28<sup>th</sup> February)**

28<sup>th</sup> of February, 1928 was the great day in India when an invention in the field of Indian science was completed by the famous Indian physicist, Sir Chandrasekhar Venkata Raman. He was a Tamil Brahmin and first one in the science, who had researched such invention in India. To commemorate and honour this event always in the future, 28<sup>th</sup> of February was asked to the Indian Government to designate as a National Science Day in India.

National science day is celebrated as one of the main science festivals in India every year during which students of the schools and colleges demonstrates various science projects. The celebration also includes public speech, radio-TV talk shows, exhibitions of science movie, science exhibition

based on themes and concepts, watching night sky, live projects and researches demonstration, debates, quiz competitions, lectures, science models exhibitions and many more activities.

**2. World Water Day (22<sup>nd</sup> March)**

World Water Day, on 22 March every year, is about taking action to tackle the water crisis. Today, there are over 663 million people living without a safe water supply close to home, spending countless hours queuing or trekking to distant sources, and coping with the health impacts of using contaminated water.

Globally, the vast majority of all the wastewater from our homes, cities, industry and agriculture flows back to nature without being treated or reused – polluting drinking and bathing and irrigation and losing valuable nutrients and other recoverable materials.

**3. Earth Day ( 22<sup>nd</sup> April)**

Earth Day is observed every year on April 22 to create awareness and support among the mass to protect the environment. The event is held worldwide to outreach to society and raise the issue on the occasion.

Like most of the countries, India also observes Earth Day. Associations, communities, government and non-profit organisations take initiatives to send the significant message to protect the environment through various advertisements, banners and charts. Schools and educational institutions are also abuzz with activities such as plating of trees, cleanliness drive to celebrate the World Earth Day. Students are given lessons on nature conservation.

**6. Has the Council developed any specific state related S & T and innovation policy? If so the details to be provided.**

State government yet to approve the proposal submitted regarding S & T Policy. Regarding innovation policy, State Govt. constituted separate Council for Innovations called state Innovation Council

**7. How strong are the links between other state government / departments if so provide details?**

Links with other state government departments is issue based, In Goa state we are yet to frame the S & T policy and specific workload for the state Council.

However, state Council is working together with following organisation on various state government and other private agency funded programmes.

Goa state pollution Control board

Goa state waste management corporation

Goa state innovation Council

Goa state Bio-diversity board

Goa state remote sensing centre

Goa State wetland authority

Member secretary & Scientists of the state council is representing on various experts group committee and board of directors of the above organisations.

**8. How strong are the links of the council with local industry units/associations?**

With respect to Industry we are trying to associate with local small industry programmes with programmes of MSME. State Council is associated with Goa Chamber of Commerce and Industry to work jointly for IPRs issues with support for patent , trademark etc with the support of TIFAC. Two meetings were held in this regards .

**9. List 5 major technology area, where the council can play an important role by finding convergent technological solutions.**

Waste management; As we all know, plastic is not a problem but its improper disposal is the major problems in Goa DST initiated and now successfully operating a waste treatment plant of 120 tons capacity per day producing power and quality fertilizers. However the non segregated waste is a major problems . so state Council is working with Waste management corporation to reach each house each shop to promote segregation of waste at source.

At school we are working with MoEF & CC to Beat the plastic pollution and make the school campus plastic free and promote schools as Green Schools under National green Corps.

Considering reduction in fish catch at few important fish points, State council is working to promote fish rearing technology with demonstrations.

Promotion of traditional salt tolerant rice varieties for conservation of Khazan lands, is also undertaken jointly with bio-diversity board. Barren khazan lands are coming under mangrove plantation disturbing land pattern and become difficult to take paddy plantation as per ban on cutting of mangroves.

State Council is also planning to undertake promotion of Value added programmes in various fruits and vegetables for both Tribal populations and peoples effected due to mining closure.

**Annexure I**

**Specific Achievements / Outcome of the project (Project no. with Title) (Restricted to one page only)**

**1 Project Title: Exposure Visit to Kisan Fair (Moshi, Pune) – 2017**

**Approved Objective/Activities:**

The main objective of the programme is to keep the farmer's in-tune with latest developments in agricultural sector.

To provide an opportunity specially to ST farmers to get acquainted with the latest technology development in the agricultural sector.

To make farmers aware about the knowledge pertains to the value addition for various agricultural produce to fetch good market price.

To learn and know about the latest high yielding and disease resistant seeds and crop variety developed along with organic pesticides for the control of pest & diseases.

To provide opportunity to farmers interact with other Experts/Farmers to overcome the problem in the Goa State.

To learn about Preservation techniques and processing perishable produce especially in vegetables.

**Achievements/Deliverables till date:**

The Goa State Council for Science and Technology, Saligao with the financial support from Department of Science & Technology, Govt. of Goa Porvorim was organized a 4 days Exposure visit at Kisan Fair, Moshi, Pune, and Maharashtra from 14/12/2017 to 17/12/2017. Around 31 progressive farmers of Tribal background, 5 GSCST officials and one Zonal Agriculture Officer a total of 37 participants took the benefit of the programme. The list of the farmers for this visit

was called from the Director, Directorate of Agriculture, Tonca, Caranzalem, Goa. The programme was successfully organized by GSCST, Saligao.

**Achievements/outcome (specific to utilization of funds for a period reported upon):**

Farmers acquainted with latest high yielding and disease resistant seeds and crop variety developed along with organic pesticides for the control of pest & diseases and also learnt learn about Preservation techniques and processing perishable produce especially in vegetables.

**2 Project Title: National Mathematics Day- 2017 & National Science Day-2018**

**Approved Objective/Activities:**

To create awareness and develop love and compassion for Science.

To enhance creativity of students.

To develop curiosity for various natural phenomenon taking place and to satisfy the same Through hands on activities.

To promote development of Science talents through quizzes, competitions and screening of audio-visual programmes.

**Achievements/Deliverables till date:**

**National Mathematics Day:**

The Goa State Council for Science and Technology celebrated (observed) Mathematics day on 20<sup>th</sup> February 2018 at Menezes Braganza Auditorium Panaji Goa. At the beginning the State Coordinator Shri. Sanjeev Chodankar welcomed the gathering and briefed out the importance of the days and the contribution of great mathematician Srinivas Ramanujan. To give respect and tribute to a great man Srinivas Ramanujan offer garland to their photos with the hands of Member Secretary, participating teachers, Students and the officials of State Council.

On this occasion a competition such as power point presentation on contribution of Indian Mathematicians was highlighted by the various Schools of Goa.

**National Science Day:**

The Goa State Council for Science and Technology celebrated (observed) National Science Day 08/03/2018 (28/02/2018) at State Council for Educational Research & Training Centre (SCERT), Porvorim, Bardez Goa. Around 52 participants mainly teachers and Students are attended the programme. At the beginning the State Coordinator Shri. Sanjeev Chodankar welcomed the gathering and briefed out the importance of the day and highlighted the contribution of great Scientist Sir. C. V. Raman towards the development of Science. To give respect and tribute to such a great man C. V. Raman garlanding their photos with the hands of Mr. U.T. Arasu, Environment Officer of C.P.R.E. Chennai, Shri. Deepak Parab, Member Secretary and other officials of the State Council.

The Resource Person Dr. Mohan Girap, Scientist from State Pollution Control Board, gave a talk on the theme “Science and Technology for Sustainable future” identified for this year.

On this occasion Quiz competition and Poster competition was conducted. The quiz is on general science and Poster competitions for Technological Advancement for Societal benefits with their merits and demerits.

**Achievements/outcome (specific to utilization of funds for a period reported upon):**

Created awareness and develop love and compassion for Science

Enhance creativity of Goan students.

Developed curiosity for various natural phenomenon taking place and to satisfied the same through hands on activities.

Promoted development of Science talents through quizzes, competitions and screening of audio-visual programmes for Goan school students.

### **3 Project Title: Taluka Level Science Exhibition to National Important Days**

#### **Approved Objective / Activities:**

- To provide an opportunity to students to learn and understand latest development in Science.
- To provide an opportunity to students to show their talent
- To encourage students to participate in the various quizzes/competitions organised during the programme
- To provide an opportunity to students to put their own ideas in the working models

#### **Achievements/Deliverables till date:**

Considering the above objectives, and in order to achieve the desired goals the Goa State Council for Science and Technology, Saligao with the financial support from Department of Science & Technology, Govt. of Goa all together four exhibition were conducted, three Science Exhibition was organised in association with the selected schools having the suitable infrastructure and the one is organised in the GSCST office premises at Saligao.

1) Pernem Taluka

At Harmal Panchyakroshi High School, Harmal Pernem Goa

2) Salcete Taluka

At Goa Our Lady of Health High School, Cuncolim

3) Bicholim Taluka

At Gomantak Gausevak Mahasangh, Sikeri, Mayem, Bicholim

4) Bardez Taluka

At Goa State Council for Science & Technology Office, Saligao Bardez

#### **Achievements/outcome (specific to utilization of funds for a period reported upon):**

Opportunity was given to the students to learn and understand latest development in Science and also to show their talent.

Students participated in the various quizzes/competitions organised during the programme

Students had displayed their own ideas by the various science models.

### **4 Project Title: National Green Corps**

#### **Approved Objective / Activities:**

#### **Achievements/Deliverables till date:**

The Goa State Council for Science & Technology (GSCST), Saligao, Goa is the State Nodal Agency for Implementing the National Green Corps (NGC) programme in the State of Goa. In this direction, various environments related events have been organised by the Nodal Agency.

The State of Goa has received the Grant-in-Aid for the year 2017-18 from the Ministry of Environment & Forest, Govt. of India, New Delhi to implement this program. The Ministry has enhanced the Grant-in-Aid from Rs. 2500/- to Rs. 5,000/- per Eco-club, which were released to 432 schools out of 500 Eco-club.

**Achievements/outcome (specific to utilization of funds for a period reported up**

**5 Project Title: World Ozone Day-17**

**Approved Objective / Activities:**

The main objectives of the mission is to celebrate the World Ozone Day in a befitting manner marking the 30<sup>th</sup> Anniversary of the Montreal Protocol which began the dedicated effort in reduction in the Ozone depleting substances.

**Achievements/Deliverables till date:**

The Goa State Council for Science & Technology, Saligao, Bardez, Goa with financial support of Ministry of Environment, Forest & Climate Change, Govt. of India, New Delhi organized World Ozone Day marking the 30<sup>th</sup> Anniversary of the Montreal Protocol.

On this occasion the competition on the theme “Protection of the Ozone Layer “on Painting and Slogan writing for the school students in the age group of 13 to 17 years were organized. The prizes in each category of Rs. 10,000, Rs. 7,500/-, Rs 5000/- and two consolation prizes of Rs. 2000/- each were awarded to the winners.

**Achievements/outcome (specific to utilization of funds for a period reported upon):**

Keeping in view the 30<sup>th</sup> anniversary of the Montreal Protocol and the on-going Ozone Heroes campaign of the Ozone Secretariat, United Nations Environment Programme (UNEP) proposed a workshop on Painting and Slogan writing competitions in various schools across the State. The participating students become the “Ozone Heroes” for spreading the awareness on Ozone Layer Protection and its associated environmental benefits

**6 Project Title: WIPRO Earthian - 2017**

**Approved Objective / Activities:**

The core objective of Wipro Earthian are integrating sustainability education in to school curriculum, to critically engage students with sustainability issues through multiple perspectives, driving sustainability thinking and action through the learning process and empowering teachers and learners to drive change in their own contexts and environment. The program is creative in promoting environmental thinking among the school going children which is highly connected to the curriculum.

**Achievements/Deliverables till date:**

Sustainability Education Programme (WIPRO-Earthian) C.P.R. Environmental Education Centre is a Centre of excellence in Environmental Education of the MoEF&CC, GoI, in collaboration with WIPRO-Earthian has taken up a Sustainability Education Programme in

Goa with collaborative support of the State Council. The programmes involves innovative project submissions on sustainability of water and bio-diversity by groups of students guided by teachers.

**Achievements/outcome (specific to utilization of funds for a period reported upon):**

During 2017-18 around 60 schools participated in the WIPRO-Earthian programme in the State of Goa wherein Shri Mahalaxmi High school, Kudne, Bicholim and Our Lady of Remedies High School, Nerul, Bardez, Goa won the National award of Rs. 1.00 lakh each.

The expenditure has been entirely borne by the C.P.R Environmental Education Centre, Chennai & WIPRO. There was no financial liability on the Goa State Council for Science & Technology.

**7 Project Title: Beach Cleaning Drive  
Approved Objective / Activities:**

**Achievements/Deliverables till date:**

As a part of awareness program for minimising usage of plastic and on the theme for this year's World Environment Day 2018 "Beat Plastic Pollution" a beach cleaning program was launched in Goa on 14/5/2018 at Calangute Village Panchayat in the distinguished presence of Dr. Anil Kumar Jain, Additional Secretary to Ministry of Environment, Forest & Climate Change, Govt. of India, New Delhi and Sarpanch of Calangute Village Panchayat, Calangute, Bardez, Goa. Before the inaugural session, beach cleaning drive was taken up by involving school children's, teachers and local community.

Inaugural event of Beach Cleanliness Drive by Shri Sudesh Mayenkar, Sarpanch of Calangute Village Panchayat, Dr. Anil Kumar Jain, Additional Secretary, MoEF&CC, GoI, New Delhi, Shri B. Barman, Advisor, MoEF&CC, GoI & Dr. Rivonkar, Head, Marine Science Department, Goa University.

**8 Project Title: Taluka Level Science Exhibition and observation of National Importance days  
Approved Objective / Activities:**

- To provide an opportunity to students to learn and understand latest development in Science.
- To provide an opportunity to students to show their talent
- To encourage students to participate in the various quizzes/competitions organised during the programme
- To provide an opportunity to students to put their own ideas in the working models.

**Achievements/Deliverables till date:**

Considering the above objectives, and in order to achieve the desired goals the Goa State Council for Science and Technology, Saligao with the financial support from Department of Science & Technology, Govt. of Goa all together four exhibition were conducted, three Science Exhibition was organised in association with the selected schools having the suitable infrastructure and the one is organised in the GSCST office premises at Saligao.

1) Pernem Taluka

At Harmal Panchyakroshi High School, Harmal Pernem Goa

2) Salcete Taluka

At Goa Our Lady of Health High School, Cuncolim

3) Bicholim Taluka

At Gomantak Gausevak Mahasangh, Sikeri, Mayem, Bicholim

4) Bardez Taluka

At Goa State Council for Science & Technology Office, Saligao Bardez

**Achievements/outcome (specific to utilization of funds for a period reported upon):**

The students to learned and understand latest development in Science and also shown their talent.

Students were participated in the various quizzes/competitions organised during the programme.

Group of students displayed their own ideas in the form of Science models in different field.



# Gujarat

## 1. Details of State S&T Council (For 2018-19)

- Name of the Secretary & Member Secretary / Director General Dr. Narottam Sahoo Advisor and Member Secretary Gujarat Council on Science and Technology
- Address, email, phone, fax, mobile number

### GUJARAT COUNCIL ON SCIENCE AND TECHNOLOGY

Dept. of Science & Technology, Govt. of Gujarat

Block: B, 7<sup>th</sup> floor, M. S. Building,

Sector 11, Gandhinagar: 382011

Phone: (079) 232593-62-65, Fax: 079-23259363

Mobile No. 09879553960, 09426490755

Email: [adv-gujcost@gujarat.gov.in](mailto:adv-gujcost@gujarat.gov.in), [narottam.sahoo@gmail.com](mailto:narottam.sahoo@gmail.com),

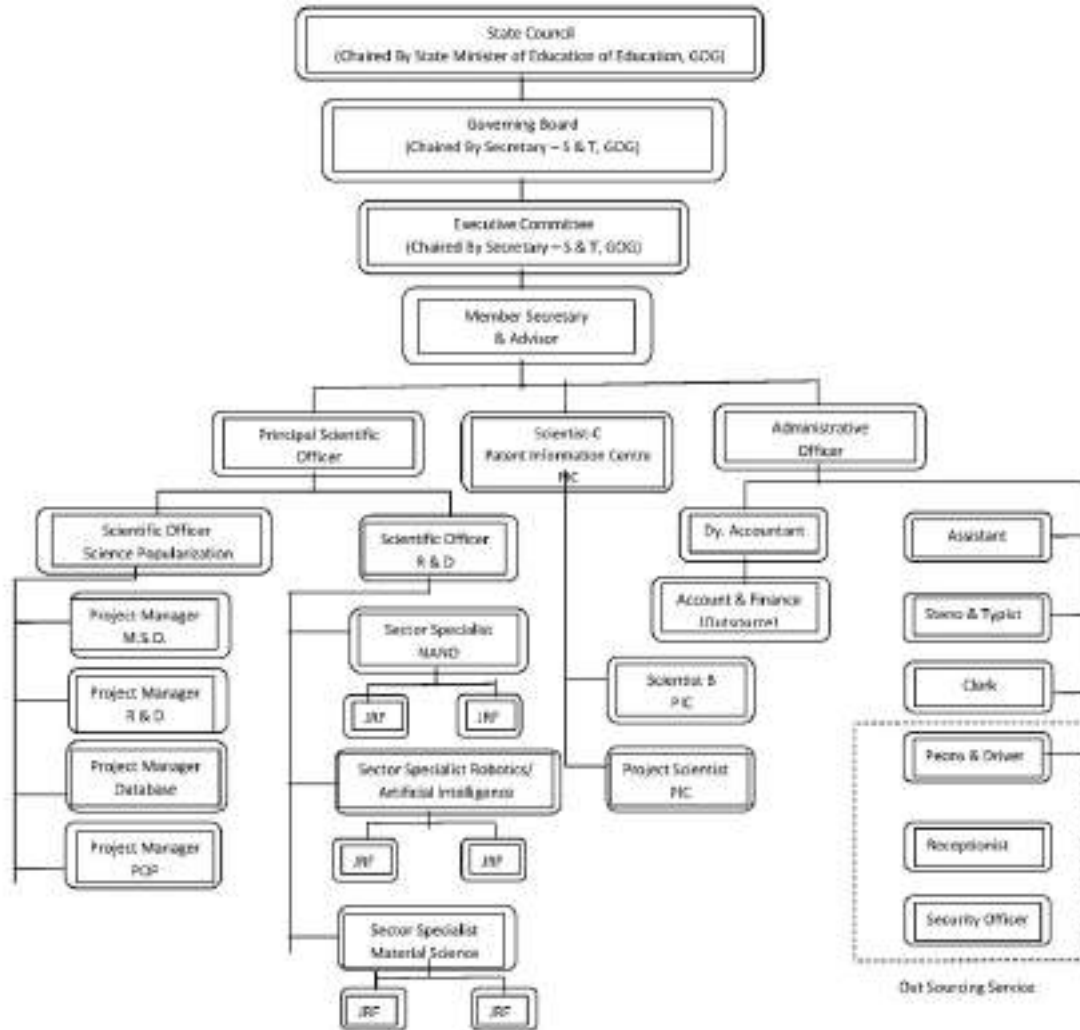
## 2. Structure of the Council:

- Year of Establishment: 1986
- Organization Structure:

Sr. No.	Designation	Pay Scale	Grade Pay	No. of Post
<b>Scientific Employees (Supported by DST, Govt of India)</b>				
1.	Advisor & Member Secretary	37400-67000	10000	1
2.	Principal Scientific Officer	15600-39100	8700	1
3.	Scientific Officer	15600-39100	5400	2
4.	Technical Assistant	9300-34800	4200	3
5.	Consultant (Sector Specialist)	40000 Fixed	-	3
<b>Administrative Employees (Supported by DST, Govt of India)</b>				
6.	Administrative Officer	15600-39100	7600	1
7.	Dy. Accountant	9300-34800	4200	1
8.	Steno	9300-34800	4200	1
9.	Typist and Clerk	5200-20200	1900	2
10.	Driver	5200-20200	1900	1
11.	Peons	10000 (fixed)	10000 (fixed)	4
<b>Total</b>				<b>20</b>

**Gujarat Council on Science and Technology**  
Dept of Science and Technology, Govt of Gujarat

**ORGANIZATION CHART**



DST GOI Supported Positions: SE: 11 (8 +3)  
AE=9  
DST, GOG Supported Positions: 13  
DST, GOI for PIC: 3  
**Total: 39**

c) Strength of approved manpower (both central (DST) and state supported)

Sr. No	Name	Designation	Pay scale	Appx monthly emoluments
<b>DST, GOI Supported and Approved Manpower</b>				
1.	Dr. Narottam Sahoo	Advisor Member Secretary	37400-67000 GP:10000	140970
2.	Dr Anasuya Lahiry	Principal Scientific Officer	15600-39100 GP: 8700	81190
3.	Ms. Nazeera Pathan	Administrative Officer	15600-39100 GP:7600	43140
4.	Recruitment is in Process	Scientific Officer (R&D)	9300-39100 GP: 5400	45000 fixed
5.	Recruitment is in Process	Scientific Officer (SP)	9300-39100 GP: 5400	45000 fixed
6.	Recruitment is in Process	Consultant (Sector Specialist )	40000 Fixed	40000 fixed
7.	Mr. Nayanbhai Upadhyaya	Dy. Accountant	9300-34800 GP:4200	40000 fixed
8.	Ms. Ami Meghal	Steno Grade-II	9300-34800 GP: 4200	30000 fixed
9.	Ms. Bhumi Shah	Technical Assistant	9300-34800 GP: 4200	30000 fixed
	Mr. Kaushik Patel		9300-34800 GP: 4200	30000 fixed
	Ms. Subhashree Satpathy		9300-34800 GP: 4200	30000 fixed
10.	Ms. Gayatriben Darji	Clerk	5200-20200 GP: 1900	15000 fixed
11.	Mr. Surendrasinh Chavda	Typist	5200-20200 GP: 1900	15000 fixed
12.	Kanubhai (Outsourcing Agency)	Driver	12000 Fixed	12000 Fixed
13.	Harish Pandya	Peon	12000 Fixed	12000 Fixed
	Manu Raval		12000 Fixed	12000 Fixed
	Arvind Thakore		12000 Fixed	12000 Fixed
	Smt. Induben Chavda		12000 Fixed	12000 Fixed
<b>DST, Govt of India supported and approved manpower</b>				
14.	Dr. Vandana Shirohi	Scientist C in PIC	15600-39100	55,000
15.	Dr. Satya	Scientist B in PIC	15600-39100	52,000
16.	Ms. Tejal Bhutani	Proj Scientist (PIC)	20000 - 23000	20,000

**3. Budget allocation to your state S&T council for last five financial years including central government, State government & any other sources.**

Sr.No	Year	State Govt. Grant in Rs. in lakh	Central Govt. Grant in Rs. in lakh
1.	2014-15	4453.00	72.60
2.	2015-16	4270.00	74.60
3.	2016-17	4270.00	125.20
4.	2017-18	4900.00	67.00
5.	2018-19	6000.00	(Proposed)111.65

**4. Key activities under taken during the last two years in the area of:**

**4.1. Technology Development / Research and Development:**

For the year 2016-17, GUJCOST has financially approved 158 R&D Proposals in the field of Basic Science, Engineering and Pharmacy, Mathematics and Nano technology disciplines with a total amount of Rs.6.54 Crore under Minor Research Project Programme.

Financial support to 158 R & D Proposals under Minor Research Project Scheme of GUJCOST.

*Rs. In Lakh*

Discipline	Proposal Received	No. of Proposal Approved	Amount Recommended by Experts		
			First Year	Second Year	Total
Biology/Microbiology	18	14	65.4635	38.7582	104.2217
Chemical Engineering	13	7	12.85	5.35	18.2
Chemistry	23	5	10.95	3.45	14.4
Civil Engineering	23	11	33.845	9.995	43.84
Electrical, EC and Computer	84	31	58.92	18.05	76.97
Environmental Science	4	2	7.76	5.01	12.77
Mathematics	5	5	15.01	4.7	19.71
Mechanical Engineering	63	29	140.47	25.37	165.84
Nanotechnology	4	4	15.51	3.36	18.87
Pharmaceutical Science	105	41	100.02	34.85	134.87
Physics	20	9	36.73	8.05	44.78
<b>Grand Total</b>	<b>362</b>	<b>158</b>	<b>497.5285</b>	<b>156.9432</b>	<b>654.4717</b>

*Rs. In Lakh*

Discipline	Equipment	Consumable	Travel	Other	Total
Biology/Microbiology	28.56	56.02	5.62	14.02	104.22
Chemical Engineering	7.00	7.55	1.40	9.00	18.20

Chemistry	5.50	6.00	1.30	1.60	14.40
Civil Engineering	19.13	14.05	6.26	4.40	43.84
Electrical, EC and Computer	112.61	6.65	8.95	2.76	76.97
Environmental Science	4.28	4.50	2.50	1.49	12.77
Mathematics	10.65	2.70	3.13	3.23	19.71
Mechanical Engineering	119.50	32.55	4.63	9.16	165.84
Nanotechnology	11.50	6.00	0.97	0.40	18.87
Pharmaceutical Science	59.45	51.20	5.35	18.87	134.87
Physics	21.72	13.10	3.10	6.86	44.78
<b>Grand Total</b>	<b>399.90</b>	<b>200.32</b>	<b>43.21</b>	<b>71.79</b>	<b>654.47</b>

## 4.2. Technology Demonstrations

GUJCOST has procured 6 super computers, 4 PARAM Shavak High Performance Supercomputer and 2 Deep Learning Supercomputer from C-DAC, Pune and established the same in selected engineering colleges including (i) L. D. Engineering College, Ahmedabad, (ii) Govt Engineering College, Rajkot, (iii) Gujarat Biotechnology Research Center / Gujarat State Biotechnology Technology Mission, (iv) Veer Narmada South Gujarat University, Surat (v) Hemchandracharya North Gujarat University, Patan and (vi) Institute for Seismological Research (ISR), Gandhinagar.

GUJCOST has successfully established Design Labs to provide the facilities to students and faculties with creative and innovative ideas. During 2017-18, eight Design Labs have been established at Gandhinagar, Vadodara, Ahmedabad, Rajkot, Navsari, Surat, Anand and Bhavnagar. The Establishment of the Design Lab has been established in selected institutions. 1. Dhirubhai Ambani Institute of Information and Communication Technology at Gandhinagar, 2. M S University at Vadodara, 3. L. D. Engineering College at Ahmedabad, 4 Govt Engineering College, Rajkot, 5 GIDC Degree Engineering College, Navsari, 6 Govt Engineering College, Valsad, 7. Govt Engineering College, Palanpur, 8. Government Engineering College at Patan.

GUJCOST has initiated the process for drafting the Science, Technology and Innovation Policy (STI Policy) for the State. GUJCOST has organized a series of meetings and brainstorming sessions among senior / specialized researcher scientists for the above and prepared a draft STI Policy for the State. The draft STI Policy has been approved and released on 15<sup>th</sup> April, 2018 by Hon'ble Chief Minister, Govt. of Gujarat.

Providing financial support to different universities / colleges / institutions for organizing 160 Seminars / Symposia / Workshops / Training Programmes at State, National and International level with a financial support of Rs.31.60 lakh.

GUJCOST has taken as a support and mentoring role in establishing 120 Atal Tinkering Lab (ATL) in collaboration with NITI Aayog, Govt of India. Each of the school has received a grant of Rs.10 lakh for establishing the Atal Tinkering Lab and another Rs.10.00 lakh for operation and maintenance for next five years from NITI Aayog.

### 4.3. Popularization of Science

- GUJCOST is celebrated the Science and Technology days through its Community Science Centres and GUJCOST Science Club.
- GUJCOST is organized the collaborative programme with different state / national departments.
- Celebration of Scientific days / birth anniversary of scientists / week / year
- Organized 18 programmes with different themes and target groups
- Organized National Science Seminar, National Rural IT Quiz, and National Science Drama Festival for School Students
- Organized National Children Science Congress for Students
- Organized collaborative programmes / activities with NCSM, VP, NCSTC, RMSA.

### S&T promotion, popularization and communication programmes conducted by the council

Sr. No	Date	Name of Programme
1.	8 <sup>th</sup> March, 2018	18 <sup>th</sup> Governing Board Meeting of GUJCOST
2.	27-28 <sup>th</sup> April, 2017	Hosting of DST Review Meeting on the Progress and Activities of the State S&T Councils
3.	22 <sup>nd</sup> May, 2017	Celebration of International Biodiversity Day on Biodiversity and Sustainable Tourism
4.	5 <sup>th</sup> June, 2017	Celebration of World Environment Day on Connecting People to Nature in the City and on the land from the poles to the equator
5.	15-17 <sup>th</sup> June, 2017	Hosting of National Advisory Committee Meeting for the NCSC
6.	29-30 <sup>th</sup> June and 1 <sup>st</sup> July, 2017	Orientation Programme for National Children's Science Congress 2017
7.	13 <sup>th</sup> July, 2017	Launch of National Children's Science Congress
8.	30 <sup>th</sup> August, 2017	State Level Science Seminar 2017 in collaboration with NCSM on Swachh Bharat: Role of S&T Promises and Challenges
9.	26 <sup>th</sup> September, 2017	State Level Ruaral IT Quiz 2017 at LDRP CAmpus
10.	13 <sup>th</sup> October, 2017	Formal function for the establishment of Design Lab, Bio Informatics Lab and Supercomputer facilities in Engineering college in Gujarat
11.	21 <sup>st</sup> October, 2017	Bhumipujan for proposed Aquatic Gallery and Robotic

		Gallery as part of Phase II Development of Science City and Distribution of Supercomputer and Design Lab Kit to select institutions
12.	12-13 <sup>th</sup> November, 2017	Hosting of National Advisory Committee Meeting for the NCSC
13.	16 <sup>th</sup> November, 2017	34 <sup>th</sup> Executive Committee Meeting of GUJCOST
14.	24-25 <sup>th</sup> November, 2017	State Level National Children's Science Congress 2017 at Gujarat Vidyapith
15.	27-31 <sup>st</sup> December, 2017	Organize 25 <sup>th</sup> National Children's Science Congress 2017
16.	21 <sup>st</sup> January, 2018	International Earth Science Olympiad 2018 for School Students
17.	26 <sup>th</sup> February to 1 <sup>st</sup> March, 2018	<b>Gujarat Science Festival 2018 on Sparking young Minds with Science for New India</b>
18.	16-20 <sup>th</sup> March, 2018	Participate in Indian Science Congress 2018 at Manipal University, Imphal

#### 4.4. Intellectual property Rights:

GUJCOST has carried out a series of programmes and activities on the promotion and popularization of Intellectual Property Rights (IPR) in the State. The Council has established a Centre of Excellence on IPR at Gujarat National Law University (GNLU). Financial supports have been provided to various institutions and university departments to organise national and International Seminars and workshops on Intellectual Property Rights and its updates and case studies.

During this period, the PIC Cell has successfully carried out the prior art search and submitted applications for patent and GI registrations.

- **Prior Art Search:**

1. Double Rack and Pinion (Bariya Kashyap)
2. Oxy Acetylene Gas Cylinders (Bariya Kashyap)
3. Design of Chair with adjustable PC (Bariya Kashyap)
4. Design of Multi-Purpose pen (Bariya Kashyap)
5. Electric Cargo Vehicle (Vagish Tripath, Harshkumar Vaghmaria, Yogeshkumar Yadav, Manthan Rathod, Utsav gadhia)
6. Supporting Device for especially abled (SARTHI) (Mudaliar Sumanth, Vishrut Bhatt)
7. Self Care Toilet (Nilesh Sompura)
8. Universal Vernier Calipers (Harsh Vaghmaria)
9. One Signal Light
10. Fly-ash beneficiation (Virendra and Fulekar)
11. Effluent Treatment (Fulekar)
12. Biometric Cash Payment (Bihag Dhadhania)
13. Solar Cooking Equipment (Vivek and Sumitabh)
14. Smart Home Automation (Bhargav Makodia)

15. Portable Water Tank (Sohil Khan , Mohib Khan, Sajod Husain)

- **Patent Drafting and filling:**

1. Universal Vernier Calipers (Harsh Vaghmaria)
2. Method of Joining Insulation Panels (Samir Nimbark)
3. A method of separation of Iron, Alumina and Silica from Flyash (Dr.Fulekar and VirendraKumar)
4. A complete solar based system for brewing hot beverages (Sumitabh and Vivek)

- **IPR Information Services:**

1. Patent, Design and TM info and Application Process (Kuldeep Vohra) (Start Up)
2. Patent and TM application Process (Bhargav Makodia) (Start Up)
3. Patent and TM application Process (Sumitabh Tiwari) (Start Up)
4. Patent and Design application Process (M D Panchal)
5. Patenting Information (Parth Devaria)
6. Patent Application Information (Sibashish Mishra, Re Innovation Technology) (Start Up)
7. Patent, TM and Design application Process (Manan Patel and Anjil)
8. Patent Filing Process (Bharat Vagh)
9. Patent and TM filing Process (Advait Raval) (Start Up)
10. Patent and TM filing Process (Anup Patel) (Start Up)
11. Patent, Design and TM filing Process (Snehal J Vanal) (Start Up)
12. Patent Filing and Patent Search (Dr. Sabina Khan)
13. Patent and Design basics and Filing Process (Sajid and Sohil)
14. Patent Filing Process B Chitra Himal (Start Up)
15. Patent, TradeMark and TradeSecret (Vedant Kaila) (Start Up)

- **Geographical Indication (GI) Registration**

Pethapur Printing Blocks

#### **4.5. Any new innovative activities**

- GUJCOST also successfully organized the 25th edition of National Children Science Congress at Science City and SAL Education Campus during 27 – 31<sup>st</sup> December 2017 where a total of 1000 child scientists from all across the country and 10 ASEAN and 3 Gulf countries and 500 guide teachers and coordinators were participated.

- Participation in 105<sup>th</sup> Indian Science Congress- Pride of India Expo during 16-20<sup>th</sup> March, 2018 at Manipur University, Manipur.

- GUJCOST has organized the two training program in collaboration Rashtriya Madhyamik Secondary Education campaign (RMSA) in Science City. The first training program was held during 14-18<sup>th</sup> February, 2018 for 150 teachers and the second training program was held during 25<sup>th</sup> March-1<sup>st</sup> April, 2018 for another 150 teachers, selected by the RMSA.



**5. List five success stories with brief about 1 page each including photograph, if available.**

**1) Regional Science Museum**

India of the 21st century is an aspiring country with aspirations of faster, sustainable and inclusive growth. The S&T has emerged globally as one of the major driver of socio-economic development and the sector must play a major proactive role in delivering on the aspirations of Indians. In the fast growing Indian economy, there are increasing expectations for scientific interventions for addressing a large variety of socio-economic, industrial and strategic issues. The country also offers enabling unique opportunity of the large demographic dividend with talented pool of scientists, engineers, innovators and start-ups with brilliant ideas for economic development.

In order to strengthen the efforts to popularize the science and technology among the society, GUJCOST is in the process of establishing five state-of-art Regional Science Museums (RSM) at Vadodara, Rajkot, Bhavnagar, Bhuj and Patan. Additionally, one Tropic Cancer Park is also being prepared at Sallaj village of Banaskantha districts.

The approach and methodology of the Regional Science Museums is focused on informal community based learning which is different from the formal mode of education. All the programmes and activities will be intended to enliven the imagination, foster creativity and develop a spirit of inquiry, especially in young minds. School-children, during their visit, discover the wonders of science and technology and get an access to the most exciting and contemporary form of entertainment regardless of the social stratum, education or age group and create a culture of learning.

Hon'ble Chief Minister of Gujarat has laid foundation stone for Regional Science Museum, Rajkot on 15<sup>th</sup> April 2018. The ground breaking ceremony for Regional Science Museum, Patan was carried out on 10<sup>th</sup> May 2018 and the same for Regional Science Museum, Bhavnagar was held on 24<sup>th</sup> May 2018. The construction work at the above three RSMs have been started and the RSM Bhuj is going to be started soon.

Each of the RSMs has been constructed over an area of 10.00 acres of land with an estimated cost of Rs.80.00 Crore which



has started with the Government of Gujarat grant. Each of the RSMs is based on different theme and innovative concept and each theme and concept has been prepared by considering the demographic potential of that regions.

**2) National Children’s Science Congress:**

India,  
best  
and



National Children’s Science Congress (NCSC) is a unique, massive and prestigious flagship programme of the Government of India, catalyzed and supported by the National council for Science & Technology Communication (NCSTC), Department of Science and Technology, Govt. of India to reach out to the nook and corner of India to search for the science talents with an aim to inculcate a scientific temper among children to seek scientific solutions for common local problems. There is no such a program anywhere in the world with such a wide outreach and concentrated effort with a sustained continuation of more than two decades.

GUJCOST has organized the State Level Children Science Congress 2017 on the theme of “Science, Technology, & Innovation for Sustainable Development with Special Emphasis for Accessibility for Persons with Disabilities”. The sub themes are (i) Natural Resource Management, (ii) Food and Agriculture, (iii)Energy, (iv) Health, Hygiene and Nutrition, (v) Lifestyles and Livelihoods, (vi) Disaster Management, (vii) Traditional Knowledge Systems. GUJCOST has coordinated the NCSC programme in the state through its community Science Centre networks. More than 350 students along with their 300 escort teachers and coordinator has attended the state level program.



GUJCOST in association with the National Council for Science & Technology Communication (NCSTC), Dept. of Science & Technology, Govt. of India successfully organized the 25<sup>th</sup> National Children’s Science Congress 2017 (Silver Jubilee Year) in during 27 – 31<sup>st</sup> December 2017 in a very bigger and attractive manner.

The



programme was inaugurated by Shri Vijay Rupani, the Chief Minister of Gujarat. The 25<sup>th</sup> NCSC 2017 with a series of scientific activities including student’s project and poster, presentation, scientific interaction with eminent scientists, scientific exhibition, Science

activity corner, teacher orientation programme, hands-on demonstration with grand inaugural and valedictory sessions.

### 3) Establishment of supercomputing facilities for research and development in frontier areas of Science & Technology in the State

The Department of Science and Technology has been trying to set up super computer facility, equipped with modern facilities for computational resource, simulation and data analysis in different engineering colleges in the state.

For this, GUJCOST has procured 4 PARAM Shavak High Performance Supercomputer and 2 Deep Learning Supercomputer from C-DAC, Pune. The 6 supercomputers facilities have been established in variously selected engineering colleges including (i) L. D. Engineering College, Ahmedabad, (ii) Govt Engineering College, Rajkot, (iii) Gujarat Biotechnology Research Center / Gujarat State Biotechnology Technology Mission, (iv) Veer Narmada South Gujarat University, Surat (v) Hemchandracharya North Gujarat University, Patan and (vi) Institute for Seismological Research (ISR), Gandhinagar



### 4) Establishment of a Design Lab in the leading areas of science, technology and information technology in the state

Gujarat Council on Science and Technology established Design Labs to provide the facilities to students and professors with creative and innovative ideas; 8 Design Lab at Gandhinagar, Vadodara, Ahmedabad, Rajkot, Navsari, Surat, Anand and Bhavnagar. The Establishment of the Design Lab has been established in selected institutions including (i) Dhirubhai Ambani Institute of Information and Communication Technology at Gandhinagar, (ii) M S University at Vadodara, (iii) L. D. Engineering College at Ahmedabad, (iv) Government Engineering College, Rajkot, (v) Government Engineering College, Valsad, (vi) Government Engineering College, Palanpur, (vii) GIDC Engineering College, Navsari, and (viii)



Each of the Design Lab institutions have received a set of instrument / equipment for design lab with a cost of Rs.25.00 lakh, which has been prepared by Expert Professor..

**6. Has the council developed any specific state related S&T and innovation policy? If so the details to be provided.**

- GUJCOST has prepared the draft Science, Technology and Innovation Policy (STI) Policy of Gujarat and the same has been approved by the State Government. The STI Policy was announced by the Hon'ble Chief Minister on 15<sup>th</sup> April 2018 and released the Policy Booklet. The Dept of Science & Technology, Govt. of Gujarat has accorded budgetary provision of Rs. 500.00 lakh for various activities under STI Policy.



**7. How strong are the links between other state government /departments If so provide details.**

- GUJCOST has a strong network and capacity building both State and Central Government Departments.
- It also established a link between local among academic institution / industries and corporate sectors.
- A series of programmes are being designed and developed implemented in association with DST, NCSTC, VP, TIFAC, NCSM, UNESCO, WIPO, UNICEF, UNEP.

**8. How strong are the links of the council with local industry units/associations?**

- GUJCOST has strong link and member of ASSOCHAM, GCCI, CSI, NSTA.

**9. List 5 major technology area, where the council can play an important role by finding convergent technological solutions.**

- Environment
- Energy production and
- Desalination of sea-water to portable and drinking water
- Innovation
- Creating new IPR
- R&D in Artificial Intelligence and robotics

**10 Proposed budget outlay for the 2018-19 commensurate with the plan of activities**

<b>Sl. No.</b>	<b>Items</b>	<b>Budget proposed 2018-19 (Rs. In Lakh)</b>
1	Support for Manpower	91.05
2	Support for Travel	8.00
3	Support for Office Expenses	9.00
4	Support for Non Recurring expenses	3.60
<b>TOTAL</b>		<b>111.65</b>
<b>GRAND TOTAL</b>		<b>111.65</b>

\*\*\*\*\*

## **Haryana**

**1. Details of State S&T Council**

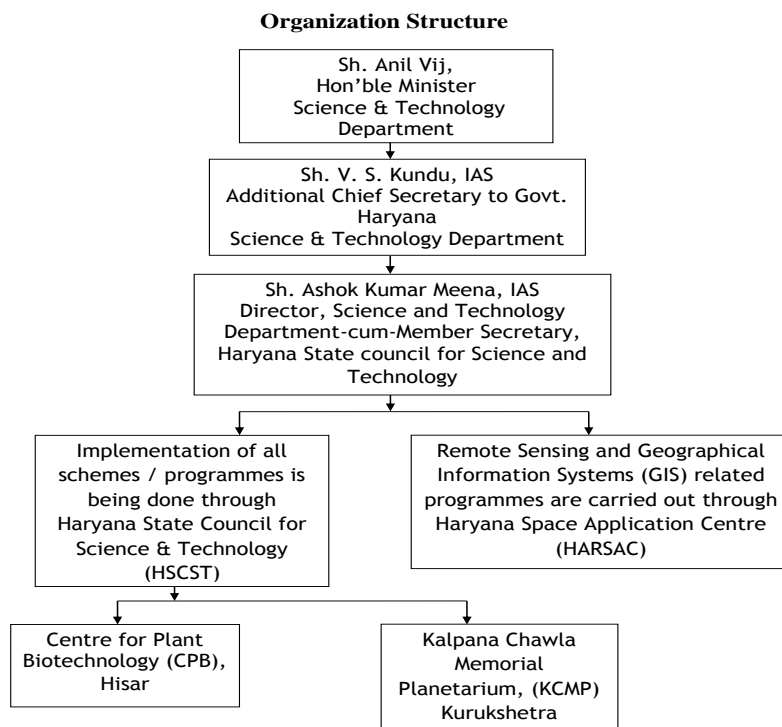
Name of the Secretary & Member secretary/Director General

Sh. V. S. Kundu, IAS  
 Additional Chief Secretary to Government of Haryana  
 Science & Technology Department  
 New Haryana Civil Secretariat, Chandigarh

Sh. Ashok Kumar Meena, IAS  
 Director,  
 Science & Technology Department – cum-  
 Member Secretary,  
 Haryana State Council for Science & Technology  
 Bays No.35-38, Sector-2,  
 Panchkula – 134109 (Haryana)

**2. Structure of the Council:**

- d) Date of Establishment: 26.02.1986
- e) Organization Structure:



f) Strength of approved manpower both Central (DST) and State supported

**Central (DST) Supported: 2 Posts**

S. N.	Name	Designation	Pay Scale	Approximate Monthly Emoluments
1.	Dr. Deepak Gupta	Chief Scientific Engineer	1,05,600/-	1,19,294/-
2.	Sh. Rajinder Kumar	Data Entry Operator	48,700/-	53,531/-

**State Supported at Panchkula (Head Quarters): 9 Posts**

S. N.	Name	Designation	Pay Scale	Approximate Monthly
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				<b>Emoluments</b>
1.	Sh. Dinesh Kumar	Deputy Superintendent	52,000/-	58,744/-
2.	Sh. ChanchalBhan	Accounts Assistant	37,600/-	42560/-
3.	Sh. Rakesh Mohan	Assistant Admin	37600/-	42,798/-
4.	Sh. HariParkash	Assistant	37,600/-	39,980/-
5.	Mrs. Veena	Personal Assistant	64100/-	67,305/-
6.	Mrs. PremLata	Clerk	36,100/-	41,063/-
7.	Sh. Sher Singh	Clerk	29,300/-	33,427/-
8.	Sh. Dharam Pal	Helper	30,600/-	35,224/-
9.	Sh. Shankar Lal	Helper	29,700/-	34,215/-
<b>TOTAL : Rs.3,95,316/-</b>				

**State Supported at Hisar (Centre for Plant Biotechnology): 6 Posts**

S.N.	Name	Designation	Pay Scale	Approximate Monthly Emoluments
1.	Dr. SubhashChander	Senior Scientific Officer - I	76,200/-	80,510/-
2.	Sh. Ajit Kumar	Technical Assistant	38,400/-	42,232/-
3.	Ms. IshuVerma	Technical Assistant	38,400/-	40,820/-
4.	Sh. Rohtash Kumar	Technical Assistant	34,300/-	37,805/-
5.	Sh. Anil Kumar	Junior Technical Supervisor	39,900/-	42,395/-
6.	Sh. Goverdhan	Accounts Clerk	30,200/-	33,333/-
<b>TOTAL : Rs. 2,77,095/-</b>				

**State Supported at Kurukshetra (KCMP): 5 Posts**

S.N.	Name	Designation	Pay Scale	Approximate Monthly Emoluments
1.	Sh. SumitMongia	Curator	71,300/-	78,095/-
2.	Sh. Sanjay Kumar	Technical Assistant	46,200/-	50,737/-
3.	Sh. Sanjeev Kumar	Education Assistant	46,200/-	50,737/-
4.	Sh. Mewa Ram	Technical Fitter	28,700/-	31,710/-
5.	Sh. Lokesh Kumar	Technician Electrical	28,700/-	31,710/-
<b>TOTAL : Rs.2,42,989/-</b>				

**3. Budget allocation to your state S&T council for last five financial years including central government, State government & any other sources.**

Financial Year	State Government (in Rs.)	DST, GOI (in Rs.)
2011-2012	422.00 Lakhs	36.76 Lakhs
2012-2013	580.00 Lakhs	32.48 Lakhs
2013-2014	504.00 Lakhs	31.19 Lakhs
2014-2015	769.00 Lakhs	35.50 Lakhs
2015-2016	1138.00 Lakhs	37.50 Lakhs
2016-2017	1550.00 Lakhs	66.47 Lakhs
2017-2018	9502.00 Lakhs	34.27 Lakhs
2018-2019	3575.00 Lakhs	-

**4. Key activities under taken during the last two years in the area of:-**

**4.1.1 Technology Development**

Council has developed and standardized the protocols for large scale multiplication of Sugarcane, Sargandha, Banana, Bamboo, Brahmi, Gladiolus, Eucalyptus, Dahlia, Potato, Strawberry, Mehandi, Stevia and Aloe vera at Centre for Plant Biotechnology, Hisar.

*Micro-propagation and Need based Research:*

Innovative project proposals up to rupees ten crores have been invited from all Head of the Departments/Boards & Corporations in the State of Haryana, all Deputy Commissioners in the State of Haryana and all Vice Chancellors of State Universities.

**4.1.2 R&D activities taken up with universities/institutions/industry:**

To enhance the general capability of scientists for pursuing innovative research ideas having socio-economic relevance/benefit for the state, grant up-to Rs.10.00 Lakhs over a period of 3 years is provided for R&D Projects. During the year 2017-18, eight R&D Projects were short listed for providing funding: -



Sr. No .	Name & address of Project Investigator	Project Title/Budget/Duration
1.	Dr. NareshKaushik, Principal Scientist, Forestry, Regional Research Station, Bawal, CCS Haryana Agricultural University, Rewari, Haryana	<i>Ailanthus excelsa</i> (Mahaneem) based Agroforestry Systems for SouthWest Haryana  Duration:- 3 years Budget:- 11,88,000/-
2.	Dr. Madhuri Rishi, Chairperson and Head, Environment	Assessment of ground water quality with reference to Health issues in and around Tosham Area,



	Studies, Panjab University, Chandigarh	Haryana, India  Duration:- 2 years Budget:- 10,00,000/-
3.	Dr. Suresh Kumar, Assistant Professor, Chemistry, Kurukshetra University, Kurukshetra	Design and Synthesis of some novel aurone derivatives as antibacterial drugs  Duration:- 3 years Budget:- 10,00,000/-
4.	Dr. Naresh Kumar, Assistant Professor, Geology, Kurukshetra University, Kurukshetra	Palaeo environmental analyses of River Terraces of some palaeochannels between Yamuna and Satluj River: an approach towards delineation of Vedic Saraswati River  Duration:- 3 years  Budget:- 16.80 lacs
5.	Dr. Raman Kumar, Associate Professor, Department of Biotechnology , Maharishi Markandeshw ar (Deemed to be University), Mullana- Ambala	To Develop a Process for Bioremediation of Chromium from Industrial Effluents using Microbial Consortium  Duration:-3 years Budget:- 8,33,800/-
6.	Dr. Pawan Kumar, Professor and Head, Veterinary Anatomy, College of Veterinary Sciences, LUVAS, Hisar	“Immunohistochemic al studies on tonsils of oro-nasopharyngeal region of buffaloes to explore immune competent sites for targeted delivery of vaccines”  Duration:- 3 years

		Budget:- 9,89,000/-
7.	Dr. Ranbir Singh Bisla, Principal Scientist cum Regional Director, Veterinary Surgery and Radiology, Referral Veterinary Diagnostic and Extension Centre (RVDEC), LUVAS, Karnal	Integrated strategies for control of parasitic diseases and enhancement of reproductive and productive performance among, dairy animals of Eastern, Haryana  Duration:- 3 years Budget:- 9.775 lac
8.	Dr. Sandeep Kumar, Assistant Professor, Department of Bio and Nano Technology, Guru Jambheshwar University of Science & Technology, Hisar	Metal Organize Frameworks-based Platform for Pesticide Removal in Haryana and Punjab Region  Duration: - Three years. Budget: - 25.93 Lacs

#### 4.1.3 Financial Assistance to Scientists for attending international conference abroad:

Under this scheme financial assistance is provided to the Professors/ Teachers/ Research Scientists/ Engineers/ Doctors/Officers working in any of the Research Institution/University/Office of Haryana State and Research Scholar/Post Graduate students studying in Academic/Research Institution of the state. The applicants are provided financial assistance up to a maximum of Rs.50,000/- or 50% of the actual air fare whichever is less on account of air fare (economy class) lowest prevailing rates. The following scientists were provided financial assistance during 2017-2018 for attending international conference abroad as per details given below:

Sr. No	Name & address	Name of Conference	Duration
1.	Sh. NarenderRanga, Research scholar, DeenbandhuChhotu Ram University of S&T, Murthal (Sonapat)	9 <sup>th</sup> International Conference on Materials for Advanced Technologies ICMAT 2017 at Suntec, Singapore	18 <sup>th</sup> to 23 <sup>rd</sup> June, 2017

2.	Sh. Jogender Singh, Research Scholar, Department of Physics, GJU S&T, Hisar	-do-	-do-
3.	Prof. S.S. Dudeja, Department of Bio & Nanotechnology, Guru Jambheshwar University S&T, Hisar	'International Seminar on Sustainable Intensification of Agriculture through Resource Management and Conservation' at Gottingen, Germany	7 <sup>th</sup> to 9 <sup>th</sup> July, 2017
4.	Ms.Suman Chaudhary, Ph. D Research Scholar, Department of Microbiology, CCS HAU, Hisar	19 <sup>th</sup> International Conference on Sustainable Agriculture, Environment and Forestry (ICSAEF 2017) at London, United Kingdom	28 <sup>th</sup> to 29 <sup>th</sup> June, 2017
5.	Ms.RinkuDhanker, Ph. D Research Scholar, Department of Microbiology, CCS HAU, Hisar	-do-	-do-
6.	Mr.Satnam Singh, Assistant Professor, North Cap University, HUDA-23A, Gurugram, Haryana-122017	“5 <sup>th</sup> International Conference on Powder Metallurgy & Advanced Materials, RoPM&AM2017 at Cluj-Napoca, Romania.	15 <sup>th</sup> to 21 <sup>st</sup> September, 2017
7.	Mr. Amit Sangwan, Ph. D Research Scholar, College of Veterinary Sciences, LalaLajpatRai University of Veterinary and Animal Sciences, Hisar- 125001	“7 <sup>th</sup> International Veterinary Congress 2017 from 4 <sup>th</sup> to 5 <sup>th</sup> September, 2017 held at Paris, France.”	4 <sup>th</sup> to 5 <sup>th</sup> September, 2017

#### 4.1.4 Collaborative Science and Technology Programme:

Project proposals were invited through press advertisement from recognized universities and institutes in Haryana for the demonstration of technologies on location specific challenges of state funded by Department of Science & Technology, Government of India.

Following projects were forwarded to Department of Science & Technology (DST), Government of India (GoI) for seeking final approval of DST, GoI Tier-2 Screening Committee on State S&T Programme.

1. Evaluation of distillery spent wash as fermentation feedstock for the production of poly ( $\beta$ -hydroxybutyrate) microbial plastic submitted by Dr. Neeraj Kumar, Assistant Professor (Selection Grade), Department of Microbiology, Kurukshetra University, Kurukshetra.
2. Membrane based bioreactor-Technology development for water purification submitted by Dr. Rajeev Kumar Kapoor, Assistant Professor, Department of Microbiology, MaharshiDayanand University, Rohtak.

#### 4.2 Technology Demonstrations

Following are on-going projects / activities under this category:

1. Production and demonstration of high quality planting material of Strawberry, banana and Sugarcane under RashtriyaKrishiVikasYojana (RKVY) sanctioned by Department of Agriculture and Farmers Welfare Haryana with a total budget of Rs.150 lakhs.
2. Double haploids development in maize (*Zea mays* L.) DST, New Delhi (Approx. Rs.34 lakhs).
3. Training programmes on Plant Tissue Culture technology for graduate and post graduate students of Biotechnology from various institutes.

#### 4.3 Popularization of Science

In order to popularize Science & Technology in the State, the following activities and programmes were organized:

##### 4.3.1 Science Quiz Contests

###### a) For School students

- Organized at district, zonal and state level.
- Schools affiliated with CBSE/ICSE and Haryana School Education Board separately.
- Prizes at zonal level are: Rs.20,000/-(First Prize), Rs.15,000/-(Second Prize), Rs.12,000/-(Third Prize).
- Prizes at state level are: Rs.60,000/- & a trophy (First Prize), Rs.50,000/-(Second Prize), Rs.40,000/-(Third Prize).

District level competition was organized from August to October 2017 by the respective District Education Officer (DEO) in each district. level science quiz competition for school students were conducted by the Council in divisions of state- Ambala division, Hisar division, Rohtak division & Gurgaon division. State level science quiz competition for school students was conducted on 09.02.2018 at Maharishi Dayanand University, Rohtak. 50% amount prize at state level is given to the concerned and 50% amount is given to school for carrying out science promotional activities.



Zonal

four

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In

Category A: First prize was won by YadhuvanshiShikshaNiketan, Mahendergarh, second prize was won by Modern VidyaNiketan, Sector-17, Faridabad and third prize by International Bharti School, Rohtak. In Category B: First prize was won by Govt. Model Sanskriti Sr. Sec. School, Taraori, Karnal, second prize was won by Arya Sr. Sec. School, Narwana, Jind and third prize by S.M. Hindu Sr. Sec. School, Sonipat.

###### b) For college students

- Organized at district, zonal and state level.
- All students studying in colleges, universities and professional institutions of Haryana.
- Prizes at zonal level are: Rs.40,000/-(First Prize), Rs.30,000/-(Second Prize), Rs.20,000/-(Third Prize).
- Prizes at state level are: Rs.1,00,000/- & a trophy (First Prize), Rs.80,000/-(Second Prize), Rs.60,000/-(Third Prize).

District level competition was organized from August to October 2017 by the respective District Education Officer (DEO) in each district. Zonal level science quiz competition for college students was conducted by the Council in four divisions of state- Ambala division, Hisar division, Rohtak division & Gurgaon division.

State level science quiz competition for college students was conducted on 08.02.2018 at Maharishi Dayanand University, Rohtak. 50% amount of the prize at state level is given to the concerned team and 50% amount is given to school for carrying out science promotional activities. First prize was won by DAV College for Girls, Yamuna Nagar, second prize was won by RKSD P.G. College, Kaithal and third prize by Suraj Degree College, Mahendergarh.



#### **4.3.2 Science Essay Writing Competitions**

##### **a) For school students**

- Organized at district and state level.
- School students of class 9<sup>th</sup> to 12<sup>th</sup>.
- Prizes are: Rs.10,000/- (First Prize), Rs.8,000/- (Second Prize), Rs.6,000/- (Third Prize) and Rs.3,000/- each (Ten Consolation Prizes).

District level science essay writing competition was organized from August to October 2017 by the respective District Education Officer (DEO) in each district. State level science essay writing competition for school students was conducted on 19.01.2018 at Kurukshetra University, Kurukshetra. First prize was won by Govt. Sr. Sec. School, Jhajjar, second prize by Yadhuvanshi Shiksha Niketan, Mahendergarh, third prize by St. Vivekanand Lotus Valley Public School, Yamuna Nagar. Ten consolation prizes were also given.

##### **b) For college students**

- Organized at district and state level.
- All students studying in colleges, universities and professional institutions of Haryana.
- Prizes are: Rs.15,000/- (First Prize), Rs.12,000/- (Second Prize), Rs.8,000/- (Third Prize) and Rs.4,000/- each (Ten Consolation Prizes).

District level science essay writing competition was organized from August to October 2017 by the respective District Education Officer (DEO) in each district. State level science essay writing competition for college students was conducted on 24.01.2018 at Kurukshetra University, Kurukshetra. First prize was won by DAV College for Girls, Yamuna Nagar, second prize by Hindu Girls College, Sonapat and third prize by GVM Girls College, Sonapat. Ten consolation prizes were also given.

#### **4.3.3 Conference/Workshop/Science Communication:**

The S&T Council has been organizing conference/workshop/science communication programmes throughout the state. During 2017-2018, funds were released to following organizations:

- HSCST has sponsored Hands on Training cum Workshop on “Spectroscopic and Chromatographic Techniques” held on November 27-30, 2017 at CSIR –CSIO, Chandigarh by releasing amount of Rs.48,000/.

- CSIR-NISCAIR-DST National Workshop on ‘Science, Technology and Innovation Policy: Optimizing Communication & Information Research’ was attended by the officers of HSCST during 23-25 January 2018 at Lecture Hall, NASC Complex, PUSA, New Delhi.
- Popular Science lectures were delivered by Prof. S. P. Khatkar, Head, Chemistry Department and Dr. Surinder Singh, Botany Department, M. D. University, Rohtak.
- One day workshop on ‘Introduction to Electronics Technology’ was organized at the university college, Kurukshetra University, Kurukshetra on 06.02.2018 with a total budget of Rs.32,600/-.
- One day workshop on ‘Innovation in Medical Sciences’ was organized at Guru Gobind Singh College of Pharmacy on 23.02.2018 with a total budget of Rs.25,000/-.



### **Exposure Visits:**

HSCST had organized two exposure visits for the meritorious students studying in Govt. Schools of the State. First visit was organized at National Science Centre & Nehru Planetarium, New Delhi on 23<sup>rd</sup> November, 2017 and second visit was organized at Pushpa Gujral Science City, Kapurthala during 28<sup>th</sup> to 30<sup>th</sup> November, 2017.

### **A Tribute to Kalpana Chawla:**

A special program ‘A Tribute to Kalpana Chawla-2018’ was organized at Kalpana Chawla Memorial Planetarium (KCMP) on fifteenth death anniversary of Dr. Kalpana Chawla. Students and teachers were invited from Govt. Schools of Kurukshetra and nearby area. Painting competitions were conducted for invited students in three different groups. A special ‘Hands on Activities’ session was conducted by Sh. Darshan Lal and Sh. Gaurav Kumar Science teachers from Yamuna Nagar. In this



session, Science experiments from NCERT books from 6<sup>th</sup> to 10<sup>th</sup> were performed for invited students and teachers. About 100 Students, teachers and general visitors of Kurukshetra participated in the program. Prizes were distributed to the winners in the presence of District Education Officer, Kurukshetra.

#### 4.4 Patents

Patent Information Centre of Department of Science & Technology, Government of India and Intellectual Property Facilitation Centre (IPFC) of Ministry of Micro, Small and Medium Enterprises (MSME) at HSCST facilitated the filing of following:

Year	Trade Mark Facilitated	Patent Facilitated	Lectures Delivered	Industrial Design	Copyright
2012-13	24	4	30	2	3
2013-14	73	11	26	1	-
2014-15	44	4	48	-	3
2015-16	43	8	32	2	-
2016-17	25	6	30	4	1
2017-18	29	6	18	9	6
<b>TOTAL</b>	<b>238</b>	<b>39</b>	<b>184</b>	<b>18</b>	<b>13</b>

An amount of Rs.30,000/- each was released to following six Universities/Organization for organizing awareness programme on Intellectual Property Rights:

- University Institute of Engineering & Technology (UIET), Kurukshetra, University, Kurukshetra
- Haryana Space Application Centre (HARSAC), Hisar.
- Lingaya's University, Faridabad.
- ManavRachna University, Faridabad.
- National Institute of Technology, Kurukshetra.
- Jan Ch. Devi Lal College of Pharmacy, Sirsa.

*Lectures delivered on IPR during 2017-18*

S. No.	Date & Venue	Details of the Programme
1	01.04.2017, Maharishi Dayanand University, Rohtak, Haryana	A lecture was delivered by Dr. Rahul Taneja in One Day UGC Sponsored National Conference on IPR and Regulatory Issues organized by Department of Pharmaceutical Science, Maharishi Dayanand University, Rohtak. The programme was attended by more than 100 students and faculty members.
2	13-14 <sup>th</sup> April 2017 at RayatBahra University, Kharar.	A lecture was delivered by Dr. Rahul Taneja in 3rd Annual Convention on APTI (Punjab), National Conference on Interdisciplinary Trends in Pharmaceutical Research at University School of Pharmaceutical Sciences, RayatBahra University, Mohali. The programme was attended by more than 100 students and faculty members.
3	26.04.2017 at Wotta Workspace, Chandigarh.	Celebration of #World_IP_Day on 26 <sup>th</sup> April 2017 with Startup at Wotta Workspace Incubation Centre, Chandigarh. The programme was attended by more than 50 Entrepreneurs from

		Chandigarh, Panchkula and Mohali.
4	6 <sup>th</sup> May 2017 at Ch. Charan Singh Haryana Agricultural University, Hisar, Haryana	One day awareness programme was organized by Haryana State Council for Science and Technology, Panchkula in association with IPR Cell, Ch. Charan Singh Haryana Agricultural University, Hisar, Haryana for the students of Science stream.
5	18 <sup>th</sup> May 2017 at LalaLajpatRai University of Veterinary and Animal Science , Hisar	One day awareness programme was organized by Haryana State Council for Science and Technology, Panchkula in association with IPR Cell, LalaLajpatRai University of Veterinary and Animal Science, Hisar, Haryana for the students of Science stream.
6	14 <sup>th</sup> June 2017 at New Delhi	Officials of PIC/IPFCs attended the conference to promote collaboration between SME and Research and Technology Development Institutions organized by MSME-DC, Govt of India, New Delhi.
8	28 <sup>th</sup> July 2017 at ISF College of Pharmacy, Moga.	A lecture was delivered by Dr. Rahul Taneja in One Day Awareness Programme on Intellectual Property Rights organized by ISF College of Pharmacy, Moga. The programme was attended by more than 100 students and faculty members.
9	23 <sup>rd</sup> August 2017 at Rai, Sonipat, Haryana.	An awareness lecture was delivered by Dr. Rahul Taneja in Sensitization Program on Intellectual Property Rights for the Entrepreneurs on 23 <sup>rd</sup> August 2018. Program was organized by Ministry of MSME-DI, Karnal, Haryana.
10	15 <sup>th</sup> September 2017 at MM University, Sadopur, Haryana.	An awareness lecture was delivered by Dr. Rahul Taneja in Sensitization Program on Intellectual Property Rights for the Entrepreneurs on 15 <sup>th</sup> Sept 2017 at MM University, Mullana for the MSMEs of Ambala Region.. Program was organized by Haryana State Council for Science and Technology in an association with Ministry of MSME-DI, Karnal, Haryana.
11	25 <sup>th</sup> September 2017 at ASBASJSM College of Pharmacy, Ropar.	A lecture was delivered by Dr. Rahul Taneja in One Day National Seminar: From Research Care to Healthcare: Your Pharmacist at service on occasion of World Pharmacist Day.
12	27 <sup>th</sup> September 2017 at Army Institute of Management and Technology, Greater Noida.	A Sensitization program on Intellectual Property Rights was organized by MSME-DI, New Delhi at Army Institute of Management and Technology. Dr. Rahul Taneja had shared his views on IPR.
13	22 <sup>nd</sup> November 2017 at MSME-DI, Ludhiana.	A lecture was delivered by Dr. Rahul Taneja in Two Days workshop on Export Procedure and Documentation at MSME-DI, Ludhiana.



14	19 <sup>th</sup> January 2018 at The Cove Hotel, Panchkula, Haryana	European Business Technology Centre (EBTC) had organized a programme in technical collaboration with Patent Information Centre, Haryana State Council for Science and Technology and European Patent Office. The programme was attended by more than 80 participants from Haryana, Himachal Pradesh and Punjab.
14	24 <sup>th</sup> Jan 2018 at UIET, Kurukshetra University, Kurukshetra	HSCST Sponsored workshop on Intellectual Property Rights was organized at University Institute of Engineering and Technology, Kurukshetra University, Kurukshetra, Haryana. Dr. Rahul Taneja had briefed about Patenting System in India during the workshop.
15	1 <sup>st</sup> Feb 2018 at Haryana Space Application Centre, Hisar.	HSCST Sponsored workshop on Intellectual Property Rights was organized at Haryana Space Application Centre, Hisar Dr. Rahul Taneja (Project Scientist) and Dr. SachivPathania, (Reader) had briefed about Patenting System in India during the workshop.
15	12 <sup>th</sup> February 2018 at Apeejay Institute of Management.	The Associated Chamber of Commerce & Industry of India (ASSOCHAM), New Delhi had organized a program on National IPR Policy 2016 on 12 <sup>th</sup> Feb 2018 at Apeejay Institute of Management. Dr. Rahul Taneja had delivered a lecture on Trademark System in India.
16	16 <sup>th</sup> February 2018 at Lingaya's University	Haryana State Council for Science and Technology sponsored workshop was organized at Lingaya's University, Faridabad on 16 <sup>th</sup> February 2018.
17	16 <sup>th</sup> March 2018 at National Institute of Technology, Kurukshetra.	Haryana State Council for Science and Technology sponsored workshop was organized at National Institute of Technology, Kurukshetra on 16 <sup>th</sup> March 2018.
18	20 <sup>th</sup> March 2018 at ManavRachna University Faridabad.	Haryana State Council for Science and Technology sponsored workshop was organized at ManavRachna University, Faridabad on 20 <sup>th</sup> March 2018.
19	21 <sup>st</sup> March 2018 at Indira Gandhi University, Meerpur, Rewari, Haryana.	Haryana State Council for Science and Technology sponsored workshop was organized at Indira Gandhi University, Meerpur, Rewari, Haryana.



#### **4.5 Any new innovative activities**

HSCST has started the following new innovative scheme:

##### **4.5.1 HSCST Science Clubs:**

Haryana State Council for Science & Technology (HSCST) has launched a new scheme by the name of 'Setting up of HSCST Science Clubs' in ten Government Senior Secondary Schools per district (22 districts x 10 Schools = 220 Schools) with a total budget of Rs.1.25 crore. These Science Clubs will play an important role in creating scientific awareness amongst the future generation i.e. students. Science Clubs will offer student the chance to do science related activities in interactive, fun, informative and informal ways that extend & enhance the science they learn in the classroom.

##### **Objectives of Science Club**

- To inculcate scientific thinking among school children.
- To explain, exhibit and demonstrate curriculum based scientific activities to students.
- To develop easy and understandable methods of science learning for students.
- To induct observational, logical and analytical approach among students.
- To explain and exhibit usefulness and importance of science at various stages of life to students.
- To design, organize and execute various scientific competitions and programs at district level for students.
- To organize State level Science Fair and Inter School Science Contest.
- To bring awareness against existing superstitions, false beliefs and prejudices of society.
- To build scientific temperament in newer generation.

##### **Celebration of National Technology Day:**

Under this scheme, every year technical institutions of the state are provided financial assistance of Rs.10,000/- each to polytechnics/ITIs and Rs. 20,000/- each to the engineering colleges and department of engineering and technology in the universities in the state. During the year 2017-18, an amount of Rs.4.40 Lakhs was released to 10 polytechnics/ITI's and 17 Engineering colleges/university department of engineering & technology for celebration of National Technology Day – 2017 in their respective institutions.

##### **Setting up of Science City:**

- About 44 acre land adjoining the DeenbandhuChhotu Ram University of Science &Technology (DCRUST) Murthal belonging to Municipal Corporation, Sonapat has been identified.
- As per the guidelines of the Ministry of Culture, GOI, total project cost is Rs.191.00 crores (approx.).
- A meeting was held between Dr. Mahesh Sharma, Hon'ble Union Minister of State (Independent Charge) for Tourism & Culture and Shri ManoharLal, Hon'ble Chief Minister, Haryana at ShastriBhawan, New Delhi on 2<sup>nd</sup> June, 2017.
- The Ministry of Culture agrees in principle to the proposal of Haryana Government to set up a Science City for NCR in Haryana.
- State Government will provide land for the Science City free of cost. Alternate sites would be suggested by State Government, which would be inspected by the National Council of Science Museums to carry out feasibility study as per requirements of Ministry.
- The project cost will be shared between the Central Government and the State Government as per Central Government guidelines.
- Following sites are identified in Gurugram:-
  1. Municipal Corporation Gurugram land in Biodiversity Park, Nathupur village
  2. HSIIDC land in Global City, Harsaru village
  3. Haryana Tourism land in Dhanchiri Camp, Dundahera village
  4. Panchayat land of village Bajghera
  5. HUDA land in Sector 33, Gurugram
  6. M/s Indian Drugs & Pharmaceuticals Ltd. site located on old Delhi-Gurugram Road in Dundahera village.

Sites will soon be got inspected from the team of Ministry of Culture, Govt. of India.

#### **Setting up of Sub-Regional Science Centre at Ambala:**

- National Council of Science Museum (NCSM), Ministry of Culture, Govt. Of India had sanctioned this project with a cost of Rs.5.00 Crores. The State Govt. has to provide 5 acre developed land with boundary wall to the NCSM free of cost besides other commitments of basic amenities and recurring expenditure after its setting up etc.
- About 5 acre land belonging to Municipal Corporation, Ambala was identified and its possession has been taken after the registration in favour of S&T Department.
- Finance Department, Haryana (Standing Finance Committee) has approved this project with a budget provision of Rs.14.00 crores for land purchase and related civil works.
- PWD B&R has been entrusted with the work of levelling the site and construction of boundary wall with a cost of Rs.3.85 crores. After preparation of site, the same will be handed over to the NCSM for further execution of the project.

#### **5. List 5 success stories with brief about 1 page each including photograph, if available.**

##### **5.1 Organizing Science Conclave:**

In order to provide an opportunity to the students and other academia of State, to listen, to interact with and get inspired from the eminent scientists of India, Council organizes regional science conclaves every year in collaboration with different universities and institutions of state.

- An amount of Rs.5.00 Lakhs was released to Bhagat Phool Singh MahilaVishwavidyalaya, Khanpur Kalan for organizing Science Conclave which was organized during 6<sup>th</sup> – 7<sup>th</sup> October 2017.
- An amount of Rs.10.00 Lakhs was released to YMCA University of Science and Technology, Faridabad for organizing Science Conclave which was organized during 25<sup>th</sup> – 26<sup>th</sup> October 2017.

- In these Conclaves, about 1000 students took part and popular talks on various scientific topics were given by eminent speakers and the participating students were encouraged and motivated towards opting for research in science as their career.

## **5.2 Haryana Vigyan Ratna and Yuva Vigyan Ratna Awards:**

These awards have been instituted to honour eminent scientists of Haryana who have made outstanding contribution in the field of Science & Technology. For Yuva award, the contributions over the last ten years were considered and for the VigyanRatna Award, outstanding contribution of entire career were considered.

Hon'ble Governor of Haryana conferred two VigyanRatna Awards (cash prize of Rs.4.00 Lakhs, Citation & Trophy) and nine YuvaVigyanRatna Awards (cash prize of Rs.1.00 Lakh, Citation & Trophy) to the eminent scientists selected for awards of last five years in an awards presentation ceremony arranged at Haryana Raj Bhawan on 10<sup>th</sup> May 2017. Hon'ble Chief Minister and Hon'ble Science & Technology Minister were also present on this occasion.

### **Haryana Vigyan Ratna awardees were:**

1. Prof. K. C Bansal, Former Director  
National Bureau of Plant Genetic Resources, ICAR, Pusa, New Delhi
2. Dr. Satish Kumar Gupta  
Emeritus Scientist, J.C. Bose Fellow,  
Former Deputy Director,  
Reproductive Cell Biology Laboratory  
National Institute of Immunology  
New Delhi

### **Haryana Yuva Vigyan Ratna awardees were:**

1. Sh. AbhineetKaushik, Deputy General Manager in BrahMos Aerospace (An India-Russia Joint Venture, under Ministry of Defence, Govt. of India), New Delhi.
2. Sh. Pradeep Kumar, Scientist - E, Research Centre Imarat (RCI), Defence Research and Development Organization, Hyderabad.
3. Dr. Deepak Sharma, Assistant Professor, Department of Biotechnology, IIT Roorkee, Uttarkhand.
4. Sh. Parveen Kumar, Scientist - E, Defence Research & Development Organisation (DRDO), Delhi
5. Dr. Savita Chaudhary, Assistant Professor, Department of Chemistry, Panjab University, Chandigarh
6. Dr. Abhinav Grover, Assistant Professor, School of Biotechnology, Jawaharlal Nehru University, New Delhi
7. Dr. Sandeep Kumar, Assistant Professor, Department of Bio & Nano Technology, Guru Jambheshwar University of Science and Technology, Hisar, Haryana.
8. Dr. Vinod Kumar, Assistant Professor, Department of Chemistry, Maharishi Markendeshwar University, Mullana, Ambala, Haryana.
9. Dr. AnuragKuhad, Assistant Professor of Pharmacology, University Institute of Pharmaceutical Sciences, Panjab University, Chandigarh



### 5.3 HSCST Fellowship Programme:

- Awarded to students holding M.Sc. or equivalent degree with minimum 55% marks and on the basis of their performance in National Eligibility Test (NET) conducted by CSIR twice in a year.
- Research fellowships are in science subjects namely Life Sciences, Physical Sciences, Chemical Sciences, Mathematical Sciences, Earth Atmospheric Ocean & Planetary Sciences etc.
- Maximum period of fellowship is five years and the amount will be Rs.12,000/- per month for the first two years and Rs.14,000/- per month for the 3rd year onwards.
- Fellowship carry an annual contingency grant of Rs.20,000/.

On-line applications were invited from students under HSCST Fellowship programme. The fellowship amount was increased from Rs.12,000/- per month to Rs.18,000/- per month for the first two years and from Rs.14,000/- per month to Rs.21,000/- per month for 3<sup>rd</sup> and subsequent years under HSCST Fellowship Programme. An amount of Rs.63,53,867/- (Rupees Sixty Three Lakhs Fifty Three Thousand Eight Hundred Sixty Seven only) had been released to the universities under HSCST Fellowship Programme for onward disbursement to the Ph. D. students.

### 5.4 Promotion of Science Education (POSE):

In order to encourage meritorious students towards science education and to support them for continuation of their science education up to higher level scholarship is awarded to the meritorious students. During the year 2017-18, the applications have been invited through online mode. Under this scheme, scholarship is provided to the 3-year B.Sc./4-year BS/5-year integrated M.Sc./M.S. courses and 2-year M.Sc. course students opting for basic & natural science subjects viz. (1) Physics, (2) Chemistry, (3) Mathematics, (4) Biology, (5) Statistics, (6) Geology (7) Astrophysics, (8) Astronomy, (9) Electronics, (10) Botany, (11) Zoology, (12) Bio-chemistry, (13) Anthropology, (14) Microbiology, (15) Geophysics, (16) Geochemistry, (17) Atmospheric Sciences & (18) Oceanic Sciences. The amount of scholarship is Rs.4,000/- P.M. for 3-year B.Sc., Rs.6,000/- P.M. for 2-year M.Sc. course and If the students take admission in 4-year B.S. or 5-year integrated M.Sc./M.S. then the amount of scholarship during 1<sup>st</sup>, 2<sup>nd</sup> & 3<sup>rd</sup> year will be Rs. 4,000/- P.M. and during 4<sup>th</sup> & 5<sup>th</sup> year Rs.6,000/- P.M. Besides, the selected students will get mentorship grant (*one time*) of Rs.12,000/- in 3-

year B.Sc. program, Rs.17,000/- in 4-year B.S. program, Rs.22,000/- in 5-year integrated M.Sc. program and Rs.10,000/- in 2-year M.Sc. program.

During the year 2017-18 about 531 applications were received from 3-year B.Sc./4-year B.S./5-year integrated M.Sc./M.S. students and 299 applications were received from 2-year M.Sc. students. Top 151 meritorious students from 3-year B.Sc./4-year B.S./5-year integrated M.Sc./M.S. & top 50 meritorious students from 2-year M.Sc. were selected for scholarship as per the criteria of the scheme. The 1<sup>st</sup> instalment of scholarship was release to them. Besides, further instalments were released to the students, based on their eligibility, who were selected in the previous years. An amount of Rs.2,64,89,883/-(Rupees Two Crore Sixty Four Lakhs Eighty Nine Thousand Eight Hundred Eighty Three only) was released under the scheme.

### **5.5 Setting up of Renewable Energy Test Centre (RETC):**

Council has established a Renewable Energy Test Centre (RETC) at Deenbandhu Chhotu Ram University of Science & Technology, Murthal at a cost of Rs.1.00 crore with the following objectives:

1. To provide testing facilities to test Solar Thermal Gadgets, viz. Flat Plate Collector, Solar Hot Water Systems, Solar Cookers etc. as per BIS, MNRE standards and procedure.
2. To provide technical back-up and training to the solar thermal system manufacturers in the North India Region.
3. To promote use of solar thermal systems for various applications and develop entrepreneurs for manufacturer of Solar Thermal Systems.
4. To generate human resource for manufacturing, maintaining Solar Thermal Systems by offering P.G. level training programmes in Solar Thermal.

### **Following test facilities are established:**

#### **(I) For Flat Plate Collector according to IS: 12933**

1. Outdoor No Flow Exposure Test
2. Rain Penetration Test
3. External Thermal Test
4. Internal Thermal Test
5. Thermal Performance Test
6. Static Pressure Leakage Test
7. Impact Resistance Test
8. Transmittance Test
9. Time Constant Test
- 10 Incident Angle Modifier Test
11. Component Test

#### **(II) For Solar Cooker according to IS: 13429**

1. Routine Test
2. Leakage Test
3. Slam Test
4. Mirror Reflectivity Test
5. Type Test
6. Exposure Test
7. Load Test
8. Thermal Performance Test

#### **(III) Solar Hot Water Systems (as per MNRE and BIS standards)**

Performance Testing of Solar Hot Water Systems (both Flat Plate Collector and Evacuated Tube based Solar Hot Water Systems) as per MNRE procedure.

**(IV) Parabolic Solar Cookers (SK 14)**

Testing of Parabolic Solar Cookers will be done as per procedure laid down by MNRE.



Electromagnetic Flow Meter



Rotameter



Thermal Performance Test Set-up



Solar Flat Plate Collector Test Set-up



Rotameter for Thermal performance Test set-up  
Solar CFL & LED



Integrated Sphere for luminary test of

**Infrastructure Development:**

Council is functioning from its own newly constructed building at Panchkula.



One training hostel for students and teachers is constructed at Centre for Plant Biotechnology, Hisar with a total budget of Rs.3.57 crore.



**6. Has the council developed any specific state related S&T and innovation policy? If so the details to be provided.**

No

**7. How strong are the links between other state government /departments if so, provide details**

- Haryana State Council for Science & Technology (HSCST) has participated in India International Science Festival (IISF) 2017 organized at Anna University Campus, Chennai during 13-16 October, 2017. Exhibits of HARSAC, CPB and KCMP were exhibited in IISF expo.



- A proposal to set up National / Regional training institute for training of science teachers, students and entrepreneurs in collaboration with Department of Biotechnology (DBT), Government of India is in process.
- HSCST has sponsored Hands on Training cum Workshop on “Spectroscopic and Chromatographic Techniques” held on November 27-30, 2017 at CSIR –CSIO, Chandigarh by releasing amount of Rs.48,000/.
- One day workshop on ‘Introduction to Electronics Technology’ was organized at the university college, Kurukshetra University, Kurukshetra on 06.02.2018 with a total budget of Rs.32,600/-.
- One day workshop on ‘Innovation in Medical Sciences’ was organized at Guru Gobind Singh College of Pharmacy on 23.02.2018 with a total budget of Rs.25,000/-.

**8. How strong are the links of the council with local industry units/associations?**

Council has strong links with local industry units / associations which resulted in facilitating the filing of 29 trademarks, the list of which is as under:-

**Trademark Facilitated in the year 2017-18**

S. No.	Trademark Application no.	Trademark Applied for	Filing Date	Class
1	3519321	ALLCOR	04/04/2017	17
2	3531634	PATAARE (Registered)	22/04/2017	18
3	3548563	NiEL GROUP OF COMPANIES	14/05/2017	35
4	3548514	Elixir Junior	14/05/2017	5
5	3558236	Madhuban Stationary	26/05/2017	35
6	3568542	BovicurePharma	12/06/2017	31
7	3568541	Bovifresh	12/06/2017	5
8	3568543	Ticktomar (Registered)	12/06/2017	5
9	3597546	Deck Roaster (Registered)	23/07/2017	42
10	3608944	Shudh life	08/08/2017	35
11	3616587	Laphaz Pharmaceutical (Registered)	20/08/2017	35
12	3622402	AKU92 (Registered)	29/08/2017	35
13	3635810	ZENLATE	14/09/2017	5
14	3637008	ZENBALIN	16/09/2017	5
15	3637124	COP BELA (Registered)	17/09/2017	41
16	3637125	ASBASJSM COLLEGE OF PHARMACY (Registered)	17/09/2017	41
17	3647731	Foodlicious (Registered)	01/10/2017	29
18	3647732	Foodlicious (Registered)	01/10/2017	30
19	3647733	Foodlicious (Registered)	01/10/2017	32
20	3662355	W+	24/10/2017	32
21	3662356	WPLUS (Registered)	24/10/2017	32
22	3685064	Dermaitch	22/11/2017	5
23	3685065	Zencoflam	22/11/2017	5
24	3697604	KYAS	07/12/2017	11
25	3697605	LITESUN CHANGE FOR BETTER	07/12/2017	35
26	3721919	PHAZGLIM	8/1/18	5

27	3762803	CONOR COSMO	23/2/18	35
28	3784154	SHAARDE	21/3/18	16
29	3780902	FIRST OF ITS KIND	17/3/18	30

**9. List 5 major technology area, where the council can play an important role by finding convergent technological solutions.**

- Plant Tissue Culture
- Remote Sensing & GIS
- Planetarium

**10. Proposed Plan for 2018-2019**

All the schemes and programmes of Haryana State Council for Science & Technology, Panchkula listed from number 4 to 8 will also be implemented in 2018-2019.

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# Himachal Pradesh

## 1. Details of H.P S&T Council

<b>Name of the Principal Secretary</b>	<b>Sh. Tarun Kapoor, IAS ACS Cum Chairman ,</b> HIMCOSTE, Govt. of H.P
<b>Name of the Member Secretary</b>	<b>Sh. Kunal Satyarthi, IFS</b>
<b>Address</b>	Himachal Pradesh Council for Science, Technology & Environment, B-34 SDA Complex, Kasumpti, Shimla-171009 (Himachal Pradesh)
<b>E-mail</b>	<b><u><a href="mailto:stc-hp@nic.in">stc-hp@nic.in</a></u></b>
<b>Phone</b>	<b>0177-2621992</b>
<b>Fax</b>	<b>0177-2620998</b>
<b>Mobile</b>	<b>94103-94349</b>

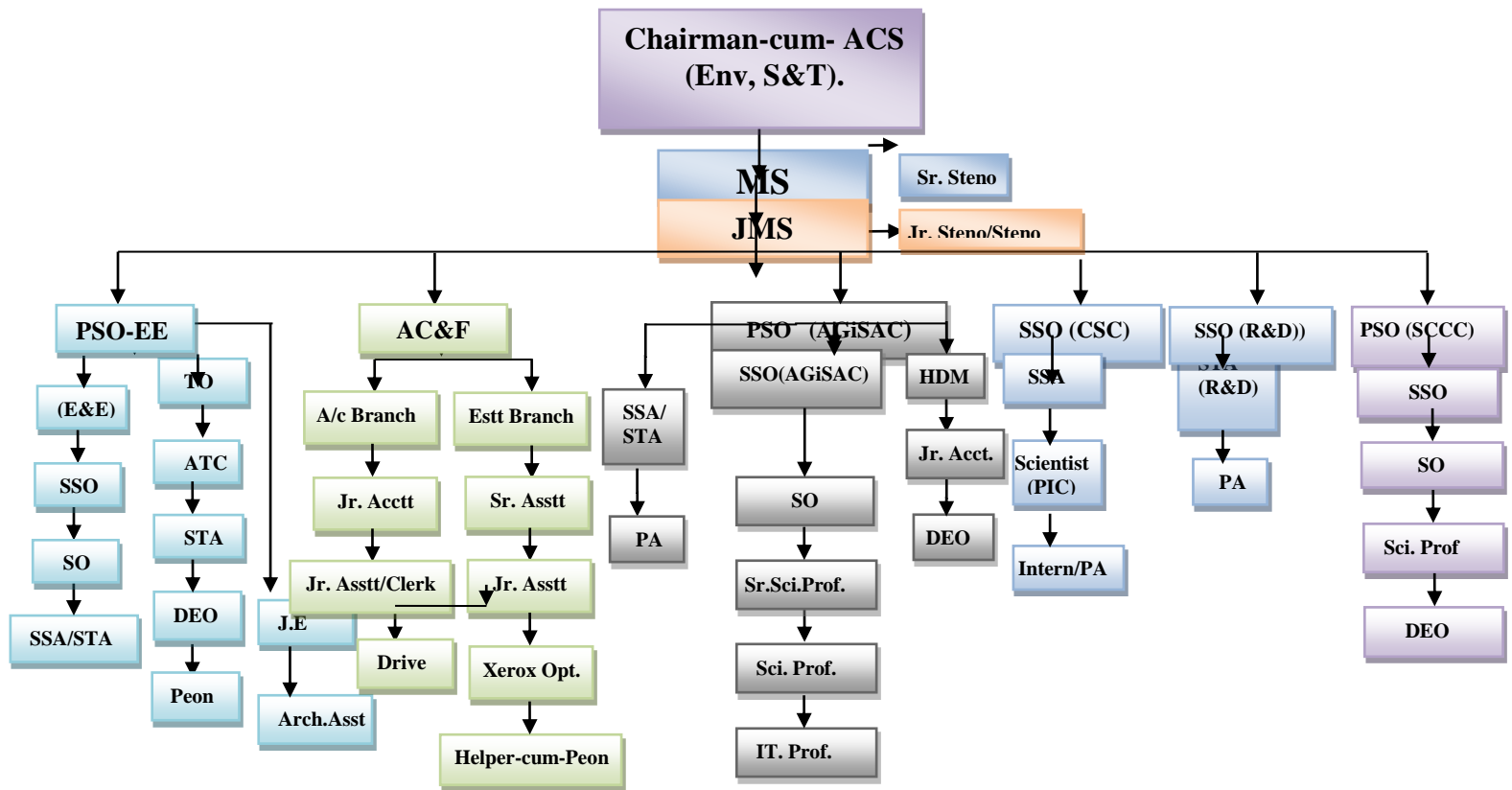
## 2. Structure of the Council:

**a) Date of Establishment**                      **03-01-1986**

**b) Organization Structure:** Chief Secretary/Additional Chief Secretary/Principal Secretary/Secretary, Environment, Science and Technology, to the Govt. of H.P is the Chairman and overall In-Charge of the State Council for Science, Technology and Environment, H.P. Member Secretary (E.C) is the Administrative Head of the State Council and he looks after day-to-day activities of the H.P. Council for Science, Technology and Environment. Activities of the State Council were confined to the following areas:

- Aryabhatta Geo-informatics and Space Application Centre (AGiSAC)
- Technology Dissemination
- H.P. State Biodiversity Board
- Creating & Strengthening of Science and Technology facilities in H.P
- Ecology and Environment
- Science Popularization and Promotion
- H.P. State Centre on Climate Change
- Environment Information System (ENVIS)

## Organizational Structure



**c) Strength of approved manpower [both central (DST) and state supported**

Sr. No.	Name of the Post	Date of Creation of Post	Name of the incumbent working	Promotion, if given, date of promotion	Date of Joining	Present Designation	Pay Scale	Approx. monthly emoluments
<b>Scientific and Technical Manpower</b>								
1.	PSO	22-7-02	Dr. Rajender Thapa	29-12-09	1-7-92	PSO	15600-39100 + 7800	125946
2.	PSO	22-7-02	Dr. S.S. Randhawa		23-10-97	PSO	15600-39100 + 7600	98748
3.	SSO	22-7-02	Dr. Aparna Sharma	--	1-8-2014	SSO	15600-39100 + 6600	94119
4.	SSO	22-7-02	Smt. Shubhra Benerjee	--	--	SSO	15600-39100 + 5400	79078
5.	STO	22-7-02	Vacant	-	-	-	15600-39100 + 6600	-
6.	STO	22-7-02	Vacant	-	-	-	15600-39100 + 6600	-
7.	STO	22-7-02	Sh. Umesh Pathania	29-12-09	10-9-91	TO	15600-39100 + 5400	95090
8.	Draughtsman	22-7-02	Shri Gopal Jain	23-6-01	7-12-91	HDM	10300-34800 + 4600	92262
9.	JE	22-7-02	Vacant	-	-	-	10300-34800 + 5000	-
	<b>Total : A</b>	-	-	-	-	-	-	-
<b>Administrative Manpower</b>								
1	Data Entry Operator	22-7-02	Vacant	-	-	-	10300-34800 + 5000	-
2	Sr. Asstt.	22-7-02	Smt. Archana Sood	22-6-17	18-6-1998	Sr.Asstt	10300-34800 + 4400	58926
3	Sr. Stenographer	22-7-02	Vacant	-	-	-	10300-34800 + 3800	-
4	Jr. Stenographer	22-7-02	Vacant	-	-	-	10300-34800 + 4400	-
5	Clerk	22-7-02	Smt. Rattani Chandel	19-6-2003	18-6-1998	Jr.Asstt.	10300-34800 + 3600	55041
6	Driver	22-7-02	Shri Surender Singh	-	2-9-2012	Driver	10300-34800 + 2400	30573
7	Peon	22-7-02	Shri Lekh Raj	-	12-5-1987	Peon	10300-34800 + 1900	43072
	<b>Total : B</b>	-	-	-	-	-	-	22851796
	<b>Total : (A+B)</b>	-	-	-	-	-	-	9397814
<b>Provision of DA hike @ 10%</b>								939781
<b>Grand Total</b>								<b>103375995</b>

**3. Budget allocation to your state S&T council for last five financial years including central government, State government & any other sources.**

(Rs. In lacs)

F.Y.	2013-14	2014-15	2015-16	2016-17	2017-18
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<b>State Grant</b>	411.92	456.32	572.09	672.09	708.10
<b>Central Grant</b>	100.60	110.66	112.66	172.92	150.25
<b>Other Sources</b>	145.90	127.43	323.72	279.61	155.18

#### 4. Key activities under taken during the last two years in the area of :-

##### 4.1 Technology Development:

- (i) Improving compressive strength and durability properties of adobe for propagating sustainable and cost-effective mass housing especially in rural areas of different districts of Himachal Pradesh- National Institute of Technology (NIT), Hamirpur.
- (ii) Demonstration of technologies in areas of water, energy and agriculture on the location specific challenges of the State at Pooh village, District Kinnaur, Himachal Pradesh.
- (iii) Studies on improving livelihood generation through scientific interventions in *Pinus gerardiana* Wall. and important wild mushrooms in Himachal Pradesh.
- (iv) Low Cost Bioinspired Point-of-Care Devices for Early Detection of Diseases Using Saliva as Diagnostic Fluid in Rural Himachal Areas- Indian Institute of Technology (IIT), Mandi.
- (v) Automation in vision testing- National Institute of Technology (NIT), Hamirpur.
- (vi) Design of low cost solar water heating system using flat plate collector for remote area application- Eternal University, Baru Sahib, Rajgarh, Sirmour.
- (vii) Microbial interventions for generating renewable bio-energy in Himachal Pradesh using forest pine needle litter – JUIT, Wagnaghat, Solan.
- (viii) Automation in vision testing- National Institute of Technology (NIT), Hamirpur

##### 4.2 Technology Demonstration:

- I. Empowering rural population through dissemination of agro-technology of flower crops in H.P. - CSIR-IHBT.
- II. Development of Artificial Diet for Honeybees: An Attempt to Bring Revolution in Beekeeping Industry- Arni University, Kathgarh, Indora, Kangra.
- III. Cloud Based Digital Resource Centre (DRC) For Remote Rural Area- Eternal University, Baru Sahib, Rajgarh, Sirmour.
- IV. Propagation of Sustainable Nutritional Gardens and Off-Season Vegetable Cultivation for Nutritional Augmentation and Socio-Economic Empowerment of Farm Women in Low and Mid Hills of Himachal Pradesh- CSK HPKV, Palampur, Kangra.
- V. Skill development training, demonstration and installation of Solar Water Heating System at Nathpa and Sungra Panchayats, Block Nichar, District Kinnaur.

- VI. Skill Development Trainings in Button Mushroom Cultivation for Gheni & Chebdi Panchayats in Basantpur Block and Mogara & Kanda Panchayats of Narkanda Block of Shimla District, emphasizing on the practical aspects of Mushroom cultivation were conducted by HIMCOSTE with handholding support of 5 months cycle.
- VII. The first Skill Development training programme on Training, Demonstration and Installation of Solar Water Heating System at Nathpa, Block Nichar, District Kinnaur, Himachal Pradesh.
- VIII. Waste water disposable system training organized by HIMCOSTE in different phases.
- IX. Popularizing conversion of pine needles biomass into coal (briquettes) for use as fuel in the rural areas in the HP state.

### 4.3 Popularisation of Science

1. DST SEED Workshop: Sensitization Programme for the Northern Region: Focus- Science and Technology for Women.
2. **Himachal Pradesh 2<sup>nd</sup> Science Congress**” has been organized by the HIMCOSTE. The theme of the Congress was **“Science and Technology for Sustainable Livelihood in Indian Himalayan Region”**.
3. Popular Lecture Series HIMCOSTE had invited eminent Scientists / Academicians/ Environmentalists of National and International repute for organizing the programmes in different parts of the State.
4. Himachal Pradesh Council for Science, Technology & Environment (HIMCOSTE) celebrates National Science Day and National Mathematics Day.
5. The Himachal Pradesh Council for Science, Technology & Environment (HIMCOSTE), Shimla had organized an exhibition on Mini Planetarium and Night Sky Watching.
6. The Himachal Pradesh Council for Science, Technology & Environment (HIMCOSTE) works for the promotion of Science, technology & innovations amongst the school children in the State so as to help in nurturing and bring out the hidden latent talent.
7. The Himachal Pradesh Council for Science Technology and Environment (HIMCOSTE), in collaboration with H.P. Forest Department organised a nature visit to Shimla water catchment & Eco Task Force, Kufri.
8. State level World Environment Day (WED) was celebrated at the Gaiety theatre, Shimla with splendour and galore.
9. The **Himachal Pradesh State Wetlands Authority (HPSWA)** in association with Forest Department and Education Department organized the World Wetland Day.

10. Capacity Building and Training Activities in Science and Technology for members of SC Category has been organized by the HIMCOSTE.

11. National Conclave of Biodiversity Management Committees (BMC) for Experience Sharing on Access and Benefit Sharing (ABS) and 2<sup>nd</sup> National Level Dialogue on Traditional Knowledge (TK) by State Biodiversity Board (HIMCOSTE).

12. Organized Interactive Dialogue on “**Biological Diversity Act, 2002** and its Access and Benefit Sharing (ABS) provisions for Bar Association and Senior Advocates of Himachal Pradesh High Court.

13. Training workshop has been organized for Forest Officials on Biological Diversity Act, 2002, and its Access and Benefit Sharing Provisions.

14. **Himachal Pradesh State Biodiversity Board (HPSBB) & Biodiversity Management Committee (BMC) Exposure Visit to Uttarakhand State Biodiversity Board (USBB).**

15. Training workshop on “**Mainstreaming Biodiversity: Sustaining People and their Livelihoods**” in District Kullu & Sirmour.

#### **4.4 Patents (Facilitated by Patent Information Centre)**

• No. of patents granted	:	Nil
• No. of patents filed through PFC-TIFAC	:	Nil
• No. of design registration/TMs filed	:	Nil
• Patent Searched conducted/Paid searches	:	09
• No. of application processed and submitted to TIFAC	:	04
• No. of IPR training provided	:	

Two women scientist deputed by TIFAC, DST, Goi for 11 months

15 IPR awareness programme conducted for students/research scholars from different universities of Himachal Pradesh.

#### **4.5 Any new innovative activities**

(i) GIS based Mapping of Core Road Network & District Rural Road Programme under PMGSY for entire HP. **Dept. of HPPWD**

(ii) GIS based Mapping of Assembly Constituency, Parliamentary Constituency, Polling Stations & Police Stations of entire State of Himachal Pradesh. **Dept. of Election**

(iii) Application of Unmanned Aerial Vehicles (UAV) in Glacier Monitoring in Baspa Basin, Western Himalaya.

(iv) Integrated studies of Himalayan Cryosphere using space based inputs (ISHC).

(v) Monitoring of Glacial Lakes in Satluj River Basin and Parechhu Lake the help of remote sensing data.



(vi) Temporal Changes in tree species composition in District Shimla of Himachal Pradesh (Based on Forest Working Plans of Rohru, chopal, shimla and Theog Forest Divisions) Forests of Himachal Pradesh

(vii) Monitoring of Changes in acreage and production of major agricultural crops and horticultural crops.

(viii) Preparation of Inventory of Water Resources as a short term adaption action plan to the climate change under SAPCC (Mapping of Wetlands: 2016). DEST

(ix) Monitoring and estimation of mass balance of glaciers with different aspects in Baspa Basin using space data and their validation with in-situ observations on Nardu Glacier.

(x) Pilot Project on Snow Ice harvesting at Pooh Village, District Kinnaur, H.P.

(xi) Vulnerability and Risk analysis of Geohazards in Himalyan Region

(xii) Understanding influence of Climate Change on Small Hydro-Power Projects in HP, India.

(xiii) Status of Geo-resources and Impact Assessment of Exogenic Geological Process on NW-Himalayan Ecosystem

(xiv) Understanding the Nature of Alpine Timberlines of Himalayan: Integrating Ecological and Scenario Studies for Assessing the Impact of Climate Change

(xv) Research & Development for Gross Environment Product of HP. (Beas Basin: Drainage, Roads, Slope, Aspect & Watershed Boundaries). DEST

(xvi) Development of Monitoring & Evaluation Protocol under EMP (Preparation of online monitoring system for waste quality, its disposal, e-return of offences, reporting system for urban waste). DEST

(xvii) Development of surveillance of RF (Rheumatic fever)/RHD (Rheumatic Heart Disease) through population based registry, Monitor secondary prophylaxis, recurrence of RF, Morbidity and mortality and NCD control Programme at PHC/CHC for High Risk Group for Cardiology Department of HP. IGMC

(xviii) Development of online application for inventory pertaining to medicines: Dept. Animal Husbandry

(xix) Mapping of Helipad of HP with aerial Distance from nearest Admin HQ, Police Station, Fire Station & Hospitals for Disaster Management: SDMA-HP

**5. List five Success stories with brief about one page each including the photographs if available:-**

### **(i) Development of Artificial Diet for Honeybees: An Attempt to Bring Revolution in Beekeeping Industry**

An artificial diet has been formulated for honeybees as the outcome of major research project funded by Himachal Pradesh Council for Science Technology & Environment (Shimla), under H. P. Specific Research & Development Projects 2016-18. The idea of developing artificial diet was aimed to solve the problems of beekeepers of the state. Beekeeping is highly profitable agro economic venture. Himachal Pradesh is also an agriculture dominating state as farmers are cultivating almost all major cereal crops, fruits & vegetables. Plants require various agents for pollination purpose. Honeybees contribute a lot in the pollination as it has already been reported that more than 70% of pollination is carried out by honeybees only. Therefore, honeybees play an important role as crop pollinator, increasing productivity of various crops and thus contribute to the economy of state as well as nation.

Nowadays, the beekeepers of our state are facing many problems, one of which is unavailability of flowers round the year. Though, Himachal Pradesh has very rich plant biodiversity but flowering is getting affected due to global warming, unseasonal climatic changes, pollution and inhumane activities. Therefore, beekeepers have to migrate their colonies to distant places like Haryana, Rajasthan and U.P. states. Migration is the only option available with the beekeepers but it also involves huge cost and labor. Also, it has been estimated that approximately 40% bees dies away during migration process. Also, there are many administrative problems related to transboundary/interstate shifting of bee boxes. Many beekeepers are now getting reluctant from this profession due to all these problems. The only solution to all these problems can be development of artificial food for bees. A number of diets have been tried by many researchers all over the world, but a satisfactory formulation is still awaited as there is no formulation that can be recommended for its wide and economically viable utilization. Looking to the importance of artificial diets for prosperous beekeeping and its commercial prospects, task of developing artificial diet was taken up in Department of Life Science, Arni University in 2016.

The proposed formulation may bring revolution in beekeeping as well as in agriculture by strengthening beekeeping venture in the state and increasing crop productivity both in terms of quantity as well as quality. Commercial trials are going on in different regions of district Kangra to further validate the effectiveness of this new formulation so that this innovative technology can be transferred to beekeepers in the state.



### **ii) Empowering Panchayati Raj Institutions Spatially:-**

#### **Introduction:**

This project aims at operational utilization of Bhuvan Panchayat portal and database through space based information support for decentralized planning activities. As a part of

implementation under EPRIS, it is proposed to take up the task of outreach activities, which aims for operational utilization of Bhuvan portal and the database prepared through SIS-DP (space based information support for decentralized planning) activities. Asset mapping refers to the task of mapping community assets by the Rural Development and Gram Panchayat representatives using Bhuvan Panchayat Mobile Application. Activity planning refers to the task of formulating the developmental plans of Gram Panchayats using Bhuvan Panchayat platform. Himachal Pradesh Remote sensing centre is involving concerned State Institute of Rural Development (SIRD) and State Panchayati Raj Department of Shimla district for the implementation of outreach activities under EPRIS Project. Validation of asset data uploaded to the Bhuvan server will be performed by National Remote Sensing Centre, Hyderabad.

**Objectives:**

- Capacity building of officials of state Panchayati Raj & Rural Development Department, their support functionaries and facilitators.
- Asset mapping by state department officials.
- Asset Mapping to map assets through web interface and mobile application.
- Activity planning to plan activities under centrally sponsored and State schemes Implementation and Monitoring of the planned activities.



**Achievement:**

Capacity building of Panchayati Raj officials & elected representatives of Basantpur and Mashobra Block, district Shimla on asset mapping using bhuvan based mobile application has been done at Panchayati Raj Training Institute, Mashobra.

### iii) Design of low cost solar water heating system using flat plate collector for remote area application

#### Summary of progress:

One complete set of flat plate collector (FPC) based water heating system has been fabricated using pine needles and rice husk as insulating materials. Fabrication of 2<sup>nd</sup> and 3<sup>rd</sup> sets of riser tubes, collector casing and mounting structure has done. Experimental studies on insulating materials especially Pine needles, rice husk, glass wool has been started under different conditions. FPC based water heating system was developed using galvanized iron as collector while Pine needles was used as insulating material. Average efficiency of the system was observed to be 65%. FPC using Mild steel as collector with Pine needles as insulating material was observed to be 59% efficient. For Mild steel collector with Wood shaving insulator the average efficiency was observed to be 63%. FPC was tested with Galvanized iron collector using Wood shaving as insulator and Copper collector using pine needle as insulator. The former observed to average efficiency of 56%, later has an efficiency of 64%. The performance of the FPC was evaluated under different climatic condition such as sunny, partial cloudy and cloudy days. The effect of wind on the performance was also examined. The efficiencies were observed as 60-70%, ~55% and 45-50% for sunny, partial sunny and cloudy days. Degradation study of the pine needles is to be carried out.



Figure 1: Selected picture of the developed project.

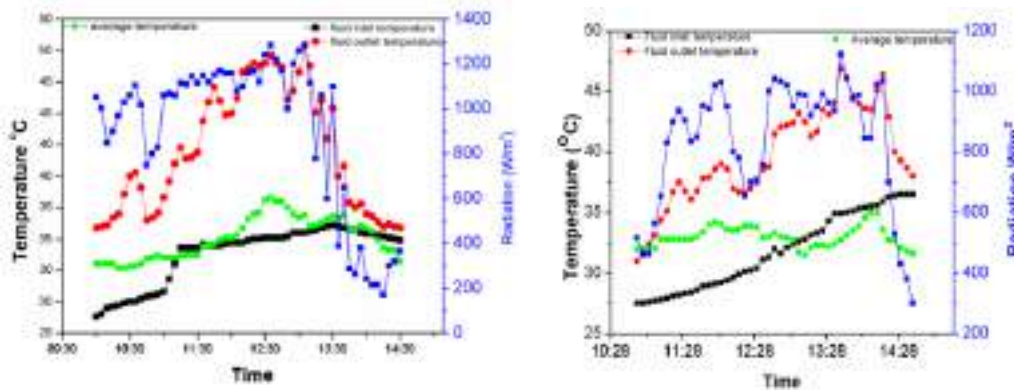


Figure 2: Variation of inlet, outlet and ambient temperature with global solar radiation for the developed project under selected design consideration.

It has been observed that pine needles, rice husk and wood shavings can be a potential insulating material. The pine needles are having suitable insulation property to minimized the heat losses in Flat plate collector and may be replaced by conventional materials. However, life and degradations need to be study. The system is designed for household application for water heating. For water heating purpose, the designed system is observed to be cost effective

as it is made up of locally available material. For short term application the system will be suitable.

#### iv) Cloud Based Digital Resource Centre (DRC)-For Remote Rural Area

**Introduction:** In this era of Information & Technology almost each and every thing is Computers Based. Almost Each and every exam is conducted online, Each and every certificate is generated online and even their Applications are also invited online. But Most of the rural Peoples in Himachal do not have Computer Literacy and access to Computers and Internet. Most of the village students or candidates fail to qualify various competitive exams because they don't know how to attempt exams on computers.

To solve this issue we have started a Cloud Based Digital Resource Centres (DRC) for Remote Rural Area in extreme Rural Areas where we are providing free of Cost Digital Literacy, Online Platform to perform mock test of various Competitive exams & E-Governance facilities.

#### Objectives of the project

- 1) Public Services Delivery System
- 2) Online Mock Test Platform.
- 3) Digital Resource Centre /Digital Library and Digital literacy.
- 4) E-Governance & M-Commerce.
- 5) Information-rich knowledge societies.
- 6) ending information poverty

**Cloud Computing:** There is a huge difference between the cities and villages to reduce this differences, Cloud Computing is a solutions to these type of problem. The Cloud computing is an effective and reliable technology which can be very useful in reducing the difference between villages and Cities. Cloud Computing is a big Umbrella where many technology can work under it. Eternal Local Cloud is created to connects with DRC.



Fig1. Proposed Model of Cloud Computing

**Web Interface Application:** A web application has been designed and under development. All the seven department of eternal University will be connected through this web portal and customer can login through this portal to Eternal University Data center

**Addressing priority of the State of H.P.:** For Remote Rural Area is aim to uplift the life of rural population of Sirmaur District of Himachal Pradesh, Sirmaur District is one of the most Backward district of Himachal Pradesh most of the population are residing in villages where there is a lack of technology facility. The main objective of this project is to provide technical and technological facility to improve the life style of the rural people of Sirmaur district. And join them to the mainstream people, and to utilize the resource of eternal university, 50 % of the project has been completed the software development, cloud development and connectivity of the centers are going on and it's on final stage. Eternal university took initiative to open at least four digital Resourcecenters to solve and spread digital literacy and empower the information-dark and marginalized communities to access all possible benefits of digital inclusion and access to the global information through this Project.

The two center are already established at Lana Bhalta and Khari.

#### Facilities Available At Digital Resource Centers:

**The following facilities are available at Digital Resource Centers**



Students Learning at DRC

**v) Propagation of Sustainable Nutritional Gardens and Off-Season Vegetable Cultivation for Nutritional Augmentation and Socio-Economic Empowerment of Farm Women in Low and Mid Hills of Himachal Pradesh**



Self sufficiency in cereal production has been the focus of agricultural technology. However, increased population pressure, increase in nuclear families and more importantly ever reducing size of land holdings has been the limitation for cereal production. Moreover, undernourishment of farming community is still a huge concern because of which H.P government promotes ‘Rajiv Gandhi Scheme for Empowerment of Adolescent Girls’ to provide nutritious supplements to adolescent girls. Bringing about rainbow revolution through

cultivation of green, yellow, orange and red vegetables in the home gardens will prove ideal for the rural community. The technology *per se* is in vogue, but with suboptimal technology, skill and infrastructure. The promotion of scientific vegetable raising practices in the home garden can be extrapolated and scaled up to a larger level for commercial purposes too. Thus, the main intent of the present proposal is to motivate and educate the farm women through trainings and practical demonstrations on various production, protection and post harvest management of potential vegetables.

**Objectives**

- To facilitate farm women in establishment of nutritional gardens (TO ENSURE FAMILY NUTRITION). To popularize and disseminate improved agro-based technologies for off- season vegetable cultivation among farm women (TO ENSURE FAMILY NUTRITION AND INCOME GENERATION). To facilitate post harvest management practices and value addition of the vegetable produce.

**Work Done:**

Objective wise	Activity
1. To facilitate farm women in establishment of nutritional gardens	1. Nutritional garden has been set up in the university; summer & winter vegetables were grown and harvested. The seasonal vegetables have been grown and maintained.
	2. Identified villages & selected farm women from different areas of low and mid hills of HP as per census 2011 for growing of nutritional rich vegetables.
	3. Conducted awareness camps, on-campus & off-campus trainings at villages Ghalore, Ambari and Ghar.
2. To popularize and disseminate improved agro-based technologies	❖ Distribution of technical bulletin / literature on different aspects of vegetable cultivation to the selected farm women.

for off- season vegetable cultivation among farm women).	❖ Visit of selected women to the nutritional garden that has been developed in the University campus.
	❖ Raising of nursery in the University farm and its distribution to the farmers for the season was undertaken including time to time monitoring of nutritional gardens at farmers' field. Excess produce was also marketed.
3.To facilitate post-harvest management practices and value addition of the vegetable produce.	❖ During off-campus and on- campus trainings the post-harvest management practices and value addition of different vegetable crops was undertaken with the help of relevant experts

**6. Has the Council developed any specific state related S&T and innovation Policy? If so the details to be provided.**

The State Council has drafted the Science Technology & Innovation Policy for the State of Himachal Pradesh. In order to finalize the policy, a Core team of renowned scientist of different fields was constituted and draft document was circulated to all the Core team members and Heads of different departments of Universities and other Central Government institutions. Accordingly after compiling the comments, a Brain Storming was organized by inviting all the core members and discussions were held on 24<sup>th</sup> May 2017. 2<sup>nd</sup> draft is being finalized which then again be circulated to all for their final comments.

**7. How strong are the links between other state government /departments If so provide details.**

The State Council for Science, Technology and Environment, H.P. is playing a vital role in co-ordinating and catalyzing the use of science and technology for the development of the State.

The Council is providing technical assistance to the State Govt. in the fields of Management of the Environment, Biodiversity conservation and Natural Resources & Disaster Management. The activities executed and initiatives taken by the State Council over the years after the establishment of the State Council are testimony to the facts stated. The State Council has now become an integral part of the strategic planning with regard to both rural and urban areas in the State. It has developed facilities and expertise to provide vital inputs for implementation of the programs at community and micro watershed level. The State Council at present is working as a link between the Govt. and the Institutions of repute at National level namely Department of Space, Ministry of Environment, Forests & Climate Change (MoEF & CC), GoI, Ministry of Science & Technology and Ministry of Non-Conventional Energy Resources etc.

The State Council is conceiving programmes in the areas of concerns requiring scientific interventions and thereafter putting them to successful trial for further implementation of the programmes/activities by the concerned user departments/institutions. The State Council is presently harnessing the potential of space technology, popularization of science, dissemination of appropriate technology, environment protection, and preservation and conservation of biodiversity in the State.

**8. How strong are the links of the council with local industry units/associations?**

The State Council for Science Technology and Environment, H.P is in the process for listing / identification of industries /units/associations etc. existing in the State for establishing links with the industries / associations.

**9. List 5 major technology area, where the council can play an important role by finding convergent technological solutions.**

Technology Area where Council can play vital role:

- Climate Change impacts on Glaciers and high attitude lakes.
- Use of Remote Sensing and GIS in effective decision making.
- Green building Technologies.
- Pine needles and other forest waste biomass conversion into briquettes.

**10 Proposed budget outlay for the 2018-19**

<b>Sr. No.</b>	<b>Budget Proposed Head</b>	<b>Budget Proposed (In Lacs)</b>	<b>Remarks</b>
<b>Recurring Expenditure:</b>			
1.	Manpower	103.37	Including 10 % provision for DA hike
2.	Consultant 3 Nos. @ 40,000/- each	14.40	
3.	TA/DA	5.00	
4.	Medical Expenses	3.00	
5.	Other items/office expenses	10.00	As per requirement of the Council
7.	Patent Information Centre	29.96	
8.	Project related grants	48.48	
	<b>TOTAL</b>		
<b>Non-Recurring Expenditure:</b>			
9.	Office equipment's, computers, printers, office furniture, etc.	5.00	To replace the obsolete systems.
	<b>GRAND TOTAL</b>	<b>219.21</b>	



## 1. Details of State S&T Council

Name of the Secretary & Member Secretary/Director General

**Prof. S. Subramaniam**

Secretary,

**Dr. S.G. Sreekanteswara Swamy**

Executive Secretary

Karnataka State Council for Science & Technology

Indian Institute of Science Campus, Bangalore-560012

Karnataka

Phone: 080- 23341652, 23348848 / 23348849

Mobile No.: 9448428419 (Prof. S. Subramaniam),

9448515976 (Dr. S. G. Sreekanteswara Swamy)

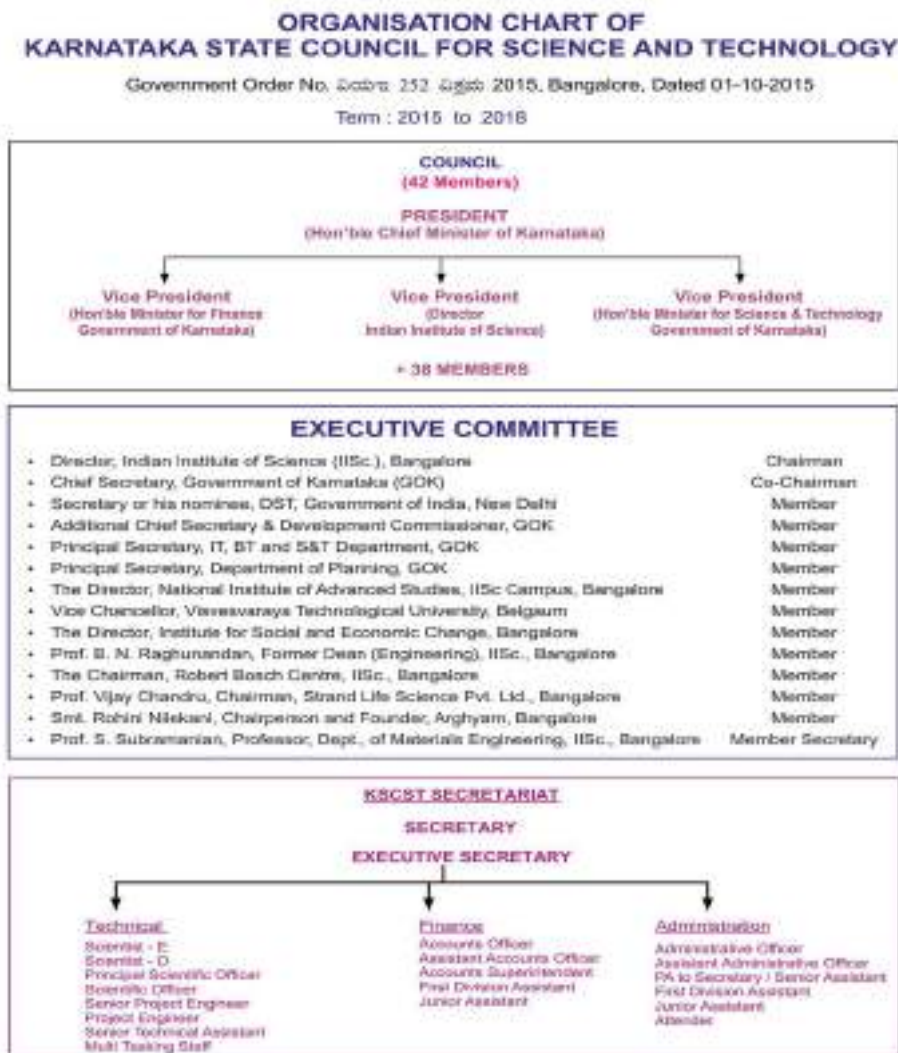
E-mail: [office@kscst.iisc.ernet.in](mailto:office@kscst.iisc.ernet.in)

Fax: 080 23348840

## 2. Structure of the Council:

g) Date of Establishment: 8<sup>th</sup> September, 1975

h) Organization Structure :



i) Strength of approved manpower (both central (DST) and state supported)

**Central (DST) approved manpower**

<b>Sl. No</b>	<b>Name</b>	<b>Designation</b>	<b>Pay Scale Rs.</b>	<b>Approximate monthly emoluments Rs. in Lakhs</b>
1.	Dr. Swamy S.G.S.	Executive Secretary I/c	67,550-1,04,600	1.83
2.	Mr.A.R.Shivakumar	Principal Scientific Officer	67,550-1,04,600	1.82
3.	Mr.H.Hemanth Kumar	Principal Scientific Officer	67,550-1,04,600	1.63
4.	Mr.S.N. Sondur	Principal Scientific Officer	67,550-1,04,600	1.66
5.	Dr. U. T. Vijay	Principal Scientific Officer	67,550-1,04,600	1.34
6.	Mr.S.N.Jayaram	Project Engineer	43,100-83,900	1.12
7.	Mr. K.N.Venkatesh	Project Engineer	43,100-83,900	1.13
8.	Ms.Neesa Sharma	Senior Technical Assistant	40,900-78,200	0.99
9.	Project-Consultant	Technical Support Group	NA	0.40
10.	Ms.B.N.Girijalakshmi	PA to Secretary	67,550-1,04,600	1.82
11.	Mr.Govindaraja	Assistant Admv, Officer	43100-83900	1.15
12.	Mr. H Shiva Prasad	Accounts Superintendent	43100-83900	1.17
13.	Admin-Assistant	Admin-Assistant	NA	0.63
14.	Accounts-Assistant	Accounts-Assistant	NA	0.57
		<b>Total-Central Supported</b>		<b>17.24</b>

**State Govt. supported manpower**

<b>Sl. No</b>	<b>Name</b>	<b>Designation</b>	<b>Pay Scale Rs.</b>	<b>Approximate monthly emoluments Rs. in Lakhs</b>
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1.	Mr.D N Subbukrishna	Scientific Officer	56,800-99,600	1.39
2.	Mr.Anil R Naik	Project Engineer	43,100-83,900	1.05
3.	Mr. K V Shivakumar	Senior Project Engineer	52,650-97,100	1.52
4.	Mr.H R Phalanetra	Scientific Officer	56,800-99,600	1.41
5.	Mr.M Rama	MTS GR-III	30,350-58,250	0.85
6.	Mr.G.Raghvendra	MTS GR-III	30,350-58,250	0.94
7.	Mr. G C M Shetty	MTS GR-II	27,650-52,650	0.67
8.	Mr. B.Thiupathiah	MTS GR-I	23,500-47,650	0.63
9.	Mr. B U Ugrappa	Attender	27,650-52,650	0.64
		<b>Total-State Supported</b>		<b>9.11</b>
		<b>Grand Total</b>		<b>26.35</b>

**3. Budget allocation to your state S&T council for last five financial years including central government, State government & any other sources.**

a) Central Government – Secretariat Assistance (2013-14 TO 2017-18)

Sl. No.	Financial year	Grant sanctioned	Sanction order Ref.
<b>1.</b>	<b>2013 – 2014</b>		DST/KAR-S&T/ 2K10-Sectt (G)/ 13 dt.30.9.2013
a)	Recurring		
	1. Manpower	87.00	
	2. TA/DA	4.00	
	3. Other secretariat expenses	6.00	
	Sub-Total	97.00	
b)	Non-recurring	5.00	
	<b>Total</b>	<b>102.00</b>	
<b>2.</b>	<b>2014-2015</b>		DST/KARS&T/2K14-Sectt(G)/12 dt.29.9.2014
a)	Recurring		
	1. Manpower	87.00	
	2. TA/DA	7.00	
	3. Other secretariat expenses	12.00	

	Sub-Total	106.00	
b)	Non-recurring	6.20	
	<b>Total</b>	<b>112.20</b>	
3.	<b>2015-2016</b>		No.DST/SSTP/ Core GrantG/ 2015-16/12 Dated:30.09.2015
a)	Recurring		
	1. Manpower	87.00	
	2. TA/DA	7.00	
	3. Other Secretariat Expenses & Website Maintenance	14.00	
	Sub-Total	108.00	
b)	Non-Recurring	6.20	
	<b>Total</b>	<b>114.20</b>	

**Amount in Lakhs**

Sl No.	Financial year	Grant sanctioned	Sanction order Ref.
4.	<b>2016-2017</b>		No.DST/SSTP/Core Grant-G / 2016-17/12 Dated 26.09.2016
a)	Recurring		
	1. Manpower-Salary	110.00	
	2. Consultants	7.20	
	3. Project related grants	50.00	
	4. TA/DA	10.00	
	5. Other Items/Office expenditure	5.00	
	6. Website creation/ maintenance/ upadation	2.00	
	Sub-Total	184.20	
b)	Non-recurring	1.00	
	<b>TOTAL</b>	<b>185.20</b>	
5.	<b>2017-2018</b>		1.No.DST/SSTP/ Core Grant-G/ 2017-18 Dated:14.09.2017 2.No.DST/SSTP/ Core Grant-C/ 2017-18 Dated:14.09.2017

			3.No.DST/SSTP/ Core Grant-G / 2017-18 Dated 26.02.2018
a)	Recurring		
	1. Manpower-Salary	115.50	
	2. TA/DA	3.00	
	3. Other Items/Office expenditure	5.00	
	Sub-Total	123.50	
b)	Non-recurring	3.50	
	<b>TOTAL</b>	<b>127.00</b>	

\* Please Note that the excess expenditure incurred has been met from the State S&T Budget.

b) Central Government – Projects details(2013-14 TO 2017-18)

<b>I</b>	<b>2013 – 2014</b>	
1.	RWH Resource Centre – Uthan	1.83
2.	Bacteria free water by silver treatment	2.24
3.	Go ICT India Digital Heritage Phase III	14.34
4.	PAMC meeting on Geo ICT	2.25
5.	SAC – PM meeting	6.00
6.	9 <sup>th</sup> PA&MC of TIDE	8.00
7.	S&T communication & popularization in state S&T Councils	10.00
8.	Documentation of technologies developed by State Council	5.00
9.	National Science Day 2014	10.00
10.	KSSDI	26.79
	<b>Total</b>	<b>86.45</b>
<b>II</b>	<b>2014-15</b>	
1.	Go ICT India Digital Heritage Phase III	65.00
2.	11 <sup>th</sup> PA&MC of TIDE	10.00
3.	Eco-Water and Sanitation Literacy Campaign	4.00
4.	India EU water Project review meeting	2.04
5.	Indo-Tunisia Joint Workshop	9.00
6.	S&T Communication & Popularization state S&T Council	0.96
7.	India EU Water Project Review meeting	2.36
	<b>Total</b>	<b>93.36</b>
<b>III</b>	<b>2015-16</b>	
1.	Status of Kalyanis & Rejuvenation using Geo	1.66
2.	National Science Day-2015	5.11

3.	Geospatial Technologies Training Program	7.56
4.	National Mathematics Day	10.00
5.	S&T for Generation Next Urban Space-KSTA	4.00
6.	Networking Programme of Village Information Systems	10.00
7.	National Science Day	10.00
8.	Printing of Compendium on S & T Interventions	0.45
9.	Oracle 12c Deployment as a Central Facility	140.00
	<b>Total</b>	<b>188.78</b>

**Amount in Lakhs**

<b>IV</b>	<b>2016-17</b>	
1.	Identification of Potential sites for installation of Micro Hydel Plant	5.06
2.	Creation of Digital Repository of SPP reports	0.16
3.	Geo-ICT India Digital Heritage Phase III	6.50
4.	S & T Generation next urban space – KSTA	0.50
5.	Networking programme on Village Information system	1.50
6.	Science activity W/S for tribal school teachers	3.75
7.	Brainstorming Workshop for radio serial	12.52
8.	Interactive workshop on Geosciences for teachers	2.00
9.	Inter disciplinary cyber Physical system	3.00
10.	3rd Meeting on PEG on state S&T programme	10.40
11.	Identification of Strategies of Mapping S & T Needs	0.13
12.	National Mathematics Day 2016	0.23
13.	National Science Day 2016	0.07
14.	Date with Disaster	2.44
15.	National Science Day 2017	10.00
16.	Production of Crude Glycerol	20.59
17.	Hybrid Ultra Capacitor	1.94
18.	Assessment of Hydrological and Physical Status of Traditional Water Harvesting Structures	20.92
	<b>Total</b>	<b>101.70</b>
<b>V</b>	<b>2017-18</b>	
1.	Networking Programme on Village Information System	6.00
2.	Science Popularisation Activities Under S&t Plan-Tribal School Teachers	5.13
3.	Review Meeting on Interdisciplinary Cyber Physical Systems	1.41
4.	National Science Day 2017	2.34
5.	Assessment of Hydrological and Physical Status of	6.66

	Traditional Water Harvesting Structures	
6.	Utilization of Crude Glycerol obtained in Biodiesel Production	11.98
7.	National Workshop on Status of State SDIs and Future Strategies	15.75
8.	National Mathematics Day 2017	10.00
9.	Indo-EU Networking Meeting	8.90
10.	National Science Day 2018	10.00
11.	PAC & GMW for the Scheme " Scheduled Caste Sub Plan"	12.00
12.	National Data Registry Technical Committee Meeting	0.80
13.	Technology Communication and Awareness Through Hands on Assessment Training on Agricultural Technologies for Livelihood Opportunities and Household Nutrition Security in the Tribal Areas Of Karnataka	6.40
14.	Deployment Of FME/XML Spy/EA Software as a Central Facility for use by all the State SDIs	23.00
15.	Indian Digital Heritage Hampi-Exhibition , Virtual Gallery and Book Launch	10.00
16.	Development And Deployment Of Smart Aquaculture an IOT Enabled System	41.27
17.	Field Testing Of Hybrid Ultra Capacitors	43.28
	<b>Total</b>	<b>214.93</b>

c) State Government / Other Sources – Block and Project grants (2013-14 TO 2017-18)

SI No	Secretariat & Projects grants received from DST-GOK	Amount
<b>I</b>	<b>2013 – 2014</b>	
1.	Block grant-in-aid	240.00
2.	NRDMS	111.15
3.	BWSSB – RWH Help Desk	6.07
4.	Virtual Laboratory	30.00
5.	Agenda of Apprentice Scientist	4.00
6.	S&T Conference	10.00
7.	Bio-fuel Cell	12.60
8.	Bio-fuel SPP grant	20.84
9.	Karnataka Israel R&D	20.00
10.	Bio-fuel Technical lecture series	1.25
11.	Evaluation of watermen training programme	6.80
	<b>Total</b>	<b>462.71</b>
<b>II</b>	<b>2014 - 2015</b>	

1.	Block grant-in-aid including state council's projects and programmes	250.00
2.	Virtual Laboratory - K-STePS	105.00
3.	Karnataka Israel R & D Program	206.50
4.	KSCST Geospatial Chair	1.60
5.	Patent Information Cell	22.59
6.	Energy Efficient Buildings Workshop	4.38
7.	Municipal Solid Waste Management	2.34
8.	Watershed Development MELD Belgaum	72.90
9.	Treatment of Desiccated Coconut and Waste Water	1.60
10.	RWH Help desk Phase-II	7.28
11.	World Environment day	0.40
12.	Nano water purification using nano technology	1.25
13.	Biofuel Cell	5.47
14.	SPP Biofuel	15.67
15.	Strategy for Augmenting Water Resources	0.50
16.	Setting up of 15 Nano Water Filters	18.75
	<b>Total</b>	<b>716.23</b>

**Amount in Lakhs**

<b>Sl No</b>	<b>Secretariat &amp; Projects grants received from DST-GOK</b>	<b>Amount</b>
<b>III</b>	<b>2015-2016</b>	
1.	Block grant-in-aid including state council's projects and programmes	250.00
2..	Virtual Laboratory - K-STePS	16.00
3.	KSSDI	24.36
4.	KSCST Geospatial Chair	4.38
5.	NRDMS	127.08
6.	RWH Help desk Phase-II	7.17
7.	Action Research Centre	3.30
8.	Patent Information Cell	6.81
9.	Energy Efficient Building Workshop	1.60
10.	Watershed Development MELD Belgaum	15.18
11.	Biofuel Cell	10.60
12.	SPP Biofuel	1.22
13.	Do it Yourself RWH Tool	4.99
	<b>Total</b>	<b>472.69</b>
<b>IV</b>	<b>2016-2017</b>	
1.	Block grant-in-aid including state council's projects and programmes	120.00
2..	Chetana Empowering girls with technology	4.34
3.	Training programme for Environmental Engineers	10.00



4.	KSCST Geospatial Chair	4.09
5.	Energy Efficient Building workshop	1.80
6.	Watershed Development MELD Programme	39.03
7.	Biofuel Cell	14.00
8.	SPP-Biofuel	20.00
9.	RWH Helpdesk Phase III	4.34
10.	Karnataka Israel R & D Program	133.50
11.	Do it yourself RWH Tool	2.62
12.	Virtual Class rooms REC	2.00
13.	Disaster Risk Management painting competition from DMC	0.79
14.	Study of Noise pollution in Mysore City	0.96
15.	Energy Cell	2.75
16.	Action research centre	11.37
17.	NRDMS	157.31
	<b>Total</b>	<b>544.28</b>

**Amount in Lakhs**

SI No	Secretariat & Projects grants received from DST-GOK	Amount
<b>V</b>	<b>2017-2018</b>	
1.	Block grant-in-aid including state council's projects and programmes	350.00
2..	Chetana Programme-Empowering Girls in Technology	2.82
3.	Training For New Recurited Environmental Engineers	3.61
4.	Energy Efficient Building Workshop	1.45
5.	Watershed Development- Monitoring, Evaluation, Learning And Documentation	18.44
6.	Biofuel Cell	12.00
7.	Biofuel SPP	13.00
8.	Establishment Of Virtual Laboratory To Improve Quality Of Education In Backward Taluks Of Karnataka-REC	123.38
9.	RWH Helpdesk Phase 4	7.34
10.	Discussion Meeting On Water & Railway Universities	0.78
11.	International Symposium On Earthen Structures Ises-2018	5.15
12.	NRDMS	162.53
	<b>Total</b>	<b>700.50</b>

**Note:**

1. As per the order issued by the Government of Karnataka at the time of inception of the Council (in 1975-76) yearly Block Grant-in-aid sanctioned to the Council is to be utilized for the Council's projects / programmes and also for salary and office maintenance expenditure. Hence, no separate S&T secretariat grant is sanctioned by the State Government to the Council.

2. Accordingly, grants indicated above other than that of Block grant-in-aid are for the implementation of specific projects / programmes.

**4. Key activities under taken during the last two years in the area of:-**

## **4.1. Technology Development**

### **4.1.1 Student Project Programme (SPP)– Biofuel / Bioenergy Projects**

During 2016-17 under the faculty development programme of KSCST, a technology for preparing Bio Films from Glycerol obtained as a byproduct during conversion of non edible oil to biodiesel has been developed by Jain University that could be applied in food or pharmaceutical industries and further under the student project program two technologies were developed for extracting biodiesel from micro algae and bioconversion of crude glycerol to polyhydroxyalkanoates / polyhydroxybutyrate (Pha/Phb). Similarly, during 2017-18 under the student project program two technologies were developed for de-pulping of non edible oil seeds meant for biodiesel production and biofuel cells from septic tank for sustainable energy generation.

### **4.1.2 Student Project Programme (SPP) of engineering students**

Under the student project programme of KSCST, during 2016-17 a total of 550 projects and 2017-18 around 560 projects sanctioned respectively to various engineering institutions in Karnataka.

1. 2015-16, (39th series): out of 636 projects sanctioned under 39th series of SPP of KSCST total of 43 projects were identified for product development and commercialization. The following projects were notable:

- a) Development of portable Fire Extinguisher using Acoustic waves.
- b) Smart Machine for plastic waste disposable.

2. 2016-17, (40th series): out of SPP out of 627 sanctioned projects, the experts identified 53 projects for further development and commercialization. Further development of the projects is under progress. The following projects were notable:

- a) Fabrication of remote operated multifunctional unmanned vehicle for an agriculture purpose using solar energy.
- b) Advanced Automated Prosthetic Limb.

### **4.1.3 Karnataka – Israel Industrial Research & Development Program KIRD**

Under the collaborative programme of Department of Science and Technology, Government of Karnataka and Isreal Innovation Authority, Isreal, Industrial R&D related projects were initiated during 2013-14. Under this programme, two beneficiaries namely: M/s. Blue Neem Medical Devices Pvt. Ltd., and M/s. Rangsons Schuster Technologies Pvt. Ltd. Mysore were selected and funds were given for developing innovative products for commercialization. M/s. Blue Neem Medical Devices Pvt. Ltd., for the Project Contisphere, was given approval for funding of Rs.90,00,000/- and M/s. Rangsons Schuster Technologies Pvt. Ltd. Mysore, for the project “Development of Aviation flexible hoses with Titanium ends fittings” was given an approval for funding of Rs.2,50,00,000/-, and the first and the second instalment amount with respect to both the companies has already been released during 2016-17. The product by M/s Blue Neem namely the device “Contisphere” has been developed for preventing female urine incontinency. The product developed by M/s. Rangsons Schuster Technologies namely the Aviation flexible Hoses with Titanium end fittings used by aircraft industries. Both the products are ready for commercialization. The projects are implemented and monitored by KSCST.

## **4.2. Technology Demonstrations:**

### **4.2.1 Biofuel Cell**

Under the Orientation programme on Biofuels KSCST has conducted 5 programmes during



2016-17 and 15 programmes during 2017-18. The programme is conducted for students and faculties of Science and Engineering colleges and includes demonstration of Biodiesel production technologies and its application and usages. More than thousand students and faculties have been benefited by the programme leading to interest in Research in the area of Biofuels and Bioenergy.

#### 4.2.2 Patent Information Cell:

IPR Awareness Programmes were organized at various engineering colleges in Bangalore and across Karnataka state. These programmes were aimed at creating awareness among students, particularly those from final Engineering students who take project work as a part of their curriculum. They were also attended by Research scholars and faculty members of the college. The programmes consisted of two technical presentations by Resources Persons. The Topic of the presentation were mainly on Introduction to IPR and on Patenting Mechanism and Procedure in India. The few other topics covered are IP Valuation, computer software Copyright, Patent drafting, Patent Laws, Prior-art search live demo and Research methodology etc. This was followed by a question-answer session to clarify the queries from participants. About 2500 participants were benefited from 30 workshops.

KSCST is interacting with different Universities and Engineering Institutions for setting up of IP Cell. The guidelines for setting up an IP Cell and the modalities are being sent to the



institutions. So far, 7 IP cells at differet instuitions have been established.

#### 4.2.3 Demonstration of GIS & Remote sensing Technologies - Natural Resources Data Management System Programme

The projects personnel of district NRDMS centres have been nominated as nodal officers by the district election authorities as per the directions of State election commission for the Assembly elections – 2018. The activity includes providing training to the officials involved election related activities in the preparation polling station booths and its jurisdiction. Google maps are being used extensively to prepare polling station information along with name & description and in some cases geotagged photographs. On an average such maps are being

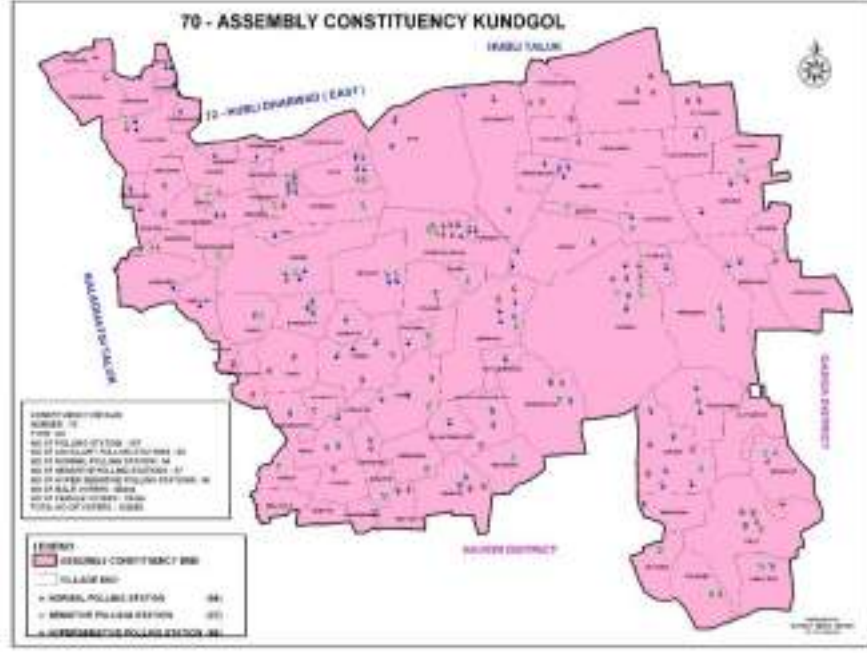
prepared for 2500 polling stations in each district. The centres are also preparing a variety of maps pertaining sector, route, polling station type etc., They are also performing the duties as contained in the instructions of the Election Commission relating to the implementation of all IT based

of

interventions till the declaration election results.



Brought out two technical reports in Kannada language titled "Use Geospatial Technologies in Panchayath raj System in August -2017". The report brought out GIS applications taken up by district NRDMS centres mainly in the areas of asset mapping of Gram Panchayaths, Water level fluctuation in Drinking water sources, Beat mapping for Police department for effective patrolling, malaria eradication, watershed management, reorganization of wards in Urban Local Bodies, tourism, animal husbandry, water quality/quantity mapping etc. These reports have about 40 applications.



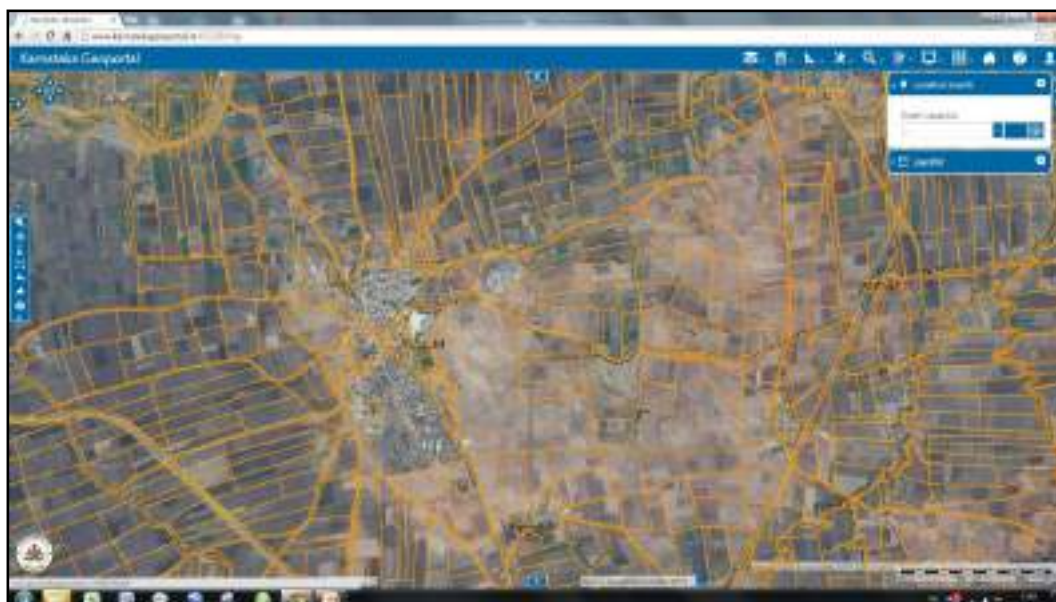
The state NRDMS centre brought out a report on "Customization of GIS Applications using USE-CASEST". Using Unified Modeling Language (UML), a general-purpose, developmental, modeling language conceptual data model have been developed for geospatial applications.

**Pollution mapping with reference to transmission system for Southern region (CPRI) - Insulator pollution is considered as one of the main problems of insulators of high voltage**

transmission lines and substations. The performance of high voltage insulators is affected by the pollution that settles on the insulator surface and results in forming electrolyte layer on the insulator surface under the influence of environment and weather conditions such as moisture and rainfall. These maps are prepared based on the inputs provided by CPRI. The severity classes have been categorized by CPRI using ESDD and NSDD values. The insulators will be designed based on severity classes provided in the map.

#### 4.2.4 Development of geospatial web applications on Karnataka Geoportal for G-governance

KSCST showcased the utilization of Geospatial Technologies by developing geospatial applications on the Karnataka State Geo-portal to evaluate watersheds in Belagavi Division of Karnataka under the Phase I and Phase II projects of PMKSY. Development and deployment of the “State Geo-portal for Watershed Management” technology enables the users to query on various geo-spatial and non-spatial (attribute) parameters at cadastral/beneficiary level for activities taken up under agriculture/ horticulture/ forestry sectors. The Geo-portal enlists a host of Open Geospatial Consortium (OGC)/ International Standardization Organization (ISO) Standards-based Web Services for accessing data sets to support Watershed Management. Crowd sourcing of data for data updating, mobile (smart phone) compatibility and online editing of data sets are some of the Technology’s major highlights. Some of the screenshots showing the home page and query pages of the State Geo-Portal are shown below:



Home page of the Karnataka Geoportal providing access to the Watershed Information Use of the services has been demonstrated to the potential end users in various training workshops in Karnataka and several other States for adoption in State SDI projects of NRDMS-NSDI.

#### 4.2.5 Energy Efficient Buildings - Low Carbon Materials and Building Systems

Department of Civil Engineering, Centre for Sustainable Technologies and Karnataka State Council for Science & Technology, the Indian Institute of Science are involved in developing and disseminating



large number of low carbon building materials since the last three decades. More than a dozen energy efficient building technologies have been developed and disseminated. Large numbers of buildings have been built using these new materials. Such buildings are energy efficient and result in at least 50% reduction in carbon emissions. There is a demand for the knowledge on low carbon building materials and systems.

#### 4.2.6 State SDI's and their Applications

Considering the importance of geospatial data and its varied applications in the present-day environment, Government of India constituted National spatial data Infrastructure in the year 2006 for the purposes of acquiring, processing, storing, distributing and improving spatial data through web based geospatial technologies. Further to meet the needs of users, planners, policy makers, industry and academia and to reap the benefits of higher-end technologies like GIS, GPS, high resolution satellite sensors, a single source of information infrastructure is a long-felt need. Moreover, fast computers and ICT technologies provide ways and means for supplying spatial data to the users on their desktops.

#### 4.2.7 Assessment of Hydrological and Physical Status of Traditional Water Harvesting Systems in Karnataka for developing Measures for Restoration and Rejuvenation using Geo-Spatial Technologies

In view of the severe water scarcity in the rural and peri urban areas the Traditional Water Harvesting structures have to be revived for improving the ground water and surface water availability.

KSCST has taken up a project on assessing the hydrological and physical status of ancient water harvesting structure such as Kalyanis, Pushkaranis/Temple tanks, Gokatte and Kunte etc., of the state for suggesting S&T interventions for rejuvenation and restoration using GIS and Remote Sensing technologies. Based on the findings, the Zilla Panchayat have come forward to implement the suggestions given by KSCST for rejuvenation of traditional water harvesting systems.



Kalyani in Doddaballapur, Doddaballapur Tq, Bengaluru Rural District

In this connection, KSCST has initiated to take up the restoration rejuvenation of Kalyani in Shantigramma village in Hassan taluk and district having the water storage capacity of 14500 cu.m. Based on the proposal from Hasiru Bhomi Prathishtana, a non profit making organization in Hassan, KSCST has sanctioned the work order to take up the rejuvenation of this Kalyani with the consent of concerned Panchayath raj institution of Hassan district.

#### 4.2.8 E-Learning Centres - Virtual Laboratories

Under the Special Development Programme (SDP) of Government of Karnataka, Department of Planning, Karnataka Science and Technology Promotion Society (KSTePS), Department of Science and Technology, Government of Karnataka (DST-GOK) and Karnataka State Council for Science and Technology (KSCST), Bengaluru are jointly established Virtual laboratories (E-Learning Centers) in 11 high schools in the backward talukas of Karnataka as a pilot-study. After the successful implementation of the above programme, Rural Electrification Corporation Limited (REC), under CSR initiative Established another 10 Virtual Classrooms in backward talukas of Karnataka.

These laboratories are established to improve the quality and effectiveness of education by collaborative learning and teaching process through IT enabled software & tools. Under this project, KSCST is developing 3D experiments for the High School syllabus.



#### 4.2.9 Teacher Enrichment Programme

Science and Technology (KSCST) along with Anubhava Science Foundation, Bengaluru and Department of Education, Government of Karnataka at the Block level organised “Teachers’ Enrichment Programme” at Indian Institute of Science campus. Teachers’ Enrichment Programme is a year-long programme envisioned to enrich the teaching - learning of science and mathematics in Higher Primary schools of Karnataka. During the workshop, KSCST has provided Physics and Chemistry experimental kits designed for Higher Primary schools.



#### 4.2.10 Digital Geospatial Data Generation And Terrestrial Scanning For 3d Reconstruction Of Heritage Site At Hampi

Initiated the process with the Department of Archaeology, GOK and ASI to take up the 3D Laser scanning of Heritage monuments of Karnataka state under Karnataka Digital Heritage(KDH) by scanning important historical monuments of heritage sites of Karnataka using Geo-spatial and 3D Laser scanning technologies” for preserving and development of Digital heritage. 3D Laser scanning of 77 World Heritage Monuments has been completed



3D Point cloud data of Balakrishna Temple and Lotus Mahal in Hampi

#### 4.2.11 Demonstration of Nano Technology based Water Purification Unit

In Raichur and Yadgir district of Karnataka State several remote villages are affected by Arsenic content in drinking water sourced from borewells. KSCST interacted with IIT Madras for application of Nano technology based water purifier which can remove Arsenic content which is found to be harmful for Human consumption leading to skin and eye problems.

KSCST identified Hal Ammapur Village in Yadgir district and Medinapur in Raichur district having more than 100 households affected by Arsenic and installed the Nano Technology based water purifier under the mini water supply scheme. This has given the confidence to the inhabitants of respective villages to consume water for drinking and domestic purpose.

Nano Tehnology based water purifying unit at Hal Ammapur village,Shorapur taluk, Yadgir district



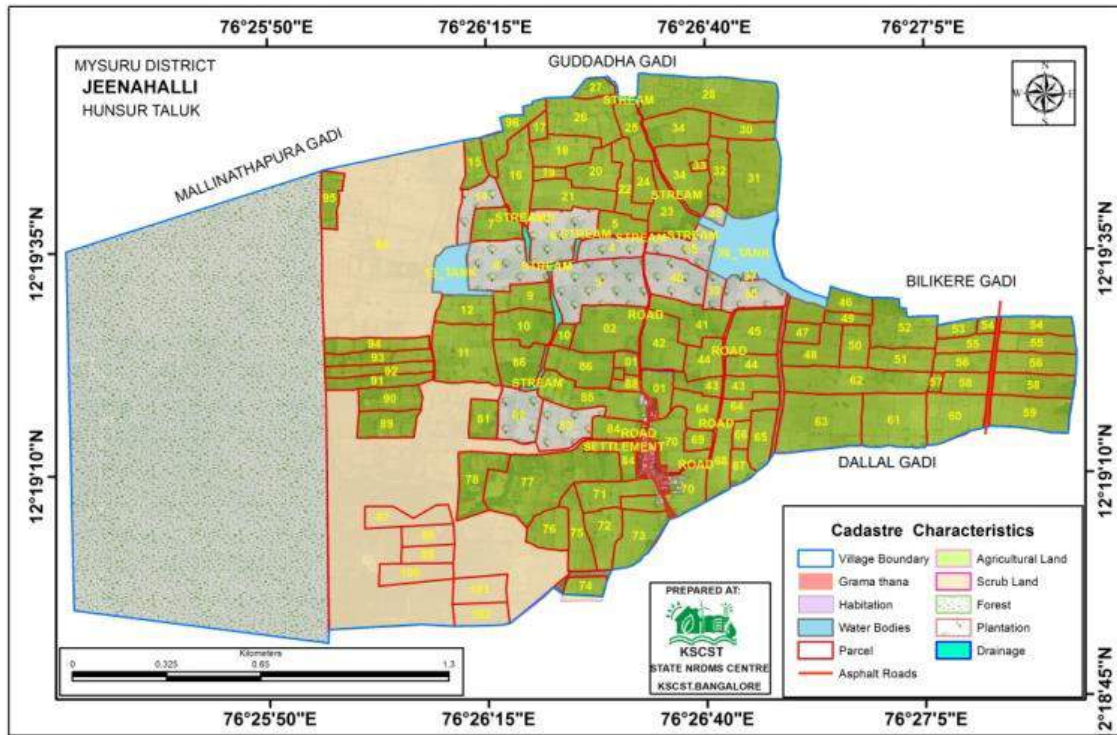
#### 4.2.12 Demonstration of High resolution mapping technology for village level asset management - Village Information System

The concept of cadastral level mapping with high resolution spatial data was initiated to capture parcel level information of the villages. The Council is a partner in DST - GoI funded



innovative programme on the development, validation and standardization of data structure and the optimum data requirements for providing village information system at cadastral level.

The Council identified Awaradi and Hirenandihalli Gram Panchayaths in Bailhongal Taluk, Belagavi district and Bilikere Gram Panchayaths in Mysore districts for implementing this innovative project and the work has been completed.



### 4.3 Popularization of Science:

#### 4.3.1 E-Learning Centres - Virtual Laboratories

Under the Special Development Programme (SDP) of Government of Karnataka, Department of Planning, Karnataka Science and Technology Promotion Society (KSTePS), Department of Science and Technology, Government of Karnataka (DST-GOK) and Karnataka State Council for Science and Technology (KSCST), Bengaluru are jointly established Virtual laboratories (E-Learning Centers) in 11 high schools in the backward talukas of Karnataka as a pilot-study. Due to establishment of such classroom in the remotely located high schools, there is a notable increase in admissions of the students and the percentage of passing.

After the successful implementation of the above programme, Rural Electrification Corporation Limited (REC), under its CSR initiative also funded to establish 10 similar Virtual Classrooms in backward talukas of Karnataka.



#### 4.3.2 Training programme for High School Teachers

Karnataka State Council for Science and Technology in collaboration with Udayabhanu Study Centre, Bengaluru organised training programme for High School teachers on Science and Mathematics syllabus. The programme was organised in 3 different talukas of Chikballapura District namely Bagepalli, Shidlaghatta and Chintamani on 9th August 2017, 17th August 2017 and 29th August 2017 respectively. Around 300 Government High School teachers have been benefitted. During the workshop atomic structure, chemical bonding, topics related to optics, resonance, algebraic expression, topics and 3D virtual experiments were discussed and demonstrated.



#### 4.3.3 Demonstration of Assistive Technologies for High School Teachers

Karnataka State Council for Science and Technology organised 2 day workshop for High School teachers on Science syllabus and Assistive Technology in different locations of Karnataka. The workshop was organised in Belagavi, Dharwad, Kalburagi and Uttara Kannada. Around 250 High School teachers have been benefitted. A session on “Assistive Technology” meant for specially abled person and various schemes available in Government of Karnataka and Government of India was held during the programme.



#### 4.3.4 Teacher Enrichment Programme

Karnataka State Council for Science and Technology (KSCST) along with Anubhava Science Foundation, Bengaluru and Department of Education, Government of Karnataka at the Block level organised “Teachers’ Enrichment Programme” at Indian Institute of Science campus. Teachers’ Enrichment Programme is a year-long programme envisioned to enrich the teaching - learning of science and mathematics in Higher Primary schools of Karnataka using physics and chemistry experimental kits.

The Teachers’ Enrichment Programme is offered in physical mode with contact sessions spread over one year for government and aided higher primary school teachers. The programme has been launched on 16th August 2017 and concluded on 4th April 2018 with contact sessions. A total of 33 teachers those who are teaching Science and Mathematics from Government and aided School in Bengaluru. The similar programmes are being planned for other districts of Karnataka.



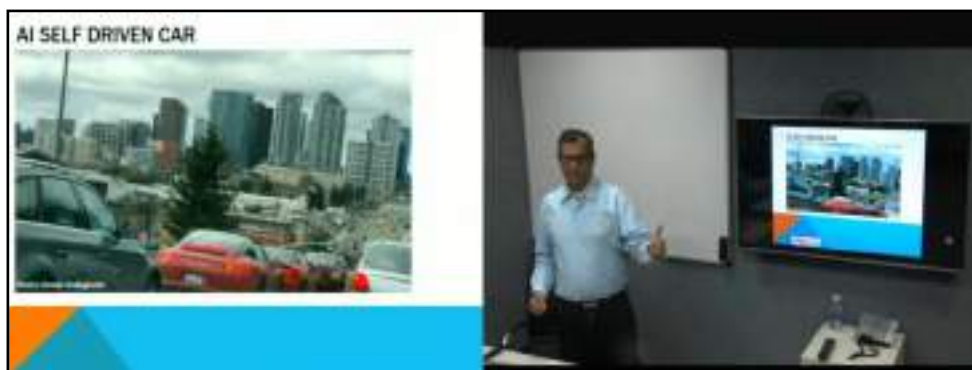
#### 4.3.5 Workshop on Geosciences for High School Teachers

KSCST in collaboration with Uttara Kannada Science Centre, Karwar and Tumakur Science Centre, Tumkur organised 2 day workshop on Geosciences for High School teachers 7th & 8th September 2017 at Kumta taluk, Uttara Kannada district and on 20th & 21st February 2018 at Tumkur respectively. Around 150 Government high school teachers teaching Geography participated in the workshop. During the workshop the topics such as Structure of Earth, Atmosphere and Climate, Remote sensing, GIS, GPS and importance of Satellites were discussed by the experts.



#### 4.3.6 Streaming of Live Lectures from Multimedia Studio

The Council has established a Multi-media Studio cum Video Conferencing Centre at the Council. This facility is being used (i) to stream and record lectures of eminent scientists for access by students in schools/ colleges all over the state and beyond (ii) for interactive meets (iii) video conferencing (iv) for interim evaluation of Student Project Programme projects in different nodal centers / institutions and interaction with NRDMS Officials in the districts, and (v) to deliver technical lectures and experiments to the VL schools, etc.



#### 4.3.7 Workshop on Science and Mathematics for Tribal Region High School Teachers

Karnataka State Council for science and technology jointly with Deenabhandu Teachers Resource centre, Chamrajanagara organised 2 day training workshop on science and mathematics for tribal region high school teachers of Mysuru and Chamrajanagara district during 11th and 12th September 2017 at Chamrajanagara. The workshop involved preparation of teaching-learning materials in mathematics and physics. The session also focused on preparation of simple models using easily available materials. Few experiments on magnetism, Optics, Pressure, Electronics and many basic topics using kits. Preparation of teaching - learning materials in mathematics and physics was conducted.



#### 4.3.8 Radio serial on “Sustainable Development”

Karnataka State Council for Science and Technology, Indian Institute of Science, Bengaluru, Vigyan Prasar, Department of Science & Technology, Government of India, and All India Radio, Bengaluru in fulfilment of its science popularisation mandate and with the aim of creating awareness about sustainable environment among general public, broadcasting the radio serial “Sustainable Development” from 18th June 2017 in Kannada and Konkani language.

Till date 40 episodes on Sustainability and Industrial Revolution, consumption of Natural Resources, India Ethos & Practices on SD, Sustainable Development Goal 2030 Energy, sustainable cities, Disaster deduction, Protecting and Managing Natural Resources, Agriculture, Food security, Education & Skill, Ocean a & Marine ecosystem, Fossil Fuel & Environment. Around 150 feedback have been received on different question answer during each episodes. Science kits prepared by Vigyna Prasar, Government of India were given to the prize winners of each episode.

#### 4.3.9 Science Express

Science Express programme is a flagship programme of Department of Science and Technology, Government of India in collaboration with Ministry of Environment, Forest & Climate Change, Department of Biotechnology, Ministry of Railways, Government of India, Wildlife Institute of India and Vikram A Sarabhai Community science Centre. It is a unique exhibition mounted on a customized 16 coach AC train focusing of Climate Change and Science & Technology.

The Science Express train has arrived at Gulbarga on 31st May 2017 to June 2nd , Bengaluru Whitefield Railway Station on 6th – 8th June 2017 and to Kengeri Railway Station on 9th – 11th June 2017. KSCST has arranged visit of 500 students from various high schools.



#### 4.3.10 Orientation programme on Assistive Technologies for High School Students

Karnataka State Council for Science and Technology organised a one day orientation programme for High School students in 21 Virtual laboratory and Virtual Class room Government High Schools in backward talukas of Karnataka. A programme includes a session on “Assistive Technology meant for specially abled persons and Schemes available”. A session was also held on “Science and Technology interventions in the education sectors”. Around 3000 High school students have been benefitted by this workshop.

#### 4.3.11 Vijnana Darshana

KSCST is very keen to popularize science among rural children. In this regard, the Council is organising “Vijnana Darshan” programme. This programme aims to take the students on a Science tour to leading R & D institutions in Bengaluru to spur the



scientific interest in the students. In this financial year, the Council has arranged arrange a visit of 84 Government High School Students and 21 faculty members of virtual Laboratories and Virtual classrooms from different parts of Karnataka from 11th – 13th January 2018. The book “Jnana Vijnana Nigantu – Science Dictionary” in Kannada was distributed to all the participants.



#### 4.3.12 Chetana Programme

With the support of the Department of Information Technology and Biotechnology, Government of Karnataka, jointly with Indian Institute of Science organized "Chetana – Empowering Girls with Technology" programme. In this programme girl students of PUC Science stream and who have passed with distinction in their SSLC exams are invited to Indian Institute of Science campus for interacting the scientists and faculty and understanding the importance of science and its application. It is also to encourage the students to take up science as thier career.

KSCST organised two such programmes in 2016 - 17 and 2017 – 18 respectively and inviting 60 students from Mysuru, Belagavi, Uttara Kannada and Hassan districts. The duration of this programme was for 20 days where the students visited various departments in Indian Institute of Science campus and also important institution in Bengaluru city.



#### 4.3.13 National Mathematics Day 2017

Karnataka State Council for Science and Technology and National Council for Science and Technology Communication Government of India, New Delhi jointly celebrated National Mathematics Day on 22nd December 2017 on the birthday of Shri. Ramanujan at Prof. Satish Dhawan auditorium, Indian Institute of Science, Bengaluru. Around 350 Students from BBMP High Schools participated in this event.

Around 40 mathematical models from various High Schools were exhibited during the programme. A book “Ganithanda Chatuvatikegalu” in Kannada was distributed to all the student participants. Technical talks were also organised on this occasion.



Students visiting various mathematics exhibits

#### 4.3.14 National Science Day 2018

National Science Day is celebrated in the honour of Sir C V Raman’s invention popularly called the Raman Effect. The theme for this year’s National Science day 2018 is “Science and Technology for Sustainable Future”.

As a pre cursor of this occasion KSCST organised On-the-spot painting competition on 10th February 2018 (Saturday) at IISc campus. Around 700 Higher Primary and High School students participated in the competition. The painting were adjudged by the faculty members of Chitrakala Parishanth and 46 paintings have been selected for award. KSCST also organised Essay Writing Competition in several Government High Schools in and around Bengaluru.



View of participants during painting competition

KSCST celebrated National Science Day 2018 on 28th February 2018 at J. N. Tata Auditorium, IISc, Bengaluru. Around 750 students from BBMP, Government and aided High Schools participated.

The programme included special lectures by eminent scientists and interaction with the



students. Prizes were distributed on this occasion to the winners of On-the-spot painting competition and Essay writing competitions.



#### 4.4 Patents :

During the period (2016-17) Patent Information Centre has received 40 queries and 8 patent applications have been filed for two designs and one copyright.

During the period (2017-18) Patent Information Centre assisted for filing 3 Provisional applications, 1 complete application, and 1 design registration. Around 45 applicants visited PIC for various IPR related queries and information's were provided suitably. The applicants include individual innovators and students and faculty members from engineering colleges.

During this financial year KSCST has organised 11 IPR awareness programmes at engineering colleges in different locations of Karnataka and around 1300 students and faculty were benefited. Further, KSCST is interacting with universities and engineering institutions to establish IPR cells.

#### 4.5 Any new Innovative activities:

##### 4.5.1 Biofuel Cell:

- **Glycerol project:** "Utilization of crude glycerol obtained in biodiesel production as an alternate to glyco-genic feed supplement for dairy cows" Supported by DST, GoI
- Experiment were carried out to extract oil from spent coffee powder
- Degumming of non edible oil using hydrothermal process

##### 4.5.2 Traditional Water Harvesting Systems

Water conservation is the need of the hour in many villages of the state. In order to improve the surface and ground water storage, KSCST devised a innovative method of renovating and rejuvenating traditional water harvesting structures such as temple tanks, ponds, animal and irrigation ponds by surveying them using GIS based technology. Through its DST sponsored programme KSCST identified more than 600 such surface water bodies for revival. Based on the reports of KSCST several Zilla panchayaths have come forward to take up the renovation and revival of such tanks.





Status of Kalyani before Rejuvenation and after Rejuvenation in Thovikere village, Tumkur district

#### 4.5.3 Academic & Industrial Interaction Cell:

- KSCST has set up a Academic and industrial interaction cell to network with different industrial groups under MSME sector to commercial products developed under Student Project Programme.
- Establishment of Virtual Laboratories (E-Learning Centres) in Backward Taluks to improve quality of education in Government High Schools of the State

#### 5. List five success stories with brief about 1 page each including photograph

##### 5.1 Application of Glycerol obtained from Biodiesel Production in animal nutrition

Under the internship program of KSCST, Post Graduate student from Manipur University, carried out a project on “characterization and purification of crude glycerol obtained from biodiesel process for its utilization as ruminants' supplementary diet”.

In this study, purification and characterisation of glycerol was performed. The Concentration of phenols and tannins in the glycerol were determined. The presence of these compounds in high concentration affects the digestibility and voluntary feed intake by the animal. The purified glycerol samples which were studied for in-vitro fermentation gave positive results, which clearly suggest that the glycerol obtained from biodiesel production from Pongamia oil can be used as glucogenic feed supplement in ruminants. Based on the findings KSCST submitted project proposal to DST, GoI which has been approved and the project is being implemented.



Purification of Crude Glycerol

##### 5.2 Restoration and Rejuvenation of Kalyanis in Karnataka

Under the project sponsored by DST, GoI KSCST had identified 600 temple tanks for their revival. During the survey conducted by KSCST, awareness was created among the villagers regarding these kalyanis as an important source of surface water. Due to the advent of borewells, overhead tanks and piped water schemes of the government these kalyanis were gradually abandoned by the villagers and slowly turned into a dump yard. Over the past 2 decades, many borewells failed due to absence of natural recharge of the ground water. Hence, there was major scarcity of drinking water in many villages. Although government adapted several methods of reviving the borewells but they were not successful. Hence, this initiative of KSCST has come as a boon to many villages and the villagers have come forward to revive their temple tanks.

KSCST has initiated to take up the restoration rejuvenation of Kalyani (temple tanks) in Shantigramma village in Hassan taluk and district having the water storage capacity of 14500 cu.m. Based on the proposal from Hasiru Bhomi Prathishtana, a non profit making

organization in Hassan, KSCST has sanctioned the work order to take up the rejuvenation of this Kalyani with the consent of concerned Panchayath raj institutions of Hassan district.



### 5.3 Development of geospatial web applications on Karnataka Geoportal for G-governance (KSSDI Phase II Project)

KSCST with the support of DST, GoI has established the Karnataka Geoportal with the State-of-the-art hardware and software technologies. This geoportal is now being extensively used by several State Government departments for projecting their schemes and also developing applications for online updation. One such application was successfully developed for the Karnataka Watershed Development Department for the implementation, monitoring and evaluation of watershed programmes.

KWDD currently has an in-house desk-top based Management Information System (MIS) for monitoring Watershed Programs by its Head Office. It makes use of out-of-date cadastral and thematic maps from planning to implementation stages and tries to document all the activities with geo-tagged time-stamped photographs before, during and after the implementation of various program-based activities.

KSCST felt the need for integrating KWDD's MIS with the web-based SDI approach of NRDMS-NSDI/ DST to provide standards-based online geospatial information services to end users in KWDD by utilizing the Karnataka State Geo-portal already operational in the State. Using the geo portal KSCST was successfully integrating the KWDD data with the latest spatial and non-spatial data generated by NRDMS.

On the launch of the above project, a user requirement analysis was taken up to understand and study the geospatial information needs of the KWDD to be accessed over the web. KSCST showcased the utilization of Geospatial Technologies by developing geospatial applications for evaluating watersheds in Belagavi division.



Query Window on Cadastral Boundary Data Layer of a Watershed

#### 5.4 Karnataka Natural Resources Data Management System (NRDMS)

Since last two and half decades, NRDMS programme of KSCST has been creating data and applications for the Zilla Panchayath, DC Office and all the line department of the districts using GIS & RS technologies. Several important applications have been developed which has benefitted the decision makers and planners. One such exercise under the NRDMS programme is the demarcation and digitization of newly identified grampanchayaths and their villages after the state government formed more than 40 new talukas in the state. On the instructions of the Deputy Commissioner of the respective Districts, the villages were demarcated and new boundaries were digitized by the NRDMS district centres. With this new maps it has become easy for the planners to implement their schemes successfully. A comprehensive report on this exercise has been submitted to the state government.



#### 5.5 Village Information System

The Village Information System project is envisaged to comprise of spatial data on demography, natural resources, climate, land use land cover patterns and socio-economic aspects etc. to aid and support the decision makers and planners to make informed decision-making at village level. The Council is a partner in DST - GOI funded innovative programme on the development, validation and standardization of data structure and the optimum data requirements for providing village information system at cadastral level.

Under this project KSCST has conducted GPS based survey in thress Gram Panchayaths located in two geographical areas of the state and captured the parcel level data. It also includes cadastral (parcel/hissa), settlements, assets and soil and water parameters using high-resolution satellite imageries, cadastral maps, Survey of India topo maps, GPS/DGPS and extensive filed verification and validation. The project was completed successfully, the report has been submitted to the Government.

#### 5.6 Virtual E-Learning Centers – Virtual Laboratories

Department of Planning, Karnataka Science and Technology Promotion Society (KSTePS), Department of Science and Technology, Government of Karnataka (DST-GOK) and Karnataka State Council for Science and Technology (KSCST), Bengaluru have jointly established Virtual laboratories (E-Learning Centers) in 11 high schools in the backward talukas of Karnataka as a pilot-study.

The objectives of establishing these laboratories are to improve the quality and effectiveness of education by collaborative learning and teaching process through IT enabled software & tools. The students will learn science experiments, inculcate scientific attitude and spread the



same in their neighbourhood schools. Both the teachers and the students were trained in the usage of this E-learning centres which were developed as per the state syllabus of the 8th, 9th and 10th standards. It has generated keen interest among the students in learning their subjects after using the digital contents effectively. It has also improved the pass percentage in the respective schools and also led to an increased intake by the schools.



View of Virtual classroom in different High schools

### **5.7 Student Project Programme**

The council has initiated and strengthened the culture of research in university departments and engineering colleges in the state through its flagship programme the Student Project Programme (SPP). Under this programme, KSCST has been providing technical and financial support to final year engineering college and university students in executing R & D projects. KSCST sponsorship of the project has now become a benchmark of quality for engineering projects, carried out by students and are accepted as mark of excellence by academic and industrial communities. This programme has been in operation for the last 41 years and more than 9000 projects have been sponsored by KSCST. Reports of these projects are kept for reference at the KSCST library and Project details are also available at KSCST portal <http://kscst.iisc.ernet.in/spp.html>. SPP of KSCST has been recognised as a model programme by Department of Science and Technology (DST) Government of India, New Delhi and it is encouraging other states to emulate the same.

Karnataka State Biofuel Development Board, Government of Karnataka, through KSCST is also helping students to take up innovative projects in biofuel/bio-energy area since 2012.

#### **Achievements:**

- Students have accessed advice and guidance of expert resource persons from Indian Institute of Science, R&D organisations, Institutions of higher learning and industry, in addition to the faculty of their colleges thereby widening their horizons and intensify their processes. KSCST has developed very good network with engineering institutions, universities and R&D institutions.
- Recognition and Awards in the form of citations or prizes have been instituted to nurture competition and pursuit of excellence. Many students who are involved in SPP programme are preferred for higher education in advanced technical institutions, universities in India and abroad
- Several studies, focused on rural and peri-urban issues, have helped in developmental activities such as low cost housing technology, ground water studies, low cost agricultural implements, assessment of drinking water potential in specific areas etc., are some of the notable examples.
- Student Project Programme started by KSCST has attracted the attention of other State councils and initiated similar programmes in their respective states.

- Projects, sponsored by KSCST have attracted the attention of industries also.



Release of SPP compendium by guests and students performing at Seminar and Exhibition held at NMAMIT, Karkala, Udupi District during August 2017

**List of Projects Awarded as best project under 40th series of SPP:**

- Design and Fabrication of Low Cost Tricycle For Handicaps Using Steering Column Propulsion
- Extraction of Chitin From Prawn Shell, Preparation of Chitosan By Biological Method and Application
- Development of Noise Absorbing Composite Materials Using Agro Waste Products
- 24x7 Lifeline Chip for Militants
- Electronic Student Project Proposal
- Prepaid Payment for Utility
- Wireless Safe, Smart and Secured Driving System
- Smart Water Meter Using Wireless Networking
- IoT Based Smart Public Distribution System
- A Smart Wrist Band Based Human Interface Device for PWD
- Automated Rubber Tapering Machine
- Arecanut Tree Climber and Pesticide Sprayer
- Developing ERP for Torque, Dimension And Electrical Calibration for Flutech Engineering Pvt. Ltd
- Development of Data Acquisition For Underground Water and Gas Pipeline Leakage Monitoring Using IoT
- Design and Fabrication of Coin Operated Portable Water Vending Machine
- Design and Fabrication of Multi Purpose Robust Cutting Machine for Agricultural
- Multitalented Robot Machine for Arecanut Farming to Avoid Arecanut Waste
- Automated Prosthetic Leg
- Design and Fabrication of Multipurpose Agricultural Equipment
- Conversion of Waste Bagasse to Bio-Oil By Pyrolysis And Utilization of its Products
- Design and Fabrication of an Artificial Leg Mechanism for above-Knee Amputees
- Mine Exploration, Recovery and Securing Instrument (MERSI)
- Implementation of Spatial Augmented Reality to Control Robotic Arm
- Design and Development of Natural Plant Fibre Extracting Machine
- Synthesis and Characterization of Phenol Based Polymeric Resin, Extracted From Cashew Nut Shell Liquid (CNSL) Oil for Industrial Applications

**6. Has the council developed any specific state related s&t and innovation policy ? If so the details to be provided**

## **6.1 Intellectual property policy of KSCST**

### **Introduction**

The Karnataka State Council for Science and Technology (KSCST) was established in the year 1975. It is one of the first State S&T Councils to be set up in the country. KSCST is an autonomous S&T organization under the Department of Science & Technology, Government of Karnataka.

During the last 40 years, KSCST has been pro-actively engaging itself to identify, propose and implement S&T based solutions to locale specific needs / problems in the broad areas of Water, Education, Energy, Ecology and Environment, Waste management and Infrastructure. In co-operation with the Indian Institute of Science and several other premier R&D institutions, KSCST executes many projects and programmes aimed at improving socio-economic conditions of the people of the state.

Over the years, a number of technologies have been translated, from research and demonstration phase, to the implementation and operational phase. KSCST provides support to the Central and State Governments, in the formulation of S&T based policies, scientific surveys, project implementation, evaluation, co-ordination & monitoring, organization of scientific meets and awareness campaigns. The Department of Science and Technology, Government of India has advocated KSCST as a model to all the states.

### **Vision:**

Application of Science & Technology for the management of resources, improvement of environment, quality of life and socio-economic conditions of the people of Karnataka.

### **Mission:**

Co-ordinate R & D activities for generation of knowledge for scientifically based interventions, development and popularization of appropriate technologies for adaptation by the civil society to overcome local-specific problems and, inspire and improve human resources of the S&T sectors in the state.

The KSCST's mission of generating and transmitting knowledge and providing service to the public creates an environment that is conducive to the conception and development of many forms of intellectual property. Considering the new intellectual property regime, KSCST has undertaken an initiative to promote inventions and innovations, and facilitate protection of intellectual property generated within KSCST, by framing suitable policy & establishing the Intellectual Property Management (IPM) Cell.

- a) This policy is called the Intellectual Property Rights & Consultancy Policy of KSCST & takes effect from 1-9-2016.
- b) The Intellectual Property Rights & Consultancy Policy shall apply to all persons employed by KSCST.

### **Applicability of the policy:**

This Policy applies to all the employees of the KSCST including anyone using the facilities of the KSCST under the supervision of KSCST scientific staff. The policies set forth herein constitutes an understanding which is binding on KSCST Scientists & staff as a condition of their participation in KSCST research, and service programs and for their use of KSCST funds, space, or facilities.

### **Scope of intellectual property rights policy:**

This policy shall apply to, all types of intellectual Property (IP) including, but not limited to, any inventions, discoveries, copyrightable materials, protectable trademarks, trade secrets, confidential information, scientific or technological development, research data, computer

software and any other form of intellectual property developed using KSCST equipment, supplies, facilities, employee time, or trade secret information, or which relate directly to the KSCST's business, research, or development.

KSCST will be the sole owner of IP generated from research work conducted in KSCST in the following cases:

1. Using funds received from Central /State Government through the budgetary/Grants process.
2. All intellectual property developed/created through the use of KSCST resources or facilities, supported directly or indirectly by funds administered by the KSCST.
3. IP generated by scientists/ innovators /employees as part of their service/ scope of employment in KSCST.
4. Using external funds, public or private where KSCST has been assigned sole ownership by the funding agency or where funds received from sponsoring agencies under grants-in-aid or funds received as donation/ endowment or funds received under bi-lateral or multi-lateral funding arrangements.

#### **Joint ownership of IP:**

- a) **Collaborative Research:** IP generated by KSCST institutions under collaborative research projects will be jointly owned by the KSCST and its collaborators/ partners on mutually agreed terms.
- b) **Shared Research Facilities :** When KSCST shares its research facilities with another party as per the guidelines but does not provide any scientific/technical input in the use of these facilities, it may not seek a share in the IP generated. However, in cases where the other party also avails scientific/technical input from KSCST, the IP thus generated will be jointly owned on mutually agreed terms.
- c) **Scientist/ Scholar Entrepreneurship:** When KSCST permits any scientist/ scholar to proceed on scientist-entrepreneurship to either set-up his/her own enterprise or to work with some private agency for up-scaling/ commercial venture with the IP generated by him/her in KSCST, the terms of use of such IP shall be clearly spelt out in the agreement between the KSCST and the concerned scientist/ scholar.

#### **Conflict in sharing of IP:**

In the event of any conflict of right or interest related to sharing of IP, it will be resolved as per mutually agreed terms set out in the agreement signed between KSCST and the other party. To arrive at a settlement, use will be made of mediation, reconciliation or arbitration. Arbitrator will be appointed by the Secretary, KSCST. Arbitration clause may be incorporated in the agreement.

#### **Forms of ip generated in KSCST:**

The research results obtained in KSCST may be patentable, protectable or not protectable under the law. However, issues such as know-how and traditional knowledge may be important in the context of IP.

- a) **Patentable IP:** Research results in any field of technology, whether processes or products, which are new, inventive (non-obvious) and useful (industrially applicable), and are patentable under the Patent Act, constitute the patentable IP of KSCST. The following research results also constitute the patentable IP.
- b) **Collective Mark/ Trademark:** The KSCST emblem is distinct/ distinguishable and well known for a long time. It will be used/ registered as the collective mark of KSCST.
- c) **Copyright:** KSCST's copyright exists in all its institutional creations/ works, viz., publications, audio-visuals, designs, computer programmes, etc., whether unregistered or

registered. Scientists and other staff of KSCST will, however, have copyright over their individual, literary and scientific creations/ works.

d) **Designs:** Designs of any commercial value, developed in KSCST, may be protected as registered designs under the Designs Act or under the Copyright Act as per law.

e) **Any other IPR Form:** On a case-to-case basis, any research result of KSCST, which is protectable as IPR in any other form under the Indian law, shall be protected and maintained for its IPR enabled transfer and use.

f) **Know-How:** A know-how available with KSCST, which could lead to development of prototype/ commercial product from an IP generated by its scientists/ scholars, constitutes an important, potentially useful property, irrespective of whether it is patentable or not. Such know-how may be utilized for strategic commercial use in the technology production chain. KSCST may protect such know-how as trade secret. Therefore, a confidentiality agreement with the other party shall be entered into before any demonstration of the technology or its validation or scaling up is undertaken.

g) **Traditional Knowledge:** The Indian Patents Act and some other IPR Acts require a disclosure of traditional knowledge used in the invention/innovation. Accordingly, KSCST shall also disclose the traditional knowledge related to the innovations made in its set up in all its patent/ IPR applications to the best of its knowledge and information.

### **General procedures for IP management:**

#### **Introduction**

This chapter describes the general procedures for management of the IPR portfolio in KSCST. Procedures specific to patents, trademarks, copyrights, etc., are discussed in subsequent chapters.

#### **Claims of IP Ownership:**

a) **KSCST/Institutions:** All claims of IP ownership, as applicable, will be made only in the name of the legal entity, viz. the KSCST even though the research is conducted by scientists/innovators working in its various offices/ Regional Centres of KSCST. Regional Centres of KSCST shall not claim the IP ownerships in their own names.

b) **Scientists/Innovators:** KSCST scientists/innovators shall assign the IP rights in the research results obtained by them to their employer, viz. the KSCST. While they will not be entitled to claim ownership of the IP generated by them, they shall be recognized as ‘True and First Inventor(s)/ Innovator(s)’ of that IP. However, they will have their own copyright over the publications authored by them as per rules.

#### **Commercialization:**

a) For purposes of protection and commercialization of intellectual property on behalf of the KSCST, patent, trademark or copyright coverage may be sought, or the property may be treated as proprietary information, technical know-how, or trade secret.

b) The Intellectual Property Management Cell may determine whether the KSCST has a legal interest in the commercialization of the property. However, the KSCST is not legally bound to commercialization of each property and the originator may not claim such right. It shall be the sole discretion of the Secretary, KSCST on advice from the Intellectual Property Management Cell to determine commercialization of the property.

c) A primary objective and responsibility of the KSCST shall be to assure that the products of its intellectual activity are brought into the widest possible use for the general benefit of society.

#### **Benefit Sharing:**



KSCST acknowledges that inventor's team should have some share in the income derived from the technology transfer. The revenue received as a result of patents in the form of cash royalties and/or equity shall be distributed in such a manner as to encourage technology development and its transfer.

**Sharing of Net Revenue/ Benefit Money:** The net revenue/ benefit money will be shared in the following proportion/manner among KSCST scientists/innovators and the team.

**Monetary Benefits:** KSCST will realize monetary share of benefits from the licensee(s) of its IPR enabled technologies in the following ways, subject to the licence agreement.

- i. upfront lump sum payment.
- ii. upfront payment plus royalty on actual sale.
- iii. royalty on actual sale.

**Scientists and Staff:**

KSCST will share the income resulting from commercialization of an IP with individual(s) responsible for the innovation.

The amount to be distributed/ shared will be the total receipts after deduction of service tax & other related expenditure explained in more detail in the subsequent paras

The payment will be treated as bonus income of the individual and shall be taxed along with salary income under the IT Act.

**Proposed Benefit Sharing :**

The benefits received by KSCST on account of technology transfer in a year shall be shared between inventor's team and the KSCST in the following proportion/manner:

- a) \*40% of net revenue received to be shared by the Inventor & the team  
(30% to inventor & 10% to the team)
- b) 60% of net revenue received to be transferred to the KSCST'S Professional Development Fund.
- c) \*The net revenue to be shared by the team is up to 40% & the Secretary, KSCST, can reduce this to a percentage less than 40 at his discretion/judgement, in which case the share of KSCST will go up correspondingly

All IPRs for commercialization have been included in the service tax net in India in 2006.

Net revenue = Gross revenue less Service Tax less any other expenditure relating to the commercialisation of IP like expenditure towards Patents filing cost , Patent Attorney's charges etc

**Tax Payable by Individuals:**

The payments received by individuals on account of technology transfer are governed by Income Tax Rules and the disbursing institutions will deduct Income Tax at source as per the prevailing rates.

**Sharing Between Institution and Scientists in respect of other services:**

- a) **Copyright:** Revenue generated through sale of a copyright publication (e.g., book) published by the Scientists/Staff of KSCST will go entirely to the author(s). Among the authors, the share may be divided based on mutually agreed terms among the authors.
- b) **Consultancy and Contract Services:** Revenue sharing will be as per KSCST's policy indicated in Chapter 'B '

**Intellectual Property Management Cell (IPMC):**

**Responsibility**

The IPM cell will assist KSCST to manage its intellectual property (IP), provide services for IP patenting, copyright and licensing to all Centres of the KSCST. IPM cell will assist KSCST to file patent applications in India/abroad and execute other documents; execute license, and material transfer agreements; enter into confidentiality and non-disclosure agreements, and execute other documents related to intellectual property and confidentiality/non-disclosure agreement. The IPM cell will handle IPR related issues such as copyright for publications, software etc. The cell will also assist the investigators on technology mapping/technology scanning of important projects being undertaken. From time-to-time IPM cell may organize seminars and presentations to expose participants to the basic concept of IPM and its strategic role in the Indian context through interactions with experts.

### **Organization**

IPM cell will have the following organizational structure to begin with:

1.	Secretary, KSCST	Chairman.
2.	Executive Secretary, KSCST	Member
3.	Expert in the relevant field/Patent Attorney, who has experience in filing and processing patent applications and transfer of technology to third party/parties.	Member
4.	Accounts Officer/ Special Officer (Finance & Admin)	Member
5.	A scientist /Project Engineer or Project Assistant to oversee day-to-day operation of IPM Cell.	Member Secretary

### **Financial Support:**

Financial resources needed to establish IPM cell & the patent filing costs would be met from the Professional Development Fund/council fund or from the grants of the funding agencies if the conditions provide for the technology development.

### **Conflict of interest and its settlement:**

If an inventor has a grievance about the KSCST's handling of intellectual property, he/she can approach the Secretary - KSCST for the benefit of the Grievance Redressal.

### **6.2 Consultancy Policy of KSCST**

Important work assignments undertaken at KSCST are:

1. Consultancy & Contract Services.
2. Orientation programs/Workshops/Seminars.
3. Sponsored Projects.
4. R&D Projects leading to Research results & Intellectual Property.

### **Consultancy & Contract Services:**

These are Short duration services involving the services of individual scientists & not involving any major use of infrastructure & undertaken with the permission of the Secretary, KSCST. Service receiving organisations have to remit service charges to KSCST. Secretary, KSCST is empowered to negotiate & fix the charges on case to case basis & also waive these charges if the services are exclusively in the interest of the Society/ General public.

Revenue Sharing 30% of the net revenue\* to the individual (as fee/honorarium) & 70% of the net revenue\* is to be transferred to the Professional Development Fund of KSCST.

In connection with the above consultancy/Contract services , if KSCST has incurred any expenditure, the same shall be deducted from the total revenue /total receipts to arrive at the net revenue\*. Fee/Honorarium paid to the individual is taxable along with the salary income.

### **Orientation programs/ Workshops/ Seminars:**

KSCST Scientists/Officers /employees may take up, in their areas of specialisation, Orientation programs/ Workshops/ Seminars. KSCST to charge registration fee along with

Service Tax to the participants / sponsoring agencies at rates appropriate to the subject & duration at the discretion of the ES/Secretary. Service Tax received from the participants/sponsoring agencies to be remitted to the Government. 30% of the net revenue\* shall be paid to the co-ordinator & his team (20% to the co-ordinator & 10% to the team). 70% of the net revenue \*is to be transferred to KSCST's Professional Development Fund.

Co-ordinator should decide on the topic coverage, prepare course material / presentation material & also deliver lectures along with other faculty.

KSCST to provide Venue, coffee, snacks, working lunch, course material, bag , certificates to the participants , remuneration to the faculty / Co-ordinator , transport &TA/DA to the outstation faculty etc.

Faculty including the co-ordinator (if he/she delivers a lecture) shall be paid Rs.2000/- per session/class (this payment to the Co-ordinator is in addition to the Co-ordinator's fee) Secretary, KSCST, is empowered to fix the faculty fee on case to case basis depending on the level of the faculty in consultation with the Co-ordinator (keeping Rs. 2,000/-per session of 1 hour & 15 minutes duration as the minimum amount payable).

All the above expenditure & the Service Tax pertaining to the program is to be deducted from the total revenue/total receipts to arrive at the net revenue\*. Income tax recovery is to be effected from Co-ordinator's fee/honorarium along with salary income.

#### **Sponsored Projects:**

At the time of submitting the project proposal along with other heads of expenditure, Over Heads to be charged @20% of the total Project cost to the sponsoring agencies. Entire Over Heads to be transferred to the KSCST'S Professional Development Fund. No share of Overheads to the PIs or other staff.

#### **R&D Projects leading to Research results & Intellectual Property:**

As stated in Chapter A the benefits received by KSCST on account of technology transfer in a year (cash royalties and/or equity) shall be shared between inventor's team and the KSCST in the following proportion/manner: 40% of net revenue\* received to be shared by the inventor & the team (30% to inventor & 10% to the team) 60% of net revenue\* received to be transferred to the KSCST'S Professional Development Fund. The net revenue to be shared by the team is up to 40% & the Secretary, KSCST, can reduce this to a percentage less than 40 at his discretion/judgement, in which case the share of KSCST will go up correspondingly. All IPRs for commercialization have been included in the service tax net in India in 2006.

\*Net revenue = Gross revenue less Service Tax less any other expenditure relating to the commercialisation of IP like patents filing cost , patent attorney's charges etc.

#### **Guidelines for the utilization of KSCST's Professional Development Fund**

The sources of the Fund are:

1. KSCST's share from consultancy & contract services.
2. KSCST's share from Orientation programs/Workshops/Seminars.
3. Overheads transferred from all Sponsored projects administered by the KSCST.
4. KSCST's share from R&D Projects (Royalties and/or equity).
5. Interest on investments made out of the above Funds.
6. Amount realized from sale or disposal of assets of research projects, if any;
7. Other miscellaneous receipts;

#### **The Professional Development Fund may be used for the following purposes:**

To meet fully or partially expenses relating to:

- a) Maintenance of the equipment acquired from the projects.
- b) Replacement of equipment acquired out of the projects, that are condemned.
- c) Acquisition of new equipments required for research.
- d) Additional infrastructure required for the projects, like space, furniture etc.
- e) Extra staff required for the administration of the project.

- f) Travel, registration fee/DA for participation in seminars/conferences within India.
- g) Expenses relating to membership of professional bodies.
- h) Expenses related to publication activities.
- i) Additional mobile services/ mobile charges etc.
- j) Financing (partially or fully) visits of the scholars to KSCST (Indian and International).
- k) Promoting participation of KSCST Scientists In conferences/seminars (national/international).
- l) Supporting publications and processing of manuscripts of outstanding research.
- m) Supporting participation of administrative officials in specialized conferences/seminars to enhance administrative skill.
- n) Partially supporting the infrastructural requirements of Outstanding Scientists engaged in research in thrust areas.
- o) Expenditure on publicity /public relations website for mobilisation of corpus.
- p) Expenditure on seminars/workshops, in case of shortfall.
- q) Establishment of Chairs and partial support for sustaining Chairs
- r) Expenditure towards IPMC, patents filing cost, patent attorney's charges etc.
- s) PI's Over Heads @ 5% of the OHs of his projects (separate account to be maintained PI wise).
- t) Any other activity budgeted in the projections of Revenue Block Grant, if there is a shortage in the allotment of funds (with the approval of the Secretary).

#### **Accounting Procedure - KSCST's Professional Development Fund**

- a) This Fund forms an Earmarked Fund which will be operated by the Finance. Separate Fund Register will be maintained for this purpose.
- b) At the end of the year, Separate Receipts and Payments Account will be prepared for this fund which is auditable by the Internal and Statutory Audit.
- c) The power to sanction expenditure out of this fund shall vest With the Secretary-KSCST for the approved activities.
- d) To run the organisation in emergent situations of non availability of funds 10% of Professional Development Fund generated every financial year may be transferred to the Corpus fund of KSCST on 31st march of the relevant financial year.
- e) In future, if there is any requirement, Secretary, KSCST is authorised to modify the provisions to the existing 'Intellectual Property and Consultancy Policy of KSCST' subject to ratification by the Executive Committee, KSCST later.

#### **7 How strong are the links between other state government / departments if so provide details**

KSCST located in IISc campus has strong linkages with both Government and R&D Institutions within and outside the State. The KSCST has regular interactions with the State Government Secretariat for various projects and programmes. Through its NRDMS centres located in all the district of the State, it has the strong network with all the line Departments and District Election offices. Further through the project and programmes sponsored by Department of Science and Technology, Government of India, KSCST has been able to build good network with other State Councils and State Governments.

#### **8. How strong are the links of the council with local industry units / association**

KSCST has also established good linkages with industry sector and industries. Council has set up the Patent Information Cell (PIC) which not only provides information /awareness on IPR but also interacts with industrial agencies such as Karnataka Council for Technological Upgradation (KCTU), Karnataka German Technical Training Institute (KGTTI), Karnataka Association for Small Scale Industries Association (KASSIA) for attracting MSME towards R&D based projects.

Karnataka (India) - Israel Program for Industrial R&D (KIRD) is such a program where KSCST has technically facilitated two industrial R&D projects. The two industries namely M/s. Blue Neem Medical Devices Pvt. Ltd., - Contisphere and M/s. Rangsons Schuster Technologies Pvt. Ltd. Mysore - Development of Aviation flexible hoses with Titanium ends fittings.

The Centre for Development of Telematics (CDOT) has provided Broadband Wireless Terminal (BBWT) for networking of annexae buildings of Council and also supporting educational activities of KSCST.

The Rural Electrification Corporation Limited, Government of India is supporting educational activities of KSCST through the project “Establishment of Virtual Classroom in Government High Schools located in Backward Talukas of Karnataka” under CSR Initiative. Further, linkages with GIZ (German Co-operation) have been established with aim to reach industries for commercializing innovation products developed as part of Student Project Programme (SPP).

KSCST is providing technical inputs to establish Virtual classrooms and to install solar energy panels to generate energy for residential high schools of Karnataka Residential Educational Institutions Society (KREIS).

**9. List 5 major technology area, where the council can play an important role by finding convergent technological solutions.**

- Biodiesel and Bio-ethanol production – Bioenergy
- Hybrid Ultracapacitor based solar home lighting – Renewable Energy
- Rainwater Harvesting Technologies – Water Technology
- Nanotechnology for water purification – Water Technology
- Traditional Water Harvesting System – Water Technology
- 3D Laser scanning which supports Virtual Tourism – GIS & RS Technologies and other IT solutions
- Natural Resource Data Management System - GIS & RS Technologies and other IT solutions
- Promoting R&D for regional specific / academic problems through Engineering Institutions and Universities. – Education
- E-Learning / Virtual Laboratory – Education
- Student Project Programme – Education

**10. Proposed programme and budget outlay for the year 2018 -2019**

	<b>Particulars</b>	<b>Proposed Budget Amount</b>	<b>Annexure</b>
<b>A</b>	<b>RECURRING EXPENDITURE</b>		
	I. Manpower Salary	185.19	
	II. Travelling Expenses	8.00	-
	III. Office maintenance expenditure		
	a) Repair & Maintenance )		
	b) Bank charges )	10.00	-
	c) Audit fee )		
	d) Contingency etc. )		
	IV. Provision for Filling Vacant posts	15.00	
	<b>TOTAL – A</b>	<b>218.19</b>	-

	<b>(Recurring Expenditure)</b>		
B.	<b>NON-RECURRING EXPENDITURE</b> 1)Assistance towards purchase of Computers, Printers, Photo copying machine , Storage cabinets,Furniture,Softwares etc 2)KSCST Website updation and maintenance, domain and hosting renewal 3)Building and office modernisation	15.00	
<b>GRAND TOTAL (A+B)</b>		233.19	
C	<b>Proposed Projects and programmes from KSCST with budget Outlay</b>		
i	Support for projects & scientific activities of the Council from SSTP/Council division	240.00	
ii	Support for projects & scientific activities of the Council from other divisions of DST, GoI	2093.02	

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## Kerala

### 1. Details of State S&T Council Pr. Secretary

Name Dr. Suresh Das  
 Address Executive Vice President, Kerala State Council for Science, Technology & Environment (KSCSTE), Sasthra Bhavan, Pattom, Thiruvananthapuram 695004  
 Email [sureshdas55@gmail.com](mailto:sureshdas55@gmail.com)

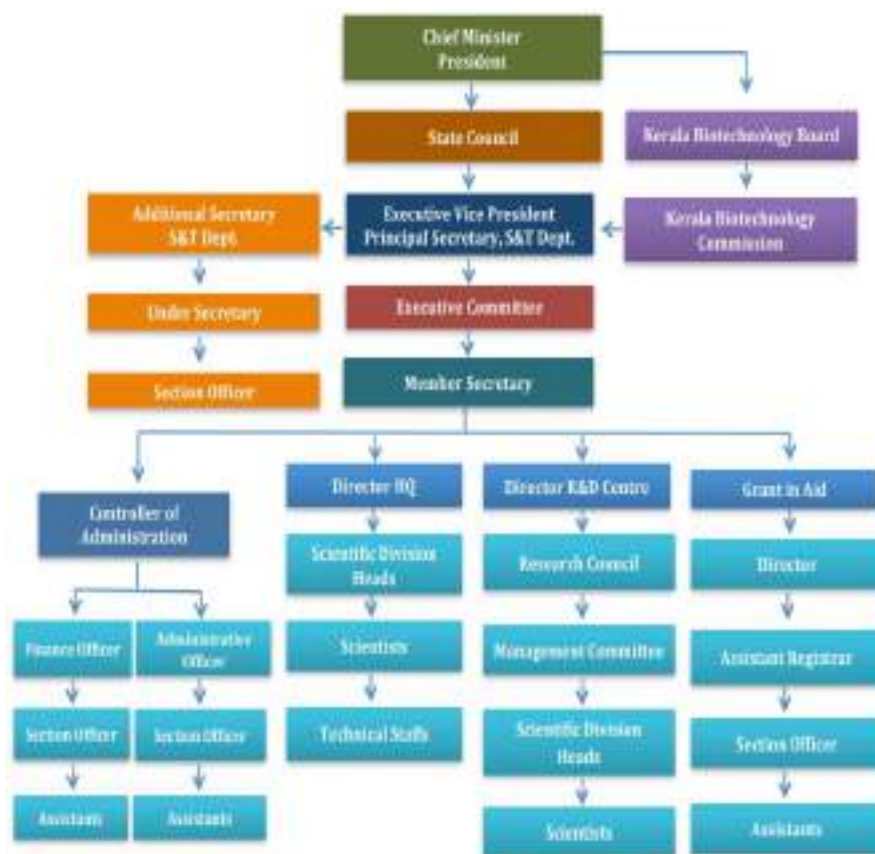
**Member Secretary**

Name **Dr. S. Pradeep Kumar**  
 Address Kerala State Council for Science, Technology & Environment (KSCSTE), Sasthra Bhavan, Pattom, Thiruvananthapuram 695004  
 Phone/Fax 0471-2548220/ 0471-2542111  
 Mobile +91-9497541220  
 Email [mkskscste@gmail.com](mailto:mkskscste@gmail.com)

**2. Structure of the Council:**

j) **Date of Establishment** : 6<sup>th</sup> November 2002

k) **Organization Structure** :



**1) Strength of approved manpower [both central (DST) and state supported]**

**Strength of Approved Manpower [Central (DST) Supported]**

Sl. No.	Name	Designation	Pay scale	Approximate monthly emoluments(₹)

1	Dr. S. Pradeep Kumar (Deputation)	Member Secretary	37400-67000+GP 10,000	1,69,920
2	Dr. Kamalakshan Kokkal	Chief Scientist	37400-67000+GP 10,000	1,90,202
3	Dr. V. AjitPrabhu	Chief Scientist	37400-67000+GP 10,000	1,90,202
4	Dr. K. R.Lekha	Principal Scientist	37400-67000+GP 8,700	1,59,854
5	Dr. C.Arunan	Principal Scientist	37400-67000+GP 8,700	1,24,562
6	Dr.C.Anilkumar	Principal Scientist	37400-67000+GP 8,700	1,43,439
7	Dr.P. Harinarayanan	Senior Scientist	15600-39100+GP 6600	97,429
8	Smt.Binuja Thomas	Senior Scientist	15600-39100+GP 6600	94,118
9	Dr. K.Vijaya Kumar	Scientist	15600-39100+GP 6600	81,257

**Strength of Approved Manpower [(Centrally supported) State pay]**

Sl. No.	Name	Designation	Pay scale	Approximate monthly emoluments ( ₹ )
1	Smt. J Ushakumari	Technical Officer	35700-75600	69,127
2	Smt. D Beena	Technical Officer	30700-65400	56,416
3	Smt. Geethalekshmi M B (Deputation)	Administrative Officer	85000-117600	1,00,400
4	Smt. JenniPappachan (Deputation)	Finance Officer	45800-89000	66,049
5	Smt. Lakshmi T	Assistant	25200-54000	37,398

**Strength of Approved Manpower [State Supported]**

Sl. No.	Name	Designation	Pay scale	Approximate monthly emoluments ( ₹ )
1.	Dr. Suresh Das	Executive Vice President		1,12,029
2.	Dr. E.S.Anilkumar	Scientist	15600-39100+GP 5400	83,571
3.	Dr. Geetha B S	Scientist	15600-39100+GP 6600	82,565
4.	Dr. A R Sarika	Junior Scientist	15600-39100+GP 5400	62,528
5.	Shri. Arjun Prasad	Junior Scientist	15600-39100+GP 5400	57,536



6.	Shri. Sherin B M	Junior Scientist	15600-39100+GP 5400	57,033
7.	Shri. Arun Prasad K	System Manager	32300-68700	40,134
8.	Shri. Safikh S	Technical Officer	29200-62400	40,143
9.	Shri. B R Bobby	Technical Assistant	29200-62400	49,710
10.	Shri. H.Gilbert Wesley	Controller of Administration	89000-120000	1,21,604
11.	Smt. Reshmy R S	Section Officer	35700-75600	50,850
12.	Smt. Bindu S R	Section Officer	35700-75600	50,850
13.	Smt. Latheefa M P	Accountant	25200-54000	36,486
14.	Smt. Raseena V	Assistant	25200-54000	34,890
15.	Smt. Manju V	Assistant	22200-48000	31,319
16.	Smt. Sreeja R	Assistant	22200-48000	31,319
17.	Smt. Praveena P G	Assistant	22200-48000	31,319
18.	Smt. Bidusha M	Assistant	22200-48000	28,158
19.	Smt.O. Ushakumari	Receptionist cum Telephone Operator	25200-54000	39,222
20.	Smt. Kala R G	Stenographer	20000-45800	25,904
21.	Smt. Anjumole K G	Stenographer	20000-45800	25,904
22.	Smt .JincyRajan	Library Assistant	20000-45800	25,904
23.	Smt. VidyaBhadran	Clerical Assistant	8960-14260	20,540
24.	Smt.Chandri C P	Clerical Assistant	8960-14260	19,486
25.	Smt. A Rajeev	Driver	22200-48000	32,260
26.	Smt. Gireeshkumar S	Office Attendant	8500-13210	19,486
27.	Smt.Vasanthaku mari P	Office Attendant	8500-13210	19,486
28.	Smt.Prasannaku mari C S	Office Attendant	8500-13210	18,315
29.	Smt.Selin N S	Office Attendant	8500-13210	18,315
30.	Smt.Savithry R	Office Attendant	8500-13210	18,315
31.	Smt.Suma A R	Office Attendant	16500-35700	20,660
32.	Smt.Sujarani V	Part Time Sweeper	9340-14800	13,252

**3. Budget released to your state S&T Council for last five financial years including Central Government, State Government & any other sources.**

**Assistance Received for the Financial Year 2013-14**

Sl. No.	Project	Purpose	Sponsoring agency	Financial Assistance received(₹)
1.	National Science Day	NSD, 2014	DST	4,00,000
2.	National Children Science Congress	NCSC, 2013	DST	5,40,000
3.	S & T Secretariats to KSCSTE	Recurring 2012-13	DST	76,00,000
4.	S & T Secretariats to KSCSTE	Recurring 2013-14	DST	58,60,000
5.	Power plant project		DST	2,10,000
6.	Biodiversity of medicinal micro fungi		DST	2,50,000
7.	26th Kerala Science Congress	Science Congress	SERB	25,000
<b>Assistance received from DST</b>				<b>1,48,85,000</b>
8.	Environmental Information system	Recurring	MoEF	12,68,066
9.	Environmental Information System	Non-Recurring	MoEF	1,88,000
10.	National Green Corps	Recurring	MoEF	95,55,000
11.	25th Kerala Science Congress	Science Congress	ICMR	40,000
12.	26th Kerala Science Congress	Science Congress	CSIR	50,000
13.	26th Kerala Science Congress	Science Congress	ICMR	40,000
<b>Assistance received from other Central Govt. Agencies</b>				<b>1,11,41,066</b>
<b>Total Assistance Received from Central Government</b>				<b>2,60,26,066</b>
14.	Plan Fund	R&D Programme	State Govt.	41,53,61,000
15.	Non-plan Fund	Recurring	State Govt.	39,21,41,000
<b>Assistance received from Kerala State Government</b>				<b>80,75,02,000</b>
<b>Grand Total</b>				<b>83,35,28,066</b>

**Assistance Received for the Financial Year 2014-15**

Sl. No.	Project	Purpose	Sponsoring agency	Financial Assistance Received(₹)
1.	National Children Science	NCSC, 2014	DST	5,40,000

	Congress			
2.	National Children Science Congress	NCSC, 2013	DST	1,35,550
3.	Patent Information Centre	Patent Awareness	DST	1,971,677
4.	National Science Day	NSD, 2014	DST	8,50,000
5.	National Science Day	NSD, 2015	DST	10,00,000
6.	S & T Secretariats to KSCSTE	Non-Recurring	DST	6,10,000
7.	S & T Secretariats to KSCSTE	Recurring	DST	61,31,000
8.	S & T Secretariats to KSCSTE	Recurring 2013-14	DST	32,40,000
9.	27th Kerala Science Congress	Science Congress	SERB	3,00,000
<b>Assistance received from DST</b>				<b>1,47,78,227</b>
10.	Environmental Information System	Recurring grant	MoEF	11,91,904
11.	National Green Corps	Recurring grant for 2014-15	MoEF	95,55,000
12.	27th Kerala Science Congress	Science Congress	ICMR	40,000
<b>Assistance received from other Central Govt. Agencies</b>				<b>1,07,86,904</b>
<b>Total Assistance Received from Central Government</b>				<b>2,55,65,131</b>
13.	Plan Fund	R&D Programme	State Govt.	51,97,32,000
14.	Non-plan Fund	Recurring grant	State Govt.	45,48,83,000
<b>Assistance received from Kerala State Government</b>				<b>97,46,15,000</b>
<b>Grand Total</b>				<b>100,01,80,131</b>

**Assistance Received for the Financial Year 2015-16**

Sl. No.	Project	Purpose	Sponsoring agency	Financial Assistance received(₹)
1.	National Children Science Congress	NCSC, 2014	DST	1,33,763
2.	National Children Science Congress	NCSC, 2015	DST	5,20,000
3.	National Science Day	NSD, 2016	DST	10,00,000
4.	S & T Secretariats to KSCSTE	Non-recurring	DST	6,10,000
5.	S & T Secretariats to KSCSTE	Recurring	DST	96,00,000

6.	Patent Information Centre		DST	Nil
7.	28th Kerala Science Congress		SERB	2,50,000
<b>Assistance received from DST</b>				<b>1,21,13,763</b>
8.	Environmental Information system	Recurring	MoEF	13,19,233
9.	National Green Corps	Recurring	MoEF	Nil
			<b>Total</b>	<b>13,19,233</b>
<b>Assistance received from other Central Govt. Agencies</b>				<b>1,34,32,996</b>
<b>Total Assistance Received from Central Government</b>				
10.	Plan Fund	R&D Programme	State Govt.	57,52,00,000
11.	Non-plan Fund	Recurring	State Govt.	49,12,73,000
	<b>Assistance received from Kerala State Government</b>			<b>106,64,73,000</b>
<b>Grand Total</b>				<b>107,99,05,996</b>

**Assistance Received for the Financial Year 2016-17**

Sl. No.	Project	Purpose	Sponsoring agency	Financial Assistance received(₹)
1.	National Children Science Congress	NCSC, 2016	DST	5,20,000
2.	Patent information System		DST	Nil
3.	S & T Secretariats to KSCSTE	Non-Recurring	DST	Nil
4.	S & T Secretariats to KSCSTE	Recurring	DST	Nil
<b>Assistance received from DST</b>				<b>5,20,000</b>
5.	Environmental Information system	Recurring	MoEF	14,22,323
6.	National Green Corps 2016-17	Recurring	MoEF	91,00,000
7.	National Green Corps, 2014-15	Recurring	MoEF	4,55,000
<b>Assistance received from other Central Govt. Agencies</b>				<b>1,09,77,323</b>
<b>Total Assistance Received from Central Government</b>				<b>1,14,97,323</b>
8.	Plan Fund	R&D Programme	State Govt.	73,22,32,000
9.	Non-plan Fund	Recurring	State Govt.	56,49,63,000

	<b>Assistance received from Kerala State Government</b>	<b>129,71,95,000</b>
<b>Grand Total</b>		<b>130,86,92,323</b>

**Assistance Received for the Financial Year 2017-18**

<b>Sl. No.</b>	<b>Project</b>	<b>Purpose</b>	<b>Sponsoring agency</b>	<b>Financial Assistance received (₹)</b>
1.	National Children Science Congress	NCSC, 2017	DST	5,20,000
2.	Patent information System		DST	--
3.	S & T Secretariats to KSCSTE	Non- Recurring	DST	--
4.	S & T Secretariats to KSCSTE	Recurring	DST	1,88,00,000
5.	National Science Day-2017		DST	10,00,000
6.	National Mathematics Day-2017		DST	10,00,000
7.	National Science Day-2016		DST	2,50,000
<b>Assistance received from DST</b>				<b>2,15,70,000</b>
8.	Environmental Information system	Recurring	MoEF& CC	16,29,746
9.	National Green Corps 2017-18	Recurring	MoEF& CC	1,78,50,000
10.	National Green Corps, 2016-17	Recurring	MoEF& CC	4,55,000
<b>Assistance received from other Central Govt. Agencies</b>				<b>1,99,34,746</b>
<b>Total Assistance Received from Central Government</b>				<b>4,15,04,746</b>
11.	Sasthrabodhini		STDD	34,89,200
12.	Sasthraposhini& NEST		STDD	32,00,000
13.	Plan Fund	R&D Programme	State Govt.	80,06,58,000
14.	Non-plan Fund	Recurring	State Govt.	60,73,20,000
<b>Assistance received from Kerala State Government</b>				<b>141,46,67,200</b>
<b>Grand Total</b>				<b>145,61,71,946</b>

**4. Key activities undertaken, during the last two years, in the area of:-**

**4.1 Technology Development:**

Major Technologies Developed under the Schemes & Programmes

**4.1.1. For year 2016-17**

**a. System Level Analysis and Design of Re-Configurable Multi-Standard Sigma Delta Analog to Digital Converters for Next Generation Wireless Transceivers.**

Dr. Babita Roslind Jose, Division of Electronics, School of Engineering, CUSAT, Kochi  
**Scheme - ETP: Amount Sanctioned - Rs.9, 48,000/-.**

The Design, Analysis and Implementation of the proposed Multi standard Reconfigurable Modulator was done in three Phases. (1) Matlabmodelling of the proposed Dual-Extended Noise-shaping architecture and the Triple-mode Hexa-standard Reconfigurable TI CrossCoupled Modulator. (2) Circuit Level Implementation of proposed Multi standard Modulator using HSPICE circuit simulator. (3) Layout of the proposed Multi standard Modulator in Cadence virtuoso. Thus, sigma delta modulator systems were also modelled.

**b. Design and Development of Compact Planar Filters for RF/Microwave Applications**

Dr. S. Mridula, Associate Professor, School of Engineering, CUSAT, Kochi. **Scheme – ETP : Amount Sanctioned - Rs. 16,45,571/-**

In this project compact planar filters for RF/ Microwave applications using SRR/CSRR/ Transmission line equivalents for better and sharp noise rejections were designed and implemented. A comparison study was done between Electro Magnetic Simulations and circuit simulations to isolate the best transmission line with least loss and study its equivalent networks in order to devise an optimised design. Tuneable filters with least variation in performance for all states were designed and developed.

**c. Design & Development of Techniques for increasing the reliability of steganography/ steganalysis on Digital Images**

**d.** Smt. Shreelekshmi R., Assistant Professor, Dept. of Computer Science & Engineering, LBS College of Engineering, Thiruvananthapuram

**Scheme – ETP: Amount Sanctioned - Rs. 9, 17,400/-** Techniques for increasing reliability of steganalysis of digital images were developed.

**e. Flexi Car**

Sri. S. S. Saji, Assistant Professor, Dept. of Mechanical Engineering, Govt. Engineering College, Barton Hill, Trivandrum

**Scheme – TDAP: Amount Sanctioned - Rs. 3, 30,000/-**

In this project Creation of a car able to execute zero radius turn as well as zero ‘mean’ radius turn is done. It proposed a gear system instead of the present rack and pinion system of steering that is commonly seen in the present-day automobiles which ensures that the front wheels turn through the required angles such that the instantaneous centres of the front and rear wheels are always coincident, which enables a smooth turn. This is achieved with a semi elliptical Ellgears. A differential with an extra attachment is employed which consist of solenoid actuators that cause the engaging/ disengaging action of the driving gear, much like that in a clutch.

**f. Natural fiber reinforced ecofriendly and recyclable commingled composite systems**

Dr. TomlalJose, Associate Professor, SB College, Changanasseri, Kottayam

**Scheme – SRS: Amount Sanctioned –14, 36,833/-**

The important manufacturing techniques for aligned fibre composites include commingling and powder impregnation. They facilitate intimate mingling of fibre and matrix constituents before melt impregnation process. This reduces the distance that the molten matrix resin must flow to achieve impregnation, offering the possibility of a fast wet out during consolidation. Commingled yarns give a very good homogeneous distribution of reinforcement in a non-molten state prior to the processing steps. Commingling is a cost-effective way of mixing reinforcing fibres with a good alignment. In commingled yarns the reinforcing fibres and matrix fibres are blended intimately at the filament level.

**4.1.2. For year 2017-18**

**a. Hybrid Microgrid for Enhanced Utilization of Renewable Energy**

Dr. Gopakumar Pathirikkat, Associate Professor, Sahridaya College of Engg

**Scheme – TDAP: Amount Sanctioned –Rs. 59,000/-**

The project aimed at developing a hybrid microgrid that facilitate simple yet efficient integration of local renewable energy sources for consumers which has five energy management operations which facilitates best utilization of renewable energy sources. Isolated twin-boosting dc/dc converter (ITBDC), two-stage isolated bidirectional converter (TIBC) and a battery management system are developed in this project for enhanced utilisation of renewable energy in hybrid microgrids. ITBDC is capable of integrating renewable sources to DC bus of hybrid ring microgrid(HRM) with enhanced efficiency and galvanic isolation. This is achieved with the aid of both boosting inductor an high frequency transformer. TIBC facilitate bidirectional interconnection of AC and DC buses with enhanced synchronisation and power flow controls. A battery management system with bidirectional power flow control with galvanic isolation is also developed.

**b. Ofets with Natural Rubber: Toward Green and Sustainable Electronica**

Dr. Shiju K, Dept. of Physics, NIT, Calicut

**Scheme – KSCSTE Research Fellowship Amount Sanctioned –Rs. 9, 18,000/-**

The use of natural rubber (Cis 1, 4 poly isoprene) (NR), one of our largest produce, as an organic semiconductor for OFET fabrication is demonstrated for the first time. Organic Electronic devices like OLED, OFET, Organic Solar Cells etc are emerging as, cost effective alternatives to their inorganic counterparts due to various reasons. However, the organic semiconductors currently available are not attractive with respect to their high cost and intricate synthesis protocols. The study demonstrated that Natural Rubber has the potential to become a cost-effective solution to this. In a bottom- contact –top- gate architecture for fabricating OFET, iodine doped natural rubber is used as channel semiconductor.

**c. Sparse Signal Processing for Undersea Acoustic Links**

Smt. Sabna N., Dept. of Electronics, CUSAT

**Scheme – KSCSTE Research Fellowship Amount Sanctioned –Rs. 9, 18,000/-**

Compressive sensing has been evolved as a very useful technique for sparse reconstruction of signals that are sampled at sub-Nyquist rates. It helps to reconstruct the signals from few linear projections of the sparse signal. A technique for the sparse signal reconstruction has been developed, by padding the compression matrix for solving the underdetermined system of simultaneous linear equations, followed by an iterative least mean square approximation. The performance of this method has been compared with the widely used compressive sensing recovery algorithms such as l1\_ls, l1-magic, YALL1, OMP, CoSaMP, etc. In underwater acoustic communication, the energy received is a combination of energies contributed by different rays traversing through different paths due to multiple reflections at the boundaries, which results in intersymbol interference (ISI). Sea trials being very expensive, underwater acoustic communication scenario can be simulated with any of the available toolboxes. Sound speed profile can be computed with the help of Leroy's formula using the CTD data using the temperature, salinity and pressure data. For a given CTD data, Ray trace, Eigen ray plot and CIR can be generated with the Bellhop model. OFDM, which is widely employed in broadband wireless communication, is a multicarrier modulation technique which makes efficient use of the available bandwidth. It divides the frequency spectrum into a number of sub bands.

**d. Transesterification of *Jatropha curcas* oil over silica-based catalysis for the preparation of biodiesel**

Smt. Sudha K. C., Dept. of Chemistry, Sree Neelakanda Sanskrit College, Pattambi, Palakkad.

**Scheme – KSCSTE Research Fellowship Amount Sanctioned –Rs. 9, 18,000/-**

The eco-friendly heterogeneous catalyst was highly efficient for the trans esterification reaction of vegetable oils with methanol to produce biodiesel.

#### 4.2 Technology Demonstration:

##### Major Technologies Demonstrated under the Schemes & Programmes 2016-17

Sl. No.	Title of the Project	Scheme	Principal Investigator
1.	Mitigation of Plastic Wastes in Kerala through the Adaption of Pyrolysis	TDAP	<b>Shri. Deepak B</b> Mar Baselios College of Engineering & Technology Nalanchira, Trivandrum
2.	Improved Ventilation System inside Vehicles	TDAP	<b>Shri. M. Manoj</b> JCM. C.S.I Institute of Technology, Kannamoola, Trivandrum
3.	Novel method for regeneration of Inter Vertibral Disc (IVD)	SRS	<b>Dr. Annie John</b> SCTIMST, Trivandrum
4.	New formulation of an entomopathogen from <i>Lecanicillium saksenae</i>	SRS	<b>Dr. Reji Rani O.P</b> Kerala Agricultural University, Trichur
5.	Anti-microbial peptide from <i>Hylaranamalabarica</i>	SRS	<b>Dr. Sanil George</b> Rajiv Gandhi Centre for Biotechnology, Trivandrum
6.	Market oriented production technology in aloe ( <i>Aloe vera</i> Burm.f.)	SRS	<b>Dr. P. C Jessykutty</b> Kerala Agricultural University, Trichur
10.	New ways of making Carbon-Carbon and Carbon-Hetero atom bonds.	SRS	<b>Dr. G. Anilkumar</b> Mahatma Gandhi University, Kottayam
11.	Carbon quantum dots were synthesized from different agro waste materials	PDF	<b>Dr. Ajith Kumar M.P</b> Mahatma Gandhi University, Kottayam
12.	Administration of ATRA (All Trans Retinoic Acid) developed as an economical therapeutical intervention in the de-addiction programme.	KESS	<b>Dr. M Indira</b> University of Kerala, Kariavattom, Thiruvananthapuram
13.	Novel synthetic route for the preparation of metal complexes under microwave assisted solvent free condition was established	KESS	<b>Dr. K Mohanan</b> University of Kerala, Thiruvananthapuram
14.	Vermicomposting technology to achieve higher bioconversion efficiency of crop residues developed	KESS	<b>Dr. George V Thomas</b> KSCSTE Emeritus Scientist, CFRD, Perinjottakkal, Konni

##### Major Technologies Demonstrated under the Schemes & Programmes 2017-18

Sl. No.	Title of the Project	Scheme	Principal Investigator
1.	Adaptive Approaches to Land,	CWRDM-	Centre for Water Resources



	Soil Nutrient and Water Management – developed a tool to identify the depletion of nutrients and will help to suggest the management options using a systematic approach	ICNMS	<b>Development and Management (CWRDM)</b>
2.	Farmer participatory demonstration and evaluation of drip fertigation technique in Kerala	CWRDM	<b>Centre for Water Resources Development and Management (CWRDM)</b>
3.	New technique for the strain free growth of crystals and synthesis of certain organic crystals	KESS	<b>Dr. K. RajendraBabu</b> KSCSTE Emeritus Scientist, MG College, Thiruvananthapuram
4.	Bioprocess for dual production of bioplastics (PHAs) and Exopolysaccharides (EPS)	PDF	<b>Dr. Pradeep S</b> KSCSTE-Post doc fellow Microbiology Division JNTBGRI, Palode, Tvpm
5.	Anaerobic extraction of Plant fibres, product development from Natural fibres, biowaste treatment systems	KESS	<b>Dr. V. B. Manilal</b> KSCSTE Emeritus Scientist, CSIR-NIIST, Tvpm
6.	Development of an activity based travel demand forecasting model for Thiruvananthapuram City	ETP	<b>Dr. Manju V. S.</b> Associate Professor, Dept. of Civil Engg., College of Engineering, Thiruvananthapuram
7.	Development of a recombinant <i>Sphingomonaspaucimobilis</i> for gellan gum production: Characterization and application of recombinant gellan gum in nano particle drug delivery system	SRS	<b>Dr. A. Santhiagu</b> Associate Professor School of Biotechnology National Institute of Technology, Calicut

### 4.3 Popularization of Science

Science Popularization Programme is envisaged to provide technical and financial support for the implementation of project/ programmes which are focused to popularize the principles and practices of Science and Technology. Considering the necessity of inculcating scientific temper among public and students and also for increasing the public attitude towards science, this several schemes are being supported which are as follows:

- Kerala Science Congress
- Biotechnology Integration in Rural Development(BIRD)
- Sastraposhini in schools
- Kerala SasthraPuraskaram
- Scheme for Promoting Young Talents in Science (SPYTiS)
- Prathibha Scholarship Programme
- Student Programme for Excellence in Experimental Design (SPEED)
- Nurturing Excellence in Science Teaching (NEST)

- International Year of Pulses
- National Science Day celebrations
- World Wetland Day
- National Technology Day
- Science Literature Awards
- ENVIS Newsletter
- Eco- clubs
- National Green Corps
- National Children Science Congress- (NCSC)
- Environment Management Training
- World Environment Day
- I AM KALAM-Science Exhibition Programme
- Student Projects
- Curtain Raiser Programmes in connection with Kerala Science Congress
- Technological advances in transforming Women's lives

#### **4.3.1. Some successful Science Popularization Programmes funded**

##### **4.1.1 Eco Innovation Kit**

Programme Coordinator: K.N. Devaki Devi (HSA), Govt. Model Higher Secondary School, Thycaud



##### **4.1.2 Preventing Ecological degradation for sustainable development in Kothad island, Cochin Backwater**

Programme Coordinator: Dr.Rosamma Stephen, President, Shakti Kerala, SasthraBhavan, Kochi



#### 4.1.3 Green Kerala

Programme Coordinator: Dr. Silvy Mathew, Dept. of Botany, St. Dominic's College, Kanjirappally, Kottayam



#### 4.1.4 Know our water - Water literacy Programme

Programme Coordinator: Dr. P. Shiju, Dept. Of Chemical Oceanography, School of Marine Sciences, CUSAT



#### 4.1.5 Science ride in Automobile

Programme Coordinator: Prof. Sherin Sam Jose, Associate Professor, Department of Automobile Engineering, AmalJyothi College of Engineering, Kanjirappally



#### 4.1.6 30<sup>th</sup> Kerala Science Congress

Inauguration of the 30<sup>th</sup> Kerala Science Congress by Hon'ble Chief Minister Sri. Pinarayi Vijayan at Govt. Brennan College, Thalassery, Kannur.



#### 4.4 Patents (Facilitated by Patent Information Centre)

Patent Information Centre – Kerala functioning with the support of DST, Govt. of India facilitated the filing of 197 patent applications from Universities, R&D/Educational Institutions, Grass root Innovators, Individual Innovators, Students, etc., from the State. Prior art patent search was conducted on all the applications and the patent search reports were forwarded to the inventors. Among them 13 applications from Organizations/ Institutions were forwarded to PFC/TIFAC, New Delhi for filing patents, out of which 1 Patent was filed and the remaining are under processing. Also, PIC-Kerala facilitated the filing of 1 Patent from a Grass root Innovator through their Official Patent Attorney. The details of the Patents filed during the last two years are as follows:

Sl. No	Applicant	Title of the Invention	Patent Application No. & Date of filing
1.	University of Calicut	Methods of obtaining Metabolites from <i>Bacillus amyloliquefaciens</i> Strain Bss5 and Applications thereof	201641026628 06.08. 2016
2.	Subhash John	Hair dying anti-ageing oil and process of preparation thereof	201641034140 05.10. 2016

Patents filed during the last two years under the funded programmes are as follows:

Sl.	Title of the Project	Scheme	Principal Investigator
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No.			
1.	Development of antifungal formulation from medicinal plants	SRS	<b>Dr. Suja K.P</b> Scientist E1 HLL Lifecare Limited, Thiruvananthapuram
2	Novel Dental Composites for Dental restoration	SRS	<b>Dr. Lizymol P.P</b> Scientist, BMT Wing SCTIMST, TVM
3	Development of Carbohydrate based non-silver hydrogel nanocomposites for topical applications.	SRS	<b>Dr. J. D. Sudha</b> Technical Officer NIIST, TVM
4	Piezoelectric compositions, methods and applications thereof	KSCSTE Research Fellowship	<b>Shri. Anil A</b> Research Scholar, C-MET, Thrissur

#### 4.5 Any new innovative activities

##### 2016-17

##### **Partnering Academic – Industrial Research (PAIR)**

Kerala State Council for Science Technology and Environment is unique in the Country for its novel programmes and initiatives and is being rated as the best State Government S&T institution in the Country. The latest being the novel Scheme named PAIR, Partnering Academic Industrial Research, which does not have a similar counterpart in the country and stands as the first initiative of a industrially sponsored research programme partnering Industry, Academic Institutions and Research Institutions and a Government S&T Sector.

- Vinvish Technologies (P) Ltd, CSIR-NIIST and KSCSTE signed MOU for a joint research programme in the frontier area of Optoelectronics. Vinvish technologies will offer the industry sponsored fellowship to the JRF and KSCSTE will release the contingency grant limiting to Rs. 5,00,000/- to CSIR NIIST, for the Joint Research Programme. The Advisory Committee in its meeting held on 24<sup>th</sup> October 2017 selected the JRF candidate for the Joint Research Programme.
- M/s. AgriGenome Labs (P) Ltd, M/s. SciGenome Labs (P) Ltd, M/s. SaksinLifesciencesPvt Ltd, M/s. MedGenome Labs Ltd have agreed to associate with KSCSTE under PAIR scheme.
- Further, M/s. HLL Lifecare Ltd, Thiruvananthapuram has also expressed interest to join the programme to train graduates especially from the field of engineering. Further, the company has also expressed interest to extend the benefits of the scheme to internal employees as part of value addition. More industries including M/s. Sami Labs Limited have also expressed interest to join the league.

## **Saasthrayaanam**

A new programme 'Sasthrayaanam' was launched with a vision to inculcate scientific temper and to promote reading culture among the High School students by strengthening the school libraries. As an initial phase, 21 Science books in Malayalam worth Rs. 2,000/- was distributed to 1145 Govt. High Schools in the State. An amount of Rs. 12,08,035/- was released in this regard.

## **Assistive Technology Programme**

A training Center to train the visually challenged to use the assistive technology started at Farook College, Kozhikode where Career Centric Computer Training course for the Visually Challenged is offered as part of the Kerala State Center for Assistive Technology(KSCAT).

## **2017-18**

### **KSCSTE-CRYSTAL (Crafting Young Scientists of Tomorrow) programme**

Kerala State Council for Science, Technology and Environment (KSCSTE) has launched a new programme 'Crafting Young Scientists of Tomorrow (CRYSTAL)' to create a platform to identify young talents and nurture them at an early age. The programme comprises of a continuous mentoring process to encourage the vital abilities of the children including creativity and task commitment along with the conventionally tested parameters including IQ, memory and problem-solving capacity. To begin with, every year, 30 students who are State level winners of the National Children's Science Congress (NCSC) in the Junior category [age group 10-14 years] are selected for the programme. These students are being shortlisted through screening processes held at school and district levels. A Governing Committee under the Chairmanship of Prof. K George Thomas, IISER Thiruvananthapuram shall monitor the implementation of the programme. The first science orientation programme for students held during May 2018.

### **Institute of Advanced Virology (IAV), Thonnakkal, Thiruvananthapuram.**

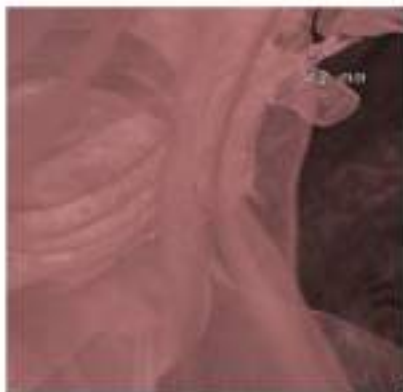
The incidence of emerging and re-emerging infectious diseases caused by viruses in humans has increased in the recent past worldwide and threatens to increase in the near future. Establishment of a state of the art viral institution is a prerequisite for a strong public health response to emerging viral diseases. The institute, to be established in the Life Sciences Park, Thonnakkal, Trivandrum shall have all infrastructure and human resources required to carry out high end research needed to study the virus and viral infections in a multifarious approach. The Institute will strengthen epidemic preparedness, rapid response and risk communication to the public apart from the high-end research in the area of basic as well as translational virology. The Institute shall have the bio-safety level measures to handle high risk viruses (Bio-safety Level 3 initially and eventually to Level 4). The Campus spread over 25 acres initially will be a farsighted one with all modern amenities and shall be green utilizing natural resources in the best possible way.



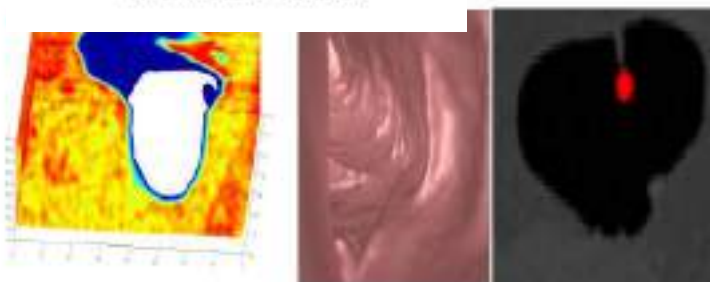
5. List 5 success stories with brief about 1 page each including photograph, if available.

5.1.1.1 Development of Medical Imaging Workstation for Virtual Endoscopy

Rajesh Kumar R, Scientist-E, C-DAC, Thiruvananthapuram  
Scheme: ETP



3D polyp measurement



Polyp detected in sub volume and corresponding view in VR and ROI in axial CT slice.

Virtual endoscopy methods combining the features of endoscopic viewing and cross-sectional volumetric imaging may provide advancement in diagnosis. The 3D model provides the surgeons the ability to navigate through the tubular structure. The navigation allows the operator to “fly through” the 3D anatomy, travelling in any direction or any position in the hollow cavity. This system provides automatic navigation through 3D reconstructed segmented colon and computer-aided detection of polyps from the CT data to locate the position of suspicious polyps for analysis by the radiologists. The objective of the project is to develop an indigenous virtual endoscopy software system that will function on Medical Imaging Workstation built around standard off the shelf computer hardware and

operating systems, without depending on any proprietary components. This system consists of reconstruction of colon structure from segmented CT images, interactive visualization and navigation through the reconstructed colon for polyp detection. When the virtual camera flies through the model, the user can track the position of the camera inside/outside the model on one screen, view what the endoscopic camera sees on another screen and track the position of the camera on all the orthogonal planes. The interactive navigation allows visualisation of both inner and outer surface of the colon. Virtual exploration through patient-specific data can help the doctor to perform a fast diagnosis and resort to invasive colonoscopy procedures only if suspicious polyps are detected. It provides an alternative to conventional optical colonoscopy for early detection of polyps on the colon lining. The system offers non-invasive and simpler procedure and even allows visualization of the outer surface of the colon, which was not possible with conventional endoscopic methods. The system can be extended into a unified platform for Virtual Bronchoscopy and virtual endoscopy of upper GI tract without any additional hardware or specialized instruments.

#### 5.1.1.2 *Fimbristylis scabrida* Schumach (Cyperaceae) – Discovery of a new species

Dr. Viji A. R., Post-Doctoral Fellow, University College, Thiruvananthapuram

##### Scheme: Back to Lab

An African sedge species is reported for the first time from the Western Ghats of India in the Asian continent.

During the floristic studies of Cyperaceae in Kerala, an interesting specimen of *Fimbristylis* was collected from the wet rocky areas in Pathanamthitta district. On critical examination and perusal of relevant literature it was identified as *F. scabrida* Schumach. a species so far known only from Africa. The present collection therefore, forms a new distributional record for the Asian continent. Taxonomic Treatment: *Fimbristylis scabrida* Schumach, Beskr. Guin. Pl. 32. 1827. Type: GHANA, Southern part of the country, Thonning. P 394 (possible holotype, C10003865 image!) Annual herbs, 10–30cm tall Roots fibrous. Culms solitary, slender, obtusely trigonus, smooth, 8–25 cm high, 0.5–1 mm thick. Leaves basal, lower ones reduced to sheaths, upper bladed; sheaths membranous, 1–3 cm long, shining fuscous or purplish, glabrous; ligule absent; blades linear, 2–13 cm long, 2.5–5 mm wide, strongly folded, erect, apex acute, antrorselyscabrid at the top. Inflorescence compound, loose, 16–30 spikelets, 2–5 × 1–5 cm; involucral bracts 2–5, erect, 0.5–2 mm long; primary rays up to 6, filiform, 0.5–3 cm long, erect or obliquely erect, smooth; secondary rays ca. 0.5 cm.



### 3. Signal Processing for Rapid and Partial Echo Planar Acquisition in Magnetic Resonance Imaging of Neural Ischemic Stroke

Dr. Joseph Suresh Paul, Associate Professor, IIITMK, Techno Park, Thiruvananthapuram

##### Scheme: ETP

The methods were developed for partial k-space filling of EPI data to minimize loss of structural information at low Signal-to-Noise Ratio and improve the image quality and time complexity for DWI and FLAIR image reconstruction. The corrective filtering methods to minimize errors in hyper intensity variations seen in FLAIR images due to partial echo acquisition and correct ADC maps measured using partially acquired DWI. Some of the major challenges faced were the loss of resolution in images due to limited number of



acquired samples and high sensitivity of existing reconstruction techniques to regularization. In the initial phase an optimal regularization criterion for in auto-calibrating parallel Magnetic Resonance Imaging (pMRI) and filtering schemes for stabilized deblurring by the addition of a nonlocal regularization term to the reverse heat equation was developed. Application of this stabilized reverse diffusion to sparse angiographic images is found to yield high-quality images after sum-of-square combination.

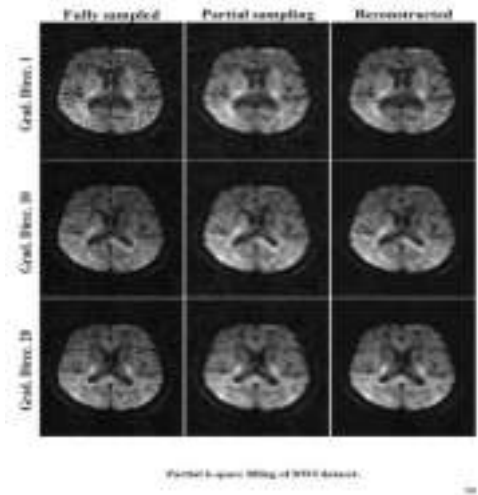
The filtering schemes developed in the project provide effective solutions to k-space filling of EPI, DWI and FLAIR data with structure preservation while significantly improving image quality and time complexity of reconstruction. Partial acquisition of DWI data introduces unwanted intensity variations in the ADC maps generated from it. Similarly, partial echo acquisition in FLAIR modulates the image pixel intensities leading to erroneous representation of hyper intensity variations. Both these issues can be addressed by biasing the NL diffusion filtering scheme using known k-space information to ensure that the image evolved through the diffusion process is most consistent with the acquired data. While the inherent nonlinear denoising properties of the proposed filtering scheme selectively diffuses weak edges in the image, biasing help to retain the actual hyper intensity variations in the FLAIR images and magnitude of diffusion in ADC maps.

#### 4. Design and Development of a Prototype Rotary Blade system for Paddy harvesting

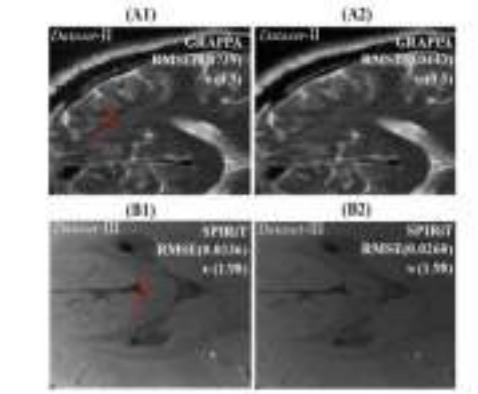
Dr. A Samson, Professor, College of Engineering, Thiruvananthapuram

##### Scheme: RTP

There is a need for compact and user-friendly harvesters affordable to small scale farmers. Thus, numerous small-scale reapers tailor made for different topologies were designed and made available in the market. These reapers are largely of reciprocating and cylindrical reaping mechanisms. Rotary reaping mechanisms, which are superior to reciprocating mechanisms in terms of efficiency, are yet to be adopted commercially. The purpose of this research is to design and test a novel rotary cutter-blade system for paddy harvesters and to develop a full-scale prototype of the same. The fabricated prototype is to be tested for its efficacy in cutting the crop and its proper conveyance. The components of the Multi-rotor paddy harvester prototype are carefully identified and designed based on previous researches, standard theories and formulae. Based on the results, a full scale Multi-rotor harvester prototype, incorporating four rotary blades and titled chain conveyor mechanism was fabricated. All the systems in the fabricated prototype was fully functional on start up. Since the prototype is working, the design calculations on power requirements and transmission characteristics are validated.



Partial k-space filling of DWI dataset.



(A1 and B1) recon reconstructed (A2 and B2) reconstruction showing method differences. The type of reconstruction, RMSE value and relative cross-over deviation (%) are provided in texts.



## 5. Basic Infrastructure for High-end Research Developed at Materials Research Laboratory of Department of Physics, S D College, Alappuzha

Dr. SreekanthVarma, Department of Physics, S D College, Alappuzha

### Scheme: SARD

The facilities provided by the KSCSTE were utilized to set up two laboratories in the department - Material Synthesis Lab and Materials and Devices Characterization Lab. Two classrooms were transformed into fully furnished laboratories to host the facilities provided under the SARD scheme.

The equipment like the muffle furnace, vacuum oven, hot air oven, de-ionization/distillation unit, refrigerator, bath sonicator, pH-meter, hot plate and stirrers with temperature controllers, and microwave oven were installed in the Synthesis lab and, Keithley 4-probe setup, tabletop pellet press and UPS were installed in the Materials Characterization Lab.

The last two batches of the PG students of the department and 15 students from nearby colleges utilized the facilities for completion of their

academic projects. A paper on “Conducting polymer composite based materials for pressure sensing applications” authored by 2 MSc students and a faculty member of the department was published. Two international journal publications of good impact factor were also published during the Phase I of the project.

## 6. Development and evaluation of starch based functional polymers for controlled plant nutrient delivery

Dr. A. N. Jyothi, Senior Scientist, ICAR-CTCRI, Thiruvananthapuram

### Scheme: SRS

A process has been optimized for the synthesis of urea coated with cassava starch-graft-copolymer. The coated fertilizer exhibited extended release of nitrogen in the soil.

A process was developed for the synthesis of crosslinked cassava starch phosphate with high water absorption capacity and for developing controlled release urea by coating with the above starch phosphate. Crosslinked cassava starch phosphate is an effective coating material for urea with very good water absorption capacity. A process

for the preparation of



urea-cassava starch-montmorillonite (layered silicate) composite which exhibits sustained release of nitrogen from the incorporated urea in soil has been developed.

The solid waste materials from cassava starch factories (Thippi), is a rich source of starch, cellulose and lignin. At present, it is utilized partly as an animal feed. Dumping of these wastes causes serious environmental issues in the surrounding areas of factories. Chemical functionalization of thippi was found to be effective to develop a grafted copolymer which can be successfully used as coating material for urea to attain sustained release properties of the nutrient.

### **7. Discoidin Domain Receptor 2: A critical regulator of Collagen type I gene expression in cardiac and vascular adventitial fibroblasts**

Dr. Mereena George, SCTIMST, Thiruvananthapuram

#### **Scheme: KSCSTE Research Fellowship**

Elucidation of the molecular basis of tissue repair and remodeling in the heart is an important clinical goal. Cardiac fibroblasts, as the only intracardiac source of type I and type III collagens, are importantly involved in wound healing in the injured myocardium. In an elegant article published in the prestigious Journal of Molecular and Cellular Cardiology in 2016, Mereena George, PhD Scholar under the guidance of Dr. K. Shivakumar at the Division of Cellular and Molecular Cardiology, SreeChitraTirunal Institute for Medical Sciences and Technology (SCTIMST), addresses the molecular basis of wound healing in the heart<sup>1</sup>. The team has uncovered a novel mechanism of regulation of the Discoidin Domain Receptor 2 (DDR2) gene by Angiotensin II and demonstrated that DDR2 and collagen type 1 are locked in a cycle of mutual regulation in Angiotensin II-stimulated cardiac fibroblasts, which can potentially impact tissue response to injury. Notably, the article by MereenaGeorge et al. attracted an exclusive editorial in the very next issue of the same journal<sup>2</sup>. Commenting on the “wonderful job determining the mechanism behind Ang II-induced up-regulation of DDR2 in cardiac fibroblasts”, the editorial from the Mississippi Center for Heart Research, The University of Mississippi, Jackson, USA, highlights the significance of the findings, stressing its translational impact. The candidate has been awarded with Ph.D last year and about to join for a post-doctoral position in a leading university in USA.

### **6. Has the council developed any specific state related S&T and innovation policy? If so the details to be provided.**

The committee appointed by the Govt. of Kerala to frame the New Science Policy of the state submitted the draft policy and the cabinet approved the New Science Policy of the State vide Order No. 08/2017/S&TD; dtd. 27.11.2017. The policy highlighted the present scenario in the state and a vision for the next 20 years is depicted in the policy. The policy was translated in the regional language (malayal) also. The committee was chaired chaired by Dr. A. D. Damodaran former Chairman, STEC and Director, CSIR-NIIST.

### **7. How strong are the links between other state government /departments? If so provide details.**

KSCSTE has been maintaining a strong link with the Industries Department and the Kerala State Planning Board. The aim is to promote technology development especially from the rural sector. Rural Innovators Meet is an annual event of KSCSTE in which new technologies/products developed by the unorganized rural innovators were exhibited/ demonstrated and the best innovations among them were rewarded with prizes.



Also, awareness on the various topics including marketing techniques, Intellectual Property Rights, Financing options, etc, were given to the innovators. Rural Innovators' Meet 2018 was organized jointly with M. S. Swaminathan Research Foundation, Kalpetta, Wayanad, with the support of the Industries Department and State Planning Board.

#### **8. How strong are the links of the council with local industry units/associations?**

KSCSTE has been maintaining a strong link with the Industries Department and the Kerala State Planning Board. The aim is to promote technology development especially from the rural sector. Rural Innovators Meet is an annual event of KSCSTE in which new technologies/products developed by the unorganized rural innovators were exhibited/demonstrated and the best innovations among them were rewarded with prizes. Also, awareness on the various topics including marketing techniques, Intellectual Property Rights, Financing options, etc. were given to the innovators. Rural Innovators' Meet 2017 was organized jointly with Mitraniketan, Thiruvananthapuram, with the support of the Industries Department and State Planning Board.

- Technical expertise has been provided to Department of Environment and Climate Change for dealing Coastal Zone Management issues, Wetland Management and other environmental problems and issues. Work with all educational institutions in the State including DPI, universities, colleges, schools, Institution of Engineers, Centre for Disability Studies and KUFOS. Similarly, with Western Ghats Cell and State Planning Board, Departments of Tourism, Fisheries, Agriculture, Soil Survey and National and State level R&D Centers of the Council.
- The scheme Sastraposhini in schools is being implemented in government schools with the help of Education department, Govt. of Kerala.
- The KSCSTE has strong linkage with line departments. The R&D institutions of KSCSTE working in various Sectors are having direct linkage with the concerned Departments. Example: CWRDM with Water Resource Department, Local Self Government Department and Environment Department, KFRI with Forest and Environment Department. NATPAC with transport Department etc.
- The KSCSTE has strong linkage with universities of Kerala viz. CUSAT, University of Calicut, University of Kerala, Mahatma Gandhi University & Kerala University of Fisheries & Ocean Studies.
- KSCSTE provided technical support to the Kerala State Planning Board and a few R&D centres under KSCSTE to migrate their library collections to KOHA, an Open source library management software

#### **9. List 5 major technology areas, where the council can play an important role by finding convergent technological solutions.**

##### **1. Medical Sciences & Health Care**

KSCSTE is spearheading programmes for providing Good Health at Low Cost with Social Justice and Equity to the needy and underprivileged group in the society. Financial assistance is providing to various agencies working in the medical and healthcare system for S&T solutions and in developing novel methods for timely interventions, creating awareness among general public through various popularization programmes. Details of few programmes conducted during 2017-18 is given below:

##### **A. Developing models to forecast outbreak of dengue virus in Kerala: creating a freely accessible web resource**

Dr. Reshmi, Scientist, RGCB, Thiruvananthapuram

Infectious diseases constitute a tenacious and major public-health problem all over the world. Among them, viral infectious diseases have assumed great public health significance in the

recent past. Once contained to small areas, they spread to larger populations and can even decimate the entire population. This study aims at providing an understanding of deterministic modeling as applied to the dynamics of infectious diseases and that develops a variety of modeling templates. The developed model is a novel innovation where public can directly use the outcome of the research work done. The mathematical model developed can easily predict the disease risks by observing current climatic data. This is possible via using the historic disease case details for the past five years from the same community. The prediction is accurate for a small area like a Panchayath than a large area like a District. This is available through internet like any other website. Currently the model works only for Trivandrum district. This can be observed as a model to further develop and extended into other locations

### **B. Development of indigenous voice prosthesis for the rehabilitation of laryngectomees**

Dr. Bipin T Varghese, Addl. Professor, Regional Cancer Centre, Thiruvananthapuram

The indwelling voice prostheses that are currently available consists of a cannula, with retaining flanges and a one-way flap valve for shunting air from trachea to the esophagus. Though there are a number of competitors for voice prosthesis globally, the basic design employed by each has remained same. There are a wide variety of issues experienced in the present voice prosthesis like Microbial adhesion and biofilm formation on the valve mechanism, Periprosthetic leakage across the outer surface of the prosthesis and Inadvertent prosthesis dislodgement from the party wall. The aim of our study is to address these issues and come up with an alternative design for the voice prosthesis which would drastically improve the quality of speech in laryngectomees. It was also intend to advance the scope of study to increase the mean device life by delaying biofilm formation in the prosthesis through surface modification and dispersion of anti-fungal agents in the VP material. The study also exploring the possibility to improve the quality of life of laryngectomees by enabling the voice prosthesis to generate a much effortless voice so that the patients are able to regain near normal speech

### **C. Identification of cellular pathways differentially modulated in Human micro-vascular endothelial cells upon Dengue virus infection**

Dr. E. Sreekumar, Scientist, RGCB, Thiruvananthapuram

Dengue has emerged as a major mosquito-borne disease in the tropics and subtropics. In severe dengue, enhanced microvascular endothelial permeability leads to plasma leakage. Direct dengue virus (DENV) infection in human microvascular endothelial cells (HMEC-1) can enhance trans-endothelial leakage. Using a microarray based analysis, identified a modulation of key endothelial cell signaling pathways in DENV-infected HMEC-1 cells. One among them was the sphingolipid pathway that regulates vascular barrier function. Sphingosine-1-phosphate receptor 2 (S1PR2) and S1PR5 showed significant up-regulation in the microarray data. In DENV infected cells, the kinetics of S1PR2 transcript expression and enhanced in vitro trans-endothelial permeability showed a correlation. It was also observed an internalization and cytoplasmic translocation of VE-Cadherin, a component of adherens junctions (AJ), upon infection indicating AJ disassembly. Further, inhibition of S1PR2 signaling by a specific pharmacological inhibitor prevented translocation of VE-Cadherin, thus helping AJ maintenance, and abrogated DENV-induced trans-endothelial leakage. Results showed that sphingolipid signaling, especially that involving S1PR2, plays a critical role in vascular leakage in dengue.

### **D. Preparation and characterization of nanoparticles from antitumor polysaccharide PST001 and elucidation of its pharmacokinetics**

Dr. T.T.Sreelekha, Assistant Professor, Regional Cancer Centre, Thiruvananthapuram

Polysaccharides have over the years been used widely in pharmaceutical, chemical, and biochemical drug delivery. This family of natural polymers has an appeal to the area of drug delivery as it is comprised of polymers with a large number of derivatizable groups, a wide range of molecular weights, varying chemical compositions, and for the most part, a low toxicity and biodegradability, yet a high stability. Galactoxyloglucan polysaccharide PST001, isolated from the seed kernel of *Tamarindusindica* demonstrated excellent immunomodulatory and anticancer potential in vitro and in vivo with non-toxicity towards normal cells. A gold-conjugated nanoparticle formulation using galactoxyloglucan polysaccharide (PST-Gold) was identified as an excellent immunomodulatory and anticancer agent. Although this nanoconjugate exerted its cytotoxic effects through the induction of apoptosis in human cancer cells, it was largely non-toxic in normal cells and tissues, except a few pathologic abnormalities observed in mice at very high doses of the nanoparticles. These nanoparticles have higher bioavailability and bioaccumulation at the tumor sites, which will make them feasible as an adaptive and targeted drug delivery system in the armamentarium of cancer.

## **2. Water Quality Management**

CWRDM is a premier R&D institution under KSCSTE working in the area of water sector. KSCSTE is implementing major programmes under this sector through the cooperation of CWRDM. During the year 2017-18 the following activities were done with respect to water Conservation management:

- The project entitled “Environmental Monitoring Programme on Water Quality” was initiated with the aim to create database on water quality and to use the derived information for practical application in the management of water resources and their effective utilization. The project was completed by documenting the water quality of 44 river basins. It will form a valuable resource for a variety of users including water resource scientists, research scholars and planners. The study also points to the need for creating water literacy among citizens as well as taking appropriate regulatory measures for water quality problems of river basins. The results of this study would be useful to formulate methods for rejuvenating our rivers.
- The projects, Piloting Model Interventions for Water and Sanitation Delivery System (UNICEF) and International Year of Water Co-operation (DoECC) proved that by proper interventions, the quality of drinking water quality can be ensured. The drinking water quality problems of various districts and block panchayaths of Kerala State were identified through workshops, sanitation surveys, water quality monitoring etc. The sanitary survey was also done during the project to understand the relationship with contamination levels.
- The service of Mobile Water Analysis Laboratory was provided in different districts of Kerala. The quality of the water samples were monitored through the analysis of various physico-chemical and bacteriological parameters. After completing the analysis Drinking Water Cards were distributed to the beneficiaries. The Drinking Water Card records the concentration of various drinking water quality parameters and describes simple methods of treatment so that common man will understand the need of protecting the water sources.
- The Algal bloom issue in Chaliyar River which may have direct effect on the health of public is timely intervened by CWRDM and necessary advices for public and LSGD officials were given.
- The drinking water issues of Payyoli Municipality was addressed by CWRDM and proper management of the issue was given to the officials.
- CWRDM prepared Hand books on water quality and sanitation for LP and UP school students in both English and Malayalam with the support of UNICEF.

## **3. Adaptation of Advanced Technology**

KSCSTE is promoting R&D activities through developing basic infrastructure facilities in R& D centres.

#### **A. Centre for Analytical Instrumentation – Kerala (CAI-K)**

(A sophisticated analytical instrumentation facility for students by KSCSTE & KFRI)

Many of the scientific research areas uses sophisticated analytical instrument capabilities for precise and quantitative valuation of experimentation. As most of the sophisticated instruments are highly costly, require continuous monitoring and maintenance, which is usually not possible for academic/research institutions because of financial and human resource constraints. Hence assemblage of these instruments in centralized facilities will help better management with qualified and dedicated scientific personnel, continuous monitoring, regulated power supply and ambient conditions among others and disbursement of services to a wide spectrum of stakeholders. By keeping in view of these aspects, KSCSTE in collaboration with KSCSTE-Kerala Forest Research Institute (KSCSTE-KFRI) established a sophisticated analytical instrumentation facility named “Centre for Analytical Instrumentation – Kerala” at KSCTSE-KFRI campus at Peechi.

The facility will have analytical instruments required for chemical, environmental and life sciences research including; Inductively coupled plasma atomic emission spectroscope (ICP-AES), High Performance Thin Layer Chromatography (HPTLC), X-Ray Diffraction (XRD) Spectrometer, High Performance Liquid Chromatograph, DNA Sequencer/Genetic analyser, Spectrofluorometer, Fourier Transform infrared spectroscope (FT-IR), Lypholizer, Scanning Electron Microscope (SEM) and Gas chromatograph – Mass spectrometer (GC-MS) along with a sample preparation lab containing minor instruments such as centrifuges, incubators etc.

#### **B. Advanced Analytical Technologies of CWRDM**

KSCSTE has developed the National Isotope Facility for Hydrology at CWRDM, which houses sophisticated analytical instruments for the measurement of stable and radioactive isotopes in environmental matrices. The different instruments available are

1. Isotope Ratio Mass Spectrometer (IRMS) - For the measurement of stable isotope ratios like D/H,  $^{18}\text{O}/^{16}\text{O}$ ,  $^{15}\text{N}/^{14}\text{N}$ ,  $^{13}\text{C}/^{12}\text{C}$ ,  $^{34}\text{S}/^{32}\text{S}$
2. Alpha Spectroscopy system - For the identification and measurement of alpha emitting radio- nuclides in environmental samples
3. Gamma ray Spectroscopy system (NaI-Tl Detector) - For the measurement of gamma radioactivity in environmental samples
4. Gamma ray Spectroscopy system (HPGe Detector) - (or the identification and activity measurement of gamma emitting isotopes in environmental samples
5. Gas Chromatograph-Mass Spectrometer (GC-MS) - For the measurement of toxic and non-toxic micro-organics
6. Ion Chromatograph (IC) - For the measurement of major ions and transition metals in
7. environmental samples
8. Mini Liquid Nitrogen Plant - For the production of liquid nitrogen for laboratory use
9. Isotope Ratio Infrared Spectrometer- For measurement of stable isotopic ratios of atmospheric carbon dioxide
10. Liquid Scintillation Counter – For measuring beta and alpha emitting radio nuclides
11. Rad7 & Rad Aqua – For measurement of radon in air and water
12. Spectroradiometer – To develop hyper spectral data in the field
13. Inductively Coupled Plasma Atomic Emission Spectrometer – For determination of heavy metals
14. CHN Analyzer – To measure C, H, N, S & O ratios in environmental samples

#### **4. Transport & Road Safety Management**

National Transportation Planning and Research Centre (NATPAC), an Institution of Kerala State Council for Science, Technology and Environment (KSCSTE) is a premier R&D Institution in the country which works on multi-modal system of transportation covering all modes of transport including road, rail, water, seaport and airport.

### **A. Transport**

During 2017-18, NATPAC handled 55 research and external funded projects pertaining to highway engineering, traffic and transport planning, transport management, transport economics, social and economic impact analysis, tourism planning, transport energy and pollution. Most prominent studies are the Design and implementation of road safety schemes along selected stretches in Gurugram City, DPR on



development of Kochi canals, Traffic and Transportation studies for more than 8 municipalities, Traffic and crowd management plan for Neelakkurnji season 2018 in Munnar, Road Safety Treatment for AdoorKazhakkootam



Safe Corridor Demonstration Project (SCDP) stretch Project etc have been successfully undertaken during the year. Many Technical Documents such as Transport vision document and other policies were also framed and submitted to the State Government. The outputs of the study reports helped in preparation of Transport Master Plan for the Municipalities in Kerala. In line with National Urban Transport Policy (NUTP) of Government of India, public transport and non-transport modes of transport have been prioritized in these study reports.

### **B. Road Safety Management**

During 2017-18, NATPAC handled more than 20 research and externally funded projects pertaining to road safety management covering road user studies, traffic signals, accident causative factors, road safety auditing, traffic education, traffic engineering and management and impact of new initiatives of the developed roads on road safety. Among the aforesaid classified categories, the major new/spill over studies are accident causative factors and its reconstruction studies, GIS Based Analysis of Demographic, Spatial and Temporal Variations in Crash Rates, behavioural studies on drivers, impact of speed governors on safety of heavy vehicles and fuel efficiency, application of ITS for enhancing road safety, identification of accident prone locations and its counter measures. Also, imparting training to various categories of road users and road safety campaign through distribution of pamphlets, audio visual programs etc. Around 40 programs were organized /conducted during 2017-18. The findings and ideas emanated from the studies of NATPAC are used to disseminate knowledge to user departments to formulate implementable action plans. The knowledge was also disseminated through trainings, seminars and workshops.





## 5. Biotechnology Development

Government of Kerala have constituted the Kerala Biotechnology Board to create the best environment in the State for the growth of Biotechnology as defined in the Biotechnology Policy. The Biotechnology Board is taking all top level administrative and financial decisions to ensure that the high end technology becomes useful to the society and reaches it at the right time by supporting the activities Kerala Biotechnology Commission (KBC) is responsible for the implementation of the Biotechnology Policy and other guidelines laid down by the Biotechnology Board. There are a number of programmes relevant to the State supported by KBC as well as take part in all measures wherein biotechnological interventions are required. KBC also addresses contemporary issues in all sectors human welfare viz, health, food security, environmental issues and crop biotechnology. KBC constantly promotes the R&D activities to

- Provide research support to young scientists for pursuing research in emerging areas of biotechnology
- Provide translational research in various disciplines of biotechnology with industrial partnership
- Extend support for conducting training projects to promote rural innovations for developing biotech based products
- Build up and strengthen the human resource capacity in biotechnology through supporting training and workshop initiatives in the emerging areas of biotechnology
- Promote biotechnology related entrepreneurial ventures, start-ups and industrial establishments in the State.

## 10. Proposed budget outlay for the 2018-19

The Kerala State Council for Science, Technology and Environment (KSCSTE) was constituted as an autonomous body of the Govt. of Kerala by restructuring the erstwhile State Committee on Science, Technology and Environment in 2002 (Vide G.O.(Rt)No.76/2002/STED dated 06.11.2002). Council become administratively and financially operational since April 2003 (i.e. financial year 2003-04 onwards). The primary objective of the Council is to implement science and technology programmes to enhance the socio- economic development as well as quality of life and environment of the state. The setting up of the Council is a significant pro-active step taken by the government to revamp and streamline the science and technology programmes to make them more responsive to the development needs of the state, and to help in the process of transformation of Kerala as a knowledge driven economy. R&D Centres functioning under the umbrella of the Council are: Kerala Forest Research Institute (KFRI), Kerala School of Mathematics (KSoM), Jawaharlal Nehru Tropical Botanic Garden and Research Institute (JNTBGRI), Centre for Water Resource Development and Management (CWRDM), National Transportation Planning and Research Centre (NATPAC), Srinivasa Ramanujan Institute of Basic Sciences (SRIBS), Malabar Botanic Garden and Institute for Plant Sciences (MBGIPS)and Kerala State Centre for Assistive Technologies (KSCAT).

Besides these, the Council provides grant-in-aid support to institutions, which include Sophisticated Test and Instrumentation Centre (STIC) and the Integrated Rural Technology Centre (IRTC).

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**Maharashtra**

## 1. Details of State S&T Council

**Name of the Council:** Rajiv Gandhi Science and Technology Commission, Government of Maharashtra

### Member Secretary

**Name** Shri S.G. Markandeya  
**Address** Apeejay House, 3<sup>rd</sup> Floor, Adjacent to KC College, 3, Dinsha Vachha Road, Mumbai 400029  
**Phone** 022-22024755/22024711/22823418/  
**Fax** 022 – 22024755  
**Mobile No.** 9869200943  
**Email** [rgstemaha@rediffmail.com](mailto:rgstemaha@rediffmail.com); suhasmarkandeya@gmail.com

## 2. Structure of the Council:

a) **Date of establishment:** 15th December, 2004 by Maharashtra Act No. XV of 2004 passed by Maharashtra Legislature.

b) **Organization Structure** : Commission consists of Chairman, Five non-official Members, Four Ex-officio Members and a Member Secretary. Except official members others are expected to be professionals with scientific and technological background. Member Secretary is the Executive Head of the Commission.

### c) Strength of approved manpower [both central (DST) and state supported]

- Approved Core Staff: Scientific & Technical (12) + Administrative (13)  
(Appointment of 7 scientific staff and 8 administrative staff is in progress)
- Contract Staff: Advisors/Consultants (20); Support Staff (20)

(4 Advisors, 2 Scientific staff for PIC and 6)

Administrative staff are currently in place

Strength of approved manpower Central (DST) and State supported.

Sr. No.	Name of the Incumbent working	Date of creation of post	Name of the Post	Date of Promotion if given	Date of joining	Present Designation	Pay scale	Consolidated monthly emoluments
<b>A : Scientific and Technical Manpower</b>								
1.	Dr. P.M. Dolas	2011	Scientist	N.A.	26.12.2011	Advisor	Consolidated	40,000/-
2.	Prof. V.V. Mahajani	2011	Scientist	N.A.	26.12.2011	Advisor	Consolidated	22,000/-
3.	Shri A.M. Patankar	2012	Scientist	N.A.	15.10.2012	Advisor	Consolidated	22,000/-
4.	Dr A. V. Sapre	2017	Scientist	N.A.	01-04-2017	Advisor	Consolidated	50,000/-

5	Mr.Harshal Vashi	2017	Project Scientist, PIC	N.A.	10.07.2017	Project Scientist, PIC	Consolidated	55,000/-
6.	Ms Priyanka Sagwekar	2017	Project Asstt. PIC.	N.A.	13.07.2017 (Pl. see footnote)	Project Asstt. PIC.	Consolidated	20,000/-
	Total (A)							2,09,000/-
<b>B: Administrative Manpower</b>								
1.	Shri V.P. Kulkarni	2011	Sr. Adm. and Finance Officer	N.A.	15.11.2011 (Pl. see footnote)	Sr. Adm. & Finance Officer	Consolidated	26,000/-
2.	Shri P.S. Ketkar	2011	Accountant	N.A.	1.11.2011 (Pl. see footnote)	Accountant	Consolidated	22,000/-
3.	Ms.V.P. Jagtap	2011	Office Asstt.	N.A.	1.11.2011 (Pl. see footnote)	Office Asstt.	Consolidated	20,000/-
4.	Shri H.V. Malandkar	2014	Officer on Spl. Duty	N.A.	1.1.2014	Officer on Spl. Duty	Consolidated	42,000/-
5.	Smt. J. R. Lulla	2011	Administrative Assistant	N.A.	15.12.2011	Administrative Assistant	Consolidated	25,000/-
6.	Smt. S Ambewadkar	2017	Accountant	N.A.	01.07.2017	Accountant	Consolidated	20,000/-
7.	Shri S. S. Shirke	2011	Office Asstt.	N.A.	1.11.2011	Office Asstt.	Consolidated	20,000/-
8.	Shri R Gaikwad		Office Asstt (Nagpur office)	N.A.	3.06.2013	Office assistant	Consolidated	20,000/-
9.	Shri R. Kelkar	2017	Driver	N.A.	02.04.2012	Driver	Consolidated	20,000/-
	Total (B)							1,89,000/-
	Grand Total							3,98,000/-

(A)+(B)						
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Note: Official at Sr. No. 6 under Scientific and Technical manpower has resigned with effect from 13th December, 2017, and three officials at Sr. No. 1, 2, 3 from Administrative manpower have resigned with effect from 1st June 2017, 13th June, 2017 and 1st July, 2017 respectively.

**3. Budget released to your state S&T Council for last five financial years including Central Government, State Government & any other sources.**

Year	Plan	Non-Plan	DST (recd)
2013-14	1400.00	222.05	22.34
2014-15	2800.00	210.00	77.30
2015-16	3150.00	145.41	47.80
2016-17	2500.00	210.50	96.00
2017-18	3000.00	--	38.80

**4. Key activities undertaken, during the last two years, in the area of:-**

**4.6 Technology Development:**

**4.1.1. 14 new R&D projects approved and grant released**

Financial Year April-2017-March-18

New Projects

Sr. No	DPP No.	Project Title	Organization/Institute and Principal Investigator	Duration (Months)	Estimated Costs (Rs)	Amount Released (Rs)
1	DPP-159	<b>Gyan Shodh– Knowledge Search Engine in Marathi Language with Recognition of Printed or Hand Written Devnagari Script as an Input</b>	Vishwakarma Institute of Technology, Pune.	36	Rs. 43.24 lakh	Rs. 12.78 lakh
2	DPP-162	<b>Foams and Hydrogel Sponges For Chronic Wounds of Burns and Diabetes</b>	SVKM's Dr. Bhanuben Nanavati College of Pharmacy, Mumbai.	24	Rs. 22.00 lakh	Rs. 8.27 lakh 01-08-2017

3	DPP-163	<b>Formulation and Development and Evaluation of Novel Gel for Vaginal Drug Delivery for Prevention of HIV Transmission and Contraception</b>	SVKM's Dr. Bhanuben Nanavati College of Pharmacy, Mumbai	36	Rs. 14.20 lakh	Rs. 4.60 lakh 01-08-2017
4	DPP-153	<b>Design and Development of Computer Aided Diagnosis (CAD) Tool for CT Scan Images of Lung Diseases.</b>	Shri Guru Gobind Singhji Institute of Engineering and Technology, Nanded	36	Rs. 14.10 lakh	Rs. 5.40 lakh
5	DPP-166	<b>An Inexpensive Method for the Determination of Oxalate in Urine And Assessment Of Urinary Calculi By Paper Strip And Biosensor Based Technique.</b>	Sant Gadge Baba Amravati University, Amravati.	36	Rs. 48.06 lakh	Rs. 22.16 lakh
6	DPP-164	<b>Quality Plant Production Using Low Cost Biotechnological Approaches.</b>	Shivaji University, Kolhapur.	36	Rs. 133.00 lakh	Rs. 43.77 lakh
7	DPP-165	<b>Wide spectrum Microbial Pesticide useful in Single Crop System</b>	CSIR- National Chemical Laboratory, Pune.	36	Rs. 27.96 lakh	Rs. 7.80 lakh
8	DPP-158	<b>Design, Development And Evaluation of Monocular Vision Based Electronic Navigation Aid for Visually Impaired People.</b>	Vishwakarma Institute of Information Technology (VIIT), Pune, jointly with Vishwakarma Institute of Technology, Pune.	24	Rs. 24.10 lakh	Rs. 13.57 lakh
9	DPP-161	<b>Portable Intensive Care Unit Setup for Rural Health Infrastructure.</b>	College of Engineering, Pune.	36	Rs. 96.00 lakh	Rs. 44.55 lakh

10	DPP-134	<b>An Educational Teaching and Assessment Tool for Hearing impaired children upto Class-V for the subject of Mathematics and English using gesture analysis.</b>	Pune Institute of Computer Technology, Pune.	24	Rs. 20.11 lakh	Rs. 16.83 lakh 01-08-2017
11	DPP-145	<b>Empowerment of Forest Dwelling and Local Communities through promotion forest based micro and small enterprises in Marathwada.</b>	Ramanand Teerth Marathwada University, Nanded.	36	Rs. 24.28 lakh	Rs. 12.22 lakh 16-08-2017
12	DPP 175	<b>Development Of nanoemulgel For arthritic inflammation And pain based On ethnomedicinal Plant of western India</b>	SVKM's Dr. Bhanuben Nanavati College of Pharmacy, Mumbai	24	Rs. 17.62 lakh	Rs. 9.77 lakh 28-03-2018
13	DPP 176	<b>Fortified Nutraceuticals Of Acacia Nilotica Pods –A health Product for Geriatric patients</b>	SVKM's Dr. Bhanuben Nanavati College of Pharmacy, Mumbai	24	Rs. 18.80 lakh	Rs. 9.15 Lakh 28-03-2018
14	DPP 146	<b>Fabrication and development of in-situ characterisation of soil element determination system</b>	Institute of Science, Mumbai	36	Rs. 86.10 lakh	Rs. 59.87 lakh 28-03,2018

**4.1.2. 11 ongoing R&D projects renewed and funds provided  
Financial Year April-2017-March-18  
Ongoing Project**

Sr. No	DPP No.	Project Title	Organization/Institute and Principal Investigator	Duration (Months)	Estimated Costs (Rs)	Amount Released (Rs)
1	DPP-072	<b>Bio-Medical Engineering and Technology (Incubation) Centre</b>	Indian Institute of Technology Bombay, Mumbai	<b>60</b>	Rs. 39.39 Crore	Rs. 7.17 Crore

2	DPP-136	<b>The Integration of Ethno Veterinary Medicine (EVM) into a Community Animal Based Health Care System</b>	BAIF Development Research Foundation, Pune.	36	Rs. 96.42 lakh	Rs. 33.54 Lakh
3	DPP-122	<b>Science &amp; Technology Resource Centre (STRC) at Gadchiroli</b>	Gondwana University, Gadchiroli	60	Rs. 15.70 Crore	Rs. 2.50 Crore 28-03-2018.
4	DPP-110	<b>Design and Development of Efficient Flocculants for Protein Recovery from Waste Water in Fish Meal Industry</b>	CSIR – National Chemical Laboratory, Pune	36	Rs. 29.16 lakh	Rs. 7.71 Lakh
5	DPP-54	<b>Maharashtra Gene Bank Programme</b>	Indian Institute of Science Education and Research (IISER) Pune.	60	Rs. 33.15 Crore	Rs. 5.50 Crore
6	DPP-80	<b>Pilot Scale Demonstration of Value Added Products from Surimi</b>	Central Institute of Fisheries Education, Mumbai	36	Rs. 39.00 lakh	Rs. 8.19 Lakh
7	DPP-107	<b>Param School and Param University for Quality School Education for all with focus on Rural Area.</b>	MKCL Knowledge Foundation, Pune.	36	Rs. 231.83 lakh	Rs. 78.69 lakh 16-08-2017
8	DPP-129	<b>Catalysing Rural Development and Women Empowerment through implementing Eco-centric Technology Aimed at gainful Recycling of Treated Sewages.</b>	Indian Institute of Technology Bombay, Mumbai.	36	Rs. 81.75 lakh	Rs. 23.37 Lakh 09-11-2017
9	DPP-131	<b>Design of an Adaptive, Error resilient and Robust Access Control System Using Multimodal hand based Biometric Modalities for Multi-layered High Security Applications.</b>	Vishwakarma Institute of Information Technology, Pune.	24	Rs. 11.54 lakh	Rs. 5.10 Lakh

10	DPP-63	<b>Technology Incubation Centre (TICE) at VNIT, Nagpur.</b>	Visvesvaraya National Institute of Technology, Nagpur	36	Rs. 227.36 lakh	Rs. 24.64 Lakh
11	DPP-84	<b>Development of crude Drug repository of genuine samples from Maharashtra</b>	Agharkar Research Institute, Pune	60	Rs. 57.17 lakh	Rs. 12.70 lakh 20-12-2017

#### 4.1.2. Other activities (11)

##### Other projects

Sr. No.	CR No.	Project Title	Organization/Institute	Amount Released (Rs)
1	CR-10	RGSTC-TIFAC MSME Internship Programme in Maharashtra at Walchand College of Engineering, Sangli.	Walchand College of Engineering, Sangli	Stage 2 of Cycle 2 Rs. 4.32 lakh 20-04-2017 Stage 1 of Cycle 3 Rs. 8.86 lakh Dated 27-03-2018
2	CR-11	RGSTC-TIFAC MSME Internship Programme in Maharashtra at Shri. Ramdevbaba College of Engineering and Management, Nagpur.	Shri. Ramdevbaba College of Engineering and Management, Nagpur.	Stage 2 of Cycle 2 Rs. 4.32 lakh 20-04-2017 Stage 1 of Cycle 3 Rs. 8.29 lakh Dated 27-03-2018
3	CR-40	National mathematics day (NMD) 2017 celebration in Maharashtra	Other Institutes	Rs. 6,00,000 dt 26.12.2017
4	CR-40	National Science Day (NSD)-2018 Celebration in Maharashtra	Other Institute	Rs.10,00,000 dt 5-02-2018
5	CR-26	RGSTC-SIAC Mentor Workshop and Design and Planning Activities for Stakeholders during 2-4 May, 2017.	Homi Bhabha Centre for Science Education, Mumbai	Rs. 37,025/- Dt. 04-07-2017
6	CR-38	India International Science Festival (IISF), 7-11 December, 2017 at Chennai.	Deptt. of Science and Technology Bhavan, New Mehrauli Road, New Delhi	Rs. 2,69,700 dt 20-12-2017

#### 4.7 Technology Demonstration:

Automated jaggery making demonstration plant commissioned at Warananagar near Kolhapur and operated during the harvest period of the year 2017-18

#### 4.8 Popularization of Science



- National Science Day (NSD) 2018 and National Mathematics Day (NMD) 2017 celebration in total 9 academic institutes
- Participation in IISF 2017 at Chennai during Dec.7-11, 2017
- 2 new SIACs approved during 2016-17 are making good progress. Two more requests for setting up SIACs from among seven applications are under consideration for which detailed proposals will be sought for.

#### **4.9 Patents (Facilitated by Patent Information Centre)**

- No new patents filed
- Patent Information Centre (PIC) established under RGSTC in Sept. 2017 at the Institute of Science, Mumbai, wherein one Project Scientist and one Project Assistant have been deployed. The centre is being equipped with required office setup for patent search and staff training is underway.

#### **4.10 Any new innovative activities**

- Pre-project work on “CILLAGE area development at Nandurbar” to be coordinated and executed by North Maharashtra University (NMU), Jalgaon, has been completed and the project is to be launched shortly. Other partners who have planned to join the programme are NMU Tribal Academy (Nandurbar), HSS KVK, (Nandurbar), BAIF (Pune), and MKCLKF (Pune).
- Pre-project studies assigned to IIT, Bombay for examining feasibility of implementing CILLAGE area development concept have been completed for the Rahata block near Ahmednagar in Maharashtra.
- Mentor Workshop for ToTs for the proposed SIACs and Design and Planning Activities for related Stakeholders was successfully conducted at Homi Bhabha Centre for Science Education, Mumbai during 2-4 May, 2017.

#### **5. List 5 success stories with brief about 1 page each including photograph, if available.**

- Development of medical devices under the Biomedical Engineering and Technology Innovation Centre (BETIC) (Dr Ravi, Deptt. Of Mech. Engg. IIT Bombay, Mumbai)
- Useful Product from Dried Leaves of Mango Tree. Prof. V. K. Rathod, ICT, Mumbai
- Pilot scale production of value added products from surimi. Prof. A. S. Balange, Dr Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, District Ratnagiri
- Catalyzing Rural Development and Women Empowerment through Implementing Eco-centric Technology Aimed at Gainful Recycling of Treated Sewages. Prof. S. R. Asolekar, Indian Institute of Technology, IIT Powai, Mumbai.
- Development of Data base of medicinal plants of Maharashtra  
Dr. Anuradha Upadhye, Agharkar Research Institute, Pune

#### **Success Stories of Sponsored Projects by RGSTC**

- “Development of medical devices under the Biomedical Engineering and Technology Incubation Centre (BETIC)” by Prof. Ravi, Deptt. of Mech. Engg. , IIT Bombay, Mumbai

Biomedical Engineering and Technology Incubation Centre (BETIC) was established at IIT Bombay in 2014 with funding from RGSTC, Govt. of Maharashtra and DST, Govt. of India and has three satellite Centres at CoE, Pune, VNIT, Nagpur and MGM Institute, Navi Mumbai in operation since 2015. Later, four self sustaining centres at BKLWalawalkar Hospital, Dervan, Dutta MegheInstt. of Medical Sciences, Wardha, KJ Somaiya College of Engineering, Mumbai and MIT-ADT University, Pune also joined the BETIC project. The team of engineers and medical doctors have identified more than 400 unmet clinical needs and developed more than 100 proof of concept devices. So far 16 products have been taken to clinical trials and most of these have been licensed to startups or industry partners. Some of these are: smart stethoscope module, clubfoot bracer monitor, glaucoma screener and biopsy gun under diagnostic devices. Similarly under surgical devices, orthopaedic surgery planner, laparoscopy instrument, nasal osteotomy forceps, orthopaedic cutting jigs and some prostheses and implants have been successfully demonstrated by the team. During last year, BETIC embarked on major exercise to establish and streamline standard operating procedures and product documentation bringing them in line with ISO 9001 ISO 13485 (Medical Devices Quality Management System).

**ii. “Useful Product from Dried Leaves of Mango Tree” by Prof. V. K. Rathod, ICT, Mumbai**



The

overall objective of the project is to develop a process technology to derive useful products from dried mango leaves. Mangiferin is an important chemical which can be extracted from dry leaves of mango tree by the process of extraction. The mangiferin so produced in the form of powder or solution has huge potential for its application in cosmetics such as fairness cream, anti aging cream, hair oil, etc. and as drug for anti diabetic and ant inflammatory applications. The project included development of a process for extraction of valuable product Mangiferin from dried mango tree leaves and to develop a simple and user friendly process for concentration and purification of product after extraction. The waste remaining after extraction of mangiferin can be further used as fuel in the form of briquettes. The process successfully developed includes extraction by screw conveyor, followed by adsorption by XAD4 non-ionic resin and desorption by precipitation technique.

## Potential Market



## Products present in global market



To demonstrate the technology, a plant of processing capacity of 100 kg of dry leaves per day at the total cost of Rs. 1.2 Crore is being setup at Kudal. The plant will produce 500 lit./day of extracted mangiferin (1 % concentration) which would need ten times dilution for actual use. It should be also possible that the plant could also be used for processing of Jamun leaves. The efforts are being made to utilize the solid waste generated after extraction process as fuel in the form of briquettes.

### iii. “Pilot scale production of value added products from surimi” by Prof. A. S. Balange, Dr. Balasaheb Sawant Konkani Krishi Vidyapeeth, Dapoli, District Ratnagiri

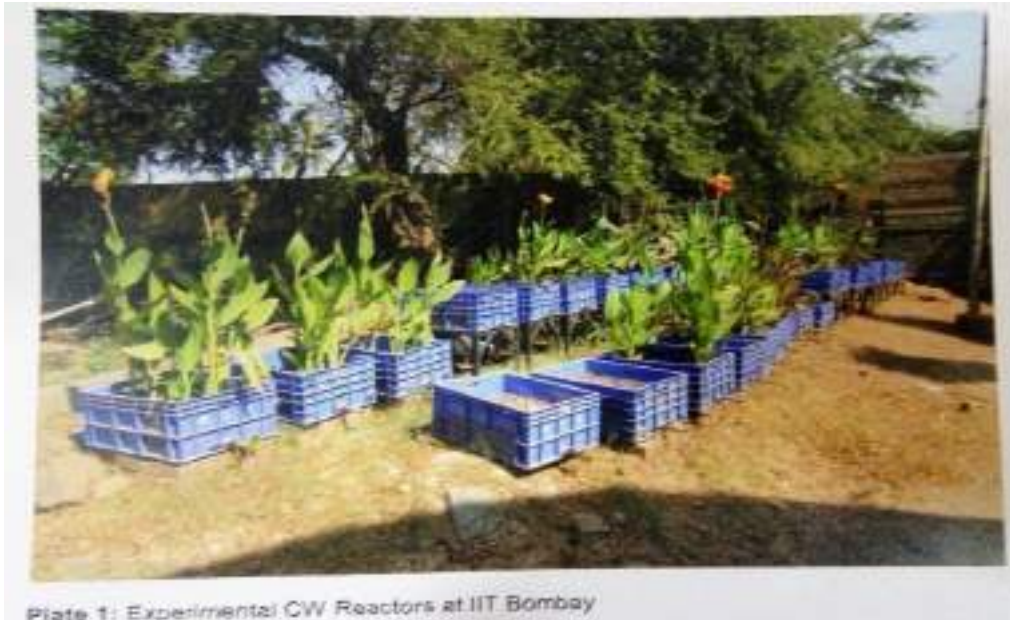
A need for the conservation of fish, an important rich source of easily digestible protein and an important food item for the coastal and other population, has been recognised in order to prevent post harvest fishery losses. Recovery of flesh by mechanical deboning and development of value added products are probably the most promising approaches. These include surimi and surimi based products. Surimi is a washed fish mince and is used as a base material for making different types of value added products like fish cutlet, fish sev, fish vada, etc. The present project was aimed at developing different value added fish products, training the people in manufacturing surimi manually and preparation of these different value added products, and conducting acceptability trials for the feedback from consumer for further improvements if any. With the use of simple table top equipment such as leaching tank, breaching machine, deep fryer and refiner the surimi preparation and value added food products were developed with acceptable taste. A series of training programmes were then conducted for fisher folks from Mumbai, Navi Mumbai, Thane, Palghar, Panvel, Raigad, Ratnagiri and sindhudurgh in which altogether more than 650 participants were trained. Among these, nearly 600 were women.

Three groups one each from Varsova, Cuff Parade Koliwada and Vasai in and around Mumbai have started their own business and four more groups have launched their products with their own brand names in local market in Mumbai.



**iv. “Catalyzing Rural Development and Women Empowerment through Implementing Eco-centric Technology Aimed at Gainful Recycling of Treated Sewages”**  
by Prof. S. R. Asolekar, Indian Institute of Technology, IIT Powai, Mumbai.

Maharashtra government is planning to prepare “Eco-Plans” of some of the villages on pilot basis. Eco plans have to be developed so that ecological and environmental concerns are incorporated in an integral manner with the respective development plan of that locality. In this project, the proposed eco centric technology is aimed at gainful processing and utilisation of treated sewage water. Use of special designs of constructed wetlands (WC) are extensively used for treatment of waste waters from various sources in gainful manner, such as production of kitchen gas, harvesting of fodder for cattle, production of high quality water in dairy industry, etc. The project was successfully executed to arrive at optimum design of CW reactor based on lab scale studies and numerical modelling. The detailed studies have already been completed to establish kinetics of CW reactors and their treatment efficiencies with three different media viz., stone aggregates, broken bricks and crushed concrete. The effect of vegetation on treatment efficiency was also studied using two species of *Canna indica var. flava* (Indica F). This was followed by the demonstration of the technology within IIT Bombay campus to use sewage water from within the campus.



Preparations for commencing the construction of first test bed are now on at Mhaswad. Based on the experience gained from this test bed, detailed engineering design, cost estimation etc will be worked out. Since the present test bed at Mhaswad is likely to cater to only about 33% of the waste water treatment, plans are on to explore the possibilities to scale up the same to meet full requirement of Mhaswad by identifying suitable finance partner. This would help to have a model town which can be brought on the map to have implemented fully the CW technology of IIT Bombay.



Chain Link Fencing



Plantation in the CW Beds



Plantation in the CW Beds



Plantation in the CW Beds



Plantation in the CW Beds



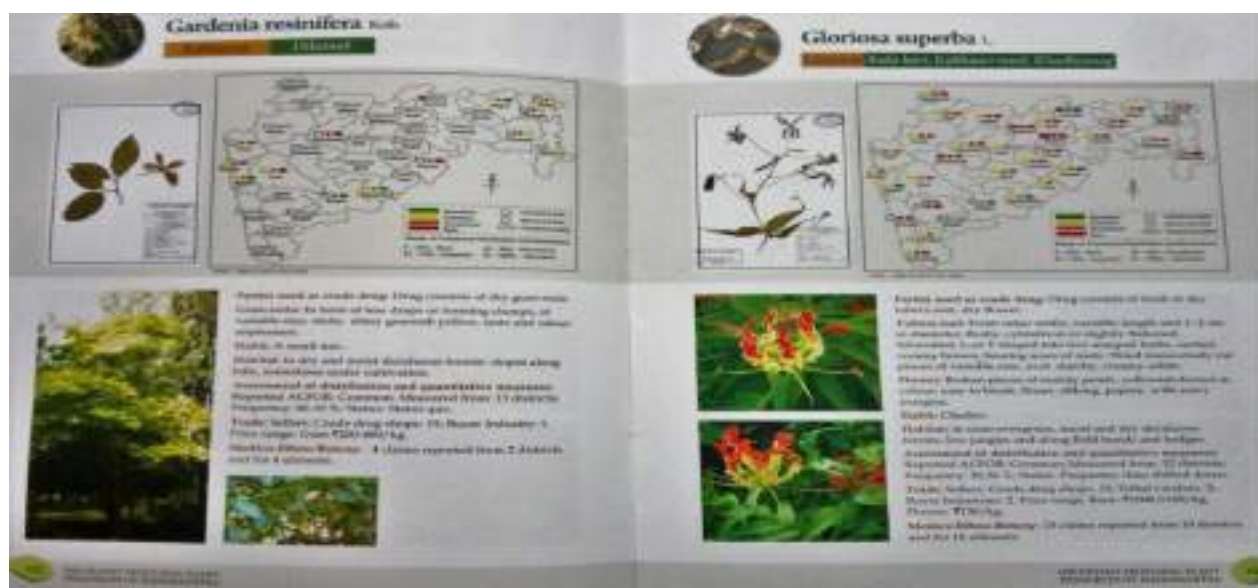
Session on Leadership Development

**v. “Development of Data base on Important Medicinal Plants Resources of Maharashtra” by Dr Anuradha Upadhye, Agharkar Research Institute, Pune**

The medicinal plants in India having vast diversity in its medicinal plants resources has been dwindling very fast due to rapid depleting habitats and their over exploitation. The project executed by Agharkar Research Institute in Pune was aimed at creating credible data base on medicinal plants in the State of Maharashtra. Under the guidance of expert team and in collaboration with 14 investigators from well spread over academic institutes in Maharashtra, a digital data base of medicinal plants has been successfully created. It considered a) quantitative assessment of occurrence of commercially high valued species through field studies, b) documentation of use values of species with reference to commercial collections and local usages and c) development of database giving information on both the above aspects. A total of 400 medically important resources have been inventoried. Of these, 157 commercially high valued species were actually mapped using standard methods by random selection of 1710 locations belonging to 290 talukas of 34 districts of Maharashtra. Efforts were also made to collect information on quantitative assessment of demand and supply of these resources. Trade data on 104 species with reference to market availability, price range and industrial demands has also been documented. These studies will provide a model for other states to conduct similar studies in their respective states.

The digital data base was launched on the Institute’s web site and the well documented book was also released on Feb. 02, 2018 through the hands of Shri Devendra Fadnavis, the honourable Chief Minister of Maharashtra. The data base can be accessed on the Institute’s web site.

A sample template of the data base is depicted below.



**6. Has the council developed any specific state related S&T and innovation policy? If so the details to be provided.**

Commission Act gives broad guidelines and directions for the S&T activities. No separate State level policy has been developed related to Science and Technology or Innovation. However, following two documents prepared earlier are being adopted by the Commission.

- i) Technology Commercialization Policy
- ii) Policy for release of database on Medicinal Plant Resources of Maharashtra

**7. How strong are the links between other state government /departments? If so provide details.**

Profiles of technologies/information generated under the projects are made available on the Commission's web site and are also being made available to State Govt Departments to facilitate Technology Transfer and wider use.

**8. How strong are the links of the council with local industry units/associations?**

For transfer of technologies developed under RGSTC sponsored projects, technology Transfer cell has been set up at Mahratta Chamber of Commerce, Industries and Agriculture, Pune.

For the scheme "RGSTC -TIFAC- MSME Internship Programme" linkages have been established during the last three years with the local industrial associations around Nagpur and Sangli, as a result of execution of technology development related projects by the academic institutes for the neighbouring industries.

Under the BETIC programme, the one to one contact between the developer and the industry partners is strengthened for taking up manufacturing the innovative medical devices which have gone through pre-clinical trials

**9. List 5 major technology areas, where the council can play an important role by finding convergent technological solutions.**

- 9.1 Biomedical Equipment.
- 9.2 Environment
- 9.3 Food Processing.
- 9.4 Fishery and Fish Processing.
- 9.5 Renewable Energy Systems.
- 9.6 Medicinal Plants and NTFP.
- 9.7 Agriculture

**10. Proposed budget outlay for the 2018-19**

**Plan:** 30.00 Crore

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## 1. Details of State S&T Council

### Member Secretary

Name T. Pamei, IAS

Address Manipur Science & Technology Council, Science & Technology Complex, Takyelpat, Imphal – 795001

Email mastec@nic.in

Phone 0385-2443451

Fax 0385-2460037

### Director

Name Th. Surendranath Singh

Address Manipur Science & Technology Council, Science & Technology Complex, Takyelpat, Imphal – 795001

Email mastec@nic.in

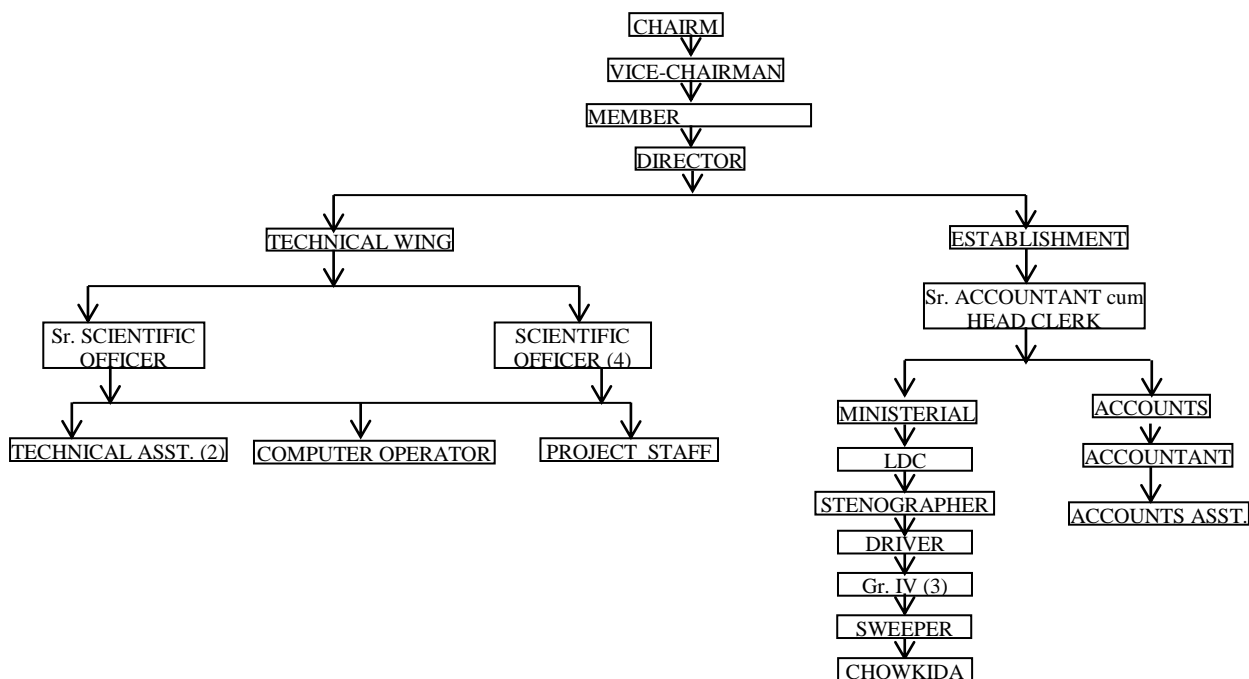
Phone 0385-2443451

Fax 0385-2460037

## 2. Structure of the Council:

a. **Date of Establishment:** Established in the year 1985 and registered as an autonomous organisation on 31/01/1996

### b. Organization Structure



### c. Strength of approved manpower [both central (DST) and state supported]

CENTRE SUPPORTED				
S. N.	Name	Present Designation	Pay Scale and Grade pay	Approximate monthly emoluments for 2017-18
1	Th. Surendranath Singh	Director	15600-39100 + GP-	Rs. 1,09,311/-



			7600	
2	Dr. L. Dinachandra Singh	Sr. Scientific Officer	9300-34800 + GP-5400	Rs. 73,816/-
3	Dr. L. Minaketan Singh	Scientific Officer	9300-34800 + GP-4400	Rs. 65,420/-
4	Dr. Kh. Rakesh	Scientific Officer	9300-34800 + GP-4400	Rs. 65,420/-
5	Ch. Sarat Singh	Scientific Officer	9300-34800 + GP-4400	Rs. 55,521/-
6	Dr. R.K. Pritamjit Singh	Scientific Officer	9300-34800 + GP-4400	Rs. 52,087/-
7	Dr. Ch. Shivaji	Computer Operator	9300-34800 + GP-4200	Rs. 53,362/-
8	H. Binodini Devi	Technical Assistant	5200-20200 + GP-2800	Rs. 44,418/-
9	Y. Shyamsunder Singh	Technical Assistant	5200-20200 + GP-2800	Rs. 44,534/-
10	K. Nara Singh	Sr. Accountant/ Head Clerk	9300-34800 + GP-4200	Rs. 42,035/-
11	A. Tombi Devi	Stenographer Gr-I	9300-34800 + GP-4200	Rs. 45,354/-
12	R.K. Bhanisana Devi	Accountant	5200-20200 + GP-2400	Rs. 34,775/-
13	H. Thangthianmang	L.D.C.	5200-20200 + GP-1900	Rs. 28,860/-
14	L. Ronel Singh	Accounts Assistant	5200-20200 + GP-1900	Rs. 26,508/-
15	L. Boyai Singh	Driver	5200-20200 + GP-2400	Rs. 32,013/-
16	L. Open Singh	Peon	4440-7440 + GP-1400	Rs. 22,888/-
17	S. Debendra Singh	Peon	4440-7440 + GP-1400	Rs. 22,828/-
18	Jamkhanmuan	Peon	4440-7440 + GP-1400	Rs. 21,920/-
19	Kh. Leidou Maring	Sweeper	4440-7440 + GP-1400	Rs. 22,828/-
20	Chingthanching	Chowkidar	4440-7440 + GP-1400	Rs. 22,405/-
<b>STATE SUPPORTED</b>				
1	T. Pamei	Member Secretary	IAS Scale	
2	L. Nilkumar Singh	Fishery Officer	9300-34800 + GP-4300	Rs. 13,600/-
3	Sapam Sanjoy Singh	Attendant	4440-7440 + GP-1300	Rs. 5,740/-
4	Haobam Sanjoy Singh	Attendant	4440-7440 + GP-1300	Rs. 5,740/-
5	T. Siampu	Attendant	4440-7440 + GP-1300	Rs. 5,740/-

**3. Budget released to your state S&T Council for last five financial years including Central Government, State Government & any other sources.**

Year	Centre	State	Others	Total
2013-14	89.50	5.00	175.00	269.50
2014-15	98.45	5.00	165.00	268.45
2015-16	99.45	12.65	180.00	292.10
2016-17	147.34	6.63	195.00	348.97
2017-18	114.14	10.00	185.00	309.14

**4. Key activities undertaken, during the last two years, in the area of:-**

**4.1. Technology Development:**

- i) Improved Mridanga (Meitei Pung)
- ii) Charcoal based Smokeless Fish Dryer

**4.2. Technology Demonstration:**

i) BARC-DAE Technologies

- Banana Tissue Culture Facility
- Soil Organic Carbon Detection Kit
- Foldable Solar Dryer
- Vibro Thermal Disinfector
- On-line Domestic Water Purifier based on Ultrafiltration Polysulfone Membrane
- Fluoride Detection Kit for Ground Water

ii) BARC-UF Water Filtration

**4.3. Popularization of Science**

- Observation of World Intellectual Property Day
- Observation of National Science Day
- Science Meet
- Vigyan Prasar Edusat Programme
- Millennium Science Lecture
- Observation of National Mathematics Day
- Aquarium Exhibition
- Technology based entrepreneurship development programme
- Summer Training on Basic Sciences at Bose Institute, Darjeeling
- Two Contact Programmes for talented school students (boys & girls)
- Science Communicator Award
- Sci-Connect programme
- ISRO outreach programme on RS, GNNS & GIS
- Hands on Science for school teachers of hill districts
- Indian Science Congress

- India International Science Expo
- Training Programme on Sustainable Aqua-culture
- Training Programme on Quality Fish Seed Production
- One day sensitisation workshop on IPR
- Teachers' Exposure Training for Olympiad at Homi Bhabha, Mumbai

#### **4.4. Patents (Facilitated by Patent Information Centre)**

- A percussion instrument (Meitei Pung) – Patent No. 201731028511 Trade Mark Registered
- Ching – Choom : Trade Mark No. 3547726 on 12/05/2017
- Mapu Ahum Hair Oil : Trade Mark No. 3567569 on 09/06/2017
- Kanglei Eshing : Trade Mark No. 3097086 on 09/11/2017

#### **Design Registration**

- Biomass grinder – Registration No. 300090 of 06/12/2017
- Multiple Fuel household cook stove – Registration No. 301374 of 17/01/2018
- Hydrolic briquete moulder – Registration No. 301872 of 31/01/2018

#### **Opening of IPR Cell**

This year 2017-18, PIC Manipur has established two more IPR Cells – one at National Institute of Electronics & Information Technology, Imphal and another one at Jawaharlal Nehru Institute of Medical Sciences, Imphal

#### **4.5. Any new innovative activities**

- Dr. Ibeyaima Innovation Award
- State Science Communicator Award

### **5. List 5 success stories with brief about 1 page each including photograph, if available.**

#### **i.) Encyclopedia of Medicinal Plants in Manipur, a web-based data of medicinal plants of Manipur - <http://medicinalplants.co.in>**

The North Eastern States of India are very rich in Bio-resources. The Indo-Burma border is considered as one of the bio-diversity hot spot. Apart from the Indo-Burma bio-diversity hot spot all the hills surrounding the valley area of Manipur are very good source of Medicinal plants. But due to lack of management of record of the identified medicinal plants and survey of the resources available the medicinal plants are growing without any use. If the medicinal plants are recorded in a database, it can be very useful for research Scientists not only in the State but also in the Country. At present the Ayurvedic/Homeopathic Doctors are also producing good valued medicines out of herbs and plants. The database will certainly be helpful to the researchers for bringing out many important drugs which can cure various ailments.

There are hundreds of medicinal plants available in the forests of Manipur which need to be explored and well documented for the reason that deforestation is taking very fast threatening to a number of rare species which in turn become extinct. The State is inhabited by 29 ethnic groups of people. The plant resources of Manipur are depleting fast. The most serious biotic factor to influence the vegetation is the man himself. The most harmful are the practices of shifting cultivation commonly called Jhumming, felling of trees for timber and fuel-wood and for the preparation of land for terrace cultivation or agro-horticultural practices, particularly for which the hill-slopes are depleted of the natural vegetation. It is necessary to document all the information related to resources through scientific investigations for a detailed database

information system of medicinal plants and their uses. The herbal medicines are vital and usually administered in several ways, depending on the type of the plant and nature of ailments. It is worth mentioned that healthy condition of the average people shows a strict co-relation between medicinal plants and food habit. People in the remote villages used to prefer herbal medicines prescribed by the village traditional physicians to the modern therapeutic treatment. Manipur has its own identity which is completely ethnic in character and culture. The village traditional physicians(Maiba - Maibi ) can also read the pulse and diagnose the causes of various diseases and treatment has been done using the traditional applications of herbal medicines.

MASTEC has implemented a project and under this project a database of 400 medicinal plants found in Manipur have been compiled. The information are available on the web <http://medicinalplants.co.in> for the general public.

## ii. A percussion instrument (Meitei Pung)

Patent No. : 201731028511 dated 10/08/2017

Inventor : Thingujam Surendranath Singh  
Director, MASTEC

Co-Inventor : Chanam Sarat Singh  
Scientific Officer (Engg), MASTEC

- The improved Manipuri Mridanga consists of a mridanga body fabricated using Bamboo Reinforced Polymer.
- The shape, size and other material remains the same as the traditional Mridanga.
- The Improved Manipuri Mridanga is un-breakable/strong enough.
- It is environment friendly.
- It takes few hours to fabricate the body of Mridanga.
- It does not require seasoning for strength and termite attack.
- Whereas the traditional Mridanga consists of a wooden body made of some specific big trees such as Mango tree, Jack Fruit tree and *Wang Tree* etc.
- These special trees are either very rarely available or available in small sizes (dwarf varieties) and takes many years to mature.
- For making number of Mridangas to meet the increasing demand we have to cut down trees which is against Environmental Pollution.
- The wooden Mridangas are easily breakable and difficult to repair.
- It takes long time in seasoning the wooden body for gain of strength.



Traditional wooden Mridanga Body



Cross sectional view of the Bamboo-reinforced Polymer Mridanga Body



Science Meet 2017



A percussion instrument (Meitei Pung)



Aquarium Exhibition



India International Science Expo 2017



Hands on activities by participants



Technology based EDP



Products of Technology based EDP programme



Distribution of Fish feed during Training Programme on Sustainable Aqua-culture



Opening of IPR Cell



Science Meet 2017



National Mathematics Day Celebration 2017



National Mathematics Day Celebration



Opening of BARC-DAE Technologies



Opening of BARC-DAE Technologies



BARC-DAE Technologies



Sci-Connect Phase I



Contact Programmes for talented school students (Girls)



Contact Programmes for talented school students



Contact Programmes for talented school students (Boys)



Sci-Connect Phase I



105th Indian Science Congress



One Day Workshop on IPR

**6. Has the council developed any specific state related S&T and innovation policy? If so the details to be provided.**

No

**7. How strong are the links between other state government/departments? If so provide details.**

Strong linkages with R&D/academic Institutions including Universities, Departments – IT, Industries, Education, Public Health Engineering, Health Services, Power, Fisheries etc.

**8. How strong are the links of the council with local industry units/associations?**

- a. All Manipur Entrepreneurs Associations (AMEA)
- b. Association of Food Scientists & Technologists (India), Manipur Chapter

9. **List 5 major technology areas, where the council can play an important role by finding convergent technological solutions.**

- a. Improvement of the traditional technologies of Manipur
- b. Community pond based drinking water through BARC Technologies
- c. Fishery : Conservation of locally available ornamental fishes of Manipur
- d. Medicinal Plants
- e. Banana & Pineapple Tissue Culture of large scale propagation

10. **Proposed budget outlay for the 2018-19**

Sl. No.	Head	Amount (in Rs)
1.	Salaries	110,92,379/-
2.	EPF (Employer's Share)	4,65,576/-
3.	TA/DA	5,00,000/-
4.	Office Expenses	10,00,000/-
5.	Website maintenance /updatation	1,00,000/-
6.	Computer, printer, equipments etc.	1,00,000/-
7.	<b>Total</b>	<b>1,32,57,955/-</b>
8.		<b>Say 132.58 Lakh</b>

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# Meghalaya

## 1. Details of State S&T Council

### Member Secretary

Name Shri C.V. Darlong Diengdoh , IAS  
Address State Council of Science, Technology & Environment (SCSTE), Meghalaya.  
C/O Meghalaya State Housing Financing Cooperative Society Ltd. Building, Nongrim Hills,  
Behind Bethany Hospital, Shillong-793003,  
Email M, stcouncilmegh@yahoo.com & [stcouncilmegh@gmail.com](mailto:stcouncilmegh@gmail.com),

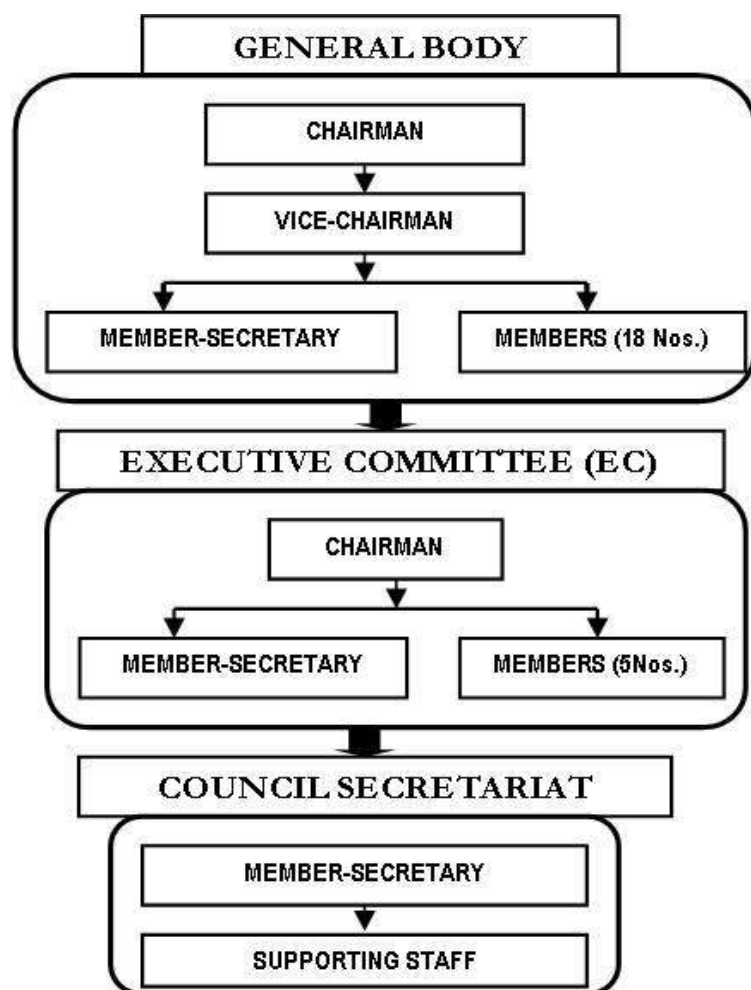
### Officer on Special Duty (OSD)

Name Shri. A.S. Suting  
Address State Council of Science, Technology & Environment (SCSTE), Meghalaya  
Phone/Fax (0364) 2522077 (0) 9436957771 (M) 9436117434, (0364) 2522077 (Fax)

## 2. Structure of the Council:

a.) **Date of Establishment** : Constituted by the Govt. of Meghalaya on 30th January, 1995 and registered under Meghalaya Society Registration Act 1983 on 15th July, 1997.

b.) **Organization Structure** :



c.) **Strength of approved manpower [both central (DST) and state supported]**

Sl. No.	Name	Designation	Pay scale (Consolidated Pay)	Approximate monthly emoluments (HRA+Mobile Allowance etc.)
<b>A. DST Supported Staff :</b>				
1.	Smti.V.L.Lyngdoh	Assistant Project Coordinator (Technical )	`26,649/-	`34,503/-
2.	Shri.W.O.Kharlukhi	Administrative Cum Accounts Officer (Non-Technical)	`26,649/-	`34,503/-
3.	Smti.R.Khongsar	Assistant Programme Officer (Technical )	`26,649/-	`34,503/-
4.	Shri.S.Wanniang	Project Technical Assistant (Technical )	`15,687/-	`19,778/-
5.	Shri.G.Sawkmie	Field Attendant (Technical )	`13,419/-	`17,353/-
6.	Shri.N.Sohlang	Field Worker (Technical )	`13,419/-	`17,353/-
<b>Total</b>			<b>`1,22,472/-</b>	<b>`1,57,993/-</b>
<b>B. State Supported Staff:</b>				
7.	Shri P. Rynjah	Stenographer Gr. III	`20,034/-	` 25,128/-
8.	Smti. S. Syiemlieh	Data Entry Operator	` 20,034/-	` 25,128/-
9.	Shri E. Shullai	Lower Division Asst.	`18,711/-	` 23,713/-
10.	Smti.R.Mawlong	Lower Division Asst.	`18,711/-	` 23,713/-
11.	Shri.D.Thangkhiew	Project Technical Assistant	`15,687/-	` 19,778/-
12.	Shri M.Marbaniang	Driver	`14,553/-	` 18,566/-
13.	Shri R. Chetri	Office Peon	`12,285/-	` 16,140/-
14.	Smt. W. Khyriem	Office Peon	`12,285/-	` 16,140/-
<b>Total</b>			<b>`1,32,300/-</b>	<b>` 1,68,306/-</b>
15.	Smt.Iva Syiemlieh	Cleaner (Daily wages)	` 207 per day	` 6,943/- (lumpsum)
16.	Shri Vinoy Hajong	Driver (Daily wages)	` 500 per day	` 15,500/- (lumpsum)
17.	Security (Outsource) (Lumpsum)			` 15,000/- (lumpsum)
<b>Total</b>				<b>` 37,443/-</b>

**3. Budget released to your state S&T Council for last five financial years including Central Government, State Government & any other sources.**

Sl. No.	Year	Central Govt. (DST,GOI) (Rs. in lakh)	State Govt. (Rs. in lakh)	Other Sources (Rs. in lakh)
1.	2013-2014	20.77	284.49	--
2.	2014-2015	29.29	179.90	--
3.	2015-2016	35.76	99.70	15.00 (NEC)
4.	2016-2017	71.65	157.00	15.00 (MBDA) 0.50 (WIPRO) 0.80 (Vigyan Prasar)

5.	2017-2018	61.17	186.81	1291.77/- (MBDA) 0.65 (WIRPO) 14.23 (Vigyan Prasar) 13.00 (NIF Ghy.) 4.15 (Co-operative) 5.34 (G.B Pant Uttarakhand)
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#### 4. Key activities undertaken, during the last two years, in the area of:-

##### 4.1. Technology Development:

**Promotion of green technologies:** SCSTE, Meghalaya has taken the initiative to promote the use of green technologies in the state, especially for housing construction. Concentration has been made on the use of bamboo, which grows abundantly in the state and use of stabilized mud blocks, training of local masons, engineers and contractors on green technologies is under process. 20 personnel had been trained on bamboo treatment, joinery and stabilized mud block to build-up their skills and capabilities.

##### 4.2. Technology Demonstration:

**Awareness practical and hands-on training:** Technology as being one of the thrust areas, SCSTE, Meghalaya has propagated appropriate technologies for overall improvement especially in rural areas. Technology awareness, technology demonstration and technology hands-on training camps have been conducted on a regular basis, by which Technology Demonstration Units have come up in most villages and other areas in the state. Such demonstration units, are Low-cost sanitation, Improved chulla, Pedal pump, Rain water harvesting, water filtration, etc.

##### 4.3. Popularization of Science

In order to inculcate scientific temper amongst the public especially school students, activities under Popularisation of Science Programme had been carried out right at the grass-root level by organizing activities like Block and State-levels Science & Environmental Fairs, Science Awareness camps, Science Exposure trips, Celebration and observation of important scientific events, radio science serial, etc. During the last 1 (one) year, SCSTE, Meghalaya has felt the need to introduce other activities by concentrating particularly schoolchildren at the village level, in this aspect initiatives had been taken to encourage schools to form Eco-Clubs where they can take up Science and Technology activities by making use of the natural surroundings, which include nutritional gardens, trees and bonsai plantation and protecting of catchment areas in their own villages. Season watch Programme (SWP) is also in the initial phase to be taken up by schools in order to make them understand the behavior and changing patterns in plant and animal species due to climate change.

##### 4.4. Patents (Facilitated by Patent Information Centre)

In this regard, Scouting of grass root innovations have been done in the state, where a good number have been identified. The SCSTE is in the process of setting up the Patent Information Centre (PIC). A MoU with CIPs, Hyderabad has been signed. The objective of the agreement is to establish, maintain and enhance academic and intellectual interaction between SCSTE/MBDA, Meghalaya and CIPS through specific initiatives.

#### 4.5. Any new innovative activities

##### **Living Root Museum and School**

Based on the community dialogue a concept of 'Living root museum and school' was conceived wherein it was envisaged that a museum depicting the various stages of growth of living root bridges, the science behind identifying roots, soil texture, constituents, etc will be explained to the visitors. The school will teach the younger generation of Khasi, Jaintia and Garo people how to make these bridges and continue the tradition. The activities related to the museum and school will be undertaken in partnership with the communities so that they are empowered ultimately.

**5. List 5 success stories with brief about 1 page each including photograph, if available.**

#### **I. Action Research on Local Fabrication Of Hydraulic Ram Pump And Installation At Site.**

Hydraulic Ram Pump (HRP) is a water pump powered by hydropower that uses the power of falling water without the need of any external power. HRP's are mostly intended for water supply in hilly or mountainous areas, requiring small flow rates delivered to high heads. It functions as a hydraulic transformer that takes in water at one hydraulic head (pressure) and flow rate, and outputs water as a higher hydraulic head and lower flow rate. The devices utilize the water hammer effect to develop pressure that allows a portion of the input water that powers the pump to be lifted to a point higher than where the water originally started.



SCSTE, Meghalaya has propagated the HRP technology for its water supply programmes, but the S&T gaps has been identified since procurement of HRP machines were made from outside, and a technician has to brought from outside which involves costs, time and resources, hence it is felt necessary that an Action Research Programme to fabricate HRP be initiated and tested for installation and cost at the field level/local level using locally available materials.

After proper survey in the field, one site ideal for intervention was selected at Umsaitsning village, Ri Bhoi District to undertake the above Action Research. After the necessary site preparations were made, Materials (pipes, sockets, bolts, nipples, etc.) were assembled for HRP system, and the same installed at the selected site, after 2(two) phases of intervention, the pump finally came out with



a successful result, which the pump was able to deliver approximately 4320 LPD, the amount of water discharged has been projected to serve for around 14 households in a rural set up.

The above Action Research Programme will also continue in other villages of the districts of the State, taking into consideration that the villages require such S&T interventions.

#### **II. Treated Bamboo Technology**



Bamboo being a sustainable natural resource abundantly grown in Meghalaya is being used widely in the State. Meghalaya is rich in a varied kind of bamboo species, and bamboo groves occupy a good quarter of forest lands, different varieties of bamboo being used for a different kind of product. Cane and bamboo crafts occupy an important place in the economy of the State, next to agriculture, rural folks attend to cane and bamboo crafts during their free time, which thereby enhances their skills and creative ideas.

Seeing the impact that bamboo can play a role in promoting the livelihood of most of the rural people, SCSTE, Meghalaya has come up with the initiative to treat bamboo and used treated bamboo for varieties of products of ranging from bamboo handicrafts to bamboo articles required for daily use including decorative items, SCSTE, Meghalaya has for the past one year introduced the treated bamboo technology for:



**(a). Green Building Technologies:** A number of structure design green buildings have been prepared for construction in Technology Theme Parks to be set up in the State, bamboo trusses and bamboo slabs have also been incorporated in the roofing construction of a Zero Energy Cool Chamber, at West Khasi Hills District, bamboo panels have also been made for use as room partitions. The use of treated bamboo as an alternative housing construction is easy and locally available in many parts of the State, its user friendly to most of the rural and tribal population in the State.



**(b). Rural Outreach Programmes:** With the introduction of treated bamboo technology in the Rural Outreach Programmes of SCSTE, it has been observed that rural folks took active part and expressed their keen interests in the technology, trainings were imparted how to treat and use treated bamboo for making articles for day to day use of medium quality and suitable to local requirements, it has also been observed that through the trainings imparted, skills of the villagers are being more enhanced, since most of the rural folks are familiarized with bamboo works, most of them have taken to develop their skills on a business model, either by imparting training to others or making bamboo articles and marketing the same, which ultimately also improve livelihood activities in a rural set up.

**(c). Master Resource Person training on bamboo technology:** In-house capacity building for Master Trainers, which is a continuous process for a period of 1(one) year was conducted at different periods by experts on bamboo technologies. Out of the trainings conducted; treated bamboo and cane products like chairs, racks, artifacts, panels, etc. were made, based on the qualities of the products and demand in the market. SCSTE, Meghalaya has decided to promote bamboo technology on a business mode on a cost-sharing partnership between SCSTE and the group of individuals (trained manpower). Work orders have been received from individuals and institutes for bamboo products and training programmes on bamboo treatment.

### III. Technology on Wheels – Go Green

The objective of the above Programme is to take appropriate technologies to the rural masses at their doorsteps in a mobile.

**Gaps identified:** Villages from far flung areas cannot access the information required from the Block office (which is the only means of communication for a villager) due to certain reasons like considerable distances, a feeling of inferiority or uncomforness, or that they are too poor and cannot afford transportation fares, or that the training programmes conducted do not meet their requirement.



Hence in order that each villager is not deprived of the opportunity to access to appropriate technologies relevant to their needs, it is felt necessary that a mass outreach of appropriate technologies be taken to remote and far flung areas of the State (also taking into consideration the topographical terrain of the State) in a mobile form. In this regard 4 nos. of 4 wheelers vehicles were procured for the process, and given volunteers were identified to take up the task at the field level for:

- (i) Scouting the technology requirements
- (ii) Scouting the skills and interests of villagers
- (iii) Identifying appropriate technologies relevant to (i) and (ii) above.

Based on the above, training programmes have been conducted at different villages of the State on technologies related to (i) Housing, (ii) Energy, (iii) Water, (iv) Sanitation and (v) Value addition, these villages are Bolmoram, East Garo Hills, Sohkhylam, West Khasi Hills, Tongkiad, West Jaintia Hills, Sohlastrim, Ri Bhoi District, Wakso Asimgre, North Garo Hills and Cham Cham, East Jaintia Hills.



It is interesting to note that due to the success of this initiative, Development Institutes in the State have joined hands with **SCSTE**, Meghalaya for mass outreach to remote areas on a convergence mode, these are **Extension Training Centre (ETC)**, **State Institute of Rural Development (SIRD)** and **Meghalaya Basin Development Authority (MBDA)**. 'Skill Training on appropriate technologies' has been conducted in a convergence mode at 8 (eight) villages, these are; (i) Nongkasen, West Khasi Hills, (ii) Raitong, Ri Bhoi District, (iii) Mawroh, West Khasi Hills, (iv)

Patharkmah, Ri Bhoi District, (v) Ksehkohmoit, West Khasi Hills, (vi) Barigoan, Ri Bhoi District, (vii) Laitdiengsai, East Khasi Hills, and (viii) Dawagre, East Garo Hills.

From the evaluation reports, it has been seen that villagers expressed their interests on the appropriateness of the technologies for daily life improvement especially Stabilised Mud Block (SMB),



Improved Chulha, Low-cost Toilet, Rain Water Harvesting and Treated Bamboo, which they also replicated the same in their respective households.

#### IV. Action Research on Low Cost Hatchery.

Poultry rearing has always been the main occupation for rural people in the State, and associated with it is the hatching of eggs either by a natural process or by means of incubations.

Low cost hatching includes using of low-cost means of incubation with minimal expenditures, and locally available skills and manpower, SCSTE, Meghalaya had introduced Solar Incubation for hatching of eggs on an action research basis. The process takes 19-21 days depending on climatic conditions of the place. Nongkasen village has been selected as an agro-climatic

region for a Solar Incubation hatching, i.e, using solar power for running the incubator, the idea of using solar energy is to encourage chicken farming and rearing in rural areas especially also with an objective to import training, counseling for rural people for promoting entrepreneurial activities.



Solar Incubator of 300 eggs capacity was installed at the above selected site, and observed between 19-21 days for hatching, which there was no result i.e, hatching does not take place within the scheduled time period, after another 7 days of observation, it was found that hatching of eggs has taken place, though late by 7 days. Also depending on the climatic condition of the area being heavy rain, cloudy and foggy, it may be summed up that the solar incubator

hatching has a positive result.

With the success of the above, SCSTE has come up with more ideas to try alternative techniques like using of kerosene/generator backup etc. in order that poultry rearers are more aware of other alternatives for hatching as well.

Low-cost hatching using solar incubator has been projected to:

- Produce eggs in large numbers
- Encourage farmers and poultry rearers
- Enhance their skills on managing these types of hatcheries
- Promote livelihood.



#### V. Season Watch Programme.

Meghalaya, a land rich in flora and fauna has also been adversely affected by global warming, leading to climate changes and leading to impacting the behavior of nature. To mitigate the impact of global warming and in order to make people aware of the micro changes leading to climate change, SCSTE, Meghalaya had implemented this nationwide programme (National Centre for Biological Sciences, Bangalore) by involving school students across the State. There are about 22 Schools in the State taking part in the above programme.



It also needs to be mentioned that the State has launched its own portal, “Season Watch Meghalaya Chapter” by the then Hon’ble Chief Minister Dr. Mukul M. Sangma, during the World Environment Day, 2017.

School students evaluating the macro changes in nature by observing changes taking place in trees within the vicinity of their school compounds or within their own respective villages, school students were also involved in the process to monitor flowering, fruiting and leafing patterns of plant species and the insects visiting the trees and to evaluate the changes thereon where information on phenological changes in true species were observed, students observed local trees like plums, peas, oranges, gulmohars, himalayan cherries, peaches, guavas, cherry blossoms, Indian gooseberries.



Most of the schools taking part in the Programme are from rural areas. In an interview with these schools, it has been found that most of them expressed that SWP is very important as they noticed that most of the fruit trees growing in their areas are less in fruit productions now as compared to earlier days of their childhood.

Some have also observed that gulmohar trees which bloom beautifully every year but observed changes that flowering pattern has greatly reduced.

A student from Anderson Higher Secondary School, Nongstoin has observed changes like leaf flushing fruiting in the Himalaya cherry tree which he has adopted for the last 1(one) year, and is planning to adopt more trees in the

years to come.

SWP as a whole not only does it creates interests in students to their link with nature, but as expressed by teachers of some of the schools, that their students have developed a keenness for science, which they are more observant in nature rather than spectators.

The enthusiasm of the students in the programme has helped them to become more oriented to nature and share their observations with others, they also learn the cycle of micro life associated with each tree they adopted for observation to add more to it, it creates in them the spirit of enquiry which ultimately developed in them the thinking power. With the active participation by students in SWP, SCSTE, hopes that more individuals will join hands in this nationwide programme in regenerating nature.



**6. Has the council developed any specific state related S&T and innovation policy? If so the details to be provided.**

The State Innovation Council was notified on the 2<sup>nd</sup> September, 2011 with the Project Director, S&T Cell, Planning Deptt. as the Member Secretary of the State Innovation Council. On the 25<sup>th</sup> November, 2011 SCSTE, Meghalaya has been declared as implementing agency for District Innovation Fund. Preparation of a Roadmap on Innovation for the State was accorded to the Consultant Firm, Innoversant Solution Ltd., Bangalore for which the Final Report is yet to be submitted.

The Council has been working with CIPs, Hyderabad and NIF-Guwahati for promoting innovative culture for transformation of ideas into sustainable innovations. Scouting of innovators and innovations across the State had been carried out which culminated into a



Regional Innovators Conclave at the State-level and where in 2 nos. had been identified at the state level by NIF to be classified as innovation.

**7. How strong are the links between other state government /departments? If so provide details.**

The Council has been able to converge with the different State, Central Governmental and Non-Governmental Agencies/Organisations in different fields for its S&T programmes implementation. The following are some of the agencies/organizations:

1. SOIL & WATER CONSERVATION DEPTT.- Science popularization programmes, Hydraulic Ram Pump Technology, Improved chulhas, Low Cost Oven, Biomass Drier and other related technologies.
2. STATE INSTITUTE OF RURAL DEVELOPMENT – Appropriate Technology Programme
3. EDUCATION & LITERACY- Distribution of reading materials in S&T in hard & soft copies, award for meritorious students in S&T, Formation of Eco-clubs in schools, NCSC, Season Watch Programme and Fun –Sci programme, GIS Training for students.
4. HEALTH SERVICES – Ceramic Membrane technology for Iron Removal Plant and Posthumous body organ donation programme.
5. MEGHALAYA INSTITUTE OF ENTREPRENEURSHIP- S&T Oriented Entrepreneurship Development Programmes & Appropriate Technology Programme.
6. MEGHALAYA BASIN DEVELOPMENT AUTHORITY – Introduction of Appropriate Technology Programme, Science Popularization Programme, Programme on Innovation, GIS.
7. OFFICE OF THE DEPUTY COMMISSIONERS AND DISTRICT PLANNING OFFICES- District level Science Popularization Programmes other related technology programmes.
8. OFFICE OF THE BLOCK DEVELOPMENT OFFICERS- Block level Science & Environmental Fairs and Block level Technology Initiation Programme and Village Adoption for S&T units (VASTU) programme.
9. MEGHALAYA NEW AND RENEWABLE DEVELOPMENT AGENCY, GOVT. OF MEGHALAYA- Renewable Energy
10. MEGHALAYA INSTITUTE OF NATURAL RESOURCES MANAGEMENT, SHILLONG - Science Popularisation Programme
11. BIO-RESOURCE DEVELOPMENT CENTRE, UPP. SHILLONG - Science Popularisation Programme
12. Shillong Science Centre, NEHU Campus- Science popularisation activities.
13. INFORMATION TECHNOLOGY DEPTT. – GIS applications
14. DIRECTORATE OF MINERAL RESOURCES- Science Awareness Camps
15. FOREST DEPARTMENT- Science Popularisation Programme and Improved Chulha programme.
16. MEGHALAYA STATE SKILLS DEVELOPMENT SOCIETY- Capacity building using appropriate green technologies.
17. State Rural Employment Society – GIS Training for VECs and Preparation of the Training module
18. Directorate of Tourism – Mapping of historical circuit in the State
19. Cooperation Department – Mapping and profiling of cooperative societies in the State
20. NIC, Meghalaya – Internet related matters, GIS Lab.,

**8. How strong are the links of the council with local industry units/associations?**

1. NORTH EASTERN HILL UNIVERSITY- Science popularization programmes and GIS activities

2. MARTIN LUTHER CHRISTIAN UNIVERSITY- Technology related activities.
3. NSS UNITS OF NEHU AND COLLEGES - Technology related activities & Science popularization programmes.
4. MEGHLAYA SCIENCE SOCIETY - Science popularization programmes.
5. NORTH EAST EDUCATIONAL DEVELOPMENT SOCIETY - Science popularization programmes.
6. NORTH EASTERN REGION COMMUNITY RESOURCE MANAGEMENT PROJECT FOR UPLAND AREAS – Technology Oriented Entrepreneurship Development Activities and Technology Popularisation activities.
7. SHILLONG COLLEGE ACADEMIC SOCIETY – Science popularization activities.
8. EDUCATIONAL INSTITUTIONS - Science popularization and Technology related activities.
9. LOCAL DURBARS/ NGO's / SHG's/ YOUTH ORGANISATIONS ETC - Science popularization and Technology related activities.
10. CENTRE FOR SCIENCE EDUCATION, NEHU - Science Popularisation Programme
11. NATIONAL INFORMATICS CENTRE, SHILLONG – Website design
12. GIZ, INDIA- Environmental popularization and Renewable Energy
13. INDIAN COUNCIL OF AGRICULTURAL RESEARCH, UMIAM- Popularisation of Agriculture Techniques for students.
14. NORTH EASTERN COUNCIL, SHILLONG – Financial Support
15. NORTH EAST SPACE APPLICATION CENTRE – GIS and Remote Sensing activities
16. BOTANICAL SURVEY OF INDIA – Providing technical inputs on local plants biodiversities
17. GEOLOGICAL SURVEY OF INDIA – Inputs on identification on geological formation
18. ZOOLOGICAL SURVEY OF INDIA – Providing technical inputs on local animals biodiversities
19. National Centre for Biological Studies, Bangalore- Season Watch Programme
20. GRAMAVIDYA , Bangalore – Design of stabilized mud block housing.
21. TREE FOUNDATION, ASSAM- Fun-Sci Programme
22. HP NET- Micro Hydro Power Intervention
23. Vigyan Prasar, New Delhi- Radio Science Serial and Sci-connect
24. WIPRO – Earthian programme
25. TATA TRUST, MUMBAI- Native skills promotion and marketing.
26. ASIAN CONFLUENCE- Action research on Mapping of Historical monuments of Jaintia Hills
27. INDIA METEOROLOGICAL DEPARTMENT & GEO-MAGNETIC RESEARCH CENTRE – Weather & Climate
28. International Institute of Waste Management, Bangalore -for feasibility study on waste management
29. Khmih Creative Society, Nongstoin -for native skill project
30. Nature Club India – for Hydroponics and Nature Camp
31. National Innovation Foundation, Guwahati
32. Institute of Livelihood and Research Training , Bhopal – Fog Technology
33. CIPS Hyderabad for Innovation and Patenting.

**9. List 5 major technology areas, where the council can play an important role by finding convergent technological solutions.**

1. Documentation, Popularisation of Innovations.
2. Green Technologies – Action Research, demonstration, development at community.

3. Information technology-GIS, Community Radio
4. Skilling in Non-farm Sector (handicraft, weaving, handloom & natural dyes) and Farm Sector.
5. Setting up of Knowledge Park cum Technology Demonstration Centre.

**10. Proposed budget outlay for the 2018-19**

Sl. No.	Budget Proposed	Amount (Rs.)
1.	State Plan	1170.00
2.	DST,GOI	56.40
<b>Grant Total</b>		<b>1226.40</b>

**1. PROPOSALS SUBMITTED TO STATE GOVERNMENT FOR APPROVAL:**

Sl.No	PARTICULARS	PROPOSED BUDGET OUTLAY (Rs. In lakh)
1	Popularisation of Science Programme	110.00
2	Scientific Research Development of Appropriate Technologies (SRDAT)	125.00
3	Sponsored Project Programme	15.00
4	Specific Project Programme	15.00
5	Science & Technology oriented Entrepreneurship Development Programme	15.00
6	Science & Technology Library & Documentation Programme	10.00
7	Remote Sensing Application Programme	20.00
8	Assistance to State Science & Technology Council	110.40
9	Capacity building on Alternative Construction Technologies (under EAP)	200.00
10	Innovation (under Innovation)	50.00
11	Science & Technology Entrepreneurship Programme ( under CSS)	500.00
	<b>Total</b>	<b>1170.40</b>

**2. PROPOSALS SUBMITTED TO DST, GOVERNMENT OF INDIA UNDER ASSISTANCE TO SCIENCE & TECHNOLOGY COUNCILS.**

<b>(i) RECURRING EXPENDITURE</b>		
Sl. No.	PARTICULARS	PROPOSED BUDGET OUTLAY (Rs in lakh)
1	Manpower	19.00
2	O.P.E Resource person on call(Rs.40,000 x 3 nos. x 6 months)	7.20

3	O.P.E Intern/Volunteers (Rs.10,000 x 6 nos. x 12 months)	7.20
3	TA/DA	10.00
4	Other Items (Office expenses, House Rent, Electricity, Telephone/Internet, Imprest Money, Repairing & maintenance of vehicles, stationeries, POL, etc)	9.00
<b>Sub-Total</b>		<b>52.40</b>
<b>(ii) NON- RECURRING EXPENDITURE</b>		
1	Office Equipments (portable LCD Projector 4 sets, White Board 4 sets, Generator 4 sets & Scooty 1 no.)	4.00
<b>Grand Total =(i) + (ii) = Rs.52.40 + Rs.4.00</b>		<b>Rs.56.40</b>

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## Mizoram

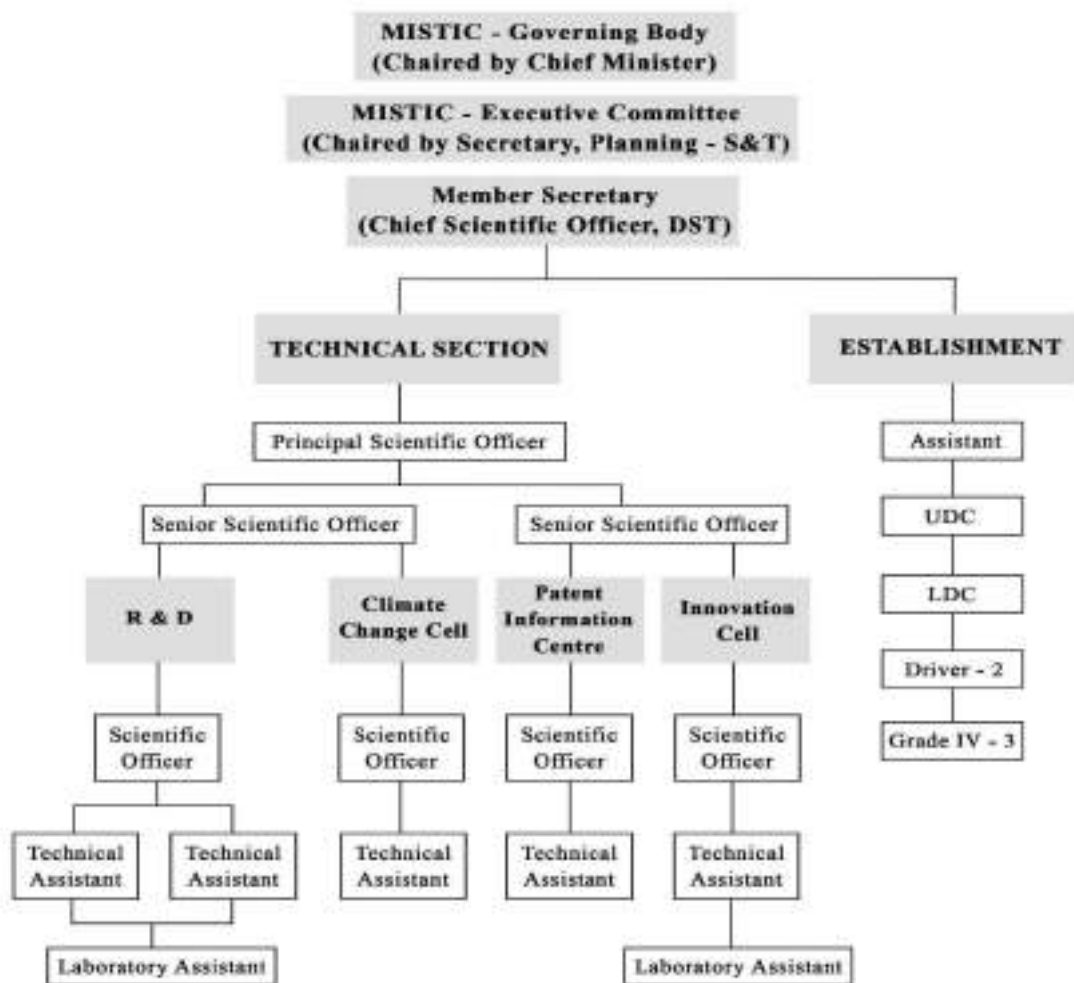
### 1. Details of State S&T Council

a) Name of the Member Secretary -Dr. R.K. Lallianthanga

- b) Address -Science & Technology Building  
Mizoram Secretariat Complex,  
Khatla, Aizawl, Mizoram  
Pin-796001
- Email [cs0.dst-miz@gov.in](mailto:cs0.dst-miz@gov.in) / [mistic.dst@gmail.com](mailto:mistic.dst@gmail.com)  
Phone /Fax 0389-2336159/2333240/2336787  
Mobile No : 9436140957

## 2. Structure of the Council

- a) Date of Establishment -12.2.1985  
b) Organisation Structure



c) Strength of approved manpower

Sl. No.	Name of the incumbent working	Designation	Pay Scale	Approx. monthly Emoluments (Rs. In Lakh)
<b>A. Central (DST) supported)</b>				
1.	Shri H. Lalsawmliana	Principal Scientific Officer	15600-39100+7600	1.10
2.	Shri K. Lalrammuana	Senior Scientific Officer	15600-39100+6600	0.95
3.	Shri F. Lalramchuana	Senior Scientific Officer	15600-39100+6600	0.88
4.	Dr. Aldrin Malsawmtluanga	Scientific Officer	15600-39100+5400	0.75
5.	Shri Samuel Lalmalsawma	Scientific Officer	15600-39100+5400	0.70
6.	Shri P.C Lalngilneia	Scientific Officer	15600-39100+5400	0.59
7.	Shri Davy Lalruatlina	Scientific Officer	15600-39100+5400	0.59
8.	Shri John Lalchhuanawma Sailo	Technical Assistant	9300-34800+4400	0.42
9.	Shri Lalruatzela Pautu	Technical Assistant	9300-34800+4400	0.42
10.	Shri R. Vanneihluanga	Technical Assistant	9300-34800+4400	0.42
			<b>SUB-TOTAL</b>	<b>6.82</b>
<b>Rupees Six lakh and eighty two thousand only</b>				
<b>B. State (Govt. of Mizoram) supported</b>				
1.	Vanlaldinthara	UDC	9300-34800+4200	0.46
2.	VL Ramhmangaihi	LDC	5200-20200+2400	0.28
3.	F. Lalsangzuala	Driver	5200-20200+1900	0.22
4.	Darthanguama	Grade-IV	4440-7440+1650	0.19
5.	Ramfangzauvi	Grade-IV	4440-7440+1650	0.19
			<b>SUB-TOTAL</b>	<b>1.34</b>
<b>Rupees One lakh and thirty four thousand only</b>				
			<b>GRAND TOTAL</b>	<b>8.16</b>
<b>Rupees Eight lakh and sixteen thousand only</b>				

*Note: Salary of the Chief Scientific Officer & Member Secretary and salary of the Administrative manpower is met by the State Government since July, 2016. Therefore, a total number of 10 (ten) Scientific/Technical manpower is supported by DST.*

**3. Budget allocation to State S&T Council for last five financial years including Central Govt, State Govt. & any other sources:**

Sl.	Year	DST (GOI)	State	Other sources	Total
1.	2013-14	64.00 lakh	127.84		191.84
2.	2014-15	70.40lakh	190.00		260.40
3.	2015-16	72.40 lakh	30.36		102.76
4.	2016-17	115.20 lakh	30.36	91.53	237.09
5.	2017-18	119.15 lakh	789.71	145.62	1054.48

**Note :**

- 1) The budget allocation from DST include Core Grant (Secretarial Support), support for State Climate Change Cell and other projects.
- 2) The budget allocation from State Govt. include administrative support and other projects.
- 3) The budget allocation from other sources include NEC funded projects, etc.

**4. Key Activities undertaken during the last two years in the area of –**

**4.1 Technology Development**

- (a) Development of working prototype of six indigenous innovations was implemented in collaboration with local innovators. The innovations are – Hand Pressing phone charger, Power hammer, Torsion design machine, Rolling shutter controller machine, Pumping of water at elevated heights using power of flowing water, Automatic multiple spindle (Thread winding machine).
- (b) The project ‘Preliminary study for scouting of indigenous grass root innovators and technologies of Mizoram’ was successfully implemented. All the districts of the state was covered. The project was given a score of 8 out of 10 by Expert Committee of DST.
- (c) The project ‘Development of Indigenous Technological Innovation in Mizoram’ is implemented. Under this project, Innovation Facility Centre is under construction at New Secretariat Complex, Khatla, Aizawl and is expected to be completed within this year 2018-2019.
- (d) Two Micro Solar Domes were installed at Kelsih Village on 8<sup>th</sup> and 11<sup>th</sup> August, 2017 as pilot programme. It is planned to install other units in the next years.
- (e) New R&D project works were taken up with the support of DST. They are :-Solar Driven Hybrid Dryer, Phytochemical Screening and Identification of Secondary Metabolites and Nutritional Profiling of *Alocasia fornicata*, Development of Portable Agarbati Round Stick Producing Machine, Development of Motor Cycle Trailer Suitable for Hilly Area, Portable Low-cost Induction Heater.

(f) The project “Development of Sawdust Briquetting and Charcoal Making Plant at Chhuanthar Tlangnuam (Baktawng)” under NEDP is implemented.



## **4.2 Technology Demonstration**

- a) The prototype viz. “New design of wind blade suitable in hilly area for harnessing wind power” was demonstrated at Hmuifang Mountain, about 54 kms from Aizawl. It was observed that the design is suitable for harnessing wind power and now a working prototype is planned to be constructed. The project is a collaboration of the Council with local innovator Mr. Ramhlun Edena.
- b) A locally innovated machine viz. “Transformer Constant Power Supply (CPS)” containing a patented unit was demonstrated. The project is a collaboration of the Council with local Innovator – Mr. Ramdinthara Renthlei.
- c) A locally built ‘Novel Sacramental Wine dispenser’ was demonstrated. The innovator is Mr. F. Lalmangaiha. Patent was filed by him and Patent Information Centre, Mizoram. It was inaugurated by Dr. R.K. Lallianthanga, Chief Scientific Officer & Member Secretary, MISTIC at Synod Conference Hall.
- d) Another locally built ‘Automatic Water pump controller’ innovated by Pu F. Lalmangaiha was demonstrated. Patent was filed by him and Patent Information Centre, Mizoram. It was inaugurated by Dr. R.K. Lallianthanga, Chief Scientific Officer & Member Secretary, MISTIC at Synod Conference Hall.
- e) A simple device i.e. ‘Rolling shutter controller machine’ that is able to lift and put down rolling shutter using a switch was demonstrated at Champhai, Champhai District, Mizoram.
- f) Demonstration of a device that is able to pump water at elevated heights using power of flowing water/river was conducted at Tiau river near Hnahlan, Champhai District of Mizoram.
- g) Demonstration of self-water pumping system using force of running water developed by Stephen Sangluaia, local innovator was held on 23<sup>rd</sup> March, 2018 at Tuirial river.

## **4.3 Promotion and Popularization of Science**

Promotion and popularization of Science is implemented in several ways as follows:-

### **I. Observation of Important Days**

- i. National Mathematics Day 2017 was celebrated at Pachhunga University College in collaboration with Mizoram Mathematics Society on 22<sup>nd</sup> December, 2017. State level Mathematics Competition result was announced and prizes were given away to the winners.
- ii. National Technology Day was observed at Aizawl in collaboration with Directorate of Science & Technology.
- iii. National Science Day (28<sup>th</sup> February) was celebrated at various districts in Mizoram in collaboration with various institutions of the districts. The main celebration programme was held at Conference Hall, Assembly Annexe, Aizawl, Mizoram.

- iv. National Science Day 2018 Celebration programme was organized at Seminar Hall, Pachhunga University College, Aizawl, Mizoram on 28<sup>th</sup> February, 2018 in collaboration with the College
- v. National Science Day 2018 Celebration programme was organized at Seminar Hall Govt. Zirtiri Residential Science College, Aizawl, Mizoram on 28<sup>th</sup> February, 2018 in collaboration with the College.
- vi. National Science Day 2018 Celebration programme was organized at Multipurpose Hall, Lunglei Govt. College, Lunglei, Lunglei District, Mizoram on 28<sup>th</sup> February, 2018 in collaboration with the College
- vii. National Science Day 2018 Celebration programme was organized at Govt. Champhai College, Champhai, Champhai District, Mizoram on 29<sup>th</sup> February, 2018 in collaboration with the College.
- viii. National Science Day 2018 Celebration programme was organized at Govt. Kolasib College, Kolasib, Kolasib District, Mizoram on 28<sup>th</sup> February, 2018 in collaboration with the College.
- ix. National Science Day 2018 Celebration programme was organized at at Govt. Serchhip College, Serchhip, Serchhip District, Mizoram on 28<sup>th</sup> February, 2018 in collaboration with the College.
- x. National Science Day 2018 Celebration programme was organized at at District Govt. Mamit High School, Mamit, Mamit District, Mizoram on 28<sup>th</sup> February, 2018 in collaboration with the institution.
- xi. National Science Day 2018 Celebration programme was organized at Govt. Southern Public High School, Lawngtlai, Lawngtlai District, Mizoram on 28<sup>th</sup> February, 2018 in collaboration with the institution.

## **II. Organising of various activities/programmes**

- i. The project entitled ‘Science and Technology Mass Awareness Programme amongst the Tribal/Rural Population in Aizawl and Lunglei Districts’ was completed. Awareness programme was held at selected 40 schools of the two districts.
- ii. Science Exposure Tour program for selected Class XI Science students of Mizoram was successfully held during 23<sup>rd</sup>-24<sup>th</sup> August, 2017. Students from rural areas were selected for the programme.
- iii. MISTIC participated and exhibited a stall at the Mega Science, Technology & Industry Expo, India International Science Festival 2017 held at Chennai during 13<sup>th</sup>-17<sup>th</sup> October 2017.
- iv. MISTIC arranged showcasing of the technologies under the ambit of S&T Mizoram in the STINER walk-through exhibition of the DONER programme during Hon'ble Prime Minister Mr. Narendra Modi's visit to Mizoram on 16<sup>th</sup> December 2017. It extended necessary assistance in arranging the exhibition.

v. State level Mathematics Competition was organized in collaboration with Mizoram Mathematics Society on 9<sup>th</sup> December, 2018 at six (6) different centers viz. Aizawl, Lunglei, Serchhip, Champhai, Saitual and Kolasib.

vi. Mathematics Summer Camp was organized in collaboration with Mizoram Mathematics Society during March 19-23, 2018 at Pachhunga University College, Aizawl, Mizoram.

vii. MISTIC participated and exhibited items in the Pride of India Expo, 105<sup>th</sup> Indian Science Congress held at Manipur University, Imphal during March 16-20, 2018.

viii. Seminar on Science & Technology for a Sustainable Future cum Science Demonstration was organized in collaboration with Mizoram Science Centre at Mizoram Science Centre, Beraw tlang, Aizawl on 22<sup>nd</sup> March, 2018.

ix. Sci-Connect of North East programme 2017 was successfully organized in collaboration with Vigyan Prasar, DST. The Mizoram (MISTIC) team represented by three students from St. Paul's HSS bagged the Second Place in the Stage-III Final Quiz Competition held at Guwahati during November 14-15, 2017.

### **III. Publication of Science Journals for popularization**

Three periodic Science journals are funded/published as part of science popularization and promotion programme with the fund from the State Government in collaboration with three Science NGOs of the state. The magazines are:-

- 1) Meithallawn – Bi-monthly (With Mizoram Science Society)
- 2) Mizoram Science Journal – Monthly (With Science Teachers' Association Mizoram)
- 3) Science Vision – Quarterly (With Mizo Academy of Sciences)

#### **4.4 Patents**

1. In the overall, 9 Patent Applications were filed at Kolkata Patent Office.
2. During 2017-18, five (5) patent search was done.
3. During 2017-18, five Geographical Indication applications were filed at the Geographical Indication Registry, Chennai.
4. During 2017-18, four (4) Trade Mark Applications were filed at Kolkata Trade Mark Registry.
5. During 2017-18, eleven (11) numbers of IPR Awareness Programs were held.
6. In the overall, the following Intellectual Property Rights (IPR) Cells were created in collaboration with the respected institutions, viz.

- a) Mizoram University IPR Cell
- b) Pachhunga University College IPR Cell
- c) Govt. Zirtiri Residential Science College IPR Cell
- d) Lunglei Government College IPR Cell
- e) National Institute of Electronics and Information Technology (NIELIT) IPR Cell
- f) ICFAI University Mizoram IPR Cell

#### **4.5 Any new Innovative Activities**

- The project ‘Development of Indigenous Technological Innovation in Mizoram through Establishment of Innovation Facility Centre and Enhanced Protection of Ownership’ was started. Under this project, Innovation Facility Centre is under construction now. The centre will be equipped with state-of-the art machines and tools and it will be a hub of technological innovations in the state. It is envisaged to operate it in PPP mode wherein the role of private partners/innovators will be prominent, with hand-holding support given by the state Government.

- Innovation Hub & Space Science Exposition Theater is under construction at Mizoram Science Centre. The Hub will be a place of innovative activities where young students will be mentored by experts. It will have different work space. The upper floor will consist of a 50 seated astronomy theater. Inauguration of the building will be held soon.

- Initiative was taken for development of the rich bio-resources of the state. DPR for establishment of Mizoram Bioresource Development Centre was prepared and submitted to Department of Biotechnology, GOI. Dr. Harsh Vardhan, the Hon’ble

Union Minister for Science & Technology and Earth Sciences laid the foundation stone for the Centre at Mizoram University, Aizawl on 14<sup>th</sup> February, 2017. Now, signing of MOU is underway.

- Digital Planetarium is being built at Lunglei town in Lunglei District with the support of North Eastern Council and the State Government. Apart from being a planetarium, the building or site will be a hub of different S&T activities that will cater the needs of students, etc. of southern part of Mizoram.

- A project ‘Development of Sawdust Briquetting and Charcoal Making Plant at Chhuanthar Tlangnuam (Baktawng)’ in Mizoram is under implementation. Baktawng is a village where many activities such as aluminium utensil manufacturing, carpentry, etc. is undertaken. Almost the whole village has a part

in such trade. Through this project a saw-dust briquetting and charcoal manufacturing plant is introduced that will utilize the tons of waste saw-dust that is being thrown away daily as garbage.

**5. List 5 success stories with brief about 1 page each including photographs, if available.**

**1) Science & Technology Mass Awareness Programme**

Science and Technology Mass Awareness Programme amongst the Tribal/Rural Population in Aizawl and Lunglei Districts was implemented during 2017-2018 in collaboration with Education Department of the State Government. The main objective of the programme is to popularize and inculcate scientific information for triggering an interest in science and technology especially amongst children and general public. The campaign destination was done by prioritizing underprivileged and remote areas where modern scientific facilities seldom reach. Under this programme 40 schools from two districts of Mizoram i.e. Aizawl district and Lunglei district were covered. Four topics were selected such as Science and Superstitions, Career in Science & Technology, Health and Personal Hygiene, and, Cultivation and Agriculture. The programme is funded by National Council for Science & Technology Communication, DST, New Delhi and implemented by Mizoram Science, Technology & Innovation Council.



**2) Sci-Connect Programme**

Sci-Connect of Programme 2017 was successfully organized in collaboration with Vigyan Prasar, DST in the state of Mizoram. The programme was conducted to nurture young talents of North-East in Science. The Stage-I Screening examination was

conducted at 7 districts which saw the participation of 256 students from all over the state. The Stage-II was successfully organized which comprises of hands on activity held workshop held at Conference Hall, Tourist Lodge, Chaltlang, Aizawl followed by a Quiz competition held at I&PR Auditorium, Aizawl on the final day. Top 15 students of Stage-I participated in the programme. In the Final Quiz Competition held at Guwahati during November 14-15, 2017 wherein one team each from seven North East states competed, the Mizoram (MISTIC) team represented by three students from St. Paul's HSS bagged the Second Place. The students are Lalremsiama Darchhun, Lalthlamuani and P.C. Lalchhuanawma.



Pic :2<sup>nd</sup> Prize winners of Sci-Connect 2017 final Quiz Competition at Guwahati

### **3) Development of Automatic Thread Winding Machine**

A local Innovator namely Mr. Chhuanmawia, who hailed from Lamthumthum, Haulawng village in the southern part of Mizoram has developed an improved version of automatic Thread Winding Machine with the support of the Mizoram Science, Technology & Innovation Council. The innovation is a fast thread winding machine that uses an electric motor (0.5 HP). Multiple spindles for winding the thread are connected to the motor through rotating lever that controls the thread while winding. Each individual spindle can be disconnected in case of malfunction. The machine can wind 4 nos. x 1200 m long thread in variable speed i.e. 15, 12 and 10 minutes on an empty bobbin.

Weaving industry is expected to largely benefit from this simple innovation as thread winding requires huge labour intensity. This machine can be operated by a single worker and reduces the laborious work. It will reduce the drudgery of women worker. The machine is working perfectly and the innovator has started using it for generating income.

#### **4) Has the Council developed any specific State related S&T and Innovation Policy? If so, the details to be provided.**

- State S&T and Innovation Policy for the state is prepared by the Directorate of Science & Technology, Govt. of Mizoram. The Council has provided assistance in preparation of the document.

#### **5) How strong are the links between other State Govt./Department? If so provide details.**

6) The Council and the Directorate of Science & Technology, Govt. of Mizoram works together in implementing many schemes and projects. The Council has good linkage with all line Departments, Colleges and Universities of the state. Many programs are organized in collaboration. It has created six (6) Intellectual Property Right (IPR) Cells in six institutions in collaboration. Most of these institutions are under the Higher & Technical Education Department of the state. It is working with the Art & Culture Department of the state Government in processing of Geographical Indications applications of five items/goods. It works together with Forest Department and other line departments such as Horticulture and Agriculture Department in Climate Change Mitigation and Adaptation programs. It has signed an MOU with Administrative Training Institute of the State Government for conducting training in climate change related areas. It works with School Education Department in implementing S&T mass awareness programmes in the state. Moreover, the School Education Department has provided a land to the Council for construction of Digital Planetarium at Lunglei.

**8. How strong are the links of the Council with local Industry Units / Associations?**

- Linkage has been made with the local Industries, associations and societies in the State. It has collaboratively organized programmes with Confederation of Indian Industries (Mizoram) and Mizoram Chamber of Industries. S&T Need Assessment workshop was organized recently with the Mizoram Science Society. Science & Technology has been actively engaged in several programmes by linking with Science NGOs of the state such as Mizoram Science Society, Mizoram Mathematics Society, Mizo Academy of Sciences,

Science Teachers' Association Mizoram, Biodiversity & Nature Conservation

Network, etc. It has also jointly organized Mizoram Science Congress

**9. List 5 major Technology Area, where the Council can play an important role by finding convergent Technological Solutions.**

- 1) Environment and Climate related area
- 2) Food processing & preservation technology
- 3) Waste management
- 4) Energy development
- 5) Water & Irrigation technology



**10. Proposed programme and budget outlay for 2018-19.**

<b>SL. NO.</b>	<b>BUDGET HEAD</b>	<b>EXPECTED SOURCE</b>	<b>AMOUNT (Rs. In lakh)</b>	<b>TOTAL (Rs. In lakh)</b>
<b>I.</b>	<b>ADMINISTRATION</b>			<b>184.40</b>
1.	Salary of Manpower with TA/DA, OE, Website maintenance	DST Core Grt	123.24	
2.	Salary of Manpower (State) with other items	State Govt.	55.16	
3.	Maintenance of office equipments/furnitures	DST Core Grt	6.00	
<b>II.</b>	<b>SCIENCE POPULARISATION</b>			<b>605.35</b>
1.	Celebration of National Mathematics Day 2018 & National Science Day 2019	NCSTC, DST	23.00	
2.	Promotion of Science and Mathematics Education at Secondary Schools in Mizoram through formation of Science Club Network	NEC	353.95	
3.	Establishment of Digital Planetarium at Lunglei, Mizoram (Total 314 Lakh)	NEC	188.40	
4.	Sci-Connect 2018	Vigyan Prasar	15.00	
5.	Mizoram Science Congress 2018	NEC	25.00	
<b>III.</b>	<b>RESEARCH &amp; DEVELOPMENT</b>			<b>2,562.88</b>
1.	Establishment of Technology Demonstration Centre in the State of Mizoram	SSTP, DST	500.00	
2.	Development of Water-based Preservation Technology for Fruits in Mizoram	State Govt.	10.00	

3.	Development of Mizoram Bioresource Development Centre	DBT,GOI	1,845.00	
4.	Installation of Radical Plasma Nitriding Plant for Surface Hardening of Tea Rollers and Agricultural Tools in Mizoram	DST/ IPR, Gujarat	129.10	
5.	Development of Medicinal Plant Database of Mizoram	SSTP, DST	48.46	
6.	Establishment of Rural Women Technology Park at Zemabawk, Aizawl, Mizoram	SEED, DST	30.32	
<b>IV.</b>	<b>MANAGEMENT OF INTELLECTUAL PROPERTY RIGHTS</b>			<b>17.00</b>
1.	Management of Patent Information Centre (Assistance from DST)	SSTP, DST	15.00	
2.	IPR filing cost	Clients	2.00	
<b>V.</b>	<b>MANAGEMENT OF CLIMATE CHANGE</b>			<b>25.92</b>
1.	Management of State Climate Change Cell	SPLICE, DST	25.92	
	<b>GRAND TOTAL</b>		<b>3,395.55</b>	<b>3,395.55</b>
<b>Rupees (Three thousand three hundred ninety five lakh and fifty five thousand) only</b>				
<b>OTHER ONGOING WORKS</b>				
1.	Construction of approach road for Digital Planetarium (44.21 lakh)			
2.	Development of Sawdust Briquetting and Charcoal Making Plant at Chhuanthar Tlangnuam (Baktawng) (38 lakh) (State Govt.)			
3.	Development of Indigenous Technological Innovation in Mizoram (DITIM) (667 lakh) (State Govt.)			
4.	State Action Plan on Climate Change formulation (3 lakh) (State Govt.)			

Thus, the Grand Total of the Budget Outlay proposed for the year 2018-2019 is **Rs. 3395.55 lakh (Rupees Three thousand three hundred ninety five lakh and fifty five thousand only)**

Out of the total budget proposed above it is expected to receive **Rs. 129.24 lakh (Rupees One hundred twenty nine lakh and twenty four thousand only)** from the Core Grant of DST, GOI as Secretarial Support.

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# Nagaland

## 1. Details of State S&T Council

**Dr. ZAVEI HIESE**

**Member Secretary.**

Nagaland Science & Technology Council,  
Science & Technology Complex,  
Below New Civil Secretariat,  
Nagaland: Kohima-797004

Mobile. : +91-9436001974

Fax : 0370-2243827

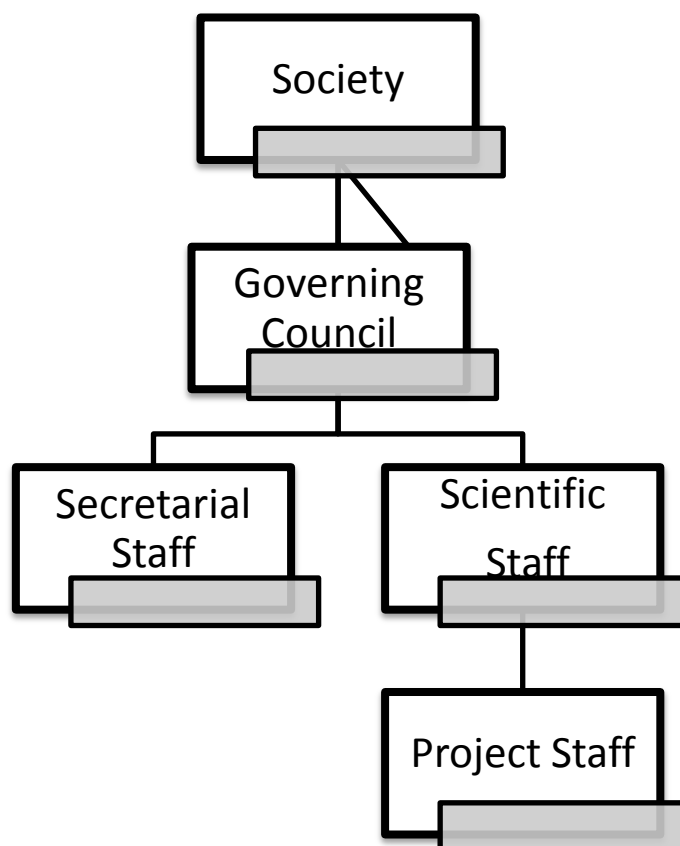
E-mail : [zhiese@gmail.com](mailto:zhiese@gmail.com), [nastecnagaland@gmail.com](mailto:nastecnagaland@gmail.com)

## 2. Structure of the Council:

### a) Date of Establishment:

Nagaland Science & Technology Council (NASTECC) is established as an autonomous body under the Department of Science & Technology, Government of Nagaland. It is a registered society under Societies Registration Act on 6th August, 1999.

### b) Organization Structure:



### Committee:

1. Society
2. Governing Council

### Service cadres: 3 cadres

1. Scientific

2. Administrative
3. Technical (supporting staff)

**Divisions:**

1. Science popularization
2. Engineering Division
3. Analytical division
4. Life Sciences / Biotechnology
5. Remote Sensing and Space Application Centre
6. Nagaland State Referral Laboratory for Water Quality Testing & Monitoring
7. Nagaland State Climate Change Cell

**Scientific facility units:**

1. Biotechnology lab
2. Microbiology Lab
3. Analytical Chemistry Lab
4. Molecular Biology Lab
5. Chemical Ecology Lab
6. State Referral Laboratory for Water Quality Testing
7. Patent Information Centre
8. Remote Sensing & GIS Lab

**c) Strength of approved manpower (both Central (DST) and Statesupported )**

Sl. No	Name	Designation	Pay scale	Approximate monthly emoluments
<b>DST Supported Manpower</b>				
1.	Dr. NesataluHiese	Scientist 'D'	15600-39100 G.P 7600	136836
2.	Er. PelengulieChücha	Scientist 'C'	15600-39100 G.P 6600	103614
3.	Mr. DithoKathiry	Scientist 'C'	15600-39100 G.P 6600	103614
4.	Mr. KekuneilLtu	Scientist 'B'	15600-39100 G.P 5400	80110
5.	Mrs. NeihenoKire	Technical Assistant-II	9300-34800 G.P 4200	50625
6.	Mrs. Chotolu	UDA-cum-Accountant	9300-34800 G.P 4200	50625
7.	Mrs. GihukaliChishi	Technical Assistant	5200-20200 G.P 2800	41359
8.	Mr. MhashetoYhobu	Technical Assistant	5200-20200 G.P 2800	42489
9.	Mr. Vemuri Vero	Technical Assistant	5200-20200 G.P 2800	42489
10.	Mr. PudunuYhobuh	Technician	5200-20200 G.P 1900	30402
<b>State Supported Manpower</b>				
1.	Mrs. V. Victoria Krocha	L.D.A-cum-Computer Operator	Fixed Consolidated Pay	15000

2.	Ms. LizzaAyemi	L.D.A-cum-Computer Operator	Fixed Consolidated Pay	12000
3.	Mr. AketolKiba	Field Assistant	Fixed Consolidated Pay	14000
4.	Mr. Besukhro D. Vadeo	Technician (Electrical)	Fixed Consolidated Pay	12000
5.	Mr. Kahive	Technician	Fixed Consolidated Pay	12000
6.	Mr. MeseweKhesoh	Driver	Fixed Consolidated Pay	11000
7.	Mr. TekheweKupa	Driver	Fixed Consolidated Pay	9000
8.	Mr. VedeHesuh	Driver	Fixed Consolidated Pay	8000
9.	Ms. SetsonelüKezo	Field Attendant/ Cook	Fixed Consolidated Pay	8000
10.	Mrs. VikheliChishi	Janitor	Fixed Consolidated Pay	7000

**3. Budget allocation to your state S&T council for last five financial years including central government, State government & any other sources.**

Sl.No	PROJECT/SCHEME	F.Y2013-2014	F.Y2014-2015	F.Y2015-2016	F.Y2016-2017	F.Y 2017-2018
1	CORE GRANT Received from DST Government of India	56,00,000	61,60,000	63,60,000	135,20,000	73,00,000
2	RESEARCH PROJECTS Received from DST Government of India	97,05,600	410,09,980	77,52,291	177,02,972	1,89,000,00
3	GRANT-IN AID Received from the Government of Nagaland Under the Department of Science & Technology	14,94,000	NIL	20,50,000	20,50,000	30,00,000

**4. Key activities under taken during the last year in the area of:-**

**4.1 Technology Development**

Sl. No.	PROJECT NAME	FUNDING AGENCY	Sanction YEAR	PARTNER AGENCY
1.	Development of Hill Agri Tools and Equipments	DST, GoI	2015	FCIPT, Gandhinagar

2.	Development of Pico-Hydel Power and Installation at Washelo Village.	LADP, GoN	2015	----
3.	Development of Electronic Load Controller	PRG, DST, GoI	2017	
4.	Water mill Based Animal feed crusher Production Unit	PRG, DST, GoI	2017	
5.	Screening and characterization of soil microbial diversity in Alder-based farming system.	PRG, DST, GoI	2017	-
6	Investigation of the antioxidant capacity and antimicrobial activity of some Medicinal Plants used by Naga people	PRG, DST, GoI	2017	
7	Mass Spectrometry analysis of bioactive constituents of extract of <i>P. molle</i>	PRG, DST, GoI	2017	
8	Biopesticides & Biofertilizers Production	LSR, DST, GoI	2017	IIHR, Bangalore

#### 4.2 Technology Demonstrations

Sl. No	PROJECT NAME	FUNDING AGENCY	Sanction YEAR	PARTNER AGENCY
1.	Socio-Economic Upliftment of Farmers through Mithun Base Farming	DST, GoI	2013	ICAR-NRC on Mithun
2.	Popularization & Dissemination of Technology of Bio-Pesticide formulations among the farmers of weaker sections in NE region	DST, GoI	2013	IIHR, Bangalore
3.	Value Addition of Agro Produce through use of Solar Air Heaters and Heat pump in Nagaland	DST, GoI	2013	IITB, Mumbai
4.	Pilot Scale Optimization for standardization of processing & Agro techniques of selected high value aromatic & Medicinal plants including technology demonstration & extension for socio economic upliftment	DST, GoI	2014	IIIM, Kashmir
5.	Testing of HUC Solar Lantern	-	2017	KSCST, Karnataka

#### 4.3 Popularization of Science

i) National Science Day 2018 was celebrated in all the districts on the theme “**Science & Technology for a Sustainable Future**” on 28<sup>th</sup> February. In each district, programmes were simultaneously conducted through coordinators supervision under the given theme. The main activities of the programmes includes- debate, quiz, exhibition and talks on popular science. During the current academic year 2018, each district could mobilize over 300 students for National Science Day celebration.

ii) National Mathematics Day 2017 was celebrated across the state in enthusiastic celebrations on 22<sup>nd</sup> December. As part of celebrations, Mathematics Model exhibition, Mathematics quiz was conducted to commemorate the day. Over thousands of students from the state joined the celebration and a talk on “Importance of Mathematics” was organized with resource person expertized in the field of mathematics from reputed institution.

iii) “Sci-Connect-Nurturing young talents of North-East on science”, a science quiz competition for the students of class 8 & 9 of the North East states, India. Organized by

VigyanPrasar in collaboration with the Nagaland Science & Technology Council (NASTEC) is held annually. The competition is based on documentary films produced by VigyanPrasar. This program consists of three stages; Screening examination, State quiz level and Regional quiz level. The screening examination was conducted in 5<sup>th</sup> April, 2017 at 7 Centres in 5 districts. The Screening examination was successfully conducted in all centers with a turnout of 408 students. The stage two level i.e state quiz level was conducted during 11<sup>th</sup> -13<sup>th</sup> July, 2017 at Dimapur resource person from VigyanPrasar. Finally, the regional quiz level was conducted during 14<sup>th</sup>-15<sup>th</sup> November, 2017 at Guwahati and the students representing the state bagged fourth position.

iv) Biotechnology Awareness & Promotion programmes conducted across the selected districts of the state.

v) Intellectual Property Rights (IPR) Awareness programmes conducted across the state.



At the international conference “Plant Biotechnology” At the Indian International Science Green for Good IV-G4G” at Olomouc, Czech Republic. Festival-2017 at Chennai



#### 4.4 Patents

- G.I on traditional “Chakhesang Shawls” has been registered under G.I no 542 with the Certification No. 301 as on 31st October, 2017 at Chennai.





- Awareness programs on “Intellectual Property Rights” have been conducted to 46 schools and colleges in the state.
- PIC Nagaland is acting as Inspection body and enforcement agency for GI and other IP related issues for the state.
- Patent Search facilities are outsourced to the public through the Indian Patent database and Ekaswa ‘A’, ‘B’ and ‘C’.

#### 4.5 Any new innovative activities: NIL

#### 5. List 5 success stories with brief about 1 page each including photograph, if available:

**5.1** The technology of biopesticide consortia formulation has been successfully demonstrated and disseminated in the state, in collaboration with IIHR, Bangalore and some other NE institutes under the project “Popularisation and Dissemination of Bio-Pesticide Formulations among the Poor and Marginal Farmers of NE Region” and funded by Department of Science & Technology, Government of India. The council is currently setting up facilities for the production of biopesticides and biofertilizers mass production units to cater to the needs of the state.



#### 5.2 Chemical Ecology of the North-Eastern Region (NER) of India: A collaborative programme linking NER and Bangalore Scientists.

A new interdisciplinary programme in Chemical Ecology and the first of its kind in the country was launched in April 2016. This programme was formulated keeping in view that the NE region has a unique and rich biodiversity, however, lacks in sufficient researchers and expertise in the field to explore the potential of the rich bioresource. The programme is a collaboration among the NER institutions viz., Nagaland State Science & Technology Council, Kohima (Nagaland), IBSD-Imphal (Manipur), IBSD-Gangtok (Sikkim), NEHU-Shillong (Meghalaya), Rajiv Gandhi University-Itanagar (Arunachal Pradesh), , Mizoram University- Aizawl (Mizoram), Manipur University- Imphal (Manipur) and partner institutions in Bangalore such as NCBS, IISc, C-CAMP and UAS-GKVK. This programme is expected to bring a huge impact for NER researchers through capacity building, enduring research and training links with partner institutions in Bangalore (NCBS, IISc, UAS), particularly in the field of Chemical Ecology. This programme will both build new scientific capacity in India and provide tremendous, unique training and career development opportunities for aspiring and established scientists, particularly from the Northeast.

The Chemical Ecology program is funded by Department of Biotechnology (DBT), Govt of India. It was launched by Dr. Harsh Vardhan, Hon’ble Union Minister for Science & Technology & Earth Science on 19th April, 2016 at NASTEC, Kohima. NASTEC has hosted the 2nd Meet of SAC and PSC on DBT’s Chemical Ecology Programme at Kohima on 10 & 11th April, 2017. Under this programme, currently three projects have been taken up, namely:

- Chemical Ecology of Oak Borer Larva with its host and the associated organisms.
- Chemical Ecology of Dazonha: A potent Anti-rheumatic plant.

(iii) Aquarium-assisted Evaluation of Fish-Poisoning Plants against Fishes followed by Piscicidal Plants Extraction, Isolation and their Neurobiological Activity.



**5.3. Nagaland State Climate Change Cell** has been set-up with the support from NMSHE, Department of S&T, Government of India and became operational in April, 2017. Under this Cell, a media workshop on “Climate Change Reporting in the Himalayas was organized from 11-13 Dec. 2017 at Kohima. In-house environmental projects, Awareness and Capacity Building Programs and Vulnerability and Risk Assessment are in progress.



#### **5.4. State Referral Laboratory for Water Quality Testing & Monitoring:**

The council has established State Referral Laboratory for Water Quality Testing & Monitoring with the funding from the Department of Science & Technology, Government of India under Water Technology Initiative programme and inaugurated by Dr. Harsh Vardhan, Hon'ble Union Minister for Science & Technology & Earth Science on 19<sup>th</sup> April, 2016 and dedicated to the service of the state.

Under this facility unit, project on Rainwater Harvesting Technology was demonstrated in 6 water scarce villages in the state. Currently, a project on Water Quality Mapping for Kohima and Peren District is in progress with funding from DST, GoI.

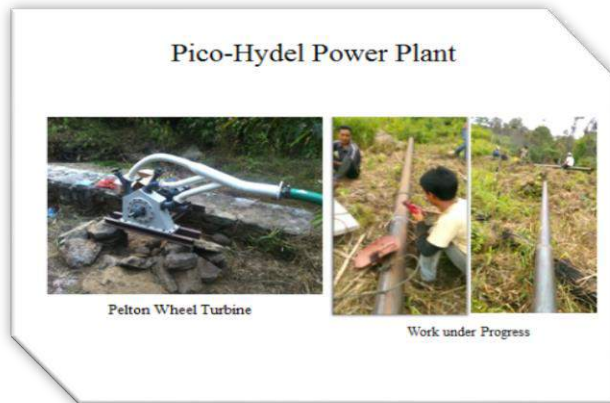
Water Quality Testing and Consultancy services are provided to user departments and various stakeholders of the state.



**5.5. Engineering for Socio-economic Development:**

**5.5.1. Development of Pico Scale Hydro Power Generation:**

NASTECH has developed Pelton Wheel Turbine to generate hydro power in pico-scale mode. The developed technology has been successfully tried and tested. The demonstration of the technology for rural area development is undergoing.



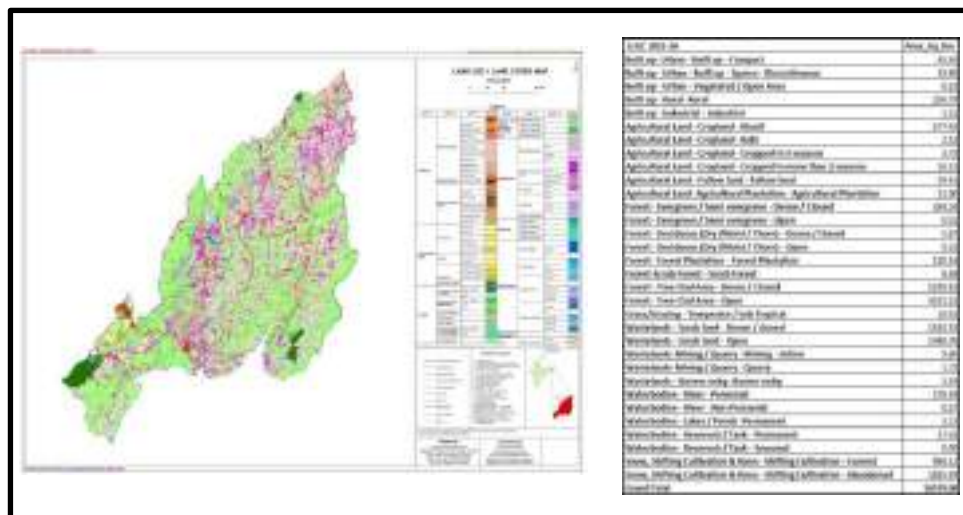
Construction of Canal

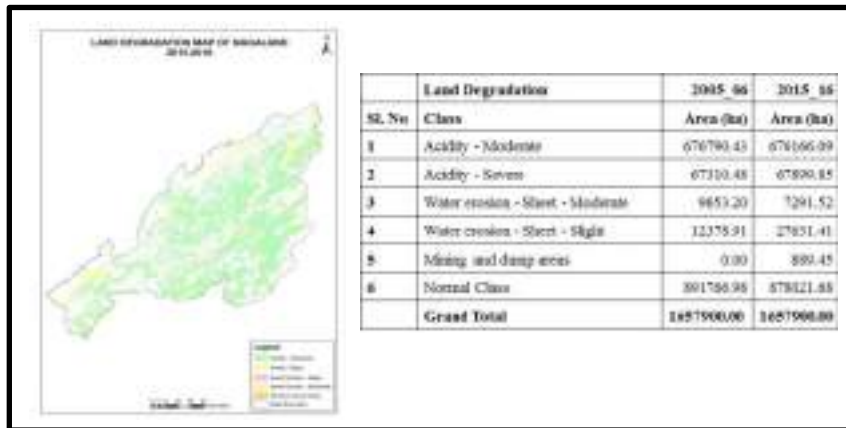
**5.5.2. Remote Sensing & GIS Applications:**

Centre for Remote Sensing & GIS Application was established with the support National Remote Sensing Centre, Hyderabad, Department of Space, since the inception of the Council and began the forerunner for all Remote Sensing and GIS applications in the state. The council under this wing has successfully completed laudable numbers of centrally sponsored projects and national network programmes.

Currently, the following projects are underway:

- (i) Application of Remote Sensing and GIS in Sericulture Development
- (ii) Land use/ Land Cover Change Analysis 3<sup>rd</sup> Cycle
- (iii) Land Degradation Mapping – 2<sup>nd</sup> Cycle
- (iv) Wasteland Change Analysis - 3<sup>rd</sup> Cycle
- (v) Rajiv Gandhi National Drinking Water Mission- water Quality Mapping
- (v) CHAMAN

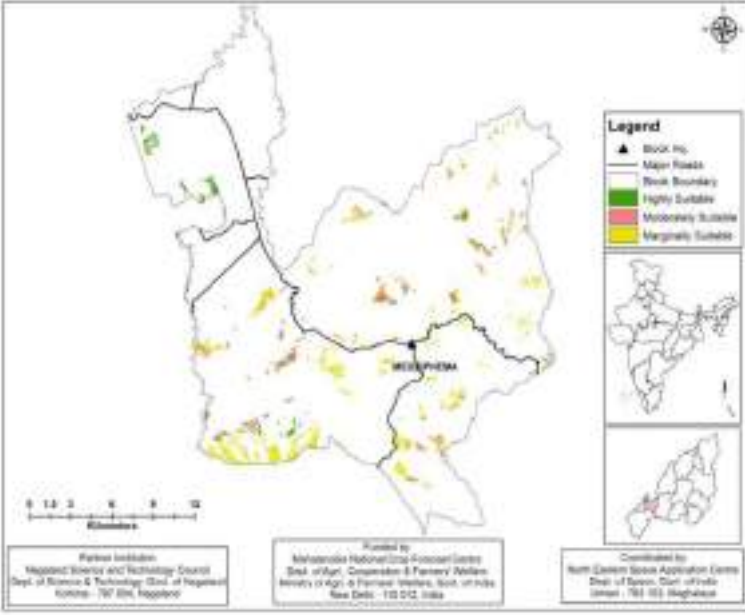




**Application of Remote Sensing & GIS for Sericulture Development: Phase II**

Sl. No.	District	Suitability Class	Total Area (Ha.)
1	Aizawl	Highly suitable	2163.2638
		Less suitable	442.52501
		Moderately suitable	2334.71873
		Moderately suitable	6736.13197
		<b>Total</b>	<b>8136.43941</b>
2	Maidohkang	Highly Suitable	4063.08443
		Less Suitable	4117.56953
		Moderately Suitable	3047.15433
		Moderately Suitable	4092.41956
		<b>Total</b>	<b>15320.22785</b>
3	Phek	Highly suitable	2093.72197
		Less suitable	3511.365182
		Moderately suitable	7169.62994
		Moderately suitable	1077.83973
		<b>Total</b>	<b>13652.55681</b>
4	Famfong	Highly Suitable	1248.278286
		Less Suitable	2388.478048
		Moderately Suitable	4663.90097
		Moderately Suitable	8676.84874
		<b>Total</b>	<b>17377.49603</b>
5	Zawthata	Highly suitable	3871.31882
		Less suitable	3822.24921
		Moderately suitable	8721.96117
		Moderately suitable	10775.8193
		<b>Total</b>	<b>27291.34853</b>
<b>Grand Total</b>		<b>67766.62671</b>	

**CHAMAN  
(Coordinated Horticulture Assessment & Management Using Geoinformatics)  
Identification of potential areas for pineapple plantation in Dimapur district**



**6. Has the council developed any specific state related S&T and innovation policy? If so the details to be provided: NA**

**7. How strong are the links between other state governments/departments. If so, provide details.**

The Council has been working in linkage with various Departments and Agencies across the country. Following are the present collaborators in various projects.

- IIT Bombay,
- IISc, Bangalore
- IIHR, Bangalore
- University of Agricultural Sciences (UAS), GKVK
- NRSC, Hyderabad
- NESAC, Department of Space
- IIIM, Jammu
- CSIR-NEIST, Jorhat.
- NCBS, Bangalore
- MOeF, New Delhi
- IBSD, Imphal
- Rajiv Gandhi University, Itanagar
- NEHU, Shillong
- Manipal University, Sikkim

**8. How strong are the links of the council with State line Departments/local industry units/associations?**

The council being the nodal agency for catalyzing and co-ordination of S&T activities in the state it has the direct linkage with the line departments, NGOs, Industries, etc., upto the village council level.

Given below are some of the current collaborators for execution of various activities in the state.

- NRC on Mithun, Jharnapani
- Nagaland University, Lumami
- Kohima Science College ( an autonomous institution of NU), Jotsoma
- PHED
- Soil and Water Conservation Department.
- Department of Forest, Environment and Climate Change, Govt. of Nagaland
- All State Line Departments

**NGOs/Partners:**

- Hill Innovation Lead Organisation (HILO) Kohima
- Turbo Engineering, Kohima
- SARDAM, Khuzami, Phek.
- Chakhesang Women Welfare Society
  
- North-East Network (NEN)
- Sustainable Development Forum of Nagaland (SDFN)
- Village Councils/Panchayats/Village Development Boards
- SHGs
- NBCC
- Other relevant NGOs in the state

**9. List 5 major technology area, where the council can play an important role by finding convergent technological solutions.**

- (i) Development of Hill Specific Technology in Agriculture
- (ii) Geospatial Technology for developmental policy guidelines in the state.
- (iii) Application of Biotechnology for harnessing of the state's rich bioresources
- (iv) Intervention of S&T in Indigenous Traditional Knowledge System in Nagaland
- (v) Development of indigenous wild foods for socioeconomic upliftment of the rural population

**10. Proposed budget outlay for the 2018-19**

**10.1. Ongoing Projects:**

Sl. No.	Name of Activity	Proposed Budget for 2018-19
1	Science Popularization	16.00 lakhs
2	State Spatial Data Infrastructure	15.00 lakhs
3	Establishment of Climate Change Cell under NMSKCC/NMSHE	38.00 lakhs
4	Water Quality Mapping for Kohima and Dimapur District	39.00 lakhs
5	Chemical Ecology of the North-Eastern Region (NER) of India: A collaborative programme linking NER and Bangalore Scientists: a) Chemical Ecology of Oak Borer Larva with its host and the associated organisms b) Chemical Ecology of DazoNha: A potent Anti-rheumatic plant c) Aquarium-assisted Evaluation of Fish-Poisoning Plants against Fishes followed by Piscicidal Plants Extraction, Isolation and their Neurobiological Activity	32.82 lakh
6	Biotechnology Hub	6.00 lakhs
7	Patent Information Centre	14.06 lakhs
8	Land Use Land Cover 3rd Cycle	1.50 lakhs
9	CHAMAN	1.50 lakhs
10	Pilot Scale Optimization for standardization of processing & Agro techniques of selected High Value Aromatic & Medicinal Plants including Technology Demonstration & Extension for Socio Economic Upliftment	27.00 lakh
11	Development of Hill Agri Tools and Equipment	10.67 lakhs
12	Wasteland Change Analysis	0.57 lakhs
13	Land Degradation Mapping	1.09 lakh

**10.2. New Proposed Activities for 2018-19 under Local Specific Research.**

Sl.No.	Local Specific Research Thematic Area	Proposed Budget (Rs. In Lakhs)
1	Load Utilization of Micro & Pico Hydel Power	20.00
2	Local Medicinal herbs	20.00
3	Indigenous Microbial Resources	20.00

4	Development of wild fruits and vegetables of Nagaland as health food	23.00
5	Research and development on fermented foods of Nagaland	20.00
6	Brine Water Processing Unit for Salt Production	10.00
7	Documentation of ITKS of Nagaland	10.00
<b>Total (Rs. In Lakhs)</b>		<b>123.00</b>

### 10.3. Proposed Core Grant Budget Outlay for 2018-19

<b>A. Recurring</b>						
Manpower (4 Scientists, 4 Tech. Assts, 1 Secretarial ) 10nos	TA/D A	Contingencie s	Local Specific Researc h	Other Items/Journals/offic e maintenance	Website Maintenance / Updation	Total (Lakh Rs.)
98.20	15.00	10.00	50.00	8.00	2.00	183.2 0
<b>B. Non-Recurring (Capital Asset)</b>						
Hardware/Furniture/Computer/printer						
5.00						5.00
<b>Grand Total (A+B)</b>						188.2 0

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## Odisha

### 1. Details of State S& T Council

Name of the Secretary & Member Secretary/Director General

**Rasid Khan IAS,**

Director, S&T,

**Dr. Prafulla Kumar Bhanja,**

Senior Scientist & Secretary,

State council on S&T

Odisha Secretariat, Bhubaneswar-751001,

Phone: 0674-2393570; E-mail: [odishapic@gmail.com](mailto:odishapic@gmail.com)

### 2. Structure of the Council:

a) Date of Establishment. 18 July, 2016

b) Organization Structure: The council shall function through the following authorities:

1. General Council (President – Hon'ble Chief Minister)

2. Executive Council (Chairman- Chief Secretary)

3. Project Management Council (Chairman – Principal Secretary S &T Deptt.)

The proposed structure of the organization: The State Council will have following five thematic divisions. Each division will have three resource persons i.e., Senior Scientist as Head of the Division supported by one scientist and one technical officer. The Senior Scientists will be posted from the existing manpower of S&T Department. The posts of scientist & technical officer will be temporarily created without budgetary support from GoO for availing grant from Department of Science & Technology, GoI. The Scientists & technical officers will be on deputation or retired professionals will be hired.

- Agriculture, Water, Energy& Climate
  - R&D, Start-up, Innovation &Consultancy
  - Science Education & Communication, IPR& Patent
  - Rural Technology, Transfer of Technology(ToT) & Social Development
  - Biotechnology, Ecology & Environment
- c) Strength of approved manpower(both central )DST) and State supported)

### 3. Budget allocation to your State S&T Council for last five financial years including Central Government, State Government & any other sources.

a) DST, Govt. of India has released Rs 13.32 lakhs for establishment of Patent Information Centre under State Council during last five years out of total project cost of Rs 28.43 lakh.

b) State Government has made budget provision as follows:



Year	Functioning of State Council(From State Budget in lakh Rs.)	Development of Biotechnology (From State Budget in lakh Rs.)
2013-14	230.03	300.00
2014-15	200.00	286.36
2015-16	160.00	100.00
2016-17	340.30	60.00
2017-18	400.00	400.00

#### 4. Key activities under taken during the last two years in the area of :

##### 4.1. Technology Development

##### 4.2. Technology Demonstrations

##### 4.3. Popularization of science

##### 4.4. Patents

##### 4.5. Any new innovative activities

##### 4.5.1. State Council On Science & Technology

- 200 scholarships @ Rs.2000/- per month have been provided to students for pursuing Post-Graduation studies in Basic Science subjects such as Physics, Chemistry, Mathematics, Botany, Zoology and Geology.
- Biju Patnaik Research Fellowship in Basic and Applied Sciences has been given to **10** students for pursuing Ph. D.
- Financial assistance limited to Rs.10.00 lakh for each R&D project for a period of 3 years duration has been provided to Government Universities/institutions to undertake **19** R & D Projects in Basic & Applied Sciences.
- The proposal for enhancement of UNESCO Kalinga Prize money from USD 20,000 to USD 40,000 has been approved by Government.
- State Council has felicitated Prof. Golombek, the UNESCO–Kalinga Prize winner of 2015 during his visit to Odisha.
- Financial support to the tune of one lakh has been provided to Regional Science Centre, Bhubaneswar for holding a State Level Science Exhibition of school students from all the districts.
- Financial support has been provided for organizing **two** International, **eight** National and **one** State level conference.
- Travel Grants have been sanctioned to **3** Scientists /Academicians of the State to give oral presentation in Taiwan, China and Australia respectively.
- Patent Information Centre has organized six workshops (PIC-3 and TIFA-3) at different Universities and Research Institutes of Odisha during 2017-18. Ten patent applications received from universities/institutions were sent to Technology, Information, Forecasting and Assessment Council (TIFAC) Govt. of India for examination & patent filing, out of which 3 applications have been found suitable for patent filing and rest are in the process of examination.
- State Council has participated in the 105<sup>th</sup> Indian Science Congress and Science Exhibition ‘Pride of India’ (POI) EXPO’2018 at Imphal from 16-20 March, 2018. Science & Technology Department, Government of Odisha Pavilion has been awarded as the best State Pavillion.
- A Sub-Regional Science Centre is being set up at Mouza-Tukurla under Bhatli Tahasil in Bargarh District in the State, which is under progress. Further, steps are being taken up for setting up of 10 more District Science Centers in the State under State Plan.

#### 4.5.2. Biotechnology Cell

- Biotechnology Policy Resolution -2016 has been announced to bring investment in Biotechnology Sector and promote education and research in Biotechnology.
- All operational guidelines relating to Biotechnology Policy Resolution-2016 have been released.
- Government has provided six Biju Patnaik Research Fellowship in Biotechnology to students to pursue Ph.D.
- Government has provided one Emeritus Fellowships in Biotechnology.
- Financial assistance limited to Rs.10.00 lakh for each R&D project for a period of 3 years duration has been provided to Government Universities, Colleges, State funded Research Institutes of Odisha and Research Institutes of Government of India functioning in Odisha to support fifteen Research & Development Projects in Biotechnology.
- 32 students have been provided with scholarships @Rs.2000/PM for pursuing Post-Graduation studies in Biotechnology in different Government Universities and Colleges of the State.

**5. List 5 success stories with brief about 1 page each including photograph, if available- NIL**

**6. Has the council developed any specific state related S&T and innovation policy? If so the details to be provided.- NIL**

**7. How strong the links between other State Government/Departments If so are provide details?**

Good link with other departments

**8. How strong are the links of the Council with local industry units/associations?**  
Good.

**9. List 5 major technology area, where the council can play an important role by finding**

Convergent technological solutions, Agriculture, Animal Husbandry, Renewable Energy, Environment, Biotechnology

#### **10. Proposed programme and budget outlay for the 2018-19**

Programme	Budget outlay in lakh Rs.	Remarks
Patent Information Centre	5.23	DST, Govt. of India
Functioning of State Council including Science Centres.	500.00	State Budget
Development of Biotechnology	120.00	State Budget

## Punjab

### 1. Details of State S&T Council

- Name of the Secretary & Member Secretary :  
**Dr. Roshan Sunkaria, IAS**  
Principal Secretary to Government of Punjab,  
Department of Science Technology & Environment  
(Member Secretary, PSCST)
- Name of the Executive Director : **Dr. Jatinder Kaur Arora,**  
Executive Director  
Address : Punjab State Council for Science & Technology,  
MGSIPA Complex, Institutional Area,  
Sector 26,  
Chandigarh.  
Phone Nos. : 0172-2792325/ 2793143 (Telefax), 9814619826 (M)  
E-mail/Website : jkarora20@rediffmail.com/www.pscst.gov.in

### 2. Structure of the Council:

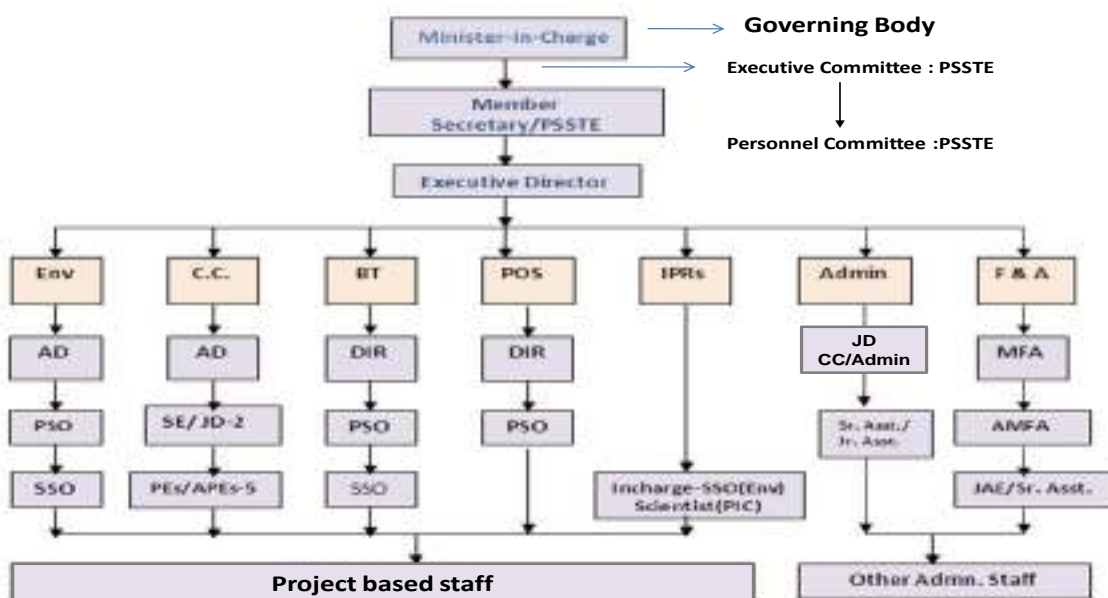
- a) Date of Establishment : **14<sup>th</sup> July, 1983**
- b) Organization Structure : Hon'ble Chief Minister of Punjab is the President of Punjab State Council for Science & Technology (PSCST). The Principal Secretary, Science Technology & Environment is the 'Chairman' of the Executive Committee and Member Secretary of the Council. The day-to-day affairs of administration are looked after by Executive Director, PSCST. The Council works in the following thrust areas:
  - Environment
  - Popularization of Science

- Biotechnology
- Technical support to industry for air pollution control & energy efficiency.

Sl. No	Name	Designation	Pay scale	Approximate monthly emoluments

- Intellectual Property Rights

## Organizational Structure



- c) Strength of approved manpower [both central (DST) and state supported]

1.	J.K. Arora	Executive Director	37400-67100+10000	209000
2.	Satnam Singh Ladhar	Addl. Director	37400-67100+8900	184000
3.	K.S. Bath	PSO	15600-39100+7600	132000
4.	Dapinder Bakshi	PSO	15600-39100+7600	110000
5.	Alkesh	SSO	15600-39100+6600	98000
6.	Gurharminder	SSO	15600-39100+6600	95000
7.	Bhanu Kiran	SSO	15600-39100+6600	78000
8.	Shashi Thapar	Secy. to ED	15600-39100+6600	117000
9.	B.S. Bajwa	PS	15600-39100+6600	110000
10.	B.R. Pahwa	PS	15600-39100+5400	100500
11.	Rajeena	Steno-typist	10300-34800+3200	46000
12.	Kulwinder Kumar	Clerk	10300-34800+3200	50200
13.	Pritika Rani	Steno-typist	10300-34800+3200	37000
14.	Dr.S.K.Saxena	Principal Scientific Officer	15600-39100+7600	140000
15.	Krishan Kant	Process Engineer	15600-39100+6600	94000
16.	Maganbir	Process Engineer	15600-39100+6600	88500
17.	Pritpal singh	Sr Er(Partial)	16650-39100+6850	
18.	Anju Chaudhary	Scientist	Fixed Rs. 25000/-	
19.	Jaspreet Singh	Steno Typist	Fixed Rs.18575/-	19000
20.	Avdesh Kaushik	Manager (M&A)	15600-39100+8200	143500
21.	Harish Raj Rai	Asstt. Manager (F&A)	15600-39100+6000	102000
22.	V.K.Puri	Private Secretary	15600-39100+6000	108000
23.	Sham Sunder	Personal Secretary	15600-39100+5700	106000
24.	Rakesh Grover	Sr. Assistant	10300-34800+4600	94000
25.	Sham Lal	Personal Assistant	10300-34800+5000	92000
26.	Vikas Sharma	Sr. Assistant	10300-34800+4600	71500

27.	Jasbir Kaur	Receptionist	10300-34800+4600	89000
28.	Being Filled	Librarian	10300-34800+3200	
29.	Kishore Kumar	Sr. Assistant.	10300-34800+4600	75000
30.	Isha Sharma	Sr. Assistant	10300-34800+4600	75000
31.	Renu Sehgal	Steno-Typist	10300-34800+4800	71000
32.	Dinesh	Junior Assistant	10300-34800+3800	65500
33.	Sandeep Gupta	Technician	10300-34800+3200	50000
34.	Mandeep Singh	System Supervisor	Fixed Rs.16236/-	18000
35.	Sativinder Singh	Driver	5910-20200+2400	19000
36.	Being Filled	Driver	5910-20200+3000	
37.	Ram Yadav	Peon	5910-20200+1900	47500
38.	Being filled	Peon	5910-20200+1900	
39.	Guman Bahadur	Peon	5910-20200+1900	44000
40.	Ram Janam	Peon	5910-20200+1900	47000
41.	Satbir	Sweeper	4900-10680+1650	29000
42.	Being Filled	Chowkidar	5910-20200+1900	
43.	Jagjit Singh	Steno Typist	Fixed Rs.18575/-	20804
44.	Gurdeep Singh	Driver	5910-20200+3000	62000
45.	Being Filled	Peon	5910-20200+1900	
46.	Vijay Kumar	Peon	5910-20200+1900	47350

**3. Budget released to your state S&T Council for last five financial years including Central Government, State Government & any other sources.**

The details of budget allocation to Punjab State Council for Science & Technology during last five years are as below:

(Rs. in

lacs)

Year	Technical Secretariat (DST-GoI)	Technical Secretariat DST-GoP	Other receipts including project grants, technical services etc.
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<b>2017-18</b>	150.56	233.00	1148.00
<b>2016-17</b>	176.56	222.00	775.46
<b>2015-16</b>	226.05	224.84	543.81
<b>2014-15</b>	171.25	207.50	596.44
<b>2013-14</b>	149.34	124.20	530.12

#### **4. Key activities undertaken, during the last two years, in the area of:-**

##### **4.11 Technology Development:**

- i) Energy efficient design of improved fixed chimney Bull's trench brick kiln with zig-zag firing.
- ii) Waste Heat Recovery System (WHRS) for cupola furnace.
- iii) Lateral Side Hood Suction System for air pollution control in induction furnace.
- iv) Process parameters for bioconversion of damaged wheat grains into bioethanol in collaboration with PU.
- v) Technology optimization for wine production from kinnow juice in collaboration with PAU.
- vi) Natural Vinegar production (through semi-continuous process) from sugarcane, guava, jamun and black carrot blend in collaboration with PAU.
- vii) Technology refinement for efficient drying of *Embllica officinalis* - a major bioresource of Kandi area using Forced Circulation Polyhouse Solar Dryer in collaboration with PAU.

##### **4.12 Technology Demonstration:**

- i) Technology demonstration and replication for air pollution control & energy conservation in 415 industries including Brick Kilns, Cupola Furnaces, Rolling Mills and Induction Furnaces.
- ii) Set up 3 Resource Efficient Brick (REB) manufacturing units at Amritsar (Punjab), Sonapat (Haryana) and Nalagarh (H.P.) to restrict GHG emissions, reduce energy consumption in brick manufacturing and save top soil. UNDP appointed consultants during terminal evaluation of the project have appreciated the proactive role of PSCST in accomplishing the tasks.
- iii) Field demonstration of technology for cultivation of Lemongrass, Citronella, and Palmarosa at farmer's fields in lower shivalik foothill of Punjab and aroma processing through setting up of essential oil distillation units.
- iv) Demonstration & promotion of technology for production of natural vinegar.
- v) Mulberry Sericulture Technology demonstrated as part time entrepreneurial activity in Kandi area.

vi) Forced Circulation Solar Drying technology demonstrated in Kandi region.

#### 4.13 Popularization of Science

i) Hargobind Khorana Memorial International Symposium on 'Genes, Genomes & Membrane Biology' organized wherein more than 350 scientists including 25 world acclaimed Khorana associates from across the globe participated.

i) HarGobind Khorana Lectures delivered by World Food Laureate Padma Shri Prof. G.S. Khush, FRS and Lester Wolfe Professor Dr. Uttam Raj Bhandari, MIT under Hargobind Khorana Lecture Series instituted as a tribute to Prof. Khorana – the Nobel Laureate of Punjab origin (attended by 800 students and teachers).

ii) Children Science Congress organized at district and state level wherein more than 10,000 school science students & teachers participated. One of the projects from Punjab was selected as the outstanding and best project at the National Children Science Congress.

iii) Organized meeting of Program Advisory and Monitoring Committee for S&T Communication of DST, GOI.

iv) State Level Science Essay Writing Competition attended by students from all districts of Punjab.

v) Celebration of National Science Day and National Mathematics Day.

vi) Science for Women Health and Nutrition through Community Radio. 365 episodes of this program "*Sehat Ka Vardaan:Nari Ka Sanman*" broadcast on Jyotirgamaya, 91.2 FM, Community Radio of PU.

vii) Awareness Programmes on Cancer in Women in Malwa region of Punjab in two districts (Barnala and Moga) of Punjab through capacity building, awareness and screening programs in collaboration with ROKO Cancer organization and Molana Azad Medical College.

viii) Awareness Programmes on prenatal screening for genetic disorders for capacity building of medical officers, ANMs and Asha workers.

ix) Exposure to meritorious science students - Visits of 990 students (45 students from each of 22 districts) to prominent industries and technical institutes in their vicinity were organized for giving them better exposure.

x) Water and Solid Waste Auditing promoted in 20 schools of district Mohali under WaSH program of DST, GOI.

xi) Outreach Programmes under National Green Corps by involving 5500 schools & National Environment Awareness Campaign through schools, colleges & NGOs etc.

xii) National Nature Camping Programmes (5 nos.).



xiii) Capacity Building Programmes (4 Nos.) on Climate Change issues for stakeholder departments and other target groups organized.

xiv) Programmes on Education for Sustainable Development (8 nos.) were organized as Regional Centre of Expertise of United Nations University Institute for Advanced Studies, Japan.

xv) Popular Biotechnology Lecture Series.

xvi) Capacity building programmes on aromatic crop cultivation and essential oil extraction (9 Nos).

xvii) Workshop on 'Bio-entrepreneurship & Bio-enterprise Creation' for young scientists & researchers from northern region of the country in collaboration with NASI, CIAB and BCIL.

xviii) Dissemination of information related to Environment & Natural Resources through Environment Information Service Centre (ENVIS) ( [www.punervis.nic.in](http://www.punervis.nic.in))

xix) Showcased initiatives of PSCST in India International Science Festival Expo organized by DST-GOI at NPL, Delhi.

xx) Workshop-cum-Brainstorming Session of CHORD, DST, GOI on STI for 'Make in India': Promoting Manufacturing and Job Creation at District level attended by 19 District Industries Centres.

xxi) Organized Technical Advisory Committee on S&T Communication Program, "Mission Eco Next" (Eco Next & Eco Media Initiative) & Regional Consultative Meet – Eco Next Connect for DST-Gol.

xxii) Sensitization workshop for officers of Govt. Construction Departments on use & benefits of resource efficient bricks (REB).

xxiv) Sensitization workshop for officers of State Pollution Control Board and brick kiln owners regarding energy efficient induced draft brick kiln technology with zig-zag firing (7 Nos.)

xxv) Publication of monthly science magazine 'Nirantar Soach'. Around 2500 schools are subscribing to the magazine at present.

xxvi) Quarterly Newsletter 'Future Frontier'.

xxvii) TISC/PIC, PSCST in collaboration with World Intellectual Property Organization (WIPO) & Deptt. of Industrial Policy & Promotion (DIPP), Gol organized Regional workshop on 'Access to Technology for Innovation'.

xxviii) PIC/PSCST organized 8 workshops/seminars and delivered 25 expert lectures on IPR issues.

#### 4.14 Patents (Facilitated by Patent Information Centre)

- No. of patents granted : 10
- No. of patents filed through PFC-TIFAC : 08
- No. of design registrations/TMs filed : 5/1
- Patent searches conducted/Paid searches : 161/144
- No. of applications processed and submitted to TIFAC: 41
- No. of IPR trainings provided:
  - Four Women Scientist deputed by TIFAC, DST, GoI for 11 months
  - Nine students from academic institutions of Punjab and Chandigarh for 1 month
  - One volunteer trainee for 6 months.

#### 4.15 Any new innovative activities

- i) Developed a novel hybrid technology for brick kiln based on natural / induced draft working principle. The patent for the same has been filed (Patent No 201711035308)
- ii) Briquette preparation from paddy straw for use as green fuel in brick kilns. The first ever paddy straw based briquetting plant being set up near Moga (Punjab). Likely to be commissioned by June, 2018.
- iii) Source Apportionment Study to prepare action plan to improve Air Quality of Ludhiana city.
- iv) Utilization of cupola slag as partial replacement of fine aggregate in concrete mix.
- v) Award of first-of-its-kind prestigious multi-institutional project 'Setting up Secondary Agriculture Entrepreneurial Network in Punjab – Early Translation Accelerator' to strengthen existing agri-food industry and promote start-ups in Punjab by Biotechnology Industry Research Assistance Council (BIRAC), DBT, GoI.
- vi) Pilot project to introduce prenatal screening tests to assess the prevalence of congenital malformations in pregnant females of Mohali, Punjab initiated in collaboration with Civil Hospital, Mohali.
- vii) TISC/PIC, PSCST prepared an IP technology scan report on "Patenting trends in the bicycle sector in the last decade" for PFC-TIFAC, DST, GoI on behalf of UNIDO, New Delhi. TISC team analysed approx 54,000 patent documents related to bicycles filed worldwide in last 10 years and compared filing trends in top countries i.e China, Taiwan, US & Korea and India.
- i)

**5. List 5 success stories with brief about 1 page each including photograph , if available.**

**i) Demonstration of Improved Natural Draft Fixed Chimney Bull's Trench Kiln**

More than 11000 brick kilns are operating in north India producing 50-55 billion bricks per annum. Coal is the main fuel used for firing of bricks in Bull's Trench Kiln, operated by semi-skilled workers with little knowledge on good practices for efficient feeding and firing. As a result, long plume of black smoke is visible from the chimneys of the kilns containing particulate emissions in the range of 550-1500 mg/Nm<sup>3</sup>. These brick kilns operate at a low thermal efficiency of 20-30%. PSCST has been working for the brick sector for the last 20 years and had demonstrated energy efficient brick kiln design way back in 1998.

Further, in anticipation of the upcoming new brick emission standards, PSCST developed and demonstrated a novel energy efficient hybrid brick kiln with zig-zag firing technology at a brick kiln in Punjab in February, 2017 with financial support of DST, Gol. The salient features of the technology are improved brick setting, longer firing zone resulting in better combustion of fuel, introduction of simpler operating system of flues, etc. This environmental friendly technology has led to reduction in fuel consumption by 15-20% as well as CO<sub>2</sub> generation by 200 tons per operating season/kiln. The black smoke from kiln chimney has vanished and the emissions are well within the upcoming new emission standards of 250 mg/Nm<sup>3</sup>. The yield of first quality bricks has also increased by 10-15%. The payback period has been assessed as less than 2.5 years. This technology has the potential for its replication in the existing brick kiln through the process of retrofitting in the existing Bull's Trench Kilns across the country. Punjab Pollution Control Board has approved this technology for its replication in the State. A number of kiln owners visited the demonstration unit during its operation in the last season. More than 300 brick kilns from Punjab, Haryana, Uttarakhand and J&K have already engaged the Council for providing technical consultancy for this technology.

The Council has already filed patent for this novel technology through TIFAC.



Hybrid brick kiln- Clean Smoke



Longer firing zone length of 42'

**ii) Demonstration of Side Suction Hood for Air Pollution Control in induction furnace**

There are around 180 induction furnaces operating in Mandi Gobindgarh and Ludhiana in the State of Punjab with average capacity of 6t/heat for manufacturing of ingots/billets. These furnaces have installed canopy hood to contain the dust emissions being generated during melting of scrap followed by Cyclonic scrubber/Pulsejet bag filter with online cleaning as Air Pollution Control Device (APCD). Most of these furnaces have now started using magnet & pusher for charging of raw material into the furnace for faster melt rate which otherwise used to be manual. The benefits accrued by using magnet & pusher are savings in heat time, enhanced productivity and lesser energy consumption.



Work zone with Canopy Hood

Work zone with Side Suction Hood

Now with the use of magnet & pusher, the operator has to keep the canopy hood away from the furnace resulting in poor suction efficiency at the hood leading to dispersion of emissions in the sheds and deterioration of ambient air quality. To address this problem, PSCST after carrying out R&D demonstrated **Side Suction Hood (SSH)** in one of the induction furnace units at Mandi Gobindgarh. The SSH was found to be quite effective and was appreciated by Punjab Pollution Control Board (PPCB) and Induction Furnace Association. After successful demonstration, PPCB has directed all the induction furnace units to get their APCDs upgraded as per the design of PSCST. 32 units have already engaged PSCST for providing technical services in this regard.

### iii) Setting up of Technology & Innovation Support Centre (TISC)

The World Intellectual Property Organization (WIPO), a specialized agency of the United Nations for promotion of IPRs has setup its first Technology and Innovation Support Centre (TISC) of India in PIC, PSCST through Department of Industrial Policy & Promotion (DIPP), Ministry of Commerce & Industry Government of India. Till date, WIPO has established 517 TISC Centers worldwide in 59 countries. DIPP, GoI is the National Focal Point for India for coordinating with WIPO on behalf of Govt. of India. The Govt. of India carried out a rigorous on-site assessment of expertise, infrastructure available and the range of activities being carried out by PIC, PSCST to promote creation & protection of IPRs in the State of Punjab & Chandigarh, before allotting the TISC to PSCST.

The creation and expansion of TISC network in India is aligned to the objectives of National IPR Policy 2016 for the promotion of innovations & IPRs, scientific research and technology transfer. Further, DIPP-GoI also organized visit of Mr. Gurharminder Singh, Incharge, PIC-PSCST and Asstt. Manager, Cell for IPR Promotion & Management (CIPAM), DIPP from 3rd to 6th April 2017 to such centres setup by WIPO in Philippines. The objective of visit was to enable PSCST to understand the working of TISC network.

Principal Secretary to Govt. of Punjab, Department of Science, Technology & Environment (PSSTE) and Joint Secretary to Govt. of India, Department of Industrial Policy & Promotion (DIPP), Ministry of Commerce & Industry signed a formal agreement on 13.7.2017 at Udyog Bhawan, New Delhi to mark the initiation of this Centre. The centre was inaugurated by PSSTE and Head, Technology & Innovation Support Division, WIPO on 4th December, 2017.



Agreement signing with DIPP, Govt. Head, of India for setting up of TISC



Inauguration of TISC by PSSTE & Technology Support Section, WIPO

TISC/PIC, PSCST in collaboration with WIPO & DIPP, GoI organized a national workshop on "Access to Technology for Innovation & Establishing a TISC Network" in PSCST on 4th & 5th Dec, 2017. Seventy one (71) participants from 7 states of northern India participated in the workshop.

The TISC at PSCST is facilitating access to International Standard IP facilities to the IP users of the region in terms of database access, awareness, training, case

studies/best practices of other countries, experience sharing platform, IP commercialization etc. The setting up of TISC will also give impetus for collaborative activities to be carried out by PIC, PSCST and DIPP, Govt for fulfillment of objectives of the National IPR Policy and Startup India in the State.

#### **iv) Networking of Plant Tissue Culture Industry in Punjab.**

Micro-propagation based tissue culture industry has been identified as a priority area for research, development and commercialization by Govt. of India. This industry is growing at the rate of 20-25% with large demand arising for disease free clones of superior quality plants in floriculture, horticulture, ornamentals etc. However, despite Punjab being agrarian state, this industry remains largely unexplored/untapped for multiple reasons. Realizing the need to strengthen this industry, PSCST and School of Agricultural Biotechnology, PAU jointly took up one year DST supported project to assess potential, prospects & technological gaps areas of existing tissue culture industry in Punjab. During the course of study, all the tissue culture units (both commercial and R&D) were mapped w.r.t. parameters viz. types of plants propagated, installed & production capacity, infrastructure, trained manpower, certification, marketing as well as gap areas/challenges faced. Further, to ascertain demand/market potential of tissue raised plants in state, one-to-one interactions/meetings were held with relevant State Development Departments (Horticulture, Forest, Cane Commission etc.). The key challenges faced by tissue culture industry in the state brought out by the study were deliberated with relevant experts from academia, state departments & industry. The emerging recommendations out of stated deliberations highlighted need for certification of units from NCS-TCP-BCIL; accreditation of prospective tissue culture labs (State Nodal Labs) for authentication of virus & pathogen free TC plants; skill development of untrained manpower of TC units and directory of all existing units in the state. PSCST is taking up necessary actions to get the identified challenges addressed in collaboration with partner agencies.



Interaction with Tissue Culture industry to understand their gap areas.

#### **v) Punjab State Climate Change Knowledge Centre**

The Punjab State Climate Change Knowledge Centre (PSCCKC) has been set up at PSCST with support of DST, GOI. Its objective is to identify state specific challenges, vulnerabilities and implications of climate change for adaptation initiatives in short and long term scenarios. PSCCKC also caters to the information and knowledge needs of policy makers, scientific community and general public on climate change issues through tailor made outreach programs. The centre has trained more than 1000 officials of stakeholder departments/institutions and sensitized more than 5 lacs schools, colleges and universities on climate change issues. The Centre has also coordinated development of several projects and has mobilized climate finance worth Rs. 70.00 Cr. approx. for their implementation.



Expert Talk of Advisor, DST, GoI for Capacity Building  
Visit of media personnel to climate friendly Integrated  
of line deptts. On Climate Change Adaptation & Mitigation  
Solar Powered Community Lift-Micro Irrigation Project at Talwara



Training Course on Addressing Climate Risk & Impacts  
Field Visit of Participants to Sukhna Wild Life Sanctuary

**6. Has the council developed any specific state related S&T and innovation policy? If so the details to be provided.**

- The Council has formulated IPR policies of 6 Universities/Institution of Punjab:
  - Central University of Punjab, Bathinda
  - Guru Nanak Dev University, Amritsar
  - Lovely Professional University, Phagwara
  - Chitkara University, Rajpura
  - Baba Farid Group of Institutions, Bathinda
  - Thapar University, Patiala
- The Council supported state Department of Industries & Commerce in developing 'Punjab Industrial Development and Investment Promotion Policy 2017' – Section on 'Life Sciences and Biotechnology'.



**7. How strong are the links between other state government /departments ?  
If so provide details.**

The Council has conceptualized & coordinated setting up of 4 S&T institutions located in Knowledge City, Mohali. The Council continues to promote synergies among Knowledge City institutions. Further, Council is part of Chandigarh Region Innovation Knowledge Cluster (CRIKC) comprising more than 20 institutions. PSCST has strong linkages with State/National as well as international level organizations/departments as under:

• State Level Organizations:

Universities:

- Punjab Agricultural University, Guru Angad Dev Veterinary and Animal Sciences University, Guru Nanak Dev University, Punjabi University, Baba Farid University of Health Sciences, Panjab University (for Ham Radio & FM Radio programme sponsored by DST), Chitkara University, Rayat & Bahra University, Thapar University, IIT-Ropar, I.K. Gujral State Technical University, Maharaja Ranjit Singh State Technical University, Central University of Punjab etc.

Departments/Organizations:

- Punjab Energy Development Agency  
- Punjab Pollution Control Board  
- Punjab Mandi Board  
- School Education including PSEB, SISE, SCERT  
- Punjab Small Industries and Export Corporation Ltd.  
- Local Government including GMADA and PWSSB.  
- Other Line Departments like Agriculture, Forests & Wildlife Preservation, Horticulture, Animal Husbandry, Dairy Development & Fisheries Urban Development, Social Welfare, Industries, Transport, Rural Development & Panchayats, Irrigation, Water Resources, IPRI, Soil & Water Conservation, PSPCL, PSTCL, Tourism, etc.  
- Punjab Remote Sensing Centre.  
- Non-Government Organizations from Punjab, Chandigarh & Uttarakhand.

• National Level Organizations : Coordination with:

• Department of Science & Technology, Government of India,  
• Ministry of Environment, Forests & Climate Change, Government of India.  
• Department of Biotechnology, Government of India  
• Department of Industrial Policy and Promotion GOI.  
• Ministry of New and Renewable Resources, Government of India  
• Ministry of Water Resources, Government of India  
• Ministry of Agriculture, Indian Council of Agriculture Research  
• Textile Committee, Ministry of Textiles, Government of India  
• National Bank for Agriculture & Rural Development  
• Centre for Environment Education,  
• Forest Research Institute  
• Bhabha Atomic Research Center.  
• Wildlife Institute of India  
• Bombay Natural History Society  
• Confederation of Indian Industry

- The Energy & Resources Institute
- Indian Institute of Technology, Delhi
- Coordination (on behalf of State Govt. ) of institutional cluster in Knowledge city – IISER, INST, CIAB, NABI, ISB for knowledge sharing and synergistic functioning

- National Thermal Power Corporation (NTPC)

- International Level Organizations

- United Nation Development Program (UNDP)
- United Nations University Institute for the Advanced Study of Sustainability
- GIZ
- World Wide Fund for Nature
- Wetlands International-South Asia (WISA)
- World Intellectual Property Organization
- United Nations Industrial Development Organization

## **8. How strong are the links of the council with local industry units/associations?**

About 6000 industrial units in the State and from Haryana, Himachal Pradesh, Uttar Pradesh, Uttarakhand, Bihar, Jharkhand, J&K, Chattisgarh, Gujrat and Karnataka have taken technical consultancy from the Council. These include the following category of industries:

- 8.1.1 Steel Re-rolling Mills
- 8.1.2 Brick Kilns
- 8.1.3 Induction Furnace Industry
- 8.1.4 Cupola Furnace
- 8.1.5 Rice Shellers

The Council usually works through Industrial Associations and has strong linkages with the following:

- i. Confederation of Indian Industry
- ii. PHD Chamber of Commerce & Industry
- iii. All India Steel Re-rolling Mills Association
- iv. All India Brick Kiln Owners Association
- v. State Associations in Brick, Steel Re-rolling, Foundry and Rice Sheller Sectors.
- vi. Bicycle Association of Ludhiana
- vii. Sports & Toys Exporters Association

## **9. List 5 major technology areas, where the council can play an important role by finding convergent technological solutions.**

The major technology areas where the Council can play important role are:

- i) Air Pollution Control and Energy Efficiency in Industry.
- ii) Energy Auditing
- iii) Technologies for sustainable livelihood generation at grass root level.

- iv) Secondary agricultural technologies.
- v) Upgradation of technologies used by industrial clusters by providing off-patent information.

**10. Proposed budget outlay for the 2018-19**

Details	Amount (Rs. in lacs)
Balance Excess expenditure of 2017-18	10.70
Manpower	188.00
TA/DA	5.00
Office Expenses	9.30
Non Recurring Expenses	6.00
<b>Total</b>	<b>219.00</b>

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## Puducherry

### 1. Details of state S&T Council

Name of the Secretary & Member Secretary/Director General

**Shri. P.Parthiban, I.A.S**

Secretary (Science, Technology & Environment) cum  
Chairman (EC, PCS&T)  
Chief Secretariat,  
Puducherry-605001

Mobile. No.: +91-9440204797, Email: secyfy.pon@nic.in

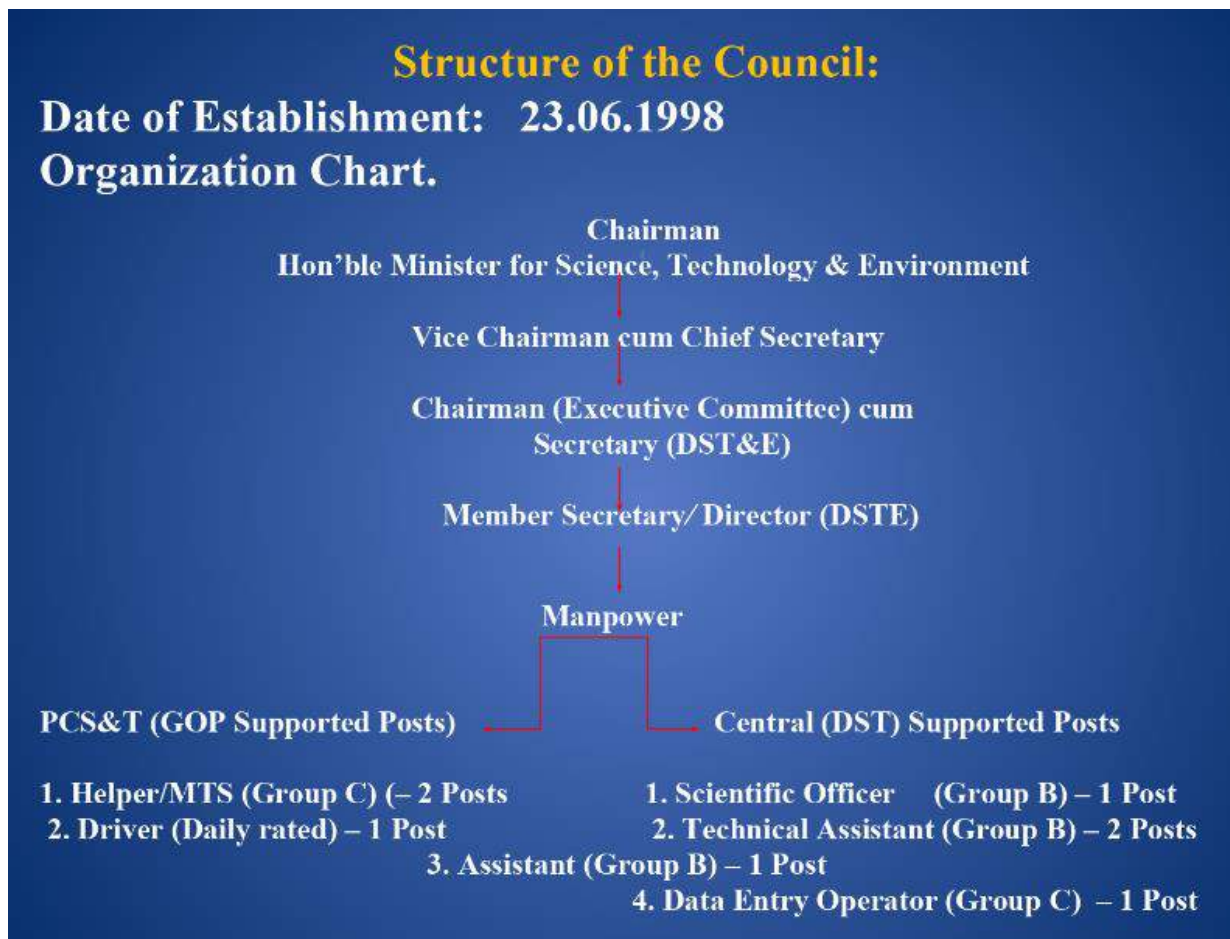
**Smt. Smitha. R,**

Member Secretary,  
Puducherry Council for Science & Technology  
PHB building, 3<sup>rd</sup> Floor,  
First cross, Anna Nagar, Puducherry-605005

Phone: +91-413-2201256, 2203494, Email: dste.pon@nic.in

### 2. Structure of the Council:

- a) Date of Establishment: 23.06.1998
- b) Organization Structure:



Sl:No	Name	Designation	Pay Scale	Approximate Monthly emoluments
<b>DST – GoI supported</b>				
1	E.Sivakumar	Technical Assistant	Rs.9300+ 4200	Rs. 39,000/-
2	P.Sathish Kumar	Technical Assistant	Rs.9300+ 4200	Rs. 39,000/-
3	C.Maguesvary	Assistant	Rs.9300+ 4200	Rs. 39,000/-
4	G.SivaSubramanian	Data Entry Operator	Rs.5200+ 2800	Rs. 33,000/-
5	S.Karthigaa	Scientific Officer	Contract Basis	Rs. 13,000/-
<b>State supported</b>				
1	K.Malathy	Helper	Rs.5200+ 1900	Rs. 31,000/-
2	S.Prabaharan	Helper	Rs.5200+ 1900	Rs. 31,000/-
3	J.Anandhan	Daily Rated Driver	Rs. 584/day	Rs.18,000/-

Sl:No	Year	State Government GIA (Rupees in Lakhs)	Central Government – Core Secretariat (Rupees in Lakhs)
1	2010-11	90.00	19.98
2	2011-12	90.00	C/F
3	2012-13	40.00	C/F
4	2013-14	120.00	C/F
5	2014-15	65.00	C/F
6	2015-16	100.00	19.98
7	2016-17	50.00	C/F
8	2017-18	50.00	11.50

c) Strength of approval manpower (Central (DST) and state supported)

**3. Budget allocation to your state S&T Council for last five financial years including central government, state government & any other sources.**

**4. Key activities under taken during the last two years in the area of :-**

- i. Technology Development.
- ii. Technology Demonstrations.
- iii. Popularization of Science.
- iv. Patents.
- v. Any New Innovative activities.

**Release of partial financial assistance for the conduct of conference / Seminar / Workshop by various educational / Academics institution funded by PCS&T**

- Financial Assistance of Rs.60, 000/- was sanctioned for conduct of National workshop on “Security Sustainable livelihood in Marine and inland fisheries and conservation of Resources” organised by Community Development Organisation Trust on 22.11.2017.

- Financial Assistance for an amount of Rs. 10,000/- was released on 19.02.2018 to Puducherry University to 36<sup>th</sup> National Conference of Indian Society of Professional social work.

- Financial Assistance for an amount of Rs. 50,000/- released on 28.02.2018 to Indian Science Congress Association for the conduct of National Science Day – 2018.

**Travel Grant to Academicians for presenting paper at International place funded in PCS&T**

- Partial Financial assistance of Rs.30,000/- was sanctioned as travel grant to Dr.P.Saravanan, Asst.Professor, PAJANCOA, Karaikal for attending International symposium on Weeds at Greece.

- An amount of Rs. 12,500/- was sanctioned as Travel grant on 29.03.2018 to Dr.S.Tamil Selvam, Associate Professor, Department of Information Technology, Pondicherry Engineering College, to present paper at International Conference on Information Technology at Dubai.

**Participation of staff's of PCS&T in various training program**

- Awareness and presentation programme on Astronomy was done by Thiru.E.Sivakumar, Technical Assistant for 100 Secondary Grade Teachers during a Workshop (TOT) organised by Periyar arts and Science College, Cuddalore on 31.08.2017.

- Presentation on Astronomy and Inauguration of Physics Department Association by E.Sivakumar, Technical Assistant, was organised on 01.09.2017 for college students of BWDA, Mailam, Tamil Nadu.

- Thiru. P.Sathish Kumar, Technical Assistant, participated in various science Competitions along with 20 Government school students in World Space Week Expo held at Sathya Bhama University, Chennai on 05.10.2017.

- One day Field Visit by Thiru. E.Siva Kumar, Technical Assistant to India International Science & Technology Exhibition Jointly organised by Anna University, Central Leather Research Institute and National Institute of Ocean Technology, Chennai on 14.10.2017.

- Thiru. E.Siva Kumar, Technical Assistant, participated in Energy Conservation Building Code (ECBC) workshop organised by Renewable Energy Agency of Puducherry (REAP) on 16.11.2017.

- Thiru E.Sivakumar, Technical Assistant, attended two weeks days training programme from 8<sup>th</sup> to 19<sup>th</sup> January 2018 organised by Indian Institute of Public Administration, New Delhi.

- Thiru P.Sathishkumar, Technical Assistant, attended 7<sup>th</sup> training Program on S&T Emerging trends in Governence for Scientists & Technologies on 12<sup>th</sup> to 16<sup>th</sup> 2018 conducted by IIPA, New Delhi.

- Thiru E.Sivakumar, Technical Assistant, participated in the Board of studies meeting on 06.02.2018 held at St.Joseph's College of Arts & Science, Cuddalore for drafting the syllabus for U.G and P.G. students of Physics Department.
- Thiru P.Sathishkumar, Technical Assistant, attended a Science Extravaganza programme at Nahar Public School, Villupuram on 24.02.2018.
- Thiru E.Sivakumar, Technical Assistant, attended one day workshop on 23.02.2018 organised by REAP, UNIDO and DSTE on Solar Thermal Technologies for Industries at M/s. Hotel sun way GRT, Puducherry.
- Thiru. P.Sathish Kumar, Technical Assistant, Thiru.G.SivaSubramanian, DEO and Tmt. J.Nithiya, Programme officer, attended Consumer Awareness programme on 15.03.2018 during the occasion of Consumer Awareness day -2018 organised by Government Middle School, T.N.Palayam, Puducherry.

#### **Sky Watching Activities organized by PCS&T**

- Sky watching programme by AKSCP on 26.08.2017 was conducted in the helipad ground of Lawspet, Puducherry for the public and students. Approximately 500 public participated and viewed the celestial objects.
- Sky watching programme by AKSCP on 26.08.2017 was conducted in the helipad ground of Lawspet, Puducherry for the public and students. Approximately 300 public participated and viewed the celestial objects.
- Conducted Sky Watching program on Total Lunar Eclipse on 31.01.2018 at Helipad by staffs of PCS&T in which nearly 800 general public witnessed the event through astronomical telescope. Massive outreach programme was organised for public in Co-ordination with Pondicherry Science Forum. Programme was conducted in 12 centres in Puducherry and 1 centre in karaikal. Total 15000 people observed the event.

#### **Financial Assistance released by PCS&T for conduct of other programs**

- Financial assistance of Rs.60,170/- was sanctioned to Pondicherry Science Forum for disbursal of magazines to all the government schools in the U.T. of Puducherry.
- Installation of 20 Kilowatt solar panel at Dr. Abdul kalam Science centre and Planetarium at a cost of Rs. 14.5 lakhs. On grid power connection was given on 04.09.2017 which has reduced the electricity bill of AKSCP by nearly 50%.
- Two days Awareness workshops was organised on 28<sup>th</sup> & 29<sup>th</sup> October 2017 on Ozone Depleting substance for Air-Conditioner technicians under the Chairmanship of Hon'ble Minister for Science, Technology & Environment. Nearly 80 Air-Conditioner technicians were benefitted.
- Financial Assistance of Rs.20,000/- was sanctioned to Government Middle School, Pandasozhanallur, Puducherry for the conduct of one day Educational Science tour.
- Financial Assistance for an amount of Rs. 60,000/- was released on 07.02.2018 to Pondicherry Science Forum for the conduct of Make Science Competition in Puducherry.
- Financial Assistance for an amount of Rs. 50,000/- released on 28.02.2018 to Pondicherry Science Forum for the conduct of National Science Day – 2018.
- Financial Assistance for an amount of Rs. 12,000/- was released on 28.02.2018 to Sutru Soozhal Kalvi Kazhagam for the conduct of National Science Day – 2018.
- An amount of Rs. 19,500/- was sanctioned on 17.03.2018 as financial assistance to Sutru Soozhal Kalvi Kazhagam, Puducherry for establishment of Herbal garden at Dr.Abdul kalam Science Centre and Planetarium(AKSCP).

- Financial Assistance for an amount of Rs. 12,000/- released to Pondicherry Science Forum from the funds of PCS&T for the conduct of Total Lunar Eclipse Program on 31.01.2018 at 13 places in Puducherry.
  - Organised two days South Regional Orientation workshop on the occurrence of Zero shadow Day on 10<sup>th</sup> & 11<sup>th</sup> March 2018 in Co-ordination with Pondicherry Science Forum
- Delivering Lecture for the benefit of the students and teachers in the U.T. of Pondicherry on S&T topics.**
- Special lecture by Member Secretary (PCS&T) to 55 nos. of faculties from Government Colleges in connection with the training programme organised by Human Resource Development Department, Pondicherry University at Dr.AKSC&P on 18.01.2018.
  - National Science Day - 2018 was celebrated in Dr.Abdul kalam Science Centre & planetarium, Puducherry on 02.03.2018. During this celebration three different lectures were given to 100 nos. of Government School students.

### **Events organized / conducted at Dr. Abdul Kalam Science Centre & Planetarium**

- Bi-monthly seminar was organised on 03.09.2017, which was lectured by Dr.V. Gopal, Prof. and HoD, College of Pharmacy, MTIHS for the benefit of the student and public community, Nearly 100 people participated and were benefitted by this programme.
- Drawing competition was conducted for school students on International Ozone Day celebration on 16.09.2017 and nearly 100 students participated in the event.
- Presentation on Hazardous waste, E-Waste and plastic waste was done in State level Awareness programme on sustainable waste management programme organised by PPCC and Pondicherry university on 09.09.2017 and 12.09.2017 was organised and nearly 250 participants from NGO's and Teachers were benefitted.
- Bi-monthly seminar was organised on 15.10.2017, which was lectured by Thiru C.Shanmugam, Senior Research fellow, Dept. Of Chemistry, Anna University, Chennai for the benefit of the student and public community, Nearly 100 people participated and were benefitted by this programme.
- Presentation on Hazardous waste, E-Waste and plastic waste was done in State level Awareness programme on sustainable waste management programme organised by DSTE and Pondicherry university on 27.10.2017 was organised and nearly 100 Teachers participants were benefitted.
- Third Bi-monthly seminar was organised on 03.12.2017, which was lectured by Thiru G.Santhanarajan, Director, CONCERT, Chennai for the benefit of the student and public community, Nearly 100 people participated and were benefitted by this programme.
- Winter vacation Science Camp was organised for the School students (both Govt. and Private) of 8<sup>th</sup> and 9<sup>th</sup> standard from 23<sup>rd</sup> to 31<sup>st</sup> December 2017. 102 school students participated in the camp. Eminent Resource persons from various fields like astronomy, Physics, chemistry, robotics, Environment and Art has delivered lecture. The valedictory function was chaired by Hon'ble Minister for Science, Technology & Environment and distributed the Certificates for the Best students.



- Drawing competition was conducted for school students on 18.03.2018 on the occasion of World Forestry and World water day celebrations. Nearly 100 students from various schools participated in the competition.

### **Science Exhibition Participation**

- PCS&T staffs participated in State Level Science Exhibition organised for three days on 3<sup>rd</sup>, 4<sup>th</sup> and 6<sup>th</sup> November 2017 organised by Dte. of School Education, at Navalur Nedunchezian Govt. Higher Secondary School. A separate stall depicting the activities of the Department and Mobile Science Exhibition Bus was displaced for the visitors and school students. Nearly 5000 school students and public participated in the exhibition.
- PCS&T staffs Participated in Regional Level Science Exhibition organised for three days on 28<sup>th</sup>, 30<sup>th</sup> and 31<sup>st</sup> October 2017 by Dte. of School Education, at Navalur Nedunchezian Govt. Higher Secondary School. A separate stall depicting the activities of the Department and Mobile Science Exhibition Bus was displaced for the visitors and school students. Nearly 5000 school students and public participated in the exhibition.
- Staffs of PCS&T participated in “Learning Festival” conducted by Azim Premji foundation for 4 days from 22-25<sup>th</sup> January 2018 and displayed Mobile Science Exhibition Bus, Sky Watching Activity, Science Documentation movies in which nearly 1000 government students were benefited.

### **General (other events)**

- A programme under the Chairmanship of Hon’ble Minister for Science, Technology & Environment was organised for Massive tree plantation with the support of Industries under CSR scheme on 14.09.2017.
- Awareness programme on Ozone Depleting substance was organised for NGO’s and Air-Conditioner technicians on 19.09.2017. Nearly 150 students were benefitted.
- 86<sup>th</sup> Birth Anniversary Celebration of Former President Dr. APJ Abdul Kalam was organised in AKSCP on 15.10.2017. Honouring the statue of Dr.Abdul Kalam was done Hon’ble Minister for Science, Technology & Environment.
- Inauguration of 20KW on grid Solar Power plant by Hon’ble Minister for Science, Technology & Environment on 15.10.2017.
- Stakeholders Intervention meeting was organised on 15.11.2017 for seeking funds from Department of Science and Technology, GoI. Accordingly 30 project proposals were received from various Educational / Research institutions of the U.T. of Puducherry, scrutinised and submitted to DST, GoI for release of funds.
- Foundation Stone Laying Ceremony was Organised for Construction of Office Building at Olandai, Puducherry on 29.03.2018 under the Chairmanship of Hon’ble Minister For Science, Technology & Environment

## **5. List 5 success stories with brief about 1 page including photographs, if available.**

### **5.1 National Science Day Celebration 2018**



- Financial Assistance for an amount of Rs. 50,000/- released on 28.02.2018 to Indian Science Congress Association for the conduct of National Science Day – 2018.
- Financial Assistance for an amount of Rs. 50,000/- released on 28.02.2018 to Pondicherry Science Forum for the conduct of National Science Day – 2018.
- Financial Assistance for an amount of Rs. 12,000/- was released on 28.02.2018 to Sutru Soozhal Kalvi Kazhagam for the conduct of National Science Day – 2018.

## **5.2 Sky watching and observing Lunar Eclipse Mass outreach programme 31.01.2018**



- Sky Watching program on Total Lunar Eclipse was conducted on 31.01.2018 at Helipad by staffs of PCS&T in which nearly 800 general public witnessed the event through astronomical telescope. Massive outreach programme was organised for public in Co-ordination with Pondicherry Science Forum. Programme was conducted in 12 centres in Puducherry and 1 centre in Karaikal. Total 15000 people observed the event.
- Monthly Sky watching programme by AKSCP is being conducted in the places like Gandhi Statue, Puducherry Beach and Helipad, Lawspet for the public and students. Approximately 200 public participated and viewed the celestial objects.

### **5.3 Zero shadow Day**



Students marking the shadow at regular time intervals observing the Zero Shadow Day on 21.04.2017 at Dr. Abdul Kalam Science Centre and Planetarium.

#### **5.4 Conduct of Bi-Monthly Seminar at Dr.AKSCP for School Students and Public**



- Bi-monthly seminar was organised on 15.10.2017, which was lectured by Thiru C.Shanmugam, Senior Research fellow, Dept. Of Chemistry, Anna University, Chennai for the benefit of the student and public community, Nearly 100 people participated and were benefitted by this programme.

#### **5.5 Summer Vacation Science Camp 2017 from 3<sup>rd</sup> May - 31<sup>st</sup> May, 2017 at Dr. AKSCP**



Summer vacation Science Camp being inaugurated by Hon'ble Minister Cum Chairman(PCS&T)





Valedictory of First Summer vacation Science Camp

## 5.6. Summer vacation Science Camp 2017 at Karaikal

Summer vacation Science Camp was inaugurated by Collector Karaikal



Valedictory of Summer vacation Science Camp -2017 at Karaikal

**5.7. Winter Vacation Science Camp from 23-31<sup>st</sup> December, 2017 at Dr. AKSC&P**



**5.8. Dr. Abdul Kalam Statue unveiled on his memorial day on 27.07.2017**



**5.9. Site inspection for Construction of Space Exposition Centre, Innovation Hub and Digital Planetarium at Thirunallar, karaikal**

Site inspection for Construction of Space Exposition Centre, Innovation Hub and Digital Planetarium at a cost of Rs.10.00 crores in 5 acres of land at Thirunallar, karaikal was done on 21.11.2017 under the Chairmanship of Collector-Karaikal, Director/M.S. (PCS&T) and Director (Visvesvarya Industrial and Technological Museum), Bengaluru.





**5.10. Visit to MSEB by the school students during the Regional Level Science Exhibition held on 28.10.2017 to 31.10.2017 at Navallar Nedunchezian Hr. Sec. School, Puducherry**



**5.11. Visit of the school students during the State Level Science Exhibition held on 03.11.2017 to 06.11.2017 at Navallar Nedunchezian Hr. Sec. School, Puducherry.**



**5.12. Inauguration of 20KWH Grid Interactive Roof Top Solar Power plant on 15.10.2017 at AKSCP at a cost of Rs.14.00 lakhs by Hon'ble Minister cum Chairman (PCS&T)**



**5.13. A view of the power plant installed at the terrace of Dr. Abdul Kalam Science Centre**



**5.14. Participation in World Space Week program by Government School students of Puducherry at Sathyabama University, Chennai held on 5th October, 2017.**



**5.15. Memorandum of Understanding for establishing Innovation Hub at Dr. AKSC&P was signed on 05.05.2017 by Member Secretary (PCS&T) and officials from NCSM, Kolkatta.**



**5.16. Drawing Competition & Prize distribution function commemorating the celebration of World Forest and Water Day Celebration at Dr. AKSC&P**



**5.17. Swatcha Pakwada was carried out in the Dr. Abdul Kalam Science Centre and Planetarium campus by the officials during September 2017**



**6. Has the council developed any specific state related S&T and innovation policy? If so the details to be provided.**

No specific state related S & T policy has been framed. Puducherry being a Union Territory, the policy and guidelines of DST are being followed and implemented.

**7. How strong are the links between other state government/ departments if so provide details?**

The PCS&T in the U.T. of Puducherry is functioning in the Department of Science, Technology & Environment since 1998. From its constitution, the Council is functioning in the Administrative Department of Science, Technology & Environment.

Hon'ble Minister for S&T is the Chairman and Chief Secretary is the Vice Chairman of the Council. Besides, the other members include Secretaries to Govt. and Heads of the academic / research institutes, each one nominee of Planning Commission and Department of Science & Technology (DST), GOI and Pondicherry University. Further the Executive Committee of the Council is headed by the Secretary (Sci., Tech. & Envnt.) and Director (DSTE) is Member Secretary for both the Council and Executive Committee.

From the PCS&T receives annual GIA from DSTE, GoP every year. The GIA received from the year 2010 are tabled below:

**8. How links of the local industry associations?**

Puducherry Science & very good industries and activities/ programmes are

Sl:No	Year	State Government GIA
1	2010-11	90.00 lakhs
2	2011-12	90.00 lakhs
3	2012-13	40.00 lakhs
4	2013-14	1.20 crore
5	2014-15	65.00 lakhs
6	2015-16	1.00 crore
7	2016-17	50.00 lakhs
8	2017-18	50.00 lakhs

**strong are the council with Units/**

Council for Technology has relationship with NGO's. Many awareness being sponsored

by different industrial units existing in the U.T. of Puducherry. Activities like Summer vacation science camp, Awareness programme on Ozone day, plastic ban, World Environment day are sponsored the Industries. Apart from above under corporate social responsibility scheme, repairing and maintenance of exhibits in Dr.Abdul Kalam Science Centre and Planetarium is being carried out a MNC.

**9. List 5 major technology area, where the Council can play an important role by finding convergent technological solutions.**

- i. Real time Student Science Projects.
- ii. Setting up of Digital classrooms with virtual science laboratory for school students.
- iii. Supporting the conduct of Science Fair in school and college levels.
- iv. Encouraging Women Science Programme.
- v. Solution to Location Specific Problem by both financial and technically.

- vi. S&T entrepreneurship training programme.
- vii. Patent support.

**10. Proposed programme and budget outlay for the year 2018-19.**

Apart from the regular activities of the council, the following programmes are proposed to be implemented with financial support of DST.

**10.1. Real Time Student Project Programme**

Puducherry Council for Science and Technology is aims to develop and utilize the tremendous talent and potential of students available in our U.T. of Puducherry and to use them for solving specific Scientific and Technological problems relevant and useful to our society. Under this Scheme financial support is provided to encourage the students of U.G (Professional) /P.G (Professional and Sciences) courses in Engineering/ Biology/ Physics/ Chemistry/ Medicine/ Agriculture/ Veterinary/ Environment / Social Sciences at the regular colleges and Universities (including Deemed to be Universities) to take up useful minor research projects to complete the dissertation work. A selected student is provided with a maximum grant of Rs. 10,000/-. About 100 projects in science and technology related to the selected disciplines are proposed to be sanctioned every year. After completion of the projects the grantees present their findings before the peer group in a seminar cum exhibition. Prizes are given to selected projects and models. Proposal seek financial assistance for an amount of Rs. 1.10 crores from DST, GoI has been submitted during the month of March 2018.

**10.2. Setting up of Digital classrooms with virtual science laboratory for school students.**

Tele teaching to school students with interactive terminal provisions. It is proposed to start with 10 schools on pilot bases with one central studio at Pondicherry. In Collaboration with the Directorate of School Education, Puducherry it is proposed to set up Digital Classrooms for enhancement of quality of education in schools with the supply of Teaching Learning Equipment (TLE). This Proposal may be implemented with technical and financial support from DST, GoI.

**10.3. Solution to Location Specific Problem by both financial and technically.**

**10.4. Patent support.**

A patent information centre shall be established with support of DST.

# Rajasthan

## 11. Details of State S&T Council

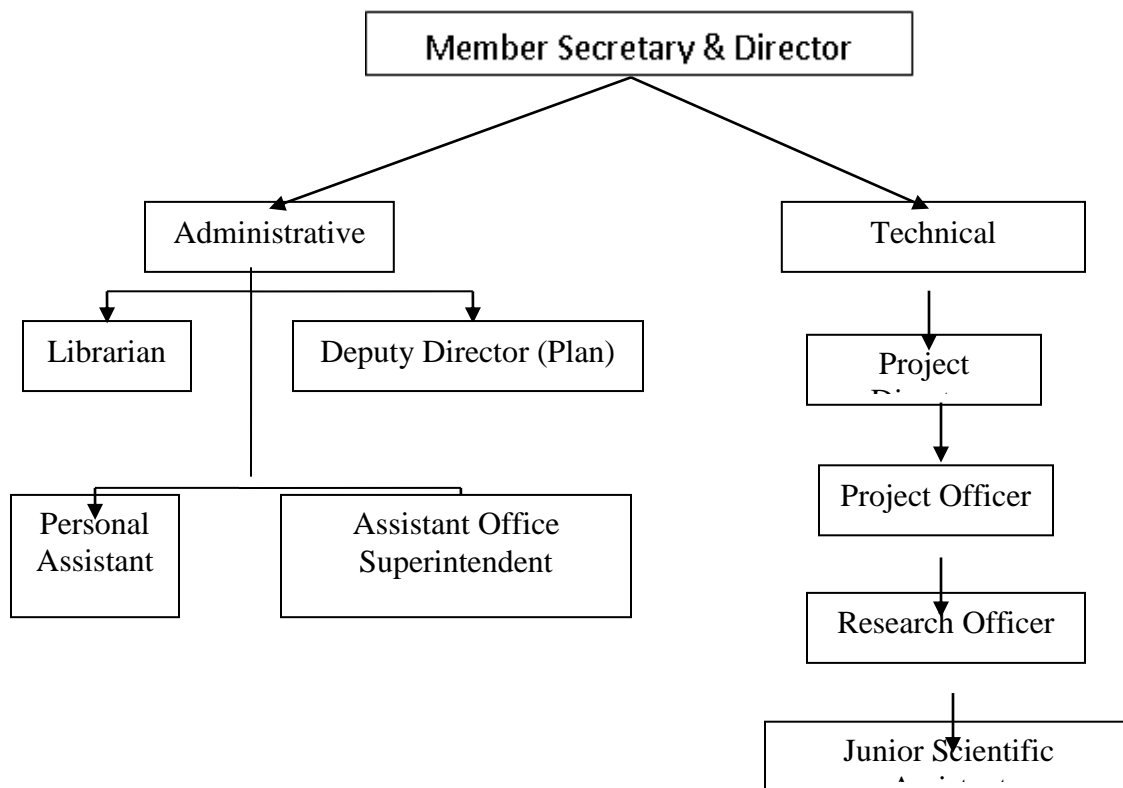
Name of the Secretary & Member Secretary : Shri Sandeep Verma IAS  
Principal Secretary, Vice Chairman,  
Executive Council

RAJCOST, Rajasthan  
Address: 506,4<sup>th</sup> Floor, Mini-Secretariat, Bani-  
Park,  
Jaipur Rajasthan

Email: [director-dst@rajasthan.gov.in](mailto:director-dst@rajasthan.gov.in),  
Phone/Fax: 0141-2200007, 2202041  
Mobile number: 9602021344

## 12. Structure of the Council:

- d) Date of Establishment :
- e) Organization Structure( DST GoI supported):



:

f) Strength of approved manpower [both central (DST) and state supported]

**Total:**176 (including DST GoI supported 22 posts), **Filled:** 96, **Vacant:** 80  
**Information of DST GoI supported posts**

Sl. No.	Name	Designation	Pay scale	Approximate monthly emoluments
1	Dr. Sadhna Mathur	Project Director (2)	PB-III 15600-39100 GP- 8200	75742/-
2	Dr. Parul Gupta Mr. Abhishek Singh Kilak	Project Officer (4)	PB-III 15600-39100 GP-6000	74416/- 64662/-
3	Mr. Rakesh Parihar	Research Officer (3)	PB-III 15600-39100 GP-5400	58854/-
4	Mr. Vijay Saxena Mr. Rajesh Garg	Junior Scientist Assistant (4)	61300/- Basic (7 <sup>TH</sup> Pay)	76399/- 76399/-
Total (A)	<b>Administrative</b>			
1	Vacant	Director (1)	-----	
2	Mr. Jwar Singh Meena	Deputy Director (1)(Plan)	108000/- Basic (7 <sup>th</sup> Pay)	1,33,840/-
3	Mr. Ghanshyam Das Mr. Sanjay Swami Mr. Ashok Dhanwani	Personal Assistant (3)	71300/- 69000/- 69000/- Basic 7 <sup>th</sup> Pay	88699/- 76399/- 76399/-
4	Mr. Deva Ram	Assistant Office Superintendent (1)	45300/- Basic ( 7 <sup>th</sup> Pay)	56719/-
5	Vacant	Steno (1)	PB-II 9300-34800 GP-3600	
6	Vacant	Librarian (1)	PB-II 9300-34800 GP-3600	

**13. Budget released to your state S&T Council for last five financial years including Central Government, State Government & any other sources.**

S. No.	Financial Year	Allocated Budget (In Lakh)
1.	2013-14	1089.17
2.	2014-15	2192.12
3.	2015-16	2860.44
4.	2016-17	3551.56
5.	2017-18	2962.77

**14. Key activities undertaken, during the last two years, in the area of:-**

4.16 **Technology Development:** Knowledge Partnership/MoU's with institutes of repute such as CEERI CSIR Pilani, MNIT, CU Rajasthan, NIIT and others have been signed. Deliberations with knowledge partners and other technical institutions are being made in this direction.

4.17 **Technology Demonstration:**

a. CEERI-CSIR, sensor based technology developed for preservation of water in irrigation is in execution in collaboration with State Council.

b. 15 RO Plants installed at Rajsamand District with support of CSIR-CSMCRI, Bhavnagar for providing safe drinking water by removal of saline and hardness of water.

c. A support of Rs. 10 Lacs has been given for skill based short term training and setting up of Industrial Exhibition & Training Centre at Manipal University, Jaipur.

d. A grant of Rs. 9.99 Lacs has been given to HELPS organization, and Rs. 6.785 Lacs to Shrushti Seva Samiti, Udaipur for pilot project on Sanitary Napkin and sanitization

**4.3 Popularization of Science:** Regular activities have been carried out.

Science Club, National Science Day, Technology Day, BARC Outreach programme, ISRO exhibition etc.

**4.4 Patents (Facilitated by Patent Information Centre)**

In wake of IPR Policy 2016 released by Government of India, Patent Information Cell has been strengthened and following measures have been taken:

- Formation of an expert group from IISc, IIT Delhi, NLU Delhi, NLU Jodhpur, RGNIIPM Nagpur



- National Conference organized at Jaipur on the theme “ National IPR Policy 2016 and Role of States” with stake holders from DIPP GoI, CGPDTM, Universities, Industries etc
- University IPR Meet organized at BISR, Jaipur with in collaboration with CIPAM, DIPP GoI
- IPR sensitization programme for 46 schools in collaboration with CIPAM, DIPP GoI ( 06 Feb. 2018)
- IPR training programme for police officers at RPA with support from CIPAM, DIPP GoI ( 11-12 Jan. 2018)
- IPR ToT programme for University and College Teachers at Jaipur with support from CIPAM, DIPP GoI (16-18 Feb. 2018)
- Guidelines for Universities IPR Cell framed and accepted by Five Universities namely University of Rajasthan, University of Kota, JNV University Jodhpur, MDS University Kota and Rajasthan Technical University Kota
- IPR Cell at above mentioned five Universities provided financial support of Rs. 2.00 Lakh each for strengthening IPR Cell
- State IPR Policy Draft approved by PIC, experts at PIC expert group meeting at NLU Jodhpur (9/3/18)
- For GI propagation, action agenda prepared and soon will be executed.

#### **4.5 Any new innovative activities:**

##### **Following new initiatives has been taken**

- A. Startup Boot Club has been successfully established by the Government at 71 Government Model Schools and 710 Startup kits distributed.
- B. Support of Rs. 296 Lakh provided for Rural Technology & Biotechnology Business Incubators has been granted.
- C. KARYA (Knowledge Augmentation and Research for Young Aspirants)programme initiated in coordination with Higher Education Department. KARYA programme is facilitating 100 Under Graduate and Post Graduate students of Rajasthan State to take up short term projects based problems in Basic Sciences at premier Institutions of DAE, CSIR, DBT, IIT's etc. The objective of KARYA is to support students of Rajasthan State to acquaint themselves with advance research based problems in Basic Sciences at Institutes of Eminence.
- D. Setting up HPC facility
- E. Skill Development Program in Partnership with DBT, in progress

ii)

#### **15. List 5 success stories with brief about 1 page each including photograph , if available.**

- i) Free coaching was provided to class XI and XII students from Government Schools for medical and engineering entrance exams in Hindi medium through SATCOM.
- ii) Proposed Sub-Regional Science Centre at Udaipur has been granted and additional amount of Rs. 5 Crore by UIT Udaipur. It will upgrade and enhance the impact of science activities to be carried out by Sub-Regional Science Centre.

- iii) Council facilitated technical 7 Technical Institutions for setting up LBI's (Livelihood Business Incubators) at 7 district under ASPIRE scheme of MSME, Government of India.
- iv) Support of Rs. 10 Lakh (each) for augmenting TBI activities in Rural Sector at four Govt. Engineering Colleges.

**16. Has the council developed any specific state related S&T and innovation policy? If so the details to be provided.**

Draft for State IPR Policy prepared for support & promotion of innovation and augmentation of NIPR 2016 objectives.

**17. How strong are the links between other state government /departments ? If so provide details.**

Following are the efforts done by RAJCOST for coordination and linking with other departments:

- A) MoU signed with CSIR-CEERI Pilani for developing Common Research Technology & Development Hub at Jaipur.
- B) Reverse Osmosis Plants being installed at Rajasamand district in coordination with CSIR-CMSCRI Bhavnagar.

**18. How strong are the links of the council with local industry units/associations?**

Following are achievements for working in close coordination with State line Departments and others

- A. Part of CII (Rajasthan State) Innovation and Start Up Task Force
- B. Nominated as member of higher level committee for executing and providing support for LBI proposals under ASPIRE scheme of MSME Government of India in coordination with State Government MSME Department.
- C. Coordination for Project Guidance cum Review Committee (PGRC) for DSIR supported CRTDH being created by CSIR-CEERI, Pilani in the area of Electronics / Renewable Energy Sector at Jaipur.
- D. State Remote Sensing & Application Centre, is executing multiple projects in coordination with Settlement, Forest, Revenue, Irrigation, UDH, IT, Agriculture and other departments at GoI.
- E. KARYA programme executed in coordination with Higher Education department

**19. List 5 major technology areas, where the council can play an important role by finding convergent technological solutions.**

- A. Availability of clean and pure water preferably in dark zones of Rajasthan.
- B. Availability of clean energy in terms of Solar Power
- C. Supporting farmers foremployment generation through agro-technology such as soya milk and bio-fertilizers units
- D. Technology based applicationfor preservation of Heritage Management
- E. Support for GI & Heritage products

**10. Proposed budget outlay for the 2018-19**

<b>S. No.</b>	<b>Name of Scheme</b>	<b>Budgeted Outlay</b>
1	Science & Technology	361.02
2	State Remote Sensing Application Centre	1021.00
3	Science & Society	120.77
4	Science Communication & Popularization	375.40
5	Biotechnology	112.03
6	Entrepreneurship Development	99.88
7	Patent Information Centre	32.67
8	MIS	266.80
9	Research & Development	199.86
10	Construction works in Science & Technology	641.00
	<b>Total</b>	<b>3230.43</b>

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**Sikkim**

**11. Details of State S& T Council**

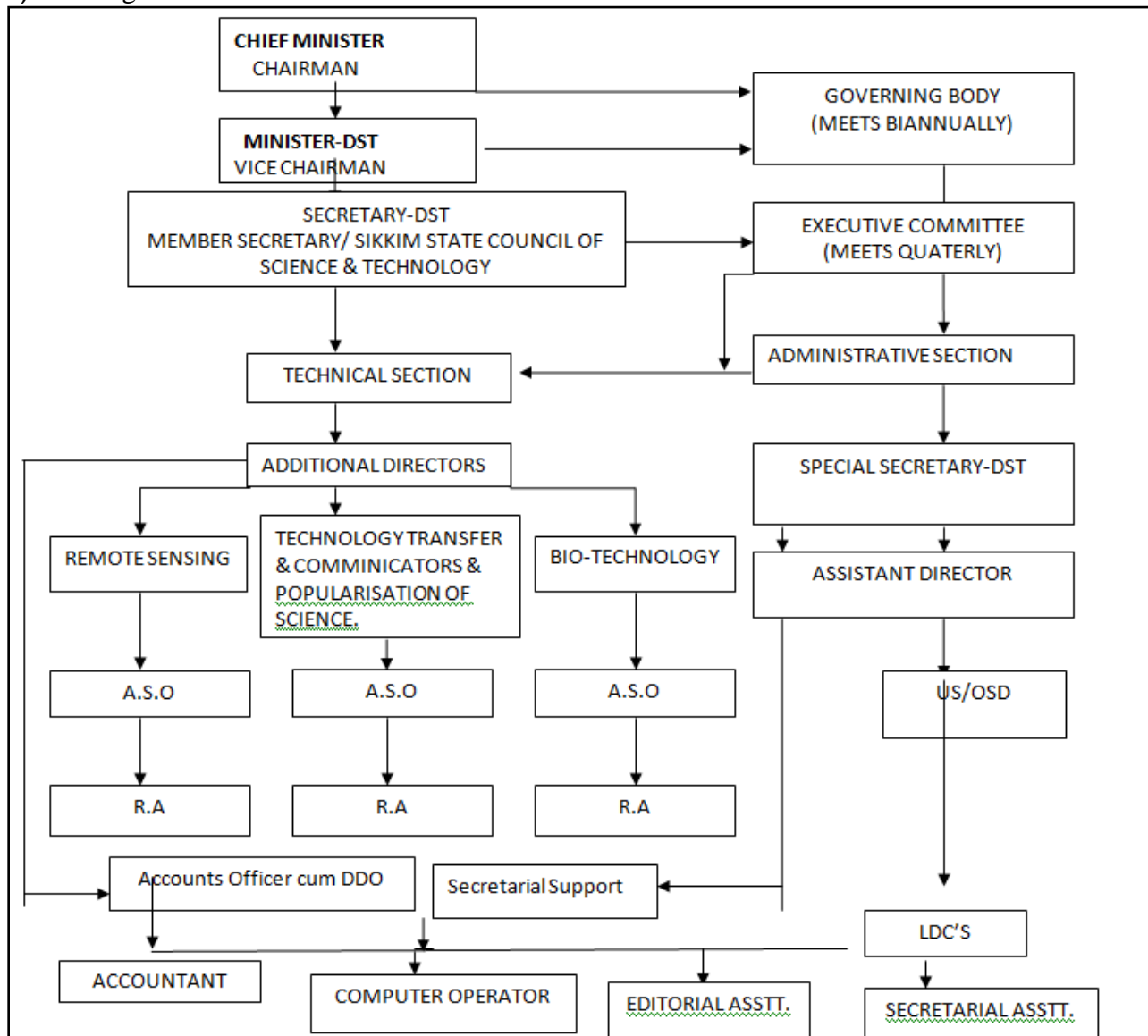
Name of the Secretary & Member secretary:

**DR. K. JAYAKUMAR, IAS**

Principal Secretary DST cum Member Secretary  
 Sikkim State Council Of Science And Technology  
 Vigyan Bhawan, P.O Deorali, Gangtok,  
 East Sikkim- 737102  
 Phone: 03592-280002; E-mail: [secydst@gmail.com](mailto:secydst@gmail.com)

**12. Structure of the Council:**

- d) Date of Establishment. November, 1997
- e) Organization Structure:



**CORE MANPOWER OF SIKKIM STATE COUNCIL OF SCIENCE & TECHNOLOGY.  
LIST OF OFFICERS & STAFF**

Name	Designation	Pay scale	Approximate monthly emoluments (Rs)
Dr. K. Jayakumar, IAS	Secretary	80,000.00	2,32,400.00

Name	Designation	Pay scale Upto June 2017 (Rs)	Pay scale from July 2017 (Rs)	Approximate monthly emoluments (Rs.)
Dr. K. Jayakumar, IAS	Member Secretary			
<b>Supported by DST, GOS Grants-in-Aid</b>				
Dr. B.C. Basistha	Additional Director	42,760.00	44,050.00	1,11,075.00
Shri D.G. Shrestha	Additional Director	42,760.00	44,050.00	1,11,075.00
Shri D.T. Bhutia	Additional Director	42,760.00	44,050.00	1,11,075.00
Shri K.B. Subba	Asst Scientific Officer	24,580.00	25,320.00	63,300.00
Shri Narpati Sharma	Asst. Scientific Officer	19,940.00	20,550.00	51,376.00
<b>Supported by DST, GOI Grants-in-Aid</b>				
Shri Suman Thapa	Asst. Scientific Officer	23,560.00	24,270.00	60,676.00
Shri Rinzing N. Lepcha	Asst. Scientific Officer	Consolidated	Consolidated	25,000.00
Shri Nabeen Sharma	Computer Operator	11,430.00	12,140.00	19,497.00
Ms. Eden Bhutia	Secretarial Assistant	14,700.00	15,150.00	36,663.00
Smt. Sonam O. Bhutia	Editorial Assistant	14,090.00	14,530.00	37,343.00
Smt. Neeta Maya Rai	Librarian	14,090.00	14,530.00	37,343.00
Shri Dadul Lepcha	Accounts Clerk	10,070.00	10,380.00	26,677.00
Shri Tika Ram Sharma	Peon	11,650.00	12,000.00	30,840.00
Shri Rohit Kr Pradhan	Account Consultant	20,000	20,000	20,000
Ms. Pema Zangmu Lepcha	ASO	20,000	20,000	20,000
<b>Supported by State Grants-in-Aid</b>				
Shri Tashi Bhutia	Peon(Consolidated)	Fixed	-	9,000.00
Shri Tenzing Bhutia	Peon(Consolidated)	Fixed	-	9,000.00
Shri Karma Bhutia	Peon(Consolidated)	Fixed	-	9,000.00
Smt. Anita Basnett	L.D.C (MR)	Fixed	-	7,000.00
Shri Dadul Bhutia	Craftsman	Fixed	-	9,000.00
Shri Hari P. Sharma	Peon(MR)	Fixed	-	9,000.00
Smt. Nar Maya Gurung	Peon(MR)	Fixed	-	7,000.00
Smt. Premika Gurung	Peon(MR)	Fixed	-	7,000.00
Km. Ganga Limboo	Peon(MR)	Fixed	-	7,000.00
Smt. Ran Maya Karki	Safai karmachari (MR)	Fixed	-	7,000.00
Mr. Arpan Lepcha	Safai karmachari (MR)	Fixed	-	7,000.00
Smt. K. Doma Lepcha	Peon(MR)	Fixed	-	7,000.00
Mrs. Nisha Gurung	Office Helper(MR)	Fixed	-	7,000.00
Shri Rohit Chettri	Night Guard(MR)	Fixed	-	7,000.00
Shri Bijay Pradhan	Driver(MR)	Fixed	-	7,000.00
Shri Am Bdr. Manger	Driver(MR) 307	Fixed	-	7,000.00
Shri Lakpa Tsh. Lepcha	Driver(MR)	Fixed	-	7,000.00
Shri Sonam Bhutia	Driver(MR)	Fixed	-	7,000.00
Prem Kumar Chettri	Driver(MR)	Fixed	-	7,000.00

Ms. H. Basnet	Special Secretary	45490.00	1,08,267.00
Ms. Tshering Donka	Dy. Director	26360.00	62,737.00
Mrs S. Chettri	Under Secretary	18840.00	47,679.00
Smt Neetu Gazmer	PS to Secretary	16640.00	41600.00
Shri Tseten Pradhan	APO s	14300.00	33,884.00
Km. Januka Tamang	OS	18150.00	43,198.00
Shri Nima Tshering Sherpa	Junior Accountant	11790.00	29476.00
Smt. Binita Shrestha	R.A. (Adhoc)	Consolidated	18,000.00
Shri Benoy Kr. Pradhan	Research Asst.	15670.00	37,295.00
Ms. Geeta Cintury	H.A.	19120.00	45,506.00
Smt. Sashi Kala Pradhan	UDC	17580.00	41,840.00
Smt. Sushila Pradhan	UDC	17310.00	41,198.00
Smt. Nisha Gurung	Steno II	15340.00	36,509.00
Smt. Prem Kum. Luitel	LDC	9480.00	23,640.00
Smt. Poonam Pradhan	LDC	10420.00	24,800.00
Smt. Lakpa Doma Tamang	LDC	13570.00	34875.00
Ms. Tshering Y. Bhutia	Lab. Attendant	8870.00	21,280.00
Smt. Saroj Lepcha	Lab. Attendant	8350.00	20,121.00
Smt. Dawa G. Bhtuia	Lab. Attendant	8350.00	20,121.00
Shri Suresh Rai	Peon	11540.00	27,465.00
Shri Raju Rai	Peon	8870.00	21,280.00
Smt. Sancha Kri. Rai	Peon	8350.00	20,121.00
Shri Sarad Pradhan	Driver	13200.00	28,767.00
Shri Ram Bdr. Gurung	Driver	13600.00	32,368.00
Shri Ongden Lepcha	Driver	9430.00	22,529.00
Shri Bikash Pradhan	Driver	9430.00	22,529.00
Shri Sonam Bhutia	Driver	10200.00	23,848.00
Shri Gyampa Sherpa	Driver	9430.00	22,529.00
Ms. Neeru Sunar	Safaikarmachari	8870.00	21,280.00

#### PROJECT MANPOWER 2018-19

Name	Designation	Pay scale	Approximate monthly emoluments
Shri Rajdeep Gurung	Scientist 'B' -	Consolidated	50,000.00
Shri Laydong Lepcha	Information Officer	Consolidated	17,000.00
Dr. Sushan Pradhan	Research Assistant	Consolidated	25,300.00
Ms. Neelam Gurung	Jr. Research Fellow	Consolidated	13,800.00
Ms. Prerna Pradhan	Jr. Research Fellow	Consolidated	13,800.00
Shri Inchung Lepcha	Lab. Attendant	Consolidated	9,200.00
Shri Tika Psd. Sharma	Lab. Attendant	Consolidated	9,200.00
Ms. Ongkit Lepcha	Data Entry	Consolidated	10,900.00

	Operator		
Shri Kishore Psd. Sharma	Data Entry Operator	Consolidated	10,900.00
Ms. Pratima Ghimiray	Jr. Research Fellow	Consolidated	13,800.00
Shri Sherap N. Bhutia	Computer Scientist	Consolidated	30,000.00
Mr Pravakar Gurung	Research Assistant	Consolidated	25,000.00
Mr Niraj Sharma	Data Entry Operator	Consolidated	21,000.00
Ms. Chunkila Bhutia	Project Assistant	Consolidated	9,200.00
Shri Radha Krishna Sharma	Scientist 'B'	Consolidated	55,000.00
Shri Pranay Pradhan	Scientist 'B'	Consolidated	55,000.00
Shri Bandan Gazmer	JRF	Consolidated	13,800.00
Shri Bhaichung Lepcha	JRF	Consolidated	13,800.00
Shri Dilli Ram Dahal	JRF	Consolidated	13,800.00
Ms. Dipa Rupa Sharma	Project Assistance	Consolidated	16,000.00

**13. Budget allocation to your State S&T Council for last five financial years including central government, State government & any other sources.  
(Amount in lakhs)**

Sl.No.	Financial Year	State Govt. Allocation	Central Govt. Allocation	Other sources	Total
1.	2011-12	106.00	68.00	--	174.00
2.	2012-13	202.90	88.37	--	291.27
3.	2013-14	199.00	88.97	--	287.97
4.	2014-15	246.45	100.07	--	346.54
5.	2015-16	203.75	101.88	-	305.63
6.	2016-17	279.43	135.80	27.00	442.23
7	2017-18	308.00	125.04	-	433.04

**4. Key activities under taken during the last two years in the area of:-**

**a. Technology Development:**

**4.1.1. Developed two new cymbidium hybrid:**

Two new cymbidium hybrids developed. One is hardy and long lasting type and another large flowered. In both the cases the traits of original *Cymbidium lowenium* of the region is re-expressed. Sikkim is also known for orchids. There are very few indigenously developed orchid hybrid which will have the commercial importance.

**4.1.2. Developed and demonstrated integrated method of azolla cultivation and System Rice Intensification(SRI):**

In this method, low requirement of water and rice seedling is demonstrated during rice cultivation. The integration of azolla in the SRI method of rice cultivation helped in considerable weed control in the rice field and enrichment of nutrients.

#### **4.1.3. Successfully developed the protocol for tissue culture of large cardamom for propagation of elite quality planting material:**

The protocol for tissue culture of large cardamom for propagation of elite quality planting material is successfully developed for all the popular cultivars. In the next phase, large scale production will be made and distributed to the farmers under a project funded by DBT, GOI.

##### **b. Technology Demonstrations:**

- a. Demonstration of Tissue Culture techniques and transfer of technology.
- b. Demonstration of modified cultivation practices of large cardamom for shortening gestation for fruiting from three years to two years.
- c. Rain Water Harvesting for drinking purpose at Suldung Kamling GPU funded by UNDP
- d. Development of dryer for Cardamom, Ginger, Mushroom and ether herbs and vegetables energized by Nano Hydel Power generated by Local Water Streams of Sikkim
- e. Micro Solar Dome for rural households for 24 x 7 solar lighting

#### **4.3. Popularization of science:**

- i. Awareness programme on Organic Farming to farmers / NGOS and Panchayat Members in all four districts of Sikkim
- ii. Awareness workshop on Climate Change Adaptation in 15 senior Secondary Schools on all four districts of Sikkim
- iii. Awareness programme on Biodiversity and its preservation and sustainable utilization
- iv. Master Trainers Workshop on Low Cost Teaching Aid for teaching Physics and Chemistry to 100 science teachers at Sikkim Science Centre, Marchak
- v. Training to the College student on the Remote Sensing and GIS application, Geoinformatics and Climate change.
- vi. Awareness workshop on Traditional Knowledge with respect to medicinal plants of Sikkim to College Science Students and NGOs
- vii. 15 days workshop on tools and techniques of Animation to students at Vigyan Bhawan
- viii. Training on tools and techniques of Biotechnology to Research Scholars and College Students of Sikkim at Biotechnology laboratory at Vigyan Bhawan, Deorali, Gangtok



- ix. Biotechnology outreach and awareness programmes in 30 school in all four districts of Sikkim
- x. Awareness lecture series on Intellectual Property Rights in Colleges, University and students and public
- xi. Training on Bioinformatics to Research Scholars and College faculty
- xii. Laboratory exposure of science students of various schools of Sikkim.
- xiii. National Science Day 2016-2017 at State Level
- xiv. National Children Science Congress 2017: organisation of District and State level competitions
- xv. INSPIRE scheme 2016-17: Organization of District and State level competition
- xvi. Radio Serials in Science in collaboration with All India Radio and Vigyan Prasara

**Innovatin Hub developed in collaboration with National Innovation Foundation and BITM, Kolkata**

**4.4 Patents:**

1. State PIC has filed for Patent in Agriculture Tool
2. Applied for GI in six item viz: Sikkim Mandarin, Sikkim Temi Tea, Lepcha Hat
3. Copyright filed for two film stories by PIC
4. Protection of Plant Variety and Farmers Right (PPV&FR) for one local rice variety (Kalo Nunia)

**4.5. Any new innovative activities**

- Siphoning of Excess lake water at high altitude South Lhonark lake to prevent Glacial Lake Outburst Flood
- Networking programme with Agriculture department on GIS and Remote Sensing for Micro planning on Agriculture sector
- Networking with Water Resource and River Development Department for preparation of DPR on River Training Works
- Collaborative programme with Land Revenue & Disaster Management Department for GLOF mitigation of South Lhonark Lake
- Forest Environment and Wildlife Management Department for Integrated Watershed Development Programme,
- UNDP and Rural Management Development Department for Spring shed Development under National Adaptation Fund for Climate Change

- Networking with the GIZ for Technical cooperation on Climate Change Study
- Networking with UNDP on Climate Change Adaptation Programme and Wet land Mapping
- Collaborative programmes with Swiss Development Cooperation for CCA
- Networking with UNDP for Rain water Harvesting at Rain shadow Area in West Sikkim
- Collaboration with NB Institute of Rural Technology for Promoting Micro Solar Dome Technology in Tribal Pockets of Sikkim in Different Agro Climatic Condition and Varied Type of Housing.
- Innovatin Hub developed in collaboration with National Innovation Foundation and BITM, Kolkata
- Automatic realtime online monitoring of the flood levels of a specific area, based on such remote cyber surveillance systems and image processing methods, will help to obtain instant flooding and water level rising event alerts. The method can better meet the practical needs of disaster prevention and help evacuate human habitation areas that would to be affected on account of flooding.

The system relies on dynamic detection of floods and overflow/ inundation is considered an intrusion object in the video surveillance image. A surveillance video from a small-scale field of view is used as the input source in order to monitor the water flow and water flow level trends in the image features are discerned. An image segmentation technique is used for removing the surrounding objects, such as building and the geographical background, and separating the intrusive objects for a subsequent risk analysis.

- A region- based image segmentation method and flood-level classifiers are used to identify the on-site variation of the rivers water levels in the identified flow terrain area to determine and calibrate the corresponding risk levels.

- **Development of Empirical equation for Glacial Lake Volume and area**

The Sikkim State Climate Change Cell under Sikkim State Council of Science and Technology recently developed a Glacial lake volume and area equation based on the scientific interventions carried out at South Lhonak lake. The Scientific paper is published in Journal 'Natural Hazards', Springer Publication, Journal of the International Society for the Prevention and Mitigation of Natural Hazards. The paper deals with the complete assessment of rapidly growing South Lhonak glacial lake in Sikkim Himalaya with sustainable adaptation and mitigations plans to tackle the GLOFs in the region. For the first time in Indian Himalaya, the team led by R.K.

Sharma proposed an empirical equation for the volume-area relationship in South Lhonak Lake. Based on the measured volume and vector layer of all the lake boundaries derived from the multi-temporal satellite images, they proposed an empirical relation between lake volume and area of South Lhonak glacial lake.

$$V = 0.0522 \times A^{1.1766} \quad (R^2 = 0.99)$$

where  $V$  is the volume,  $A$  is the area, and  $R^2$  is the coefficient of determination.

The equation, first of its kind in Indian Himalaya, gives more accurate estimation of volume for the glacial lakes in the Himalaya with smaller error compared to the equation developed by Huggel and others (2004), and Yao and others (2012). The present equation can be extensively used to calculate the storage capacity of similar moraine-dammed glacial lakes in Sikkim Himalaya and Indian Himalaya as a whole.

#### ▪ **Early Warning Flood Detection And Monitoring System**

Hilly regions of the himalayan belt near glaciers will need preparedness and early warning systems for evacuation of persons in the event of Glacial Lake outburst flood (GLOF) due to the breaching of moraine walls in the higher altitudes. Glacial Lake Outburst Floods (GLOFs) – events are caused by the breach of moraine-dammed lakes.

Conventional flood monitoring uses on-site water-level measurement facilities, such as rainfall observation stations, water level observation stations, and meteorological stations.

However, direct sensor measurement of the water level is restricted by the particular limitations of the sensor installation location and the unavoidable requirement of frequent maintenance. It also has the disadvantage of obtaining only water-level information and not visual evidence for judgment. Therefore, recently, the integration of flood monitoring systems and image processing techniques for flooding and inundation monitoring has become vital for flood disaster prevention.



Moreover, for both precipitation and flood forecasts, the results are not necessarily in line with the real situation and it is difficult to obtain precise results for small hilly terrains and local areas, on account of uncertain factors in the natural climate system, e.g., the complex interactions between hydrology, monsoon, drainage, cloud burst etc.

Hence, a visual flood monitoring system for near real-time flood overflow detection and flood risk evaluation using remote surveillance videos, can be used as a cyber surveillance tool for instant flood monitoring and early warning system.

The communication equipments enable to control the **Bono** integrated electronic siren from an entity's own facilities, or from third parties facilities: for example via common computer WiFi network or structured cabling.

## **Coordination with GIZ & UNDP Partners in different line Department**

### **I. Oak Forest Rehabilitation in Sikkim**

- It is a continuation of the previous activities of GIZ CCA-NER
  - Oak rehabilitation handbook was prepared
  - Climate modeling of Oak forest was done
  - Capacity building of forester on Oak mapping
- 1) This year project focus is on implementation of recommendation for Oak forest rehabilitation. One of the recommendation for Oak rehabilitation is direct seeding of oak species
    - I. Direct seeding exercise mainly practices in Turkey and Russia
    - II. This is an old fashion technology but still in use in many parts of the world
    - III. Comparatively cheaper and effective then raising a oak nursery and replantation

### **II. Integrated beekeeping activities in Sikkim**

- 1) Feasibility study to understand the gaps on beekeeping development program in Sikkim
- 2) Development of 20 numbers of state master trainer on Beekeeping (1<sup>st</sup> May-5<sup>th</sup> May 2017).
- 3) Advance training for state master trainer on queen bee rearing techniques and exposure visit in Himachal Pradesh
- 4) Development of beekeeping handbook for farmers ( under publication)
- 5) Demonstration of clay hives in the farm of master trainer

- 6) Agreement with State Institute of Rural Development as training partner is under process
- 7) Hands-on training on queen bee rearing for state master trainers at Dr YSP University, Himachal Pradesh (21<sup>st</sup> Sept-27<sup>th</sup> Sept 2017)
- 8) Exposure visit for state master trainer on low cost beehives (clay hives construction mechanism), Himachal Pradesh (21<sup>st</sup> Sept-27<sup>th</sup> Sept 2017)
- 9) Demonstration of low cost clay hives by the master trainer in Sikkim after a study tour in Himachal Pradesh organized by GIZ

### **III. Spring-shed Development (*Dhara Vikash*) Programme**

A bottom up approach of increasing community resilience through capacity building at Block & District level in Sikkim. An Awareness program on Dhara Vikas (reviving springs) at 8 drought prone blocks in South and 4 in West Districts

#### **Objectives:**

- Simplify the scientific knowledge and technique of spring-shed development to the stake holders
- Encourage stakeholder's participation in spring revival initiatives.
- Publication of Training handbook & posters in English and Nepali languages on Dhara Vikash for dissemination of knowledge and creating awareness among communities at block/panchayat level.

#### **Outcome**

- Communities and local stakeholders become aware and got sensitized on the Dhara Vikas initiative.
- More than 1000 community participants from 12 drought prone blocks were sensitized.
- Now onwards people showed their willingness to own the programme and participate in this initiative with the government.
- Dhara Vikas programme will become a community programme for ensuring effective source sustainability.
- Production of "*A user manual for Spring shed development to Revive Himalayan Springs*" and *Flex: "Can you Revive Your Springs"* in English & local Nepali language

### **IV. Assessing the Impacts of Invasive Species on Forest Ecosystem in the State of Sikkim**

#### **Need for Mapping of Invasive Species**

Invasive species mapping is vital to keep track on the expansion or shrinkage in biologically invaded areas. This way, a better scope with new interest can be generated among various stakeholders in understanding invasive species better. Maps can also act as an important graphic tool to develop a plan for management of invasive species.

Upon analysis of the prioritization matrix *E. adenophorum*, *L. camara*, *M. micrantha*, *C. odorata*, *A. conyzoides* and *T. diversifolia*. were observed to be the main invasive species based on various parameters. The short-listed species were then taken into account and a survey questionnaire was designed and field survey planned accordingly for further analysis.

### **Objectives of the Study**

- i. Assessment of the impact of invasive species on the ecosystems and biodiversity.
- ii. Geospatial mapping of areas under the influence of invasive species and suggest the monitoring and action plan to FEWMD for tracking the invasive spread.
- iii. Forest type and range-wise assessment of the invasive species.

The study on mapping the distribution of short-listed invasive species was carried out in the South Sikkim district. However, due to a limited time available for the study, it was not possible to take mapping of all the invasive species. During a meeting conducted with FEWMD and IORA, it was decided to map only invasive species, which are posing immediate threats to the ecosystem through prioritization Matrix.

## **V. Inventorization of Water Resources in Sikkim Himalayas**

### **GIS Mapping of the spring water sources with ground truthing by GPS survey**

**Rationale:** The main aim of the spring's initiative is to understand the working of the spring-shed and to conserve and reinstate the sustainability of these primary water sources in Himalayan region which otherwise has been dwindling largely due to the impact of climate change.

### **Objectives**

- Training of manpower for the process of geo-tagging and data collection with the help of GPS device
- Geo-tagging of 500 springs starting from the drought prone area of the state
- Collection of basic information of individual springs in a prescribed format
- Mapping of the Geo-location of this springs and basic information in GIS Platform.

### **Outcome**

- The Spatial information of the springs are being captured in GIS platform which can readily be used for various planning/policy initiatives, research analyses and water conservation and management initiatives.
- The total database of more than 2000 springs spread across the drought prone areas of the state will be made available.
- Trained field functionaries for scaling up the initiative.

## **VI. Strengthen monitoring of springs in drought prone areas of Sikkim**

**Rationale:** Precisely in the context of springs the variability of discharge is ultimately the result of changes in the recharge (Rainfall) or aquifer structure. This is impacted largely due to climate change in mountain ecosystems. The knowledge of seasonal variation of supply and data on seasonal water demand will help to design effective strategies to combat scarcity.

### **Objectives**

- Identification of springs/sites and setting up monitoring mechanism through instrumentation for Spring discharge and precipitation
- Creating manpower for monitoring process to be followed

### **Expected Outcome:**

- Backup for policy level decision making for rural water security of Sikkim
- Daily Monitoring of critical springs through instrumentation and monthly monitoring of significant spring discharge manually during lean period
- Creation of database of springs for future Research and Studies & Policy interventions

## **Preparation of Wetland Atlas of Sikkim Using Remote Sensing and GIS**

Sikkim is very small, it has a very diverse physical feature that is naturally blessed with various types of wetlands. Using LISS-IV image of the year 2015-16 a total of 677 lakes have been identified, that covers an area of 3162 ha excluding rivers and small lakes below one hectare. The main objectives of the project is to Mapping the wetlands of Sikkim using IRS LISS IV Satellite imageries following a standard wetland classification system as per National Wetland Atlas: India, 2011, creation of a seamless wetlands database of the states in GIS environment, etc . In Sikkim there are a total of **671** high altitude lakes. The remaining 6 are low altitude lakes. There are 102 rivers and streams in the state. The North District has the highest number of wetland, having 501 lakes. The West District has around 70 lakes and the East District has 103 lakes. The South district has the lowest wetland area, consisting of only 3 lakes.



## India Enterprise Portal

### Brief Overview

The *India Enterprise Portal* has been architected for the Ministry of Micro, Small and Medium Enterprises under the Scheme for Promotion of MSME in the North East Region and Sikkim, on the basis of validated approaches in the earlier deployments of the [skillyoungindia.com](http://skillyoungindia.com) and [indiaskillpedia/ techpedia](http://indiaskillpedia.com) portals.

The Strategic approach which guided the development and deployment of the Portal relies on presenting a unified blackboard architecture and collaboration platform, serving as a cyber ecosystem, cutting across the boundaries of several Ministries, State Agencies, Industries and Institutions serving the cause of promotion and growth of entrepreneurship, startUps and MSME's in our nation.

The portal relies on distributed, decentralized content updation of operations, sharing of information/resources by the network of partners, state agencies as also the Enterprise Development Centres, which are proposed facilitation centres being set up across the nation on the lines of PHC/ ICDS centres and such other field Offices of the governments.

The India Enterprise Portal encompasses functionality and features for **online delivery of services- eServices**, to entrepreneurs/ startUps – aligned with

- (a) their profile and requirements as discerned from their inputs, interactions during the use of the portal, as also from
- (b) the posting of their needs by facilitators, on the basis of counselling and facilitation services offered by various field operatives and centres.



**The Portal encompasses functionality features besides eServices, which includes ;**

- (i) **Knowledge Repository** with authoring systems,
- (ii) **eMarket Place**,
- (iii) unified view of information related to **programmes and schemes** for entrepreneurs notified and implemented by the Ministries of Govt. of India,
- (iv) **R & D Solutions and Technologies** developed by various Institutions,
- (v) **Directory Services and Profile pages** for each of the Registers Users, Industries, State Agencies and Institutions,
- (vi) **Events** notification with mention of follow up action required
- (vii) **Streaming blog/ youtube anchors** and contents
- (viii) **Ideas and Opportunities in Focus Sectors** with blog contents and relevant resources to evoke interest and enthusiasm in entrepreneurs

The portal applies **cognitive methods** to enhance comprehension and ease of understanding with visual cues, tool tips, enriched GUI and interactive features and system intelligence for notifications, messages and onscreen alerts to users to draw their attention and engage them in the process of on-boarding them and promoting patronage in the use of the facilities offered on the portal.

The solution architecture for the portal subscribes to the **paradigm of Open innovation**, which is becoming increasingly relevant in the current scenario where collaboration, networking and partnerships play significant roles to determine success and outcomes.

**System intelligence** is built in to enable log the user activity on the basis of his consent in order to provide him customized links and recommendations adapted to his needs.

#### **Organisation of Knowledge Resources and E Services**

The Knowledge and Service Clusters, Sub-Clusters and Thematic Nodal Clusters are structured and organised along

- (a) the life cycle of the enterprises/startUps –such as inception; setting up infrastructure; planning for production & services; operation & management; sustainability, scaleup & value addition
- (b) across profiles of service agencies/ facilitators
- (c) across service clusters and categories and
- (d) across focus sectors.

Processes are built in, - to take service requests, register for redress of grievances, provide status updates, seek resolution on issues / technical assistance, view notifications seeking responses/ compliances, document uploads to enable process service requests.

Features and facilities for management of the knowledge resources, information on services and related contents, their representation and presentation under various links provided in the GUI layout are provided. Links are also presented for operations such as previews, downloads, archiving/ editing/deleting or managing metadata of contents.

## **5. List 5 success stories with brief about 1 page each including photograph, if available.**

### **5.1. Study on South Lhonak Glacial Lake of Sikkim in terms of GLOF**

Sikkim State Remote Sensing Applications Centre under Sikkim State Council of Science and Technology has been monitoring the South Lhonak glacial lake from the past few years. South Lhonak glacial lake, located in the extreme North-western parts of Sikkim, is one of the fastest growing lakes in Sikkim. The lake formed right at the snout of the glacier is located in the geographical coordinates of N 27<sup>0</sup> 54' 56.7" and E 088<sup>0</sup> 12' 33.7" at an altitude of 5201m. The analysis of satellite imagery revealed that the lake is growing at alarming rate. The lake is dammed by loose moraines debris brought down by the glacier. The lake was a small glacial lake in 1960s, which grows to more than 2.10 km in length and 0.6 km in width within a span of 45 years. With this figure, the lake became one of the longest and largest lake within the territory of Sikkim. This enormous growth of lake on the loose moraines debris of the glacier, within a short period of time makes it one of the vulnerable lakes in Sikkim in terms of glacial hazard, in the form of glacial lake outburst flood (GLOF). The lake has increased from 18 ha in 1976 to 109 ha in 2011.



Keeping the threat in mind, Department of Science and Technology, Sikkim has already taken an initiative to study this particular lake. A working group committee has been formed in order to carry out the effective scientific studies of the lake. Based on the suggestions made by the working group committee, a field study of the lake was carried out in the end of August 2014. Following studies was conducted during this field visit:

### **Installation of Early Warning Sensor at South Lhonak Lake for GLOF**

#### **1. GLOFs and South Lhonak Lake Mitigation**

South Lhonak Lake is continuously increasing in size from last few years. The lake was around 18 ha in 1976 which increased to more than 126 ha in 2013. The lake is purely a glacial moraine dammed lake which is vulnerable in terms of GLOFs. The lake if burst may cause devastation in the downstream.

It was with this background and with support of Land Revenue and Disaster Management Department (LR&DM), a multi departmental expedition to South Lhonak Lake carried out this time (September 2016) most importantly for siphoning of lake and to install Glacier Lake monitoring system in the South Lhonak Lake. The expertise for the Siphoning has been engaged by LR&DM Department, Sikkim from SECMOL, Ladakh. Other line departmental officials were also the part of this expedition for the different, aspects of study pertaining to GLOFs.

#### **5.2. First Siphoning of South Lhonak Lake**

After the scientific interventions, Sikkim State Climate Change Cell together with the support of Disaster and land Revenue Department, Government of Sikkim and expert guidance from Dr. Sonam Wangchuk, SECMOL, Ladakh, initiated the first mitigation works for GLOF in September 2016 at South Lhonak Lake. Siphoning of lake was done by using High Density Polyethylene (HDPE) quick clamp pipes during the expedition. The diameter of the pipe was 8 inches. A total of 140 pipes were used for the siphoning of lake for siphoning of water from three sets of pipelines. The team first measured the discharge of lake (say discharge after the peak melting season) by area velocity method. The approximate discharge measured near the outlet was about  $4.5 \text{ m}^3/\text{s}$  (160 cusec). The discharge from single pipeline is measured approximately 50 litres/second which ultimately gives a total of 150 -180 lit/s in three sets of pipelines. It is expected that lake would be lowered by about 2 meters at the end of winter season. This is the first of its kind, that HDPE pipes were used for siphoning the glacial lake in India and first approach towards the siphoning of such glacial lake in Indian Himalayan region.



I. GLOF sensor installed in South Lhonak Lake & II. Pipelines laid down for the siphoning of water from South Lhonak Lake



I. Photograph showing the stream draining to the South Lhonak lake & II. The photograph showing laying of pipelines with the help of rope in September 2016

### 5.3. Updating the Bathymetric studies

Previously in 2014, the DST team studied the volume of the lake by ultrasonic depth sounder and estimated volume was about 53 million m<sup>3</sup>. At the middle of the lake, it was expected that more depth could be there as the depth sounder crossed its threshold of 80 meters.

During 2016, the team also calculated the actual depth at the middle of the lake using Eco sounders and manual probe made up of rope and measuring tape. The maximum depth was estimated to about 131 meter at 600-900 m away from glacial terminus. The storage volume of South Lhonak lake was measured as 65.81 million m<sup>3</sup>.



Photo: Updating the Bathymetric survey and measuring the Water Depth in the lake in September 2016

#### **5.4. Installation of Lake Water monitoring system**

As a part of project with Centre for Development and Advanced Computing (CDAC), Pune, the Department of Science and Technology, Sikkim has installed a Lake monitoring and information System (water level Sensor ) at South Lhonak lake. The sensor gives the water level of the lake and also monitored the lake level when there is sudden fluctuation in water level. The sensor is developed by CDAC Trivandrum. The sensor provides the data to the CDAC-Pune and mobile information system is in process so that any alert message can be given at the local level. The sensor system is in experimental phase.



I. Assemble of Antenna of GLOF Sensor & II. Installation of Data Logger and Transmitter in South Lhonak Lake

The particular sensor is in experimental phase. The high altitudinal lakes are prone to high velocity winds, extreme temperature and weak geologic structures due to the presence of moraines. The sensor equipment may not able to withstand in such climatic conditions. As such the functionality of the sensor needs to be monitor in high altitude areas which are easily

assessable. To fulfil that objective the GLOF sensor have been installed in Kupup lake in East Sikkim which is assessable by road ways.



I. Assembly of GLOF Antenna at Kupup Lake in East Sikkim & II. Antenna during the installation at Kupup Lake



I. Data Transmitter and AWS installed at Kupup Lake & II. Collection of depth point using raft boat

### **Development of Empirical equation for Glacial Lake Volume and area:**

The Sikkim State Climate Change Cell under State Council of Science and Technology recently developed a Glacial lake volume and area equation based on the scientific interventions carried out at South Lhonak lake. The Scientific paper is published in Journal 'Natural Hazards', Springer Publication, Journal of the International Society for the Prevention and Mitigation of Natural Hazards. The paper deals with the complete assessment of rapidly growing South Lhonak glacial lake in Sikkim Himalaya with sustainable adaptation and mitigations plans to tackle the GLOFs in the region. The scientific team comprise of R.K. Sharma (Scientist B), Pranay Pradhan (Scientist B), N.P. Sharma (Asst. Scientific Officer) and D. G. Shrestha (Additional Director) who have contributed four years of intensive field studies to come up with the volume area equation, to calculate the volume of other potentially dangerous glacial lakes in the Sikkim Himalaya.

For the first time in Indian Himalaya, we proposed an empirical equation for the volume-area relationship in South Lhonak Lake. Based on the measured volume and vector layer of all the lake boundaries derived from the multi-temporal satellite images, we proposed an empirical relation between lake volume and area of SLL

$$V = 0.0522 \times A^{1.1766} \quad (R^2 = 0.99)$$

where  $V$  is the volume,  $A$  is the area, and  $R^2$  is the coefficient of determination.

This empirical equation is based on measured lake volume and areal information recorded during different periods.

### **Characteristics and implications of our lake Volume –Area (VA) equation**

- ❖ This first lake Volume and area (VA) equation developed for moraine dammed Glacial lakes in Indian Himalaya
- ❖ The Computed lake volume from our equation correspond well with measure volume of the glacial lakes of Himalaya
- ❖ Our equation gives more accurate estimation of volume for the glacial lakes in the Himalaya with smaller error compared to the equation developed by Huggel et al. (2004), and Yao et al. (2012)
- ❖ The present volume-area relationship can be extensively used to calculate the storage capacity of similar moraine-dammed glacial lakes in Sikkim Himalaya and Indian Himalaya as a whole.

### **5.5. Pilot demonstration on Providing Clean Drinking Water and Building Water Security through In-situ Rainwater Harvesting At Suldung Kamling, West Sikkim**

Kamling Suldung is a remote village in the Soreng Block of West District of Sikkim. It is located at  $27^{\circ}11'28''N$   $88^{\circ}18'43''E$  /  $27.191^{\circ}N$   $88.312^{\circ}E$ . Suldung Kamling area in West Sikkim is a steep gradient high hills and valley; the rain fall is very low as it falls under the rain shadow area of the Darjeeling hills. Suldung Kamling area experiences severe shortage of drinking water for over six months of the year.

#### **Objectives of the project**

*Short term:*

- Providing safe drinking water through rainwater harvesting

*Long term:*

- Sustainable water supply for the village and improve the water quality through filtration
- Improve water availability through rainwater harvesting.

- Build awareness on sustainable use of local resources for improved health, hygiene
- Survey of the village households for statistical details and analysis of the water availability against requirement.

### **Innovation and Knowledge Transfer**

Standardized RWH designs were not available for this region before this project but are essential to ensure that RWH systems perform adequately and meet community expectations. Training local artisans in how to construct the systems and set up business, dialogue with key stakeholders and the promotion of RWH among local estate developers and entrepreneurs will facilitate the adoption of the model RWH systems on a wider scale. Since artisans in Sikkim often work with at least two apprentices, the knowledge and skills will be further spread quite efficiently among enterprises and individuals at the grassroots level in the water sector.

Rain water harvesting simply involves the process of collecting water from surfaces on which rain falls, filtering it and preserve it for later use. This water is normally collected from the roof tops and stored in rain-water tanks. The other aim is to reduce over-dependency on other traditional patterns and sources of water that are being fast threatened with the depletion in resource-levels as well as erratic shifts in seasons.

Rain-water harvesting will also go a long way in reducing water-conflicts.

### ***Skill development and hand holding activities***

- This project not only aims at bringing water security, improved health and hygiene but also develop few entrepreneurs who can make sustainable livelihood through implementation of findings of the project and replicate such interventions which are appropriate in the neighbouring villages.
- Entrepreneurs in two villages encouraged to take up activities and hand holding through the project.

### ***Rainwater harvesting interventions for roof top water collection***

- In Suldung Kamling area of West Sikkim around 25 households were selected for roof top rainwater harvesting and storing the collected water in a close surface tank for direct use of drinking water. Design parameters which were considered: the types of roof characterization or piping requirement, filtration methodology, methods of storing water for long term usage, using locally available materials and deploying local skills will be taken up.

### **Output of the Project**



- Overall improvement of Health, Hygiene and Environment in the project area due to introduction of double filtration system.
- Availability of drinking water through rainwater harvesting at individual homes and at community level.
- Adoption of sustainable and cost-effective methods for achieving sustained water supply.
- Developing skills among local youths for replication of successful models.
- Documentation and preparation of protocol for post project maintenance activities

### **Overall Impact**

- Availability of filtered harvested rainwater with a storage capacity of 4000 litres water per household at a given time
- Creation of Source of clean drinking water for the community
- Participation of the communities to take ownership programme
- Usage of sustainable and cost-effective methods
- Developed skill for replication of successful model.

The aim of the project is to increase resilience to climate change by conducting holistic sustainability assessments and implementation of designs based on standardized criteria that offer affordable, appropriate and cost-effective rain water harvesting (RWH) solutions, for safe rural drinking water supply.

Area MLA Shri K.S Lepcha, during inauguration of the project:





- 1) Rain Tap Pop up Filter system and
- 2) FFL (First Flush Lock) with Sand bed filter system.

**6. Has the council developed any specific state related S&T and innovation policy? If so the details to be provided.**

NA

**7. How strong are the links between other state government / departments if so provide details.**

- Sikkim State council of Science & Technology works in close coordination with the line departments as well as the state government
  - Sikkim State Council of Science & Technology is the nodal institution in the state for Climate Change initiatives. State Action Plan for Climate Change has been prepared with the support of GIZ and released. All departments are involved as the member of the steering committee for Climate Change.
  - Linkages with UNDP, Swiss Development Cooperation and GIZ on Climate Change adaptation programmes.
  - INSPIRE Programme of DST; Govt. of India has been taken up in coordination with Human Resource Development Department. State Nodal Office is the Council while District Joint Directors of HRDD are the district Coordinators.
  - Support to the user departments/ agencies: Centre, being nodal for Remote Sensing and GIS applications in Sikkim, has contributed handsome support to many user department and agencies in Sikkim. Some of the support includes-
    - Preparation of various GIS map for General Election 2014
    - GPS data collection and mapping of the polling station of Sikkim for the Election Department
    - Catchment area mapping for the various projects of Irrigation and Flood Control Department.
    - GIS maps provided for Agriculture Department, Govt. of Sikkim.
- Council is responsible for all patent work related to intellectual property in the state.

**8. How strong are the links of the council with local industry units/associations?**

Sikkim being a hilly landlocked state, there is not many local industries except for cottage industries and handicraft. The council is striving to have linkages with such local industries by formulating projects in the areas of handicraft.

**9. List 5 major technology area, where the council can play an important role by finding convergent technological solutions.**

- (i) Biotechnology and tissue culture
- (ii) Climate Change Adaptation and Mitigation
- (iii) Remote sensing

- (iv) Non renewable energy
- (v) Post harvest technology

**Tamilnadu**

**1. Details of State S&T Council**

**Dr. R. Srinivasan,**

Member Secretary

Tamilnadu State Council for Science and Technology

Directorate of Technical Education Campus

Chennai – 600 025

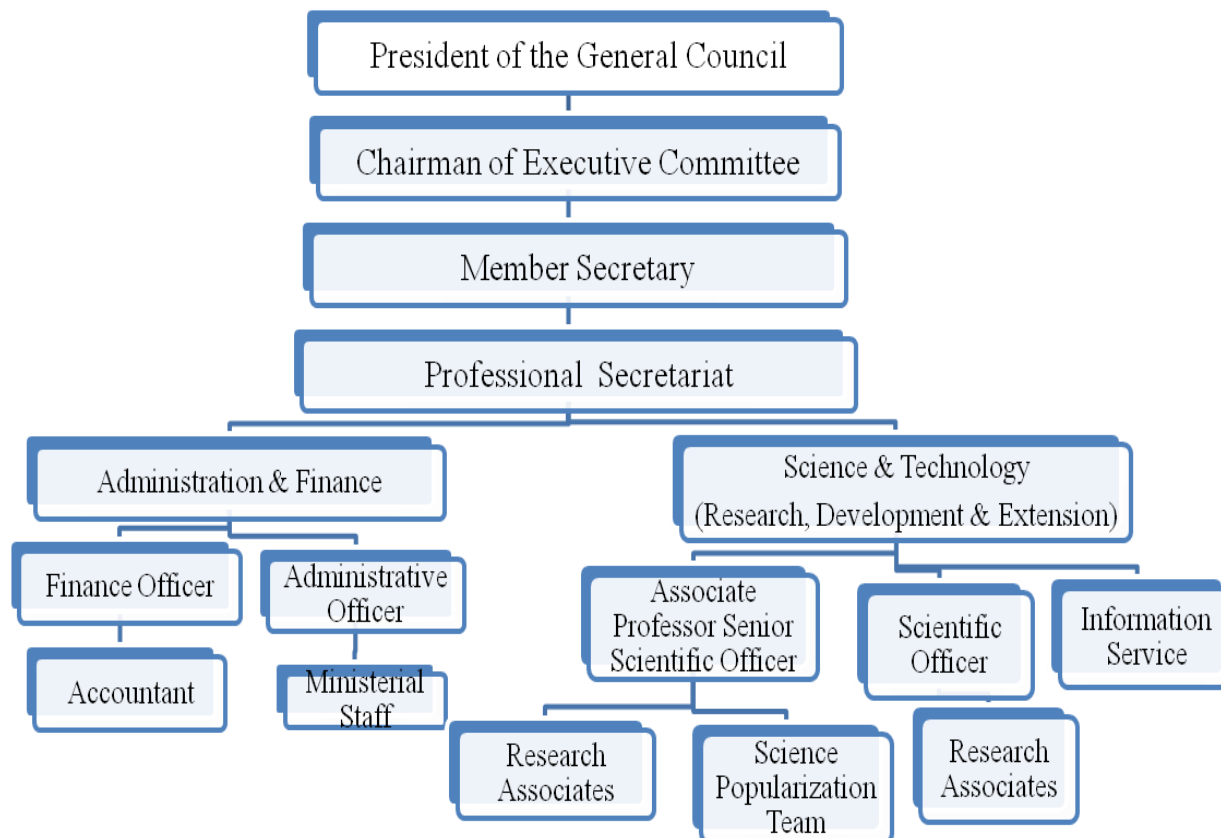
Ph: 044-22301428, Fax: 044-22301552

E-mail: [enquiry.tanscst@nic.in](mailto:enquiry.tanscst@nic.in), [ms.tanscst@nic.in](mailto:ms.tanscst@nic.in)

**2. Structure of the Council**

a) Date of Establishment: 31.03.1984

b) Organization Structure



c) Strength of approved manpower

Sl. No.	Name	Designation	Scale of Pay/ Level of Pay	Approximate monthly emoluments Rs.
<b>State Supported</b>				
1.	Dr.R.Srinivasan	Member Secretary	Rs.37400-67000 (AGP Rs.10000/-)	2,11,600.00
2.	Mr.T.Natesan	Messenger (Spl Gr.)	Rs.16600-52400	46,600.00
<b>DST Supported</b>				
1.	Prof. V.Ramaswami	Associate Professor.	Rs.37400-67000	1,91,440.00

			(AGP Rs.9000/-)	
2.	Dr. A.Ramanan	Scientific Officer.	Rs.15600-39100 (AGP Rs.6000/-)	83,672.00
3.	Tmt. N.Sneghalathaa	Steno-typist (Gr.I)	Rs.36900-116600	87,310.00
4.	Mr. R.Selvarathinam	Junior Asst. (SG)	Rs.19500-62000	57,790.00
5.	Mr.K.Ramachandran	Accountant.	Rs.20600-65500	50,980.00
6.	Tmt. S.Chitra,	Computer Operator (SG)	Rs.19500-62000	54,420.00
7.	Mr. S.S. Jai Janakiraman	Office Asst.	Rs.15700-50000	28,780.00
8.	Tmt.C.Kalaivani	Typist	Daily wages Rs.540/- per day	12,960.00
9.	Mr. D.Parthiban	Office Asst.	Daily Wages Rs.362/- per day	8,688.00
			<b>Total</b>	<b>5,76,040.00</b>
	<b>To be filled posts:</b>			
10.	Scientific Officers (6 Posts) Rs.15600-39100 (AGP Rs.6000/-)			3,79,020.00
11.	System Analyst (1 post) Rs.15600-39100 (AGP Rs.6000/-)			63,170.00
			<b>Total</b>	<b>10,18,230.00</b>

$$\begin{aligned}
 \text{Rs. 10,18,230/-} \times 12 \text{ months} &= \text{Rs. 1,22,18,760.00} \\
 \text{Other allowances} &= \text{Rs. 19,78,439.00} \\
 &===== \\
 \text{Total} &= \text{Rs. 1,41,97,199.00} \\
 &=====
 \end{aligned}$$

**3. Budget allocation of State S &T Council for last five financial year including Central Government, State Government & any other sources**

(Rs.in lakhs)

Years	State Govt. Recurring Grants			DST, Govt. of India			
	Revenue Expenditure	S&T Schemes	Total Rs.	S&T Secretariat	Schemes	any other sources	Total
2013-2014	23.06	172.00	195.06	72.45	75.73	-	148.18
2014-2015	27.56	205.00	232.56	79.70	46.30	-	126.00
2015-2016	21.28	175.00	196.28	85.81	27.95	-	113.76
2016-2017	19.04	175.00	194.04	87.72	50.00	-	137.72
2017-2018	31.48	213.00	244.48	104.72	679.68	17.13	801.53
<b>Total</b>	<b>122.42</b>	<b>940.00</b>	<b>1062.42</b>	<b>430.40</b>	<b>879.66</b>	<b>17.13</b>	<b>1327.19</b>
2018-2019	32.40	250.00	282.40	176.97 (proposed)	40.73 (proposed)	-	217.70

**4. Key activities undertaken**

The Council has been implementing 16 Science and Technology Schemes for the benefit of people of Tamilnadu covering area such as research and development, Science and Technology manpower development, Science and Technology Infrastructure development, and Popularisation of Science.

#### 4.1. Technology Development

Through Schemes such as Science and Technology research projects and Joint Projects various issues of our State in the areas of agriculture, environment, engineering and technology, water, health, energy etc., have been studied by various investigators of Higher Educational and research institutions of our State resulting in creation of valuable baseline data, suggestions / improvements to manage the issues.

#### 4.2. Technology Demonstration

Various technologies have been demonstrated and propagated through scheme such as Dissemination of Innovative Technology, particularly in the area of Agriculture, Fisheries and Veterinary sector.

#### 4.3. Popularization of Science

Through programmes such as Popularization of Science and Creation of Scientific Awareness, S&T Developments have been popularized among various sections of the society.

#### 4.4. Patent

Through Intellectual Property Rights and Patent Facilitation Centre of the Council the Universities, Researchers, Scholars and others have been enabled to apply for the Patent Rights of their research works. Awareness Workshops are also organized in different parts of the State in collaboration with academic institutions, associations like CODISSIA, MADISSIA and others.

#### 4.5. Any new innovative activities

With the financial assistance of Department of Science and Technology, Government of India the Council has initiated following 7 projects having technology development / demonstration aspects as a component in the broad area of Agriculture, Water and Energy. The progress review for these projects has been conducted.

Sl No.	Project title	Investigator	Total
1	Exploitation of Banana fiber as an alternative for cotton and value added products development in the rural community  <i>(Technology Demonstration)</i>	Dr.G.Gajalakshmi Assistant Professor Dept. of Botany PSGR Krishnammal College for Women Coimbatore – 641 004.	<b>18.44</b> <b>3 years</b>
2	Isolation and Characterization of environment friendly antifouling metabolites from marine sponge associated actinobacterial strains  <i>(Technology Development)</i>	Dr.S.Prakash Assistant Professor Dept. of Biotechnology Sri Kaliswari College Sivakasi – 623 130	<b>18.87</b> <b>3 years</b>
3	Implementation of magnetic induction (MI) based wireless underground sensor network (WUSN) system for smart	Dr.S.Sakthivel Murugan Associate Professor Dept. of ECE SSN College of	<b>7.352</b> <b>2 years</b>

	irrigation. <i>(Technology Demonstration)</i>	Engineering Kalavakkam -603 110	
4	Design, Analysis, Development and production of power using wind Tree <i>(Technology Development)</i>	Dr.V.S.Arulmurugan Professor & Head Dept. of EEE Excel College of Engineering and Technology Namakkal -637 303	<b>7.45</b> <b>3 years</b>
5	Retrofitted technology for municipal solid waste manage-ment through formulated microbial consortia for sus-tainable agriculture nutrient needs <i>(Technology Development)</i>	Dr.P.S.Aruna Devi Assistant Professor Dept. of Zoology Sri Vasavi College Erode – 638 316	<b>14.99</b> <b>3 years</b>
6	Identification of potential anti-dermatophytic essential oil among the fifteen Eucalyptus spp in Palani Hills. <i>(Technology Development)</i>	Dr.A.Usha Raja Nanthini Associate Professor Dept. of Biotechnology Mother Teresa Women’s University Kodaikanal-624 101	<b>10.623</b> <b>3 years</b>
7	Genetic Evaluation of draught animal power of Umbalachery breed in Cauvery delta zone <i>(Technology Development)</i>	Dr.K.Jagadeesan Assistant Professor Animal Genetics and Breeding Veterinary College and Research Institute Orathanadu – 614 625	<b>13.006</b> <b>3 years</b>
		<b>Total</b>	<b>90.731</b>

**5. List 5 success stories with brief about 1 page each including photograph, if available**

**5.1 Tamilnadu Scientist Award (TANSA) :**

The Tamilnadu State is the first in instituting a State Level Award in recognition of outstanding contribution to research and development to the scientist of our State. Through this scheme TANSA Award is given in 10 categories such as Agricultural Sciences, Biological Sciences, Chemical Sciences, Environmental Sciences, Engineering and Technology, Mathematical Sciences, Medical Sciences, Physical Sciences, Social Sciences and Veterinary Sciences. A Sum of Rs. 50,000/- Cash Award with citation is given to the selected Scientist.





## 5.2. Young Student Scientist Programme

To encourage and attract Young minds to select Science and Research career, Young Student Scientist Programme is being organized as a residential programme in Universities and reputed Colleges of our State. This scheme gives exposure to the students about research institutions and they get first hand information about latest research activities through the scientist and resource persons.



Chemistry lab practical training, biology lab – explaining the chart at kamaraj college tuticoin

## 5.3. Student Project Scheme :

Student Projects Scheme of the Council enables Under Graduate and Post Graduate students to do useful research on various topics of Science and Technology relevant to our State. The results of this research are presented in a Seminar cum exhibition by the students. The abstract of the research is also brought out in the form of seminar proceedings. This scheme was initiated in the year 1992-93 in a small way with a total of 13 projects. Now, due to its success and popularity about 200 to 250 Student Projects are given every year in different discipline such as Agriculture, Biology, Environment, Engineering and Technology, Medicine, Social Sciences and Veterinary Sciences. A maximum sum of Rs.10,000/- is provided for each project. From the year 2017-18 the budget allocation has been increased for this scheme from Rs.20 lakh to 40 lakh by Govt. of Tamilnadu. Hence 500 projects are supported.



**Exhibits by the students of completed projects**

**5.4. Science and Technology Capacity building for Industrial needs**

Capacity building for the industrial needs programme enables students of Engineering and Polytechnic institutions of our State to improve their soft skills for employment and also promote self employment through entrepreneurship. Organisations such as District industries centre and industry resource persons are involved in the successful conduct of this programme. Every year this programme is organized in 10 districts of our State. Six days programmes for organized in two phases with a minimum of 300 students.



Student's interaction during the programme at University College of Engineering, Dindigul



Hands on training activity to Students during the programme at Sree Sowdambika College of Engineering, Arupukottai

### **5.5. Research Fellowship for Research Scholars in Govt. Colleges and Improvement of Science and Technology Infrastructure in Govt. Colleges**

The Research and Development Assistance to the weaker sections of the society is enabled successfully through schemes such as Research Fellowships to Research Scholars in Colleges and Science and Technology Infrastructure Development of Government Colleges. Under these programmes a monthly stipend of Rs.10,000/- per month is given as fellowship and Rs.30,000/- per year towards contingency for a total period of 2 years. Those research students who have enrolled already for Ph.D., and successfully published at least 2 research papers in indexed journals are considered for grant. In Govt. Colleges, Laboratory facilities are developed and Laboratory equipments are purchased through Council's scheme which enable the students access to better facilities for the research.

All the schemes of the Council are need based, very well received and highly successful. Therefore, the Council is striving to get higher allocation for all the S&T Schemes of the Council. Any additional funding from Department of Science and Technology, Govt. of India for the schemes of the Council will be very useful in taking Science and Technology benefits to the people.

**6. Has the council developed any specific state related S&T and innovation policy? If so the details to be provided.- NIL**

**7. How strong the links between other State Government/Departments If so are provide details?**

The Department of School Education is involved in successful conduct of the Council Programme Inservice Training to School Teachers which enable our School teachers to update their knowledge particularly with respect to the revised syllabus covering various science topics. This Programme is conducted through Universities and Colleges where excellent infrastructure and expertise is available. The Department of School Education deputed teachers to this training through CEO / DEO.

The Council is also playing an advisory role to Tamilnadu Watershed Development Agency in implementing various programmes related to Agriculture, irrigation and Watershed Development.

**8. How strong are the links of the Council with local industry units/associations?**

The Council also involved in association such as PSG – STEP in promoting science, technology and entrepreneurship. Organisation such as District Industries Centre and many experts from industries are involved in the successful conduct of the Council programme viz Capacity Building for Industrial Needs.

**9. List 5 major technology area, where the council can play an important role by finding Convergent technological solutions.**

The Council would like to contribute more in the following areas

AGRICULTURE - Drip Irrigation System to save water, Mutation of seeds for effective harvesting, vermi-compost and organic farming etc.

ENVIRONMENT - Waste management, Wealth from waste.

WATER - Rain water harvesting, Effluent treatment process and recycling the water in home and industrials, Potable water through R.O. process with least cost.

ENERGY - Solar energy, Energy conservation and energy storage devices.

HEALTH - Health, Hygiene awareness, Clean Environment and Industrial Safety.

**10. Proposed Programme and Budget outlay for the 2018-19**

Budget for Secretariat for current financial year 2018 - 2019

(Rs. in

Lakhs)

Sl. No.	Item	No. of Posts	Pay Band & Grade Pay Rs.	DST (GOI)	State S&T	Total
A.	Recurring Expenditure					
	I. Manpower Salary +					
a)	Member Secretary	1	37400-10000 (Rs.10000/-)	0.00	25.40	25.40
b)	Associate Professor	1	37400-67000 (Rs.9000/-)	26.84	..	26.84
c)	Scientific Officer	1	15600-39100 (Rs.6000/-)	11.67	..	11.67
d)	Scientific Officer *	6	15600-39100 (Rs.6000/-)	52.87	..	52.87
e)	System Analyst*	1	15600-39100 (Rs.6000/-)	8.81	..	8.81
f)	Steno Typist ( Grade I )	1	Rs.36900-116600	12.26	..	12.26
g)	Junior Assistant (SG)	1	Rs.19500-62000	8.09	..	8.09
h)	Accountant	1	Rs.20600-65500	7.15	..	7.15
i)	Computer Operator	1	Rs.19500-62000	7.62	..	7.62
j)	Office Assistant	1	Rs.15700-50000	4.04	..	4.04
k)	Typist	1	Daily wages	1.57	..	1.57
l)	Office Assistant	1	Daily wages	1.05	..	1.05
m)	Messenger	1	Rs.16600-52400	0.00	5.60	5.60
n)	Sanitary Staff	1	Consolidated wages	0.00	0.70	0.70
	Total amount required for the year 2018 - 2019	19		141.97	31.70	173.67
			Sub Total -I	141.97	31.70	173.67
	II. Traveling & Daily Allowance:			10.00	0.50	10.50
			Sub Total -II	10.00	0.50	10.50
	III. Other Items:					
	a) Office Expenditure (Including Motor Vehicle Maintenance, Postage, Telephone & Miscellaneous etc..			10.00	15.00	25.00

		Sub Total – III	10.00	15.00	25.00
	IV. Project Related Grant (PRG) (Balance grant)		40.73	--	40.73
		Sub Total – IV	40.73	--	40.73
	V. Non-Recurring:				
	Air Conditioner, Generator & Computer Accessories & High Voltage UPS		15.00	--	15.00
		Sub Total – V	15.00	--	15.00
	Total A (Recurring Expenses) ( I + II + III+IV+V)		217.7 0	47.20	264.9 0

\*Sl.No. d & e. To be filled up post (Scientific Officer -6 post and System Analyst 1 post)

**Budget proposed for the current financial year 2018-2019 from DST, Govt. of India towards Professional Secretariat.**

**(Rs. in lakhs)**

1. Manpower	Rs. 141.97
2. TA/DA	Rs. 10.00
3. Other items	Rs. 10.00
4. Project Related (balance grant)	Rs. 40.73
5. Non-Recurring	Rs. 15.00
	=====
<b>Total</b>	<b>Rs. 217.70</b>
	=====

## Telangana

### 20. Details of State S&T Council

- Name of the Member Secretary: **Prof. Ravi Kumar Puli**
- Address, email, phone, fax, mobile number

#### **Telangana State Council of Science & Technology (TSCOST)**

4<sup>th</sup> Floor, Aranya Bhavan, Saifabad, Hyderabad – 500 004.

E-mail: [secy\\_tscst@telangana.gov.in](mailto:secy_tscst@telangana.gov.in)

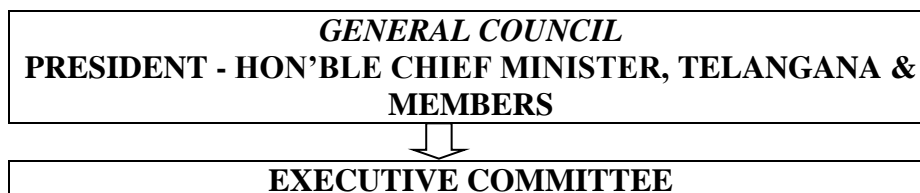
Phone: 040 – 24619675      Cell: 79016 98682

Phone/ Fax: 040 – 24600590

### 21. Structure of the Council:

- m) Date of Establishment 27.01.1986 (erstwhile APCOST)  
Devolved as TSCOST w.e.f 23.06.2015
- n) Organization Structure

#### ***TELANGANA STATE COUNCIL OF SCIENCE & TECHNOLOGY (TSCOST) ORGANIZATION CHART***



**CHAIRMAN - HON'BLE MINISTER FOR EFS&T & MEMBERS**

**CHIEF EXECUTIVE & HEAD OF THE DEPARTMENT  
MEMBER SECRETARY**

<b>Popularisation of Science (POS)</b>	<b>Integrated Rural Energy Programs (IREP)</b>	<b>Regional Science Center, Warangal</b>	<b>S&amp;T Communication Projects</b>	<b>Administration</b>
<b>Rural Development</b>	<b>Patent Information Centre</b>	<b>Agriculture, Traditional Sciences &amp; Technologies (TSTs)</b>	<b>S&amp;T Information Systems</b>	<b>Accounts</b>

- o) Strength of approved manpower (both central (DST) and state supported)  
     State Government – 40 posts  
     DST, GoI – 15 posts

**22. Budget allocation to your state S&T council for last five financial years including central government, State government & any other sources.**

**State Govt. Plan Budget position of State Council for the past 5 years:**

(Rs. in lakhs)

YEAR	Proposed	Sanctioned	Released	Expenditure
2013-14	995.00	151.50	113.61	113.61
2014-15	7125.00	22.23	22.23	22.23
2015-16	734.00	55.43	28.50	28.50
2016-17	1359.00	55.47	27.72	27.72
2017-18	1318.70	53.27	24.00	24.00

**State Govt. Non-Plan Budget position of State Council for the past 5 years:**

(Rs. In lakhs)

YEAR	Proposed	Sanctioned	Released	Expenditure
2013-14	995.00	151.50	113.61	113.61
2014-15	7125.00	22.23	22.23	22.23
2015-16	389.00	142.00	140.04	140.04
2016-17	419.70	220.16	224.08	224.08
2017-18	294.79	220.16	220.16	220.16

**Govt. of India – Plan & Secretariat Assistance Budget position for the past 5 years**

(Rs. In lakhs)

YEAR	Plan Programs			Secretariat Assistance for Manpower & Office Expenses	
	Proposed	Sanction	Releases	Sanction	Releases
2013-14	408.18	65.96	65.96	75.00	75.00
2014-15	56.82	8.57	7.16	55.00	55.00
2015-16	530.00	124.79	124.79	65.00	65.00
2016-17	175.70	175.70	153.12	82.20	81.20
2017-18	382.69	125.59	103.85	31.45	31.45

### 23. Key activities under taken during the last two years in the area of:-

#### 23.1 Technology Development

As a part of support for R&D projects, the Scientists and Academicians of Research Institutes and Universities were requested to identify unique, novel and innovative S&T programs keeping in view of the problems being faced by the public in different parts of the state. This resulted in formulation of a number of novel S&T programs. Some of them are mentioned here.

Sl. No.	Name of Program/ Project	In association with	Benefit to society
1	Thalassemia Disease burden and mutation , micro profiling in populations of Telangana	Prof. V Raghavendra Rao, Research Professor, Genome Foundation, Flat No. 402, Apoorva Towers, Road No. 2, Banjara Hills, Hyderabad.	The project targets a very important disease prevalent in rural Telangana, to find remedies and solutions.
2	Assessment of Plasma Metabolites in Patients on Maintenance Hemodialysis	Dr.Sripadi Prabhakar, Principal Scientist, Analytical Chemistry, CSIR- IICT, Uppal Road, Tarnaka, Hyderabad.	Specialised research topic in the field of medical sciences field.
3	Synthesis of some novel quinolone derivatives as aromatase inhibitors in breast cancer therapy	Dr. Raghuram Rao Akkinapally, Professor, Dept. of Pharmaceutical Chemistry, Kakatiya University, Warangal.	Aims at finding suitable remedies in the breast cancer therapy
4	Characterization of Circulating Cancer Cells (CCCs) from Clinical Blood Samples of Ovarian Cancer for the Development of Prognostic Biomarkers	Dr. Syed Sultan Beevi, Scientist, Cancer Biology, KIMS Foundation and Research Center, Hyderabad.	Unique attempt being made to develop biomarkers which are expected to be of help in the treatment of cancer



5	A novel approach for reduction of fluoride concentration in Fluoride affected village with Geo-Textile as filter and direct recharge of surplus runoff into aquifers	Dr. MVSS Giridhar, Center for Water Resources, Institute of Science and Technology, JNTU, Kukatpally, Hyderabad.	Application of innovative mechanism to reduce fluoride concentration in the ground water.
6	Studies on environmental radiation level in the dwellings constructed under double bedroom scheme at Erravalli and Narasannapet model villages of Telangana	Dr. B.Linga Reddy, Professor, Dept. of Physics, Chaintanya Bharathi Institute of Technology Gandipet, Hyderabad.	Application of S&T for the Govt. program – Double Bedroom Scheme – to find radiation levels and to suggest remedial measures, if required.
7	A cost effectiveness analysis of Rosuvastatin against Atorvastatin in primary & secondary prevention of CVD & stroke	Dr. Rajasekhar, Professor and Principal, St. Peters Institute of Pharmaceutical Sciences, Warangal.	Project aims at analysing the treatment methodologies
8	e-Measurement book for road accident analytics in Differential GIS architectures	Dr.K.M.Lakshmana Rao, Professor, Dept. of Civil Engineering , JNTU, Hyderabad.	Useful for Civil engineers, Transport department etc.
9	Design and Fabrication of Lipo-Drug-in-Adhesive patch for transdermal delivery of sumatriptan succinate in the pain management of migraine.	M. Srujan Kumar, Associate Professor, Samskruti College Pharmacy, Kodapur, Ghatkesar Mandal, Ranga Reddy District	Useful in developing a patch for application of medicine easily. ( particularly for Migraine patients )
10	Design, Synthesis and evaluation of novel dithiocarbamate analogues as potent anticancer agents	Dr.T.Saritha Jyostna, Professor, Sarojini Naidu Vanita Pharmacy Mahavidyala , Tarnaka, Hyderabad.	Aims at drug designing to develop a medicine against cancer.

11	Proactive mitigation of gray mold ( <i>Botryotinia ricini</i> ) disease of castor ( <i>Ricinus communis</i> L.) crop in Telangana State using dynamical disease forecast	Indian Institute of Oilseeds Reseach (IIOR), Rajendra Nagar, Hyderabad	The project aims at development of suitable methods for control of gray mold disease of Castor Crop.
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#### 4.2 Technology Demonstrations

Sl. No.	Names of Programs/ Project	Support extended to / Organised by	Benefit to society
1	Replication of successful technologies for generation wealth from waste – Implementation of Bio-digestor ( 15 cu.mt)	NIRD & PR & CCMB	Savings of around 100 kgs of LPG per month for one plant and 2000 kgs. of LPG per month for the proposed 20 plants.
2	Theme Meeting on Outreach of Department of Atomic Energy (DAE) Technologies for Societal Applications	TSCOST & BARC	This meeting provided a very fruitful interaction between Scientists and Officials for exchange of ideas for transfer of technologies. Technology information was disseminated during the interactions.

#### 4.3 Popularisation of science

Sl.No	Scheme	Names of Programs/ Project	No. of Programs organised	No. of beneficiaries ( Nearest figures)
1	Popularisation of Science	Visits of students, teachers, general public to RSC, Warangal	Daily visits	15200 students, teachers, general public

2	Popularisation of Science	Science based activities on the occasion of Telangana State Formation Day at RSC, Warangal	1	100 students & academicians
3	Popularisation of Science	World Environment Day Celebrations at RSC, Warangal	1	164 students & academicians
4	Popularisation of Science	Telangana Ku Harithaharam – Plantation and Nature conservation campaign - Hon'ble Minister Forests graced the occasion.	1	Saplings planted in NAARM, ICAR Institution, GoI and about 220 students, scientists, research scholars and officials attended.
5	Popularisation of Science	Intensive Training Program to Tribal Students on S&T supported by Vigyan Prasar, GoI	1	100 students, academicians & general public
6	Science Communication	Participation in State Level Science Exhibition on Environment, Mathematics and Science Organized by SCERT	1	3000 students, academicians & genl. public
7	Science Communication	Participation in Southern India Science Fair Organized by SCERT	1	3500 students, academicians and general public
8	Science Communication	Observation of Total Lunar Eclipse	1	900 students, teachers and general public participated
9	National Children's Science Congress	State Level Orientation Workshop For Resource Teachers	1	62 District Coordinators, District Academic Coordinators, Resource Persons, Guest faculty etc.

10	National Children's Science Congress	Publications	2	4200 Activity Guides, 7000 brochures
11	National Children's Science Congress	District Level Events	31	2090 projects, 9000 students, 2300 teachers, DCs, DACs, RPs, Evaluators etc.
12	National Children's Science Congress	District level orientation programs for teachers	45	4800 teachers, 120 DCs, DACs, RPs etc.
13	National Children's Science Congress	State Level Event	1	125 projects, 300 students, teachers, Evaluators, DCs, DACs, RPs etc.
14	National Children's Science Congress	National Event of NCSC	Participation of State Delegation	18 members Child Scientists, Escort Teachers, officials
15	Science Communication	National Science Day Celebrations	8 Programs	3400 students, research scholars, teachers and academicians from all over the state.

#### 4.4 Patents

The DST has set-up 20 Patent Information Centres (PIC) in 20 states through Patent Facilitating Centre (PFC), TIFAC for spreading the awareness about patent filing, registration among Scientists / Technologists / Researchers / Engineers & Traditional Medical Practitioners etc.

One such Patent Information Centre (PIC) is established in the State Council. As a part of this, Intellectual Property Rights (IPR) Cells were established in the following 3 universities in Telangana State :-

- (i) Osmania University, Hyderabad.
- (ii) PJTSA University, Hyderabad
- (iii) JNT University, Hyderabad.

Certain activities were implemented in connection with IPRs and Patent processing etc.

#### 4.5 Any new innovative activities

- TSCOST is concentrating on
- i) Waste Management Technologies

- ii) New and Renewable Energy Sources and Technologies
- iii) Development of new technologies for Sustainable Agricultural Practices
- iv) New approaches in Water Conservation and Water quality improvement
- v) Climate Change mitigation and adaptation
- vi) Application of Radioisotopes and Radiation Technologies for societal applications
- vii) Establishment of Science Centres
- viii) Establishment of Innovation Hub in Science Centres

**5 List 5 success stories with brief about 1 page each including photograph, if available.**

**Project – 1: Projects on Location Specific Challenges and providing S&T intervention through technology development and demonstration**

TSCOST has been requesting the Department of Science & Technology (DST), GoI for providing budgetary allocations to undertake Locations Specific Research and Application of S&T Interventions in the State. The DST released exclusive budget to TSCOST as Project Related Grant (PRG) towards projects formulated on the location specific challenges of that state and providing S&T intervention through technology development and demonstration.

Accordingly, as per the guidelines of DST, an Expert Committee has been constituted with the Subjects Experts from various disciplines. TSCOST addressed letters to Universities, Institutions, R&D laboratories of Telangana state with a request to submit project proposals having state specific problems & need based programs with remedial measures/ solutions duly establishing linkages / involving the concerned line departments, National laboratories, Universities, Institutions, R&D laboratories etc.

Out of the 64 proposals received, the Expert Committee has shortlisted 21 projects. Depending upon the budget and upon the approval of DST, the following 10 projects were finally considered under the DST – PRG grants.

Sl.No	Name & Address of PI and Title of the Project
1	Prof. V Raghavendra Rao, Research Professor, Genome Foundation, Flat No. 402, Apoorva Towers, Road No. 2, Banjara Hills, Hyderabad. <b><i>Project: <math>\beta</math>- Thalassemia Disease burden and mutation , micro profiling in populations of Telangana</i></b>
2	Dr.Sripadi Prabhakar, Principal Scientist, Analytical Chemistry, CSIR- IICT, Uppal Road, Tarnaka, Hyd. <b><i>Project: Assessment of Plasma Metabolites in Patients on Maintenance Hemodialysis</i></b>
3	Dr. Raghuram Rao Akkinapally, Professor, Dept. of Pharmaceutical Chemistry, Kakatiya University, Warangal. <b><i>Project: Synthesis of some novel quinolone derivatives as aromatase inhibitors in breast cancer therapy</i></b>
4	Dr. Syed Sultan Beevi, Scientist, Cancer Biology, KIMS Foundation and Research Center, Hyderabad. <b><i>Project: Characterization of Circulating Cancer Cells (CCCs) from Clinical Blood Samples of Ovarian Cancer for the Development of Prognostic Biomarkers</i></b>

5	Dr. MVSS Giridhar, Center for Water Resources, Institute of Science and Technology, JNTU, Hyderabad. <b><i>Project: A novel approach for reduction of fluoride concentration in Fluoride affected village with Geo-Textile as filter and direct recharge of surplus runoff into aquifers</i></b>
6	Dr. B. Linga Reddy, Professor, Dept. of Physics, Chaintanya Bharathi Institute of Technology Gandipet, Hyd. <b><i>Project: Studies on environmental radiation level in the dwellings constructed under double bedroom scheme at Erravalli and Narasannapet model villages of Telangana</i></b>
7	Dr. Rajasekhar, Professor and Principal, St. Peters Institute of Pharmaceutical Sciences, Warangal. <b><i>Project: A cost effectiveness analysis of Rosuvastatin against Atorvastatin in primary &amp; secondary prevention of CVD &amp; stroke</i></b>
8	Dr.K.M.Lakshmana Rao, Professor, Dept. of Civil Engineering, JNTU, Hyderabad. <b><i>Project: e-Measurement book for road accident analytics in Differential GIS architectures</i></b>
9	M. Srujan Kumar, Associate Professor, Samskruti College Pharmacy, Kodapur, Ghatkesar Mandal, Ranga Reddy District <b><i>Project: Design and Fabrication of Lipo-Drug-in-Adhesive patch for transdermal delivery of sumatriptan succinate in the pain management of migraine.</i></b>
10	Dr.T.Saritha Jyostna, Professor, Sarojini Naidu Vanita Pharmacy Mahavidyala , Tarnaka, Hyderabad. <b><i>Project: Design, Synthesis and evaluation of novel dithiocarbamate analogues as potent anticancer agents</i></b>

TSCOST organized a review meeting of the Expert Committee in the chambers of Hon'ble Minister for Forests, Environment & BC Welfare, Govt. of Telangana on 12-2-2018 in which the Project Investigators (PIs) of the SSTP, DST, Govt. of India funded Location Specific Research Projects participated and presented the progress achieved on their respective projects. Hon'ble Minister for Forests, Environment & BC Welfare, Govt. of Telangana chaired the Session. Dr. Rajat Kumar, IAS, Principal Secretary to Govt., EFS&T Dept., Govt. of Telangana and Smt. G. Krishnavni, Joint Secretary to Govt., EFS&T Department, Govt. of Telangana and Member Secretary (FAC), TSCOST along with members of Expert Committee participated, reviewed the progress of research projects and suggestions for further course of action was given to the PIs .

## **Project – 2 : Installation of Kitchen-waste Operated Biogas plants - A Safe, Clean and Wealth Generation Initiative**

### **i) Introduction and Background :**

Waste disposal is a rapidly growing problem due to population growth, consumption pattern and rapid economic development. The rising quantities and poor management of organic waste and waste water leads to environmental and social issues among the households, communities and Institutions like hostels, hospitals and old age-homes. The advanced bio digester technology can use organic waste & waste water from kitchen & other sources to generate biogas and suitable for institutional & household level deployment. TSCOST is encouraging innovative adaptation and mitigation technologies by concerned agencies to conserve energy and for propagation of non-conventional energy technologies in the state.

**ii) Objectives :**

To reduce carbon emissions into the environment by promoting non- conventional/ renewable energy technologies

To generate energy from kitchen and organic waste, thereby increasing the scope for conservation of precious natural resources.

**iii) Studies/R&D work :**

In tune with the above, TSCOST is promoting innovative biogas technology at household, community and institutional level to promote organic waste management for generating cooking gas and lighting from kitchen waste/ other organic waste. The main component of the gas produced is methane which is proven and effective alternative to Liquefied Petroleum Gas (LPG).

**iv) Outcome / demonstration / promotion:**

TSCOST has installed 15 CuM capacity Biogas Plant at National Institute of Rural Development & Panchayat Raj (NIRD & PR), Centre for Cellular and Molecular Biology (CCMB), Hyderabad. This plant is using kitchen waste mixed with waste water from the kitchen to convert bio-degradable materials into cooking gas with the help of a special type of patented anaerobic bacteria.

v) The DST, GoI has sanctioned a project for installation of 20 kitchen waste biogas plants in various institutes of the state. The DST is giving 60% cost of the plant and 40% has to be borne by the beneficiary. The project is under progress.



### **Bio-digester plant installed at CCMB**

Sri Jogu Ramanna, Hon'ble Minister for Forests, Environment and BC Welfare, Govt. of Telangana inaugurated the Bio-digester plant installed at CCMB, Hyderabad.



### **Project : 3 - Intensive Training Program to Tribal Students on S&T :**

Vigyan Prasar, GoI has sanctioned an Intensive Training Program to Tribal Students on S&T with an objective to create interest towards Science in General and Scientific Research in particular among the students. The program is targeted for 100 tribal students in the state.

The Program was inaugurated by Ms. K. Amrapali IAS, Collector & District Magistrate, Warangal Urban District and Smt. G. Krishnaveni, Member Secretary, TSCOST on 18-8-2017 at RSC, Warangal. Dr. T.V. Venkateswaran, Scientist, Vigyan Prasar, New Delhi graced the occasion and explained about land mark scientific achievements so far that led the world to newer heights in development.

Several interesting topics of Science such as Hands-on experiments, Visits to Scientific Institutions such as National Institute of Technology and Kakatiya Medical College, Popular Science Lectures on Space, Physical, Chemical and Biological Sciences have been arranged to inspire the students towards Science.

The resource persons of RSC and others were involved in giving hands on training on science experiments. The sanctioned budget is Rs.5.30 lakhs out of which Rs.4.15 lakhs has been released by Vigyan Prasar. The duration of the program is 6 days and was organised during 18-23, August, 2017 at Regional Science Centre, Warangal.





Inauguration and Training Sessions of the program

#### **Project : 4 – Transfer of Technologies – Collaborative Project with BARC**

As per the communication received from Director, Bhabha Atomic Research Centre (BARC), Department of Atomic Energy (DAE), Govt. of India, Mumbai, TSCOST has participated in the Theme Meeting on Outreach of DAE's Technologies in Agriculture, Food Technology and Health Care sectors for Societal Applications through State S&T Councils scheduled during 5-7, April, 2017 at BARC, Mumbai. The program was coordinated by Vijnana Bharti (VIBHA), New Delhi. Visits to DHRUVA Reactor and other departments of BARC have been arranged as a part of the meeting.

As a follow-up of the Workshop held by BARC ( Bhabha Atomic Research Centre) at Mumbai on the subject, TSCOST organized a Theme Meeting on Outreach of Department of Atomic Energy (DAE) Technologies for Societal Applications in the fields of Agriculture, Food Preservation, Water, Waste Management and Health Care etc during 13-14 July 2017, for transfer of technologies in consultation with the concerned line departments / Universities and Research Institutions. Senior Scientists of various divisions of DAE, GoI made presentations and interacted with the Line departments, Universities and Research Institutions for exploring possible avenues of application of these technologies in relevant sectors. Officials, Scientists and Academicians from Agriculture, Horticulture, Medical & Health, Municipal Administration, Forests, Rural Water Supply, Ground Water, TSIIC, EPTRI, Bio-diversity Board, TSPCB, IIT, JNTU, NIMS, MNJ Institute of Oncology & Research Centre, KIMS Research Centre and several R&D Institutions attended the program. TSCOST has requested all the participants to submit a list of technologies relevant to their department for replication / implementation.



Officials of line departments interacting with BARC Scientists

Recently, during 17-19 May 2018, TSCOST coordinated the Consultation Meetings organized at Karimnagar, Warangal and at Telangana State Secretariat to prepare the Action Plan for implementation of Department of Atomic Energy (DAE) / Bhabha Atomic Research Centre (BARC) Technologies in Telangana State. Sri Ajay Misra, IAS, Special Chief Secretary (FAC) to Govt., EFS&T Department presided over the Meeting. Prof. Ravi Kumar Puli, Member Secretary (MS), TSCOST welcomed all the participants. Officials from several departments such as Revenue, Agriculture, Horticulture, Municipal Administration, GHMC, HMWSSB, TSIIC, Marketing, Agril. & Horticulture Universities participated in the meeting. Several technologies have been found to be suitable for application in various locations and the departments were requested to prepare proposals for implementation of these technologies in coordination with TSCOST and BARC, DAE, GoI.



Sri Ajay Misra, IAS, Special Chief Secretary (FAC) to Govt., EFS&T Department giving presidential address in the meeting held on 19-5-2018 at TS Secretariat.

**6 Has the council developed any specific state related S&T and innovation policy? If so the details to be provided.**

- Taking into consideration the latest developments in S&T and the emerging scenario of S&T in future, TSCOST submitted proposals to the Government seeking approval for preparing S&T Vision Document for Telangana State in association with TIFAC.
- As a part of the Telangana 2024 – the First Decade Document, TSCOST organised a Consultation Meeting with the Scientists, Academicians and Experts from various research institutions and universities on 7-11-2017 at Telangana Secretariat, Hyderabad and held discussions on identification of Development Indicators for preparation of Inception Report for TSCOST. These Development Indicators have a relevance to the Sustainable Development Goals (SDGs) approved by the United Nations Organisation. In accordance with the Government directions, TSCOST prepared the Baseline & Current Status Report as well as Inception Report and submitted to the Government for consideration.

The following indicators have been finalized after consultations :

1. Popularisation of Science & Technology & its Applications in daily life
2. Promotion of Scientific Temper through Science Centres
3. Integrated Rural Energy Program (IREP)
4. Replication of Successful Technology models & Location Specific Research Projects ( Lab to Land)
5. S&T Innovation, Entrepreneurship Development & IPR ( STIED & IPR)

Programs of S&T Council are being oriented towards these Development Indicators and proposals are being submitted to the State & Central Governments accordingly.

## **7 How strong are the links between other state government /departments If so provide details?**

- As such, the Council works in coordination with the Departments of Education (School, Technical, Higher), Department of Energy, Department of Forests, Environment, Social / Tribal Welfare departments etc. and Universities and associates itself with the programs organized by these Departments/ involves them in the programs of the Council.
- Linkages with Scientists of Bhabha Atomic Research Centre (BARC), Department of Atomic Energy (DEA), Govt. of India have been established and TSCOST coordinated interaction sessions between the scientists and several state government departments with regard to technology transfer.
- TSCOST is also actively associated with a number of R&D establishments and Institutions for promotion of industry/ technology/ research such as CCMB, NIRD, NIT-Warangal, IICT, HCU, JNTU, OU, Genome Foundation etc.
- Recently the delegation led by Jogu Ramanna garu, Hon'ble Minister for Forests, Environment & BC Welfare, Govt. of Telangana visited Gujarat State and visited several facilities of S&T / interacted with the officials of S&T on schemes and programs and exchanged information.
- One member from the other State S&T Councils has been included as a member of the Executive Committee of TSCOST.
- Interaction with other State S&T Councils in the country is also being strengthened

## **8 How strong are the links of the council with local industry units/associations?**

- ❖ An Industrialist is representing as a Member from Industry category in the General Council and Executive Committee of the Council.

❖ Several programs on Innovation, Technology Transfer and Entrepreneurship Development are held for the benefit of Industrialists / Start Ups etc. through NIMSME, Institution of Engineers and Universities.

❖ Programs are being chalked out for the association of CRTDH with the Pharma / Chemical and Drug industries.

**9 List 5 major technology area, where the council can play an important role by finding convergent technological solutions.**

TSCOST can play an important role in the following areas in association with the relevant R&D Institutions

- Food and Agriculture
- Energy
- Climate Change Adaptation and Mitigation measures
- Medical and Pharma
- Waste Management

**10 Proposed programme and budget outlay for the year 2018-19**

**GOVERNMENT OF INDIA – ACTIVITIES PROPOSED FOR 2018-19**

S.No.	Activity details	Budget (Rs. in lakhs)
1	National Science Day / National Mathematic Day Celebrations (DST)	63.00
2	National Children’s Science Congress (DST)	25.00
3	Science Centre at Karimnagar ( Min. of Culture)	655.00
4	Innovation Hub at Regional Science Centre, Warangal ( Min. of Culture) (Joint program of State and Centre on 50:50 basis)	90.00
5	Location Specific Demonstration projects/ SEED/ NRDMS etc. (DST)	350.00
6	Transfer of Technologies / BARC Technologies (DST, DAE, DBT, MOFPI, MoEF, Swatch Bharat Abhiyan)	2200.00
7	Renewable Energy Systems at Assembly and Golconda Fort (MNRE)	100.00
	Total	3483.00

**STATE GOVERNMENT – ACTIVITIES PROPOSED FOR 2018-19**

S.No.	Activity details	Budget (Rs. in lakhs)
1	POS, NCSC, NSD, NMD, IPR related activities, Scientist awards, fellowships, seminars,	30.27

	workshops, exhibitions etc.	
2	Regional Science Centre, Warangal	6.00
3	IREP	17.00
4	Science Centre, Karimnagar	865.00
5	Innovation Hub at Regional Science Centre, Warangal (Joint program of State and Centre on 50:50 basis)	90.00
6	Transfer of Technologies / BARC Technologies	2200.00
	Total	3208.27

## Tripura

### 24. Details of State S&T Council

Name of the Secretary & Member secretary / Director General

**Dr. Alind Rastogi, IFS**

Secretary, Science, Technology & Environment

(Member-Secretary, Tripura State Council for Science & Technology)

Secretariat, Capital Complex, Agartala-799006

Phone: 03812418094, 9650990722 (M); E-mail: [alindrastogi@yahoo.in](mailto:alindrastogi@yahoo.in)

**Shri Shivananda S. Talawar, IFS**

Director, Science, Technology & Environment

Joint Member Secretary, Tripura State Council for Science & Technology

Vigyan, Prajukti O Paribesh Bhawan, Gurkhabasti, Agartala- 799006

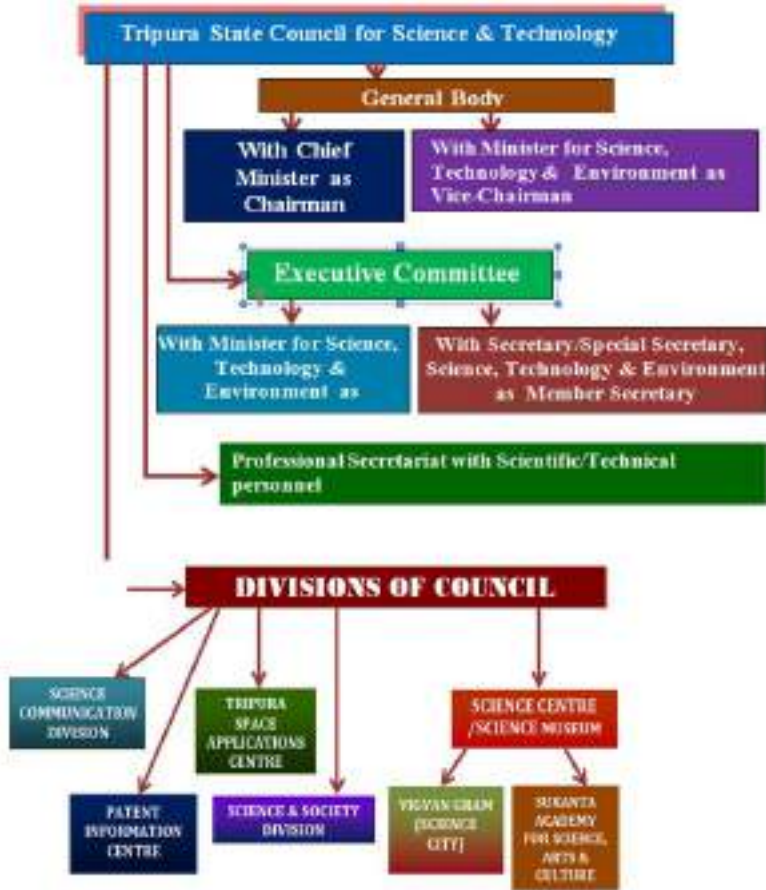
Phone: 03812307751, 8732052483, 9436772662 (M)

E-mail:shivandstalawar@gmail.com

25. **Structure of the Council:**

g) Date of Establishment – May, 1984.

h) Organizational Structure





C) Strength of approved manpower (both central (DST) and state supported)

Sl. No.	Name	Designation	Pay scale	Approximate monthly emoluments
<b>DST,GOI supported posts</b>				
1.	Shri Shivananda S. Talawar	Joint Member Secretary	41,400-50,400 (Apex Scale)	1,03,630.00
2.	Dr. Mihirlal Roy	Principal Scientific Officer	15,600-39,100, PB-4, GP-7100, L-18	1,10,370.00
3.	Shri Nataraj Datta	Principal Scientific Officer	15,600-39,100, PB-4, GP-7100, L-18	1,10,370.00
4.	Shri Madhusudan Debnath	Senior Scientific Officer	15,600-39,100, PB-4, GP-6800, L-16	87,200.00
5.	Shri Bhabatosh Datta	Senior Scientific Officer	15,600-39,100, PB-4, GP-6800, L-16	83,360.00
6.	Shri Deepayan Ghosh	Research Officer	15,600-39,100, PB-4, GP-5400, L-14	57,770.00
7.	Shri Avishek Choudhuri	Research Officer	15,600-39,100, PB-4, GP-5400, L-14	57,770.00
8.	Shri Ayan Kumar Saha	Scientific Assistant/ Demonstrator	10,230-34,800, PB-3, GP-4400, L-11	52,215.00
9.	Shri Prabir Kumar Saha	Accountant	10,230-34,800, PB-3, GP-4600, L-12	59,055.00
10.	Smt. Laxmi Debbarma	Stenographer	10,230-34,800, PB-3, GP-4400, L-11	52,215.00
11.	Shri Dipak Chandra Saha	Peon	4,840-13,000, PB-1, GP-1400, L-1	22,005.00
12.	Shri Vanlal Muana Tochhawug	Peon	4,840-13,000, PB-1, GP-1400, L-1	21,885.00
*1(one) post of Driver is vacant due to the death of the incumbent in service which will be filled up shortly				
<b>State supported posts</b>				
1.	Shri Subrata Paul	Scientist/ Engg-B	15,600-39,100, PB – 4, GP- 5400, L – 14	68,870.00
2.	Shri Abhisek Dasgupta	Scientist/ Engg	15,600-39,100, PB – 4, GP- 5400, L – 14	68,870.00
3.	Shri Subhrajyoti Chowdhury	Scientist/ Engg	15,600-39,100, PB – 4, GP- 5400, L – 14	68,870.00
4.	Shri Sujit Das	Scientist/ Engg	15,600-39,100, PB – 4, GP- 5400, L – 14	65,870.00
5.	Shri Abhijit Roy	Scientist/ Engg	15,600-39,100, PB – 4, GP- 5400, L – 14	68,870.00
6.	Smt. Banani Bhattacharjee	Scientist/ Engg	15,600-39,100, PB – 4, GP- 5400, L – 14	65,870.00
7.	Shri Supriya Majumder	Scientist/ Engg	15,600-39,100, PB – 4, GP- 5400, L – 14	65,870.00
8.	Smt. Rita Roy	Scientist/ Engg	15,600-39,100, PB – 4, GP- 5400, L – 14	68,870.00
9.	Shri Subhranil Roy	Scientist/ Engg	15,600-39,100, PB – 4, GP- 5400, L – 14	68,870.00
10.	Smt. Nupur Nag	Scientist/ Engg	15,600-39,100, PB – 4, GP- 5400, L – 14	68,870.00
11.	Shri Parthi Sarathi Goswami	Scientist/ Engg	15,600-39,100, PB – 4, GP- 5400, L – 14	65,870.00
12.	Shri Sanjoy Sen	Project Officer	15,600-39,100, PB – 4, GP- 5400, L –	57,770.00

			14	
13.	Shri Partha Sarathi Das	Supervisor	5700 – 24000, PB - 2, GP – 4200, L - 10	51,705.00
14.	Shri. Manoj Kumar Pal	Demonstrator	10,230-34,800, PB-3, GP-4400, L-11	52,215.00
15.	Shri. Prasenjit Basak	Demonstrator	10,230-34,800, PB-3, GP-4400, L-11	52,215.00
16.	Shri. Swapan Debnath	Demonstrator	10,230-34,800, PB-3, GP-4400, L-11	52,215.00
17.	Shri. Manabendra Debbarma	Upper Division Clerk	5700 – 24000, PB - 2, GP – 2800, L – 9	40,398.00
18.	Smt. Basanti Chakraborty	Lower Division Clerk	5700 – 24000, PB - 2, GP – 2200, L – 7	28,588.00
19.	Shri. Santi Mohan Tripura	Lower Division Clerk	5700 – 24000, PB - 2, GP – 2200, L – 7	28,415.00
20.	Smt. Rita Rani Roy	Peon	4,840-13,000, PB-1, GP-1400, L-1	20,325.00
21.	Shri Bhaskar Chakraborty	Peon	4,840-13,000, PB-1, GP-1400, L-1	20,665.00
22.	Smt. Laxmi Dhanuk	Peon	4,840-13,000, PB-1, GP-1400, L-1	19,665.00
23.	Shri Vivek Kumar	Sweeper	4,840-13,000, PB-1, GP-1800, L-3	28,732.00
24.	Smt. Jyotsna Basfore	Sweeper	4,840-13,000, PB-1, GP-1400, L-1	21,885.00

d) Details of the manpower salary for 2018-19

Sl. No.	Name	Designation	Pay scale	Approximate monthly emoluments	Annual emoluments
1.	Shri Shivananda S. Talawar	Joint Member Secretary	41,400-50,400 (Apex Scale)	1,03,630.00	12,43,560.00
2.	Shri Nataraj Datta	Principal Scientific Officer	15,600-39,100, PB-4, GP-7100, L-18	1,10,370.00	13,24,440.00
*3.	-	Principal Scientific Officer	15,600-39,100, PB-4, GP-7100, L-18	1,07,050.00	10,70,500.00
4.	Shri Madhusudan Debnath	Senior Scientific Officer	15,600-39,100, PB-4, GP-6800, L-16	87,200.00	10,46,400.00
5.	Shri Bhabatosh Datta	Senior Scientific Officer	15,600-39,100, PB-4, GP-6800, L-16	83,360.00	10,00,320.00
6.	Shri Deepayan Ghosh	Research Officer	15,600-39,100, PB-4, GP-5400, L-14	57,770.00	6,93,240.00
7.	Shri Avishek Choudhuri	Research Officer	15,600-39,100, PB-4, GP-5400, L-14	57,770.00	6,93,240.00
8.	Shri Ayan Kumar Saha	Scientific Assistant/ Demonstrator	10,230-34,800, PB-3, GP-4400, L-11	52,215.00	6,20,580.00
9.	Shri Prabir Kumar Saha	Accountant	10,230-34,800, PB-3, GP-4600, L-12	59,055.00	7,08,660.00
*10.	-	Driver	5,700 – 24,000, PB-2, GP-2,200, L-7	28,088.00	2,80,880.00

11.	Smt. Laxmi Debbarma	Stenographer	10,230-34,800, PB-3, GP-4400, L-11	52,215.00	6,20,580.00
12.	Shri Dipak Chandra Saha	Peon	4,840-13,000, PB-1, GP-1400, L-1	22,005.00	2,64,060.00
13.	Shri Vanlal Muana Tochwawug	Peon	4,840-13,000, PB-1, GP-1400, L-1	21,885.00	2,62,620.00
	<b>TOTAL</b>			<b>707475</b>	<b>98,29,080.00</b>

\*Note : 1(one) post of Driver is vacant due to the death of the incumbent in service which will be filled up shortly

1(one) post of Principal Scientific Officer is vacant from April, 2018 which will be filled up by promotion

**26. Budget allocation to your state S&T council for last five financial years including central government, State government & any other sources.**

Sl.NO.	Financial Year	Fund received			Total
		Central	State	Others	
1.	2011-12	315.29	111.44	9.0	435.73
2.	2012-13	34.25	332.25	-	366.5
3.	2013-14	163.45	956.78	-	1120.23
4.	2014-15	58.05	1711.04	156.25	1925.34
5.	2015-16	95.50	161.31	1.50	258.31
6.	2016-17	190.10	1615.03	-	1805.13
7.	2017-18	74.16	101.19	35.33	210.68

**4. Key activities under taken during the last two years in the area of:-**

**4.1. Technology Development**

- Computerized Examination Data Processing system
- Development of Pabda Hatchery and improvement of reproductive and larval performance of pabda
- Setting up of Hand Made Paper unit
- Scientific evaluation of water purification system in Tripura
- Setting up of manufacturing unit of Liquid Disinfectant Cleaner

**4.2. Technology Demonstrations**

- Demonstration of rural technologies developed by CSIR (Terafil, mushroom, banana leaf fiber, low dust chalk, low cost bakery oven, hot air dryer)
- Vermicomposting, floriculture, composite fish culture, polyculture, pig breeding/fattening, boiler farming
- Demonstration of floral craft technology
- Popularisation of coir technologies in Tripura

- Demonstration of technologies supported by Science for Equity and Empowerment Development Division of DST, GOI

#### **4.3. Popularisation of science**

- Sci-Connect of North-East – A project of Vigyan Prasar, DST, GOI
  - Radio Serial in Kokborak on Scientific Awareness in Tripura (VP,DST,GOI)
  - Networking for WaSH : Communicating Science (NCSTC, DST, GOI)
- 
- Awareness on Scientific Understanding of Posthumous Body, Organ and Tissue Donation (NCSTC, DST, GOI)
    - Workshop on Inclusive Innovation (NIF, DST, GOI)
    - Nucleation/rejuvenation of School Science Club and College Science Forum
    - Annual event : Science Fair (State & District Level), Inter School Science Drama Competition (State & District Level), Inter College Science Drama Competition, Students Science Seminar (State & District Level), Junior Mathematics Olympiad (State & Subdivision level), Observation of National Science Day, Children’s Science Congress (State & Sub-division Level)
    - Student’s Project Programme
    - Nucleation of District Science Forum
    - Nucleation of Sub-divisional Science Forum
    - Utilization of Local Festival/ Mela for awareness generation
    - Workshop for development of resource persons in Kokborok
    - Workshop on Improvement of Science Education
    - Meet the Scientist Programme
    - Memorial lectures
    - Mass campaign against mis-belief/superstition/ blind faith
    - Science Communicators’ Conclave

#### **4.4. Patents**

- 16 workshop on IPR at different educational Institutes
- Formation of IPR Cell at 7 Institutes
- 2 Patent Applications filed
- Orientation camp for co-ordinators of IPR cell
- 5 Trademark Registration done
- 6 Copyrights registered
- More than 150 patent searching done

#### **4.5. Any new innovative activities**

- Student’s Project Programme
- Radio serial in Kokborok
- Campaign programme on WaSH

- Production of science communication materials in Kokborok language

**5. List 5 success stories with brief about 1 page each including photograph, if available.**

**5.1. Sci-Connect of North-East :** Vigyan Prasar under Department of Science & Technology, Govt. of India sanctioned a project to Tripura State Council for Science & Technology on ‘Sci-Connect’ for the children of upper primary and secondary level. The main objective of the programme is to sensitize the young children towards science in day to day life to improve their decision making skill. Sci-connect – 2017 completed in four stages viz. Screening of film, District level quiz, State level quiz and Regional level quiz. Team Tripura got the first position in the Regional Quiz and honoured to host the final of Sci-connect – 2018.



**5.2. 2<sup>nd</sup> Students Project Programme:** In order to motivate/encourage and to provide opportunity to the Post-Graduate, Under-Graduate/Diploma and other categories of students of Higher & Technical Education in Tripura to take up challenges in identification and/or in solution of the problem of the surrounding society with inputs of Science & Technology and/ or to work for better utilization of resources with inputs of Science & Technology the 2<sup>nd</sup> student project programme was organized with the theme ‘**Challenges of Climate Change**’. The main competitions were organized in 2(two) separate groups viz., Group: A for the Post Graduate students and Group: B for the Under-graduate/Diploma /other categories of students of Technical Institutes. In the technical sessions projects were presented followed by question answer sessions. Great enthusiasm was seen among the students during the whole programme. More than 1500 students took part in the said programme.



**5.3. Networking for WaSH : Communicating Science :** Under the sponsorship of National Council for Science & Technology Communication, Ministry of Science & Technology,

Department of Science & Technology, Govt. of India a project on ‘Networking for WaSH : Communicating Science’ was undertaken with a view to aware people about the sanitation practices at home, hand-wash before meal, reduce sanitation related diseases and create awareness regarding water body concentration among students and common people. Under this project following programmes were organized

- District level sensitization meet
- Sensitization meet for Anganwadi Incharges
- Spec on Sanitation & hygiene issues
- “Hand Wash before meal” campaign
- Sanitation Science Communication Poster campaign



**5.4. Radio Serial in Kokborok on Scientific Awareness in Tripura :** Vigyan Prasar, an autonomous organization under Ministry of Science & Technology, Govt. of India has sanctioned a project to Tripura State Council for Science & Technology to produce 26 episode of radio serial in Kokborok (Mother tongue of Tribals of Tripura) on Scientific Awareness and broadcast the same in All India Radio, Agartala. A brainstorming workshop was organized in Agartala for identification of the issues of different episode. The serial was aired from March, 2017 in the name of ‘Soisimakok’ means ‘Bigyaner Katha’. Each episode was of 30 minutes. Topics covered in the serials were broadly divided into four categories; 1) Environment, Biodiversity & Wildlife 2) Superstition, Misconception and health related issues 3) Health & Social evils 4) Disaster &



**5.5. Liquid Disinfectant Cleaner:** Tripura State Council for Science & Technology supported M/S. SAPMG (Small and Productive Manufacturing group) for adopting a technology for manufacturing of Liquid Disinfectant Cleaner developed by NEIST, Jorhat. The entrepreneur are selling the product in the brand name ‘CLEANO’.



**5.6. Hand Made paper :** One hand made paper unit has been set up in Kasturba Gandhi National Memorial Trust, R.K.Nagar, Jirania. Technology has been adopted from TARA Machines & Tech Services Private Limited, New Delhi. On the unit they are recycling paper and from the outcome different byproducts like pen stand, folder, fine paper for letter-head etc. are making and supplying in different Line department /programmes.



**6. Has the council developed any specific state related S&T and innovation policy? If so the details to be provided.**

Draft of the State S & T Policy has been prepared but not yet approved

**7. How strong are the links between other state government /departments If so provide details?**

The Council is maintaining a strong link with other State Government Departments like School Education and Higher Education. Maximum numbers of the Science Communication activities are being implemented in collaboration with the School Education and Higher Education Departments with an objective to enhance the scientific temper among school and college students. In association with the Industries & Commerce departments, Council is taking initiative to protect the Intellectual Property Rights of various stakeholders. Apart from that various science & technology related projects have been implemented in collaboration with Agriculture Department, Fisheries Departments, etc. Council has completed a project in collaboration with Tripura Tribal Areas Autonomous District Council (TTAADC). Council has also organized R & D workshops, Brainstorming workshops and other programmes involving various line Departments of the State and Higher Educational Institutes of the State.

**8. How strong are the links of the council with local industry units/associations?**

Apart from maintaining strong link with the various State Government Departments, the Council has implemented some projects in collaboration with local industrial units/ NGOs/SHGs like Pabda Hatchery, Iron Removal Plants, Handmade Paper Units, Herbal Incense stick etc. An initiative has also been taken to link up with Industry association for registration of Geographical Indication (GI) item.

**9. List 5 major technology area, where the council can play an important role by finding**

**convergent technological solutions.**

1. Safe drinking water straight from the air
2. Rain Water Harvesting
3. Improvement of Science Education
4. Productivity enhancement of women SHGs of Tripura through science and technology intervention
5. Adoption of herbal gulal making technology and incense stick making technology from offered flower for the unemployed youth of Tripura.

**10 Proposed programme and budget outlay for the 2018-19**

i.	Manpower Salary (including Annual contribution Towards LICI linked pensionary benefit)	Rs.	98.29 lakhs
ii.	Travel expenses	Rs.	12.00 lakhs
iii.	Office Expenses		
26.1	Automation	Rs.	10.00 lakhs
26.2	Others	Rs.	10.60 lakhs
<b>Total</b>	<b>Rs. 130.89 lakhs</b>		

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# Uttar Pradesh

## 1. Details of State S&T Council

Name of the Secretary & Member Secretary/ Director General

**Shri Hemant Rao, IAS**

Principal Secretary, Department of Science & Technology,  
Govt. of U.P.,

Lucknow-226 018, U.P.

Ex-Officio Director General

**Shri I.D. Ram**

Secretary,

Council of Science & Technology, U.P.,

Lucknow-226 018, U.P.

### Address

Vigyan Bhawan,

9-Nabiullah Road, Lucknow-226 018

Uttar Pradesh

Email: cstup@nic.in; cstup1975@gmail.com

raohem@gmail.com; idram.upcst@gmail.com

Phone: 0522-2230868 Director General (O)

Fax: 0522-2611793

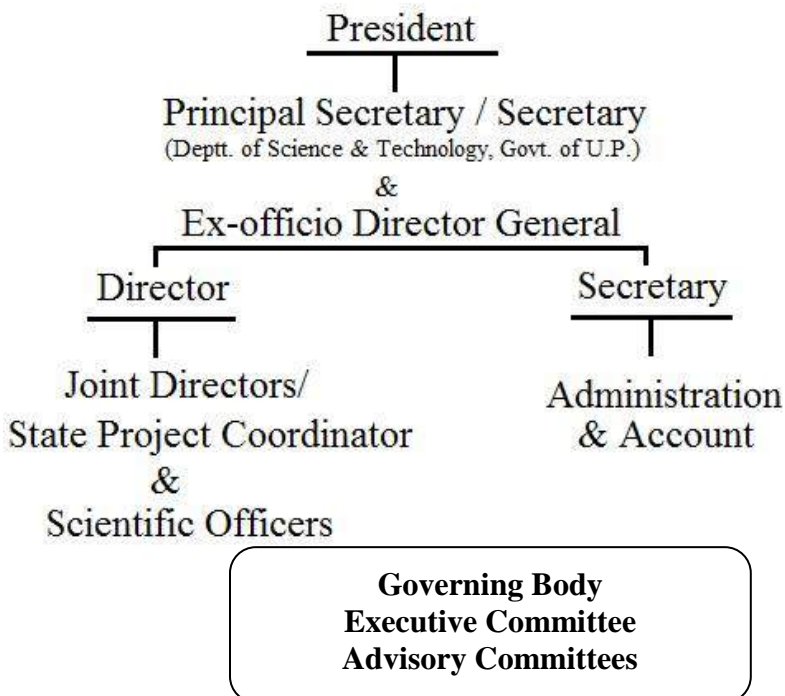
Mob. No.: 9335902585- Secretary

Website: dstup.gov.in

## 2. Structure of the Council

(a) Date of establishment: 1May, 1975

### (b) Organization Structure



**(c) Strength of approved manpower (both Central (DST) and state supported).**

**Strength of manpower Central (DST)**

<b>S.No.</b>	<b>Name</b>	<b>Designation</b>	<b>Pay Scale</b>	<b>Approximates monthly emoluments</b>
1.	Dr. Devendra Shah	scientific officer (SG)	2200-4000 Dt 1.1.1996, 8000-13500 dt 1.1.2006 15600-39100 GP 5400, DT. 1.1.2016 Level. 12	123227.00
2.	Dr. Ashwani kumar singh	scientific officer (SG)	2200-4000 Dt 1.1.1996, 8000-13500 dt 1.1.2006 15600-39100 GP 5400, DT. 1.1.2016 Level. 12	119627.00
3.	Sri Mahadev pandey	scientific officer (SG)	2200-4000 Dt 1.1.1996, 8000-13500 dt 1.1.2006 15600-39100 GP 5400, DT. 1.1.2016 Level. 12	115676.00
4.	Sri suresh Chandra Sharma	scientific officer (SG)	2200-4000 Dt 1.1.1996, 8000-13500 dt 1.1.2006 15600-39100 GP 5400, DT. 1.1.2016 Level. 12	122417.00
5.	Sri P.K. Singh	Computer Operator	1400-2300 Dt 1.1.1996, 4500-7000, Dt 1.1.2006, 5200-20200, GP-2800 Dt 1.1.2016 Level-7	70234.00
6.	Smt. Nargis Praveen	Stenographer	1400-2600 Dt 1.1.1996, 5000-8000, Dt 1.1.2006, 9300-34800, GP-4200 Dt 1.1.2016 Level-8	72327.00
7.	Shri Shyam Kishor	Office Assistant	950-1500 Dt 01.01.1996, 3050-4590 Dt 01.01.2006 5200-20200 GP-1900, and 01.01.2016 Level-5	45928.00
8.	Shri Pravendra Kumar Dubey	Office Assistant	950-1500 Dt 01.01.1996, 3050-4590 Dt 01.01.2006 5200-20200 GP-1900, and 01.01.2016 Level-5	44194.00
9.	Shri H.C. Awasthi	Office Assistant	950-1500 Dt 01.01.1996, 3050-4590 Dt 01.01.2006 5200-20200 GP-1900, and 01.01.2016 Level-5	42634.00
10.	Shri Devendra Kumar Dubey	Office Assistant	950-1500 Dt 01.01.1996, 3050-4590 Dt 01.01.2006 5200-20200 GP-1900, and 01.01.2016 Level-5	44194.00
11.	Shri Mainuddin	Typist	950-1500 Dt 01.01.1996,	44394.00

			3050-4590 Dt 01.01.2006 5200-20200 GP-1900, and 01.01.2016 Level-5	
12.	Shri Suresh Kumar	Typist	950-1500 Dt 01.01.1996, 3050-4590 Dt 01.01.2006 5200-20200 GP-1900, and 01.01.2016 Level-5	44074.00
13.	Shri Raj Kumar Saraswat	Typist	950-1500 Dt 01.01.1996, 3050-4590 Dt 01.01.2006 5200-20200 GP-1900, and 01.01.2016 Level-5	44134.00
14.	Shri Raghuvir Singh	Office Assistant	950-1500 Dt 01.01.1996, 3050-4590 Dt 01.01.2006 5200-20200 GP-1900, and 01.01.2016 Level-5	43024.00
15.	Shri Rajendra Singh	Typist	950-1500 Dt 01.01.1996, 3050-4590 Dt 01.01.2006 5200-20200 GP-1900, and 01.01.2016 Level-5	43274.00
16.	Shri Rajesh Kumar	Office Assistant	950-1500 Dt 01.01.1996, 3050-4590 Dt 01.01.2006 5200-20200 GP-1900, and 01.01.2016 Level-5	44074.00
17.	Shri S.K. Upadhyay	Office Assistant	950-1500 Dt 01.01.1996, 3050-4590 Dt 01.01.2006 5200-20200 GP-1900, and 01.01.2016 Level-5	44444.00
18.	Shri Ram Nath	Peon	750-940 Dt 01.01.1996, 2550-3200 Dt 01.01.2006 5200-20200 GP-1800, and 01.01.2016 Level-4	37681.00
19.	Shri Lokesh Kumar	Peon	750-940 Dt 01.01.1996, 2550-3200 Dt 01.01.2006 5200-20200 GP-1800, and 01.01.2016 Level-4	37621.00
20.	Shri Mahendra Singh	Peon	750-940 Dt 01.01.1996, 2550-3200 Dt 01.01.2006 5200-20200 GP-1800, and 01.01.2016 Level-4	36641.00
21.	Shri Ashok Kumar Mishra	Peon	750-940 Dt 01.01.1996, 2550-3200 Dt 01.01.2006 5200-20200 GP-1800, and 01.01.2016 Level-4	37561.00

**3. Budget Allocation to State S & T Council for Last Five Financial years State Govt. , Central Govt., and any other Sources**

Year	State	Central Govt.	Other
2017-18	4138.73	110.50 (2.66%)	65.00
2016-17	3925.22	149.20 (3.80%)	-
2015-16	1756.00	158.20 (9.0%)	-
2014-15	1755.00	156.20 (8.9%)	-
2013-14	1718.07	165.99 (9.6%)	-



**Aerodynamics Workshop**



**National Mathematics Day**



**Industrial Trip**



**4. Key Activities under taken during the last two year in the area of**

	Last two Years	Year 2017-18
Technology Development	37	12
Technology Demonstration	40	31
Popularization of Science	865	794
Patent Filed/Handled	28/62	14/35

**Any New Activities**

- Scholarship
- Engineering Student's Project

CSTUP

3. Research Fellowship Programme
4. Interuniversity Science film Making Competition
5. Development of Online Portal for CSTUP
6. Establishment of Science Park
7. Science Bus.
8. Establishment of Bio Design Centre .

Summer

#### 4.1 Technology Development (2017-18)

S.No.	Technology Developed	Organisation
1.	E-ticketing software for Planetarium	CSTUP
2.	Development of CSTUP web portal	CSTUP
3.	Online Submission & Evaluation of R&D Projects	CSTUP
4.	CSTUP App	CSTUP
5.	E-Office is being installed	CSTUP
6.	Partial Replacement of Cement & Coarse aggregate using Silica fume, egg shell & e-waste and construction of porous hollow concrete panel.	Buddha Institute of Technology, Gorakhpur
7.	Dynamic wireless charging of an electric car	Noida Institute of Engineering & Technology
8.	Anti derailment & Health facility system	Noida Institute of Engineering & Technology
9.	Polystyrene foam disposals Recycling Machine	CIPET, Lucknow
10.	Allovera, cultivation improvement	NBRI, Lucknow
11.	System & Method for test suite optimization in regression testing	Deptt. of IT, BBAU, Lucknow
12.	A Despeckling Framework of Agricultural Sar Images for Land Monitoring	Deptt. of IT, BBAU, Lucknow

#### 4.2 Technology Transfer / Demonstration / Dissemination

- ion & production of bio-diesel from Jatropha Seeds (1). Demonstrat
- ion & Training of Blue Green Algae Bio Fertilizer (4). Demonstrat
- ion & production of Azolla as a cattle food to increase the milk production (2). Demonstrat
- Culture Lab is expanded for producing higher quality of Banana Saplings. Tissue
- on of economic & short term process of Vinegar Making 4 places. Disseminati
- ion of Organic Farming/ Bio fertiliser & Tissue Culture among farmers (16). Demonstrat
- ion of Paddy planter (2) & Manual Harvester (2). Demonstrat

## More than 794 programme organized in the Year 2017-18

### 4.2.1 S & T Promotion

Scouting Innovation (5), Astronomical Events (150), Lecture on IPR (22), Training Program at B.K.T. Lucknow (4), Innovation awareness Programme (40), Farmers Programme on Tissue Culture (18), Sir J.C Bose Innovation Contest (1), 50 Days Training to BITS Pilani Students (1), Training of Farmers on Biodiesel Production, Laborator / Industrial Visit of Students.

### 4.3 Science Popularization & Communication

- Celebration of Special days viz National Science Day (38), National Technology Day (1), WIPO Day & Innovation Day (2), Sir C V Raman Birthday (73).

- Programme on Potable Water (108), Safe disposal of Plastic & Other Non Degradable / Bio Degradable Material (85),

- Hello Young Scientist on All India Radio (Every Sunday)

- IPR Awareness programmes (25)

- Bal Vigyan Mahostsawa (05), Science Popularization Programmes (40), Demystification of Myths with Scientific Explanation (120), S & T Exhibition (06)

- Mobile Planetarium Show (10 Districts)

### 4.4 Patent Application Filed

Sr. No/	Title of the Invention	Application No.	Detail of Applicant
1	Method for Enhancing Biogas Production	201711043149	Chetanya, S/O: Rajendra Prasad house no- 619, mohanganj Hathras, HathrasHathras Uttar Pradesh - 204101 Contact No. 9412135565, +91-8803341729, chetanya0007@gmail.com
2	System for Self-Sustaining Liquid Circulation with Continue Rotating Turbine	Awaited	KasufSiddikee, Amit, Ajay Pandey,&108/7, Gram Alladpur Post:- KamlabadBadhuliLucknow, Pin 226201, U.P. , India +917607142980, Email: amtansh.96@gmail.com
3	Modified Carburettor System for enhance mileage of Motorcycle	201711045543	Vivek Kumar Patel, PipariCharva, Kausambhi , U.P. 212203 Mob 9648545177
4	A Potentiometric Biosensor For Measuring Concentration Of Glucose Molecule In A Solution	201711036226	Applicant: COUNCIL OF SCIENCE ANDTECHNOLOGY-UP, Inventor: Nikhil KantShukla,, AssociateProfessorDepartment

	And Processes Thereof		of ChemistryMGPCollege, Bank Road,Purdilpur, Gorakhpur
5	A Despeckling Framework Of Agricultural Sar Images For Land Monitoring	201711035086	Raj Shree, B-1/1-4, Department of Information Technology, BabasahebBhimraoAmbedkar University, VidyaVihar, RaebareliRoad, Lucknow (226025), INDIA rajshree.bbau2009@gmail.com
6	System and Method For Test Suite Optimization In Regression Testing	201711035077	Raj Shree, B-1/1-4, Department of Information Technology, BabasahebBhimraoAmbedkar University, VidyaVihar, Raebareli Road, Lucknow (226025), INDIA rajshree.bbau2009@gmail.com
7	Vacuum Air Vehicle	201711025816	1. Rajat Mishra, Sector N-185 aashiana colony, Lucknow (PIN 226012), <a href="mailto:Rjrajat678@gmail.com">Rjrajat678@gmail.com</a> 8077950972 2. Harshit Mishra. Sector N-185 aashiana colony, Lucknow (PIN 226012) <a href="mailto:Mishrah254@gmail.com">Mishrah254@gmail.com</a> 9410606747
8	Light Weight and High Strength Frame for Bicycle	201711024191	Amit Kumar & Ajay PratapPandey, 108/7, Gram Alladpur Post:- KamlabadBadhuli Lucknow, Pin 226201, U.P. , India +917607142980, Email: amtansh.96@gmail.com
9	Side Stand Starter Lock System for Two Wheelers	201711023261	RadheyShyamPandey, Village- Kamapur, Post.- Sohgauli, PS/block- Kurwar, Dist.- Sultanpur, U.P. Pin- 228155 India, 9795277773, Email: radhey.pandey277773@gmail.com
10	Absolute Coordinate Module Based Navigation System For Automatic Guided Vehicle	201711013449	Anupam Prasad 633/01 GovindVihar Colony, Faizabad Road, Lucknow Email: <a href="mailto:anupam.prasad@kapyah.com">anupam.prasad@kapyah.com</a> Mob No. 9451964463
11	Drive Arrangement for Flue Injection Pump	201711016316	SATYA PRAKASH DUBEY, KaushikBhavan, N.H.-28, Rustampur, Gorakhpur 273016 , U.P. , India Email: samdiesels@rediffmail.com Mob. No. 9415327532
12	Security System for protection of crime	201711012918	JeetuShukla, 4/608, A vinayKhand, Gomti Nagar, Lucknow Mob. 7618991111 Jetu.shukla07@gmail.com
13	Process of Making Herbal	Awaited	Prahlad Singh S/o ShriShyamlal, Gram-

	Medicine for Treatment of Hepatitis-B		Ratanpura, Block- Dibai, Dist. Bulandsaher , U.P. Mob. 9675655365
14	Device for Electrical Anti Shock And Voltage Control	201811008530	ShriBanshraj Singh, 4/1, Azad Square, Allahabad 9839048013

#### 4.5 Copyright

Sr. No.	Title of Work	Diary No.	Detail of Creator
1	RasayanVigyan Me AlifeticYogicoKoEk Hi Formula DwaraGyatKarneKaTarika	8660/2017 -CO/L	Gyanendra Singh Maurya S/o RamsumiranMaurya Bardah Bazar, Nanpara, ShivpurBehraich , U.P. PIN 271830
2	Real Periodic Table	8452/2017 -CO/L	ShriyaTiwari, 561/ka, SindhuNagar, Kanpur Road, Lucknow, Mob. 9839360846 <a href="mailto:Shriyatiwari846@gmail.com">Shriyatiwari846@gmail.com</a>
3	AlifeticHydrocorbonYogiko KoEk Hi Formula DwaraGyatKarneKaTarikako	10174/2017-Co/L	Gyanendra Singh Maurya S/o RamsumiranMaurya Bardah Bazar, Nanpara, ShivpurBehraich , U.P.PIN 271830
4	KashthaDozi	10559/2017-CO/L	Ayushi Sihna, Vinay Sinha, 215/273, subham marg, Durgawan, Lucknow. ayushisinha.1995@rediffmail.com
5	Voice Airway Project for U.P.	14737/2017-CO/L	Dr.RakeshSrivastava, KGMU, Lucknow <a href="mailto:rakeshshrivastavaent@gmail.com">rakeshshrivastavaent@gmail.com</a>
6	Letter Pad (Bismillah Home Shop)..	Diary Awaited	MohammadZafaruddin Address: N.K.C., 47, Nehru Road, Lucknow – 226002
7	Bharat kaNayaParishram , Gyanjeetkasaveraho (book)	18168/2017-CO/L	Sanjeev Kumar Verma, Village- KaruaSahabganj, Block- Bhadpura, Post: Dalel Nagar, Nawabganj, Bareilly-262406

#### 4.6 Trademark

Sr. No	Name of Trademark	Details of Proprietor
1	The Achaari (3569077)	ParikshitMehrotra, parikshitdesign@gmail.com
2	PANACEU (3605364)	Ms RichaBhadauria, A-3, C21, Devratan Apartment, H park, ManagarExtention, Lucknow. Email: <a href="mailto:richaipbhadauria@gmail.com">richaipbhadauria@gmail.com</a>



3	“Excellent Movies” with logo	Dinesh Chandra, 05, Shivam Nagar, Behind Kandhari Tent House, Post – Manas Nagar, Lucknow – 226 023 09506157694
4	“Hafizia “	NadeemAkram, HAFIZIA ART AND CRAFTS PVT. LTD. Sitapur Mob. No. +91-9889438650
5	“Oryll”	JogindarRajpati Singh, 48,Gairahan, Kalikadham, Sevapuri,Varanasi- 221403 Uttar Pradesh , jogiswamy@gmail.com

#### 4.7 Design

#### 5. List of 5 Success Stories.

Sr. No.	Name of Design	Application	Details of Creator
1	Motorcycle Side Stand	295346	RadheyShyamPandey, Village- Kamapur, Post.- Sohgauli, PS/block- Kurwar, Dist.- Sultanpur, U.P. Pin- 228155 India, 9795277773, Email: radhey.pandey277773@gmail.com
2	Bicycle	294840	Amit Kumar & Ajay PratapPandey, 108/7, Gram Alladpur Post:- KamlabadBadhuliLucknow, Pin 226201, U.P. , India +917607142980, Email: amtansh.96@gmail.com
3	Interlocking Brick	297186	Diwaker Kumar Shukla Address: Village- Purela, Post.- Chhitipalgarh , Pratapgarh PS/block- Mandhata, Dist.- Pratapgarh, U.P. Pin- 212507 Email: diwakershukla2017@gmail.com Contact No: +919793345542

- Mini Science Park at Ghaziabad.
- Production of 25 Lakhs Tissue Culture Banana plantlet.
- Financial sanctioned to 158 R & D projects.
- Engineering Student’s Project and Summer Research Fellowship.
- Scholarship Amounting Rs 345 lakh per year.
- Science Bus.



Science Park



Tissue Culture Lab



Engineering Student's

**6. Has the Council developed any specific State related S& T and innovation policy? if so the details to be provided.**

- Consultation Provided in Drafting of Pharma Policy of the State 2018
- Biotech Policy 2014
- Innovation Guidelines 2015
- S & T Vision Document

**7. How strong are the links between other state Government/ department if so provide details.**

Research & Development Technology	National Institutes-CSIR, ICAR, ICMR, State and Central University, IITs, PRL Ahmadabad, IUCAA Pune, BARC Trombay
Local Industry Unit	Hindustan Bio Energy Limited
Technology Development Biotechnology	Technical Institutions, IIT Kanpur, IET, HBTI, IIIT Allahabad, DBT, GOI, Biotech Park, Dept. of Horticulture/ Health/ Industries, Udyog Bandhu, Investors, Industrial development, NIC & UP electronics Corporation.
Professional Bodies Agriculture	UPAS, Lucknow, NASI, Allahabad & other Scientific Societies UPCAR, ICAR institutions, Deptt. of Agriculture State,

	Agriculture Universities SHIAST- Allahabad
For IPR & Innovation Programme	PHD Chamber of Commerce, CII, IIA, FICCI, U. P. Sugar Mill Association, Cold Storage Association, District Industry Centres, MSME-DI's U. P. , MSME's Export, Promotion Bureau, NIF, Ahmadabad, GIAN, Technical Education Dept., Planning Dept.
CORE Support Technology	DST, GOI
Convergent Support	NCSTC, GOI
Science Popularization	Education Dept. Regional Science Centre etc.
Mapping of S & T. Needs	Dept. of Agriculture & Environment, RSAC UP, Health, Horticulture, Fisheries, Tourism, Minerals etc.

**8. How strong are the links of the council with local Industry units/association.**

Local Industry Unit	Hindustan Bio Energy Limited
Technology Development Biotechnology	Technical Institutions, IIT Kanpur, IET, HBTI, IIIT Allahabad, DBT, GOI, Biotech Park, Dept. of Horticulture/Health/ Industries, Udyog Bandhu, Investors, Industrial development
For IPR & Innovation Programme	PHD Chamber of Commerce, CII, IIA, FICCI, U. P. Sugar Mill Association, Cold Storage Association.

**9. Major Technologies Area, where the council can play an important role by finding Convergent Technological Solution.**

- i. Safe Drinking Water.
- ii. Green Energy.
- iii. Technology Relevant To Rural Area.
- iv. Solid, Biomedical Plastic And Sewage Waste Management.
- v. Biomedical Technologies.

**10. Proposed programme and budget outlay for the Year 2018-2019.**

REQUEST FOR ANNUAL INSTALMENT WITH  
UP - TO - DATE STATEMENT OF EXPENDITURE

(Financial Year i.e. 1st April 2018 to 31st March 2019)

1	Sanction Letter No.	DST/SSTP/Core Grant-G/2017-18 Dated: 14.09.2017
2	Total Project Cost	Rs. 114.86 Lakh (Rs. 11050000+Int. Rs. 435805.00)
3	Sanctioned/Revised Project cost (if applicable)	Rs. 110.50 Lakh

4	Date of Commencement of Project	01st April 2018
5	Duration	12 Months
6	Grant Received in each year	
	a. I year	Rs. 110.50 Lakh
	b. II year	Nil
	c. III year	Nil
	d. Bank Interest received on grant (mandatory)	Rs. 4.36 Lakh
	<b>e. Total</b>	<b>Rs. 114.86 Lakh</b>
7	Total expenditure	Rs. 187.73 Lakh
8	Funds required for next year	Rs. 212.18 Lakh

Contd./-

**STATEMENT OF EXPENDITURE & Budget Proposal**

*(Period 01.04.2017 to 31.03.2018)*

Rs. In Lakh

SI No	Sanctioned Head	Funds Allocated (*)	Expenditure Incurred During Financial Year-2017-18		Balance as on date	Requirement of funds upto 1st April 2018 to 31st March 2019	Remarks (if any)
I	II	III	IV	V- Total	III-V		
1	Manpower	105.00	182.04	182.04	-77.04	196.68	*
2	Permanent Equipments	1.00	1.00	1.00	0.00	5.00	
3	Travel	1.5	0.75	0.75	0.75	2.50	
4	Contingencies	3.00	3.94	3.94	-0.94	8.00	
5	<b>Total (A)</b>	110.50	<b>187.73</b>	<b>187.73</b>	<b>-77.23</b>	<b>212.18</b>	

Note- 1. \*This amount includes salaries (Rs. 184.08 Lakh) and seventh pay commission arrears (Rs. 12.60 Lakh, i.e. 01.01.2016 to 31.12.2016)

2. Shortfall amount for FY 2017-18 Rs. 77.23 Lakh and for FY 2016-17 Rs. 56.45 lakh is to be released by DST GOI to CST UP.

3. CST UP has a bearing of unspent amount of Rs. 50.00 Lakh Received as PRG and Rs. 4.85 remaining of consultants salary. DST GOI may release Rs. 79.20 lakh only after deducting Rs. 54.85 lakh to meet the shortfall.

Name & Signature with stamp

**Principal Investigator/Member secretary/Director (Council):**

.....

**Signature of Competent Financial authority.....**

**with stamp**

**Signature of Principal Secretary (S&T) and Secretary**

**(S&T)**

**\* Indicate sanctioned/revised allocation as applicable.**

**a) Expenditure under the sanctioned heads, at -any point of time, should not exceed funds allocated under that head, without prior approval of DST i.e. Figures in Column (V) should not exceed corresponding figure in Column (III).**

**b) Utilisation Certificate for each financial year ending 31st March has to be enclosed, along with request for carry-forward permission to next year. Which is to be uploaded on PFMS website this is responsibility of the Council please check with PAO DST for system etc over phone or personally**

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# Uttarakhand

## 1. Details of State S&T council :

Name of the Secretary & Member Secretary/Director General

**Dr Rajendra Dobhal**

Director General

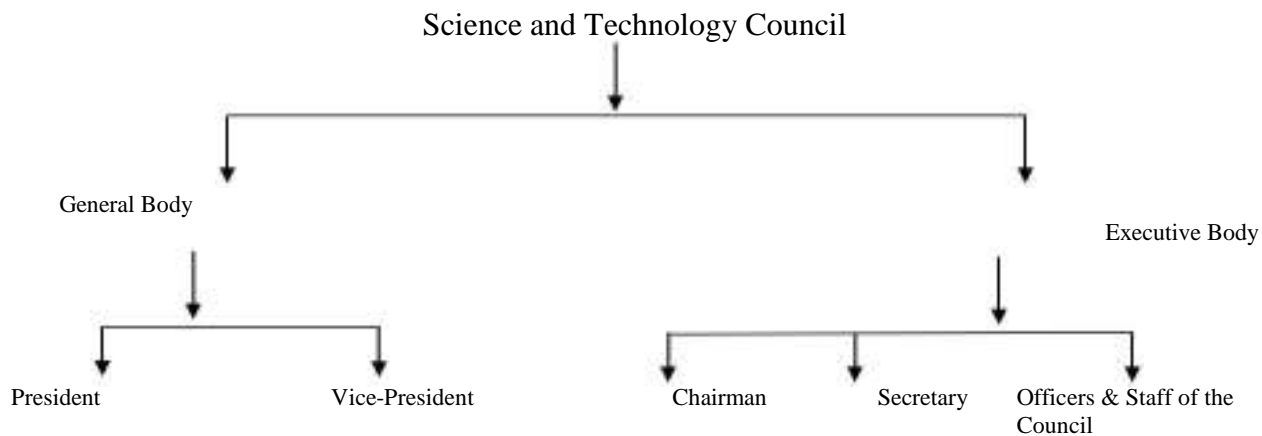
Uttarakhand State Council for Science and Technology,  
Vigyan Dham, Jhajra, Dehradun – 248007, Uttarakhand

Phone : +91-9412051556, 9412051557; Email : ucost@ucost.in

## 4. Structure of the Council:

Date of Establishment : 2005

Organization Structure:



c) Strength of Approved Manpower Central (DST) Sponsored

Sl. No.	Name	Designation	Pay Level	Approximate monthly emoluments (In `)
1	Dr Rajendra Dobhal	Director General	14	2,54,302.00
2	Dr B.P. Purohit	Joint Director	12	1,37,146.00
3	Dr D.P. Uniyal	Senior Scientific Officer	11	86,249.00
4	Dr Piyush Joshi	Senior Scientific Officer	11	86,249.00
5	Er Jitendra Kumar	Scientific Officer	10	71,512.00
6	Shri Nathi Ram	Scientific Officer	10	71,512.00
7	Dr Ashutosh Mishra	Scientific Officer	10	71,512.00
8	Shri Alok Maithani	Technical Assistant	7	57,471.00
9	Dr Manmohan S. Rawat	Technical Assistant	7	57,471.00

State Sponsored

Sl. No.	Name	Designation	Pay Level	Approximate monthly emoluments (In `)
1	Dr Rajendra Dobhal	Director General	14	2,54,302.00
2	Dr Kirti Joshi	Scientific Officer	10	71,512.00
3	Dr Govind Kumar	Scientific Officer	10	71,512.00
4	Sh Amit Pokhriyal	Manager Public Relations	10	71,512.00
5	Sh Subhas Negi	Manager Marketing	10	71,512.00
6	Sh S.D. Bijalwan	Administrative Officer	7	57,471.00
7	Dr K.N. Bhardwaj	Junior Scientific Officer	6	46,138.00
8	Dr Poonam Gusain	Junior Scientific Officer	6	46,138.00
9	Dr J.S. Aswal	Scientific Assistant	6	46,138.00
10	Sh Manoj Kumar	Scientific Assistant	6	46,138.00

11	Sh Ramdev Ghuniyal	Scientific Assistant	6	46,138.00
12	Sh O.P. Rawat	Scientific Assistant	6	46,138.00
13	Sh Pankaj Rawat	DTE Operator	6	46,138.00
14	Sh Pankaj Thapliyal	DTE Operator	6	46,138.00
15	Smt Sonia Bhandari	Demonstrator	6	46,138.00
16	Sh Nitin Kapil	Demonstrator	6	46,138.00
17	Sh Vikas Nautiyal	Junior Scientific	5	37,213.00



		Assistant		
18	Sh Pradeep Kumar	Stenographer	4	32,459.00
19	Smt Arti Dhiwan	Stenographer	4	32,459.00
20	Sh Kulvir Sajwan	Junior Assistant	3	27,586.00
21	Sh Vineet Kailkhuri	Junior Assistant	3	27,586.00
22	Sh Vipin Bidalia	Junior Assistant	3	27,586.00
23	Sh Girish Chauhan	Junior Assistant	3	27,586.00
24	Sh Rajneesh Bharti	Library Assistant	3	27,586.00
25	Sh Gajpal Singh	Plant Operator	3	27,586.00
26	09 persons are outsourced through Uttarakhand Purv Sainik Kalyan Nigam, Dehradun	Peon/ Guard	Consolidated Salary	1,08,000.00

**2 Budget allocation to your state S&T Council for last five financial years including central government, state government & any other sources:**

Year	2013-14		2014-15		2015-16		2016-17		2017-18		Rs in Lakhs Total In Last 05 Years	
	State	DST	State	DST	State	DST	State	DST	State	DST	State	DST
<b>Amount</b>	380	102	1010	112.2	400	114.20	332.5	153.2	550	95	2672.5	576.6

## 5. Key activities under taken during the last two years in the area of:-

### 4.1. Technology development:

- Development of Field Testing Kit for Water analysis.
- Development of high valued nutraceutical and therapeutic importance products by wild edibles of Uttarakhand.
- Development of High valued products from nutritionally rich traditional crops.
- Value addition to the hill cattle using allele polymorphism of Base in protein.
- Standardized the fish feed for commercial fish production by traditionally grown nutritional rich grain.

The Council has also funded Research and Development projects in major identified areas to the various Universities/institutes in the state for technology development during last two years.

<b>Name of the University/institutes</b>	<b>Project title</b>
Department of Biotechnology Indian Institute of Technology Roorkee Roorkee, Haridwar (UK)	Application of probiotic bacteria for enhancing nutritional status of underutilized millets of Uttarakhand
Department of General Surgery All India Institute of Medical Sciences Rishikesh, Dehradun (UK)	Study of molecular markers and their association with clinicopathological parameters in Gall bladder carcinoma
Department of Ophthalmology All India Institute of Medical Sciences Rishikesh, Dehradun (UK)	Screening of Ocular disease and survey of colour blindness in school attending children of Rishikesh
Otorhinolaryngology (ENT) & Head Neck Surgery All India Institute of Medical Sciences Rishikesh, Dehradun (UK),	Uttarakhand Thyroid Surgeries Registry (UTSR)
	Atmospheric Science Group

Department of Science and Technology  
(DST)

Aryabhata Research Institute of  
Observational

Sciences (ARIES), Manora Peak, Nainital-263002

(UK)

National Institute of Malaria Research  
NIMR, Field Unit

Sector-3, Health Centre, BHEL, Haridwar-249403

(UK)

Department of Botany and  
Microbiology

Gurukula Kangri Vishwavidyalaya  
Haridwar (UK)

Assistant Professor

Department of Pharmaceutical Sciences  
Gurukul Kangri Vishwavidyalaya

Haridwar-249404 (UK)

Spatio temporal variability of particulate matter and  
meteorological parameters in the Himalayan and  
adjacent plain regions of the state of Uttarakhand

Situation analysis and identification of risk factors  
of Dengue in Dehradun for its prevention and  
control

Cold tolerant plant growth promoting *Bacillus* spp.  
Productivity enhancement of *Eleusine coracana*  
cultivated  
at hilly district of Uttarakhand

Applicability of extracted resistant starch from  
madua

grains in indigenous and chemically modified form  
in  
development of drug delivery devices

## 4.2. Technology demonstrations:

### 4.2.1. Field Testing Kit for Water analysis:

Natural surface water may get polluted in different ways and polluted water should never be used. Generally in hills, the water becomes polluted during pre-storage as well as during storage. It therefore, becomes imperative to assess the quality of water being used for drinking and household needs, since it may contain substances which are harmful to human health. In difficult hilly terrains of Uttarakhand, the piped and treated water supply is still difficult and sometimes not possible. As per Census 2011 in Uttarakhand, still 14.3% households take tap water from untreated sources for

drinking purpose, which may impact the public health in various ways. The water available from natural sources and being used by local inhabitants for drinking and domestic needs should be tested to assess the quality of water before consumption and use. This will not only protect human health from various diseases in general but will also save them from massive hazards owing to bacterial contamination in particular.

Therefore, a low cost Field Testing Kit (FTK) for water quality testing has been developed and successfully demonstrated taking into



consideration the requirement of simple and reliable water quality testing tool in hills of Uttarakhand. The water quality parameters that can be semi-quantitatively tested using this kit include (i) two Physical Parameters: Turbidity and pH, (ii) five Chemical Parameters: Hardness, Chloride, Iron, Nitrate, and Residual Chlorine, and (iii) One Bacteriological Test. Some important features of the developed water quality testing kit are:

- h) Testing of water quality at source/ point of use (no need to carry the sample to lab)

- (ii) Light weight and leak proof for easy field application
- (iii) Simple to use i.e. ease of operation
- (iv) Analysis and results in less than 25 min for all 7 physico-chemical parameters and 1 bacteriological test (24 hours for results)
- (v) Testing of 100 water samples per kit for 8 physico–chemical parameters and biological parameters as per BIS: 10500 (2012) i.e. total 800 tests
- (vi) Shelf lives of chemicals of kit: one year
- (vii) User manual of kit in Hindi and English
- (viii) Kit is customizable for one/ two parameters as per requirement of field/ user
- (ix) Kits supplied to Gram Panchayats of Tehri and applied in field with success
- (x) Useful for analysis of raw and supply drinking waters
- (xi) No requirement of electricity for operation
- (xii) Cost less than Rs. 3,000.00 per kit @ Rs. 3.75 per test
- (xiii) Planning for certification of kit by reputed laboratories of India and incorporating raw water quality parameters as per NRDWP guidelines.

The usefulness of the current field based science and technology intervention lies in empowerment of hill population of Gram Panchayats (GP) of Uttarakhand in checking the quality of their local drinking water sources situated in difficult mountains. Moreover, kit's long term usage will also safe guard health of citizens of state from harmful water borne diseases including diarrhoea, dysentery and gastroenteritis owing to use of polluted water. Further, bare minimum educated person without science background can also perform water quality tests using the developed kit. The application of developed water quality Field Testing Kit (FTK) will not only directly benefit the society living in far flung areas of our hill state but will also cater the need of onsite analysis of water in urban settlements of Uttarakhand in lesser time, resources and manpower.

#### 4.2.2. Pandit Deen Dayal Upadhyay Vigyan Gram Sankul Pariyojana

Science and Technology (S&T) are powerful tools of transformation and sustainable development at grassroots with enormous potential to meet aspiration & need matched through local skill set and resources. In this context “Pandit Deen Dayal Upadhyay Vigyan Gram Sankul Pariyojna” funded by Department of Science and Technology, GoI is running by Uttarakhand State Council for Science and Technology (UCOST). Dr. Harsh Vardhan, Hon’ble Minister of Science & Technology and Earth Sciences (S&T and ES) and Environment, Forest and Climate Change inaugurated this project on 22 September 2017 during the centenary year celebration of *Pt Deen Dayal Upadhyay* to explore possibilities of S&T Interventions for Sustainable Development” through cluster approach in Uttarakhand. *Padmashree* Dr. Mahesh Sharma, former Chairman, KVIC & DG, MPCOST and now Chairman, Gramodaya Network and Coordinator Gram Sankul Yojana is steering this unique initiative. The main focus of this project is to make use of appropriate S&T interventions targeting natural resources, skills, traditional crafts and thus generating livelihood opportunities for people in four identified clusters of 60 villages and preventing migration of the local youth towards plains. Approximately one lakh people would benefit directly or indirectly through this project with support of Rs6.3 crore from Department of Science and Technology (DST) for a period of three years.

Four clusters have been selected in Uttarakhand namely *Gaindhata (Haridwar district)*, *Bazira (Rudraprayag district)*, *Bhigun (Tehri district)* and *Kausani (Bageshwar district)*. Need and challenge identification across the clusters was accomplished through field visits, intensive and elaborated interaction with members of the civil society and local populace. Area of interventions in these selected clusters are processing and value addition of milk, honey, mushroom, Spices, herbal tea, horticulture & local crops, medicinal & aromatic plants and traditional craft & handloom of Uttarakhand. Comprehensive development and self-reliance based on available natural resources, appropriate technical knowhow, product information and marketing strategies are prime objective of this project. These clusters are acting as model production cum training and demonstration centre. There is a possibility of replicating this cluster approach in other hill states of country once established and stabilized. The specific objectives of the projects are Preparation of framework for comprehensive development plan for selected clusters in Uttarakhand and preparation of local level development plan, Development plan based on natural resources for selected cluster of the Uttarakhand, Development of self-reliant clusters sites in Uttarakhand with appropriate technical backup, product information and appropriate marketing strategies, Establishment of model production cum training cum demonstration centre and Field extension activities and technical support group for field projects.

#### 4.2.3. Apiculture/ Bee keeping:

For strengthening the economy of the villagers, bee cultivation program was inaugurated by Dr. Mahesh Sharma in Bazira and Bhigun cluster. 15 days training program was also organized in Bazira cluster, where 15 beneficiaries participated. In past villagers were cultivating honey bee in traditional way. In that method the bee hive was totally destroyed in the lack of knowledge. During training, villagers were trained how to cultivate honey bee and how to process honey in a scientific way. 150 boxes were distributed in Bazira, 100 in Bhigun and 100 in Kausani along with bee colony (*Apis mellifera*). This programme would provide employment to the villagers of the cluster.



#### **4.2.4. Spices Cultivation and Processing:**

Spices cultivation is one of the component of the project. Under this program 1000 Big cardamom saplings were planted in Danda and Kurali villages of the Bazira cluster (Rudraprayag district). 100-100 saplings were distributed to the 10 farmers of the cluster.



#### **4.2.5. Milk Processing Unit:**

As plenty of milk is available in Gaindikhata cluster (District Haridwar), conversion of raw milk into primary processed dairy products including concentrated milk, khoya, Kulfi, Flavoured milk, Ghee, Butter, chhana during flush season at producer's level would enhance better return to dairy farmers and minimize the stakeholders in dairy value chain. The milk processing unit will be established in Gaindikhata cluster.



**4.2.6. Fruit Cultivation and Processing:**

Fruits saplings will be prepared in modern nurseries and after that distributed to the villages of the clusters. Fruit plants like Malta, Kiwi, plum, peach, Walnut etc will be promoted. Fruits will be further processed into juice and other valuable products. All clusters are preparing nurseries for the cultivation of horticultural crops.

**4.2.7. Mushroom Cultivation and Spawn unit:**



In three clusters of the Uttarakhand namely Bazira, Bhigun and Kausani, mushroom and spawn unit will be established. Villagers from the clusters will be trained for the cultivation of Mushroom. The units will be established in specially designed huts and empty houses of the villages. By this so many villagers will get employment and they can start their own business. The mushroom may be supplied in hotels of the char dham Yatra route for the tourists.



**4.2.8. Handloom and Takli:**



Kausani cluster is selected for the Handloom and takli unit. Locals of the Kausani cluster will be promoted for this. Shawl, woolens and other items will be developed by this industry.

#### **4.2.9. Ringal Cultivation:**

As Bhigun cluster is having good quantity of Ringal, so handicraft will be promoted by using ringal. Items like baskets, carpets, pen stands, Decorative light covers, Decorative items, Agricultural tools etc and traditional arts will be promoted. Cultivation of Ringal to be promoted along with training in value-added handicraft and other usable items.

#### **4.2.10. Modern Nursery, Net House and Seed Bank Development:**

Modern Nursery and Net house is proposed in all four clusters. In this one mist chamber and three net houses will be established in each cluster. Clusters will be benefited by cultivating medicinal plants, horticulture saplings etc. 3 participants from each cluster have been sent to Central Institute of medicinal and aromatic plants (CIMAP), Lucknow to know about how to cultivate medicinal and aromatic plants. In clusters medicinal plants like Satawar, Timru, Tulsi, Alovera, Ashwagandha, Kasni, Safedmusli, Pattarchur, Neem etc and aromatic plants like lemon grass, Tulsi, Piperment, etc will be cultivated. Conservation of traditional seeds to be facilitated through setting up a village level Seed Bank.

#### **4.2.11.**



#### **Technology Resource Centres (TRC):**

The scheme heralds development of improved technologies based on locally available natural resources and improvement of post harvesting techniques for commercial requirements. The scheme is initiated in all the thirteen districts and will be subsequently extended to block level. These TRCs blends modern science with traditional experience and knowledge.

S. No	Coordinating organization	Location of the Centres	Available Technologies	Beneficiaries
1	Himalayan Action Research Center (HARC)	TRC, Naugaon, Uttarkashi	3-Units of Poly-house demonstration of 50x25x15 ft. (Poly sheet, polymetal structure, poly curtains, drip irrigation system, fogging system, fertilization system, sprinklers, pump, 3 tier structure, input material etc.), power tiller, bari making machine, hammer machine, malta juice machine, vacuum filling head, up-gradation of chullu decorticator	3249
2	Himalayan Action Research Center (HARC)	TRC, Kaleshwar, Chamoli	Colloidal mill with tank, mixing machine 25 Kg capacity + hydro machine, Potato peeler, slicer, namkeen pouch packing machine, Bhujiya making machine, Pressurizer diesel stove, nitrogen gas cylinder, RTS cup sealing 7 filling machine, High pressure sealing machine	4251
3	Gramin Sudhar and Shramik Seva Sansthan, (GRASS)	TRC, Jakholi, Rudraprayag	Cap sealing machine, Juice filter machine, Bottle lamination machine, steam boiler, homolyser, aquaguard filter, microscope, pH meter, soil testing kit, humidity testing machine, hand refractometer for measuring concentration, seed analysis kit, anemometer	1589
4	Society for economic and social studies	TRC, Sahaspur, Dehradun	Pulper juicer machine, grinder, refractometer	150
5	Hit Samiti	TRC, Kanatal, Tehri	Refractometer, stainless steel top tables, electric heat sealer, weighing machines, storage drum, peeling tools, lab equipment & preservatives, hand operated slicer & grater, diesel bhatti, mechanical rier, grinder, crown corking machine, pulper juicer, mixing machine,	160

			fruit mill	
Devoted organization for reforming environment (DORE)	TRC, Ranikhet, Almora		Pulper juicer machine, juicer, offline water purifier, refractometer, pouch sealing machine, plastic glass sealing machine	729

Council establish TRCs in different geographic locations in the state and these TRCs basically catch the need of inhabitants to effectively utilize the natural resources available in the adjoining areas of particular TRCs. Most of the intervened technology is based on the agriculture and horticulture due to rich in their produce and most of the state population engaged in these activities.

#### 4.2.12. Food processing unit developed at technology resource centres (TRCs)

The TRCs act as a source for technology dissemination and training of local people to start small enterprises related to processing, grading and packaging of fruits juices, vegetables, pickles and fish rearing. Mango, Papaya, Leechi, Malta, Kinoo, Jackfruit, Green Chilly, Red Chilly, Amla, Ginger, Garlic, Carrot and Turnip were the main crop used by the villagers. Processing of Rhododendron, Apples, Wild Apricot (Chuloo), Apricot, Plum was also carried out for manufacturing Squashes, RTS drinks, juices, chatni, jams and extract of wild apricot oil.



4.2.13.

#### Technology resource cum training centre for processing and preservation of horticultural produce in Sahaspur, Dehradun

At UCOST-TRC of Sahaspur, 16 batches of training have been conducted and 258 Master-trainers (106M/152F) have been trained for preservation and storage of mango, green chillies etc., storage of apple, mixed fruit jam and pulp, orange and Rhododendron squash, amla murabba, various products of tomato, continental sauce, papaya chutney, spice processing, packing, quality control and marketing by using essential machinery like shrink wrapping machine, mixing

washing tanks, ss vessel, weighing machine, sterilization tanks, hydraulic press and dispenser. The unit is equipped with a vacuum tube Collector model solar water heater that heats 200 liters of water up to 55 – 60°C on a sunny day in winter. The water is being used for domestic (for baths) and for industrial applications (with boiler).



#### **4.2.14. Demonstration of decentralized micro hydro power generation using cross flow turbines**

The geography and photography of the State promotes hydropower as an only feasible and commercially viable technology in the state. The Kedarnath II mini hydro power project is first of the two hydel power generation stations having the capacity of 2x100 KW placed at the Kedarnath in Rudraprayag district. The project is supposed to provide the electricity to the habitation of houses and shops in the Kedarnath shrine and surrounding areas situated in Kedarnath of Ukhimath Block. The project is a collaborative persuasion of Uttarakhand State Council for Science and Technology (UCOST) and Uttarakhand Renewable Energy Development Authority (UREDA) with the financial support of Department of Science and technology, New Delhi.

#### **4.2.15. Utilization of glass waste for the degradation of waste plastic**

The present project developed a method for the management of common variety of municipal solid waste glass and plastic. Waste glass material containing majority silica with other elements which after activation method can be converted to amorphous zeolite and acting as a catalyst for degradation. Activation involving the following steps: (i) pulverization; (ii) initial separation by cyclone; (iii) classification into specific size with the help of vibratory shaker; (iv) and final

activation step involving thermal or chemical treatment.



In activation method the obtained glass powder was categorized into two kinds: fine (mesh size in between 100-200); and superfine (more than 200 mesh size).

Thermal activation was achieved by calcine the powder temperature of about 400<sup>0</sup>C to about 575<sup>0</sup>C. Chemical modification process involved the use of fluoride reagent followed by final calcinations. Superfine thermally activated glass powder with calcinations temperature shows application as absorbent material in chromatography including column and thin layer; while chemically activated material can be used as skeleton and isomerization catalyst for polyolefin degradation.

The resultant chemically activated waste glass material thus obtained was used for the degradation of various kinds of polyolefin namely polypropylene and polyethylene and the following are the findings:

4. Alkanes are obtained as a principle degradation product in all the cases of degradation all kinds of waste plastics;
5. Liquid fuel products obtained by the plastic degradation are in between the range of 50-70% indicates practical and economic aspects of this degradation, as collection and transportation of liquids are easier compared with gases;
6. In this method degradation is achieved by using economic catalysts which makes the process more economic;
7. No hazards products were obtained after degradation;
8. Potential method for the conversion of waste plastic to fuel products.

By the above project it is possible to produce amorphous Zeolite at the cost of about 100-120 rupee per KG (the cost of commercial amorphous Zeolite was around 1200-1400 rupee per KG). The cost of fuel oil thus obtained from waste plastic was around the cost of 30-32 per liter.

Two reactors, one pilot scale and another laboratory scale, were also designed in this project. The pilot scale reactor can be used for the pulverization and separation of silicate containing solid waste and laboratory scale.

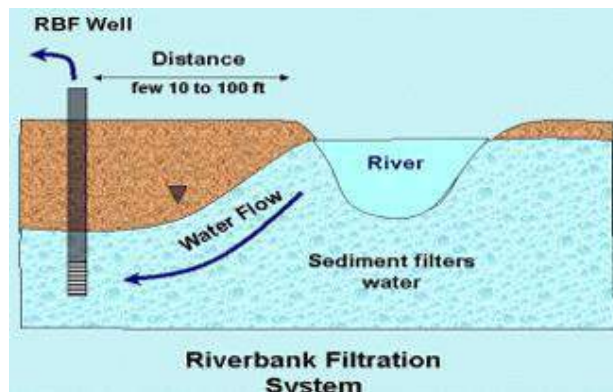
#### 4.2.16. Development of river bank filtration (RBF) systems in Uttarakhand:

The quantity and qualities are two major hurdles in providing sufficient and safe drinking water to mass population of the State. Also, the methods currently being employed for providing potable water based on surface water abstraction, offer temporary solution.

With the above background, the project “Development of Riverbank Filtration (RBF) in Hill Regions for Sustainable Solution for Quality and Quantity Problems of Drinking Water in Uttarakhand”, funded by the “Water Technology Initiative Programme” of the Department of Science and Technology, Government of India, New, which was coordinated by Uttarakhand State Council for Science and Technology (UCOST), Dehradun and executed by Uttarakhand Jal Sansthan (UJS), Dehradun, in order to investigate the efficiency of using RBF as an alternative to direct surface water abstraction for drinking water production in the towns of Satpuli, Srinagar, Agastyamuni and Karnaprayag. Within the framework of this project, one production well for drinking water and one monitoring well were constructed each in Satpuli, Srinagar, Karnaprayag and Agastyamuni by the rivers East Nayar, Alaknanda and Mandakini. Nearly 100% of the drinking water supply to the town of Satpuli was supplied through RBF, thereby completely replacing the existing surface water based production. RBF accounted for nearly 18 – 20% of the drinking water production in Srinagar.

In brief, the investigations carried out show that the abstracted water, after minimal post-treatment of disinfection by chlorination, meets the drinking water quality standards of BIS. The investigations at the five sites have shown that suitable hydrogeological conditions exists for RBF in the hills, the main advantage lies in removal of pathogens and turbidity, especially during the monsoon, RBF sites, if properly sited and designed are better as compared to conventional surface water abstraction and treatment and Significant scope for replication of RBF in Uttarakhand exists.

Through the interventions of RBF project of WTI/DST, the RBF technique has been widely recognized and appreciated at Central Govt. as well as States levels. Ministry of Rural Water Supply and Sanitation, Govt. of India has recommended to various states for implementation of RBF for drinking water supply. In this regard, PHED/ departments of drinking water supply of various states including Tamilnadu, West Bengal, Jharkhand etc. have visited RBF sites of Uttarakhand to explore and learn about the knowhow of the technique. This nationwide popularization of RBF has been made possible by the WTI/ DST’s support through which different states got familiarized with RBF system and are now in the process of installing RBF driven drinking water schemes for public supply in their states. The horizon of RBF has now extended for supplying water in better qualitative and quantitative manners in sustainable way in difficult hilly terrains of Uttarakhand State.





### SATPULI RBF SITE



Photographs of RBF Sites

### 4.3. Popularization of Science:

Science Popularization Programs in 2016-17			
S. No.	Name & Address of the organizer	Topic/Tite	Duration
1.	Mr. Anil Taneja Regional Director- Uttarakhand PHD Commerce of Commerce & Industry Shiva Place, 2 <sup>nd</sup> Floor No 18/19, 57/19, Rajpur Road Dehradun, Uttarakhand 248001	Conference on Ayush : Uttarakhand 17 <sup>th</sup> June 2016. Hotel Madhuban Dehradun.	17 <sup>th</sup> June, 2016
2.	Dr. Arun K. Agarwal, Head, Dept. of Botany, Govt. PG College Uttarkashi, Vishwanath Marg, Uttarkashi-249193	Crop Diversity and Entrepreneurship Development in Himalayan Region”	29 <sup>th</sup> Sep – 01 <sup>st</sup> Oct, 2016
3.	Mr. Uday Kirola, Organizing Secretary	“Balshaitya mein vigyan lekhan”	10 <sup>th</sup> -11 <sup>th</sup> Sept, 2016

	Secretary, cky lkfgR; 'kks  ,oa lao?kZu lfeR Ranikhet Road, Dwarahat, Almora– 263653		
4.	Mr. S.K Singh Principal Scientist, S.E Group, CSIR- Central Building Research Institute, Roorkee-247667, Uttarakhand	Advances in repair and Rehabilitation of Concrete Structures” on May 27-28, 2016	27 <sup>th</sup> -28 <sup>th</sup> May, 2016
5.	Mr. Kamal Joshi Dept. of Electrical Engg, Faculty of Technology, Uttarakhand Technical University, Dehradun-248007, Uttarakhand	“Green Technologies” on April 28 <sup>th</sup> , 2016 at Uttarakhand Technical University, Dehradun	28 <sup>th</sup> April, 2016
6.	Prof. Mahesh C. Joshi, Professor & Head, Dept. of Mathematics & Computer Science D.S.B Campus, Kumaun University Nainital – 263002	19 <sup>th</sup> International Conference on International Academy of Physical Sciences (CONIAPS- XIX) and Symposium on Fixed Point Theory and Dynamical Systems 17-19 October 2016	17 <sup>th</sup> -19 <sup>th</sup> Oct, 2016
7.	Er. V.K. Saxena Hon. Jt. Secretary The Institution of Engineers (India),	Emerging Drilling Technology in Oil and Gas Exploration	24 <sup>th</sup> -25 <sup>th</sup> July, 2016



	Uttarakhand state centre, Saharanpur road, (Near ISBT), Dehradun 248002		
8.	Dr. Hemwati Nandan Department of Physics Gurukul Kangri Vishwavidyalaya Haridwar- 249404, Uttarakhand	Low Cost Experiments and hands-on Training in Physics	9 <sup>th</sup> -10 <sup>th</sup> Sept, 2016
9.	Dr. Anumita Aggarwal Assistant Professor, Dept. of Economics, Govt. P.G College, Gopeshwar, Chamoli- Uttarakhand.	International Seminar on Sustainable Development: Challenges and Strategies	20 <sup>th</sup> -21 <sup>st</sup> Oct, 2016
10.	Prof. S.K Joshi Department of Chemistry, S.S.J Campus, Kumaun University, Nainital – 263601	Emerging Technologies in Chemistry Laboratories	13 <sup>th</sup> -17 <sup>th</sup> Nov, 2016
11.	Dr. R. S. Dixit, Assistant Professor, Dept. Of History, DAV (PG) College, Karanpur, Dehradun	Environmental Ethics in Man Nature Relationship	15 <sup>th</sup> -16 <sup>th</sup> Oct, 2016
12.	Mrs. Kamala Pant, Chairman PAHAL, H.No. 108, Lane-1, Vivekanand Gram Phase-1, Jogiwala Haridwar Road, Dehradun	Lokpriya Vigyan Lekhan: Samasyayein evam Sambhawnayein	23 <sup>rd</sup> -24 <sup>th</sup> Sept, 2016
13.	Dr. Geeta Bhandari Professor & Head, Dept. of Anaesthesiology and Critical Care, Govt. Medical College and Dr. S.T.M Govt. Hospital, Rampur road, Haldwani, Nainital	6 <sup>th</sup> Annual State Anaesthesiology Conference	24 <sup>th</sup> -25 <sup>th</sup> Sept, 2016
14.	Dr. Shubham Pandey Assistant Professor of Statistics, Dept. of Community Medicine Himalayan Institute of Medical Sciences, D-IV/2 D0-Block, SRHU Campus, Dehradun-248140	2 <sup>nd</sup> Annual Symposium on Clinical Biostatistics & 1 <sup>st</sup> Annual Workshop on Clinical Biostatistics	21 <sup>st</sup> -23 <sup>rd</sup> Oct, 2016
15.	Dr. Ratna Prakash Principal Pal College of Nursing and Medical Sciences, Anadi Tower, Nainital, Road, Haldwani, Uttarakhand, 263126	Interdisciplinary Research Collaboration: A key Strategy for High Quality Patient Care	21 <sup>st</sup> -23 <sup>rd</sup> Oct, 2016
16.	Dr. Gurjeet Khurana Professor & Head, Dept. of Anaesthesia, Himalayan Institute of Medical	VIII <sup>th</sup> Annual Conference of Indian Society of Anaesthesiologist central zone CZISACON 2016	15 <sup>th</sup> -16 <sup>th</sup> Oct, 2016

	Sciences, Swami Ram Himalayan University, Jolly Grant, Dehradun- 248016		
17.	Dr. Hemwati Nandan Department of Physics Gurukul Kangri Vishwavidyala Haridwar – 249404, Uttarakhand	Popular Lecture by Padmavibhusan (Prof.) V.N Narlikar on “Astronomy & Astrophysics”	
18.	Dr. U.C. Gairola Associate Professor, Dept. of Mathematics H.N.B Garhwal University, Pauri Campus, Pauri Uttarakhand-246001	19 <sup>th</sup> Annual Conference of Vijnana Parishad of India on recent advances in mathematics and mathematical sciences and their applications and a symposium on fixed point theory and applications.	10 <sup>th</sup> -12 <sup>th</sup> Nov, 2016
19.	Dr. Narotam Sharma Scientist, Central Molecular Research Laboratory (CMRL) Department of Biochemistry, Shri Guru Ram Rai Institute of Medical Sciences & Hospital Patel Nagar, Dehradun	Cellular & Molecular Diagnostics : New Era of Prognosis	18 <sup>th</sup> -19 <sup>th</sup> Nov, 2016
20.	Prof. (Dr). Sanjeev Kumar, Dept. of Civil Engineering Graphic Era University 566/6, Bell Road, Clement Town, Dehradun	Water Management in Himalayan Region	12 <sup>th</sup> Nov, 2016
21.	Mr. Sanjay Sharma Associate Professor, Dept. of Mechanical Engg. Graphic Era Hill University 566/6, Bell Road, Clement Town, Dehradun	Fabrication of advance materials and processing : An approach towards Make in India	20 <sup>th</sup> -21 <sup>st</sup> Jan, 2017
22.	Dr. V.B. Mathur Director, Wildlife Institute of India, Post Box No.- 18, Chandrabani, Dehradun- 248001	International workshop on “Trans- Boundary & Kailash Sacred Landscape”	23 <sup>rd</sup> -24 <sup>th</sup> Nov, 2016
23.	Dr. V.B. Mathur Director, Wildlife Institute of India, Post Box No.- 18, Chandrabani, Dehradun- 248001	International workshop on “Mixed World Heritage”	24 <sup>th</sup> -25 <sup>th</sup> Nov, 2016
24.	Padam Shree (Dr.) Lalit Pande Director	SAMVAD-2016	13 <sup>th</sup> -14 <sup>th</sup> Nov, 2016

	Uttarakhand Seva Nidhi Paryavaran Shiksha Sansthan Jakhandevi Mall Road, Almora – 263601, Uttarakhand		
25.	Dr. Kamal Kishore Pandey (The Convener) Dept. of Research and Development M.B Govt. P.G College, Nainital Road, National Highway 87, Haldwani, Uttarakhand 263139	Seven Day Workshop on “Synergy Between Information and Communications Technology & Academics”	5 <sup>th</sup> -11 <sup>th</sup> Nov, 2016
26.	Dr. Brij Mohan Sharma, Secretary, Society of Pollution & Environmental Conservation Scientists (SPECS), 115-Krishan Nagar, Dehradun – 248001	Training Program on “Awareness workshop on Microbes”	Date not decided yet
27.	Dr. Prabhakar P. Badoni (The Convener) Associate Professor, Dept. of Chemistry H.N.B Garhwal University, Pauri Campus, Pauri Garhwal- 246001	Carrier Guidance activities for NSS Volunteers	14 <sup>th</sup> Nov, 2016
28.	Dr. Brij Mohan Sharma, Secretary, Society of Pollution & Environmental Conservation Scientists (SPECS), 115-Krishan Nagar, Dehradun – 248001	Training Program on “Assembling & Repairing of LED Bulbs”	28 <sup>th</sup> - 29 <sup>th</sup> Oct, 2016
29.	Dr. C.D. Suntha (The Convenor) Principal Government Degree College, Ganai Gangoli, Village & P.O – Ganai Gangoli Pithoragrah- 262531, Uttarakhand	Strategies for Protection of Traditional Knowledge through IPRs for Conservation of biodiversity and sustainable development in Himalayan Region of Uttarakhand.	
30.	Dr. Vinay Rana, The Convener Head, Dept. of Hotel Management School of Hotel Management & Hospitality, Graphic Era University 566/6 Bell road, Clement Town Dehradun – 248002	International Conference on Trends, Issues & Technology in Hospitality & Tourism.	20 <sup>th</sup> -21 <sup>st</sup> Jan, 2017
31.	Dr. K.K Chaudhary, The Convener Army Cadet College Wing	National Conferences on Advances in Science &	24 <sup>th</sup> -25 <sup>th</sup> March, 2017

	Indian Military Academy Prem Nagar, Dehradun.	technology: <i>a step towards 'Make in India In Defence Sector'</i>	
32.	Dr. Savita, The Convener Director FRI & Vice Chancellor (FRI Deemed University) Forest Research Institute P.O, New Forest, Dehradun – 248006	Commonwealth Forestry Conference 2017	03 <sup>rd</sup> -07 <sup>th</sup> April, 2017
33.	Dr. S.K. Kashyap Prof.& Head/Jt. Director Dept. of Agricultural Communication G.B Pant University of agriculture & Technology Pantnagar, U.S Nagar, Uttarakhand- 263145	National Conference on skilling India for Youth Empowerment: opportunities, challenges & futuristic strategies	12 <sup>th</sup> -13 <sup>th</sup> Jan, 2017
34.	Dr. Pradeep Mamgain (Seminar Director) Assistant Professor Dept. of Business Management H.N.B Garhwal University, Chauras Campus, Srinagar Garhwal- 246174	Two Day National Seminar on “Opening Uttarakhand State for Start-up companies in Uttarakhand.	11 <sup>th</sup> -12 <sup>th</sup> March, 2017
35.	Dr. Siddharth Jain (The Convener) Head, Dept. of Mechanical Engineering College of Engineering Roorkee (COER) Roorkee -247667	International Symposium on Research and Innovations in Engineering & Technology (ISRIET 2017)	7 <sup>th</sup> -8 <sup>th</sup> April, 2017
36.	Prof. Pankaj Chaudhary (The convener) J.B Institute of Technology 23 Milestone, NH-07, Shankerpur, Chakrata Road Dehradun-248197, Uttarakhand	National Conference on Recent Innovation in Science, Engineering & Technology	3 <sup>rd</sup> -4 <sup>th</sup> March, 2017
37.	Prof. S.C. Bagri Professor, Center for Mountain Tourism & Hospitality Studies HNB Garhwal University, Chauras Campus, Post- Kilkileshwar via Kirti Nagar, TehriGarhwal Srinagar, Garhwal – 249161	A Three Day Capacity Building Programme on Sanitation and Hygiene for Eateries Runner at Byasi, Kaudiyala And teen dhara Midways Located on Rishikesh-Badrinath Highway.	21 <sup>st</sup> -23 <sup>rd</sup>
38.	Dr. Sangeeta Gupta (Organizing Secretary)	Human Environment Relationship: A Specific	20 <sup>th</sup> -21 <sup>st</sup> Dec 2016

	Department of Economics P.N.G Govt. P.G College Ramnagar (Nainital) 244715, Uttarakhand	Discussion/seminar on „Water Crisis in India“	
39.	Dr. Archana (Joshi) Bachheti Dept. Of Allied Science Graphic Era University 566/6 Bell road, Clement Town Dehradun – 248002	Recent Trend in Green Chemistry & Sustainability	17 <sup>th</sup> -18 <sup>th</sup> Feb, 2017
40.	Dr L.M.S. Palni Professor, Dept. of Biotechnology, Graphic Era University, 566/6 Bell road, Clement Town, Dehradun – 248002	National Seminar on “Recent Trends in Biology, Culture, Conservation, Commercialization and Sustainable Utilization on Medicinally and Floriculturally Important Orchids”	24 <sup>th</sup> -26 <sup>th</sup> March, 2017

#### Science Popularization Programs in 2017-18

S. No.	Name & Address of the Convener/ Organizing Secretary	Topic/Title	Duration of Program
1.	Mr Surjeet Singh Khaira Founder & Chief Editor, The Himalayan Geographer, The Himalayan Geographical Society, Dehradun	Himalayan Geographer	-
2.	Dr Brij Mohan Sharma Secretary, Society of Pollution & Environmental Conservation Scientists (SPECS), 115-Krishan Nagar, Dehradun – 248001	Science Mela in Bissu Mahotsav 2017	27 <sup>th</sup> - 28 <sup>th</sup> May, 2017
3.	Dr Vibha Malhotra Director & Head Uttarakhand State Office, Confederation of Indian Industry (CII) 30/1 Rajpur Road, Nepal House, Dehradun	8 <sup>th</sup> Environment Summit 2017	29 <sup>th</sup> - 30 <sup>th</sup> June, 2017
4.	Sh S. Ramaswami Chief Secretary Integrated Mountain Initiative (IMI), Govt. of Uttarakhand, Secretariat	6 <sup>th</sup> Sustainable Mountain Development Summit (SMDP) at Aizawl, Mizoram	20 <sup>th</sup> – 22 <sup>nd</sup> Sept, 2017

	4 Shubhash Marg, Dehradun		
5.	Dr A. K. Mittal Hony. Secretary, Roorkee Local Centre, The Institution of Engineers (India), IIT Campus, Roorkee, Haridwar	All India Workshop on "Mass Housing & Rapid Construction" at Roorkee Local Centre (IE), IIT Roorkee	14 <sup>th</sup> - 15 <sup>th</sup> Nov, 2017
6.	Dr Hemwati Nandan Dept. of Physics, Gurukul Kangri Vishwavidyalaya Haridwar	XXXII Annual IAPT Convention and National Symposium" at Gurukul Kangri Vishwavidyalaya, Haridwar	28 <sup>th</sup> - 31 <sup>st</sup> Oct, 2017
7.	Mr Ramendra Kotnala General Secretary Akhil Garhwal Sabha, Dehradun, 71/6 Chaudhary Bihari Lal Marg, Neshvilla Road, Dehradun	Science Mela in dkSfFkx	25 <sup>th</sup> - 31 <sup>st</sup> Oct 2017
8.	Dr Divya Upadhayaya Joshi Deputy Director UGC-Human Resource Development Center, Kumaun University, The Hermitage, Mallital, Nainital- 263001	"International Conference on Urban Ecology and gender: Exploring Gender, Marginalization and equality in urban spaces in the Asia-Pacific." at UGC-Human Resource Development Center, Kumaun University, The Hermitage, Nainital	1 <sup>st</sup> - 2 <sup>nd</sup> Nov, 2017
9.	Sh G.S.Rautela, President, Katyur Foundation Ghangali, PO- Dangoli Bageshwar-263635	"Science Carnival" at Bageshwar	24 <sup>th</sup> -27 <sup>th</sup> Nov, 2017
10.	Dr Shubhra Kala Assistant Professor, Dept. of Physics, H.N.B. Garhwal University, Srinagar	Physical and Applied Sciences: with particular references to contribution to Indian Scientists	29 <sup>th</sup> -30 <sup>th</sup> Nov, 2017
11.	D. Mangey Ram Professor & Head Dept. of Mathematics Graphic Era University Dehradun	Non Linear Functional analysis & its applications	Feb 19 <sup>th</sup> -24 <sup>th</sup> , 2018

S. No.	Name & Address of the Convener/ Organizing Secretary	Topic/Title	Duration of Program
12.	Mrs Meena Negi Secretary Shivalik Parvatiya Jankalyan Evam Shikshan Samiti VPO Rajakhet, Block Jakhnidhar Tehshil Pratapnagar Tehri Garhwal	Water Exhibition and workshop	22 <sup>nd</sup> March 2018
13.	Dr Govind Pathak Assistant Professor Dept. of Mathematics M.B Govt. P.G College, Haldwani Uttarakhand	National Conference on “Advances in Mathematics & its Applications”	22 <sup>nd</sup> -23 <sup>rd</sup> Feb, 2018
14.	Dr S.S. Bisht Organizing Chairperson Swami Rama Himalayan University Jolly Grant, Dehradun.	XIII Annual Conference on association of otolaryngologists of India – Uttarakhand Chapter	6 <sup>th</sup> -8 <sup>th</sup> April 2018
15.	Dr Nitin Kumar Assistant Professor Dept. of Computer Science & Engineering National Institute of Technology Uttarakhand Srinagar Garhwal	International Conference on Advances in computing applications (ICACA 18)	26 <sup>th</sup> – 27 <sup>th</sup> Feb 2018
16.	Prof B S Mahapatra Organizing Secretary (NAC 2018) Professor, Dept. of Agronomy College of Agriculture GBP UA&T, Pantnagar, US Nagar- 263145.	National Agronomy Congress (NAC) on topic “Redesigning agronomy for Nature Conservation and Economic Empowerment”	20 <sup>th</sup> -22 <sup>nd</sup> Feb 2018
17.	Dr D.K Bhatia Organizing Secretary Dept. of Zoology Govt. P.G College, Devprayag Tehri Garhwal – 249301	One Day Intellectual Property Rights (IPR) Workshop	19 <sup>th</sup> Feb 2018
18.	Dr R. A. Singh Associate Professor Dept. Of Geology LSM PG College, Pithoragarh	National Science Day- 2018	28 <sup>th</sup> Feb, 2018
19.	Mr Prakash Pandey Editor, Himal Prasang KRIYUSH (Krida Evem Yuwa	One Day Seminar for Reporters/Media Regarding Science Media	18 <sup>th</sup> Feb, 2018

	Samiti), Village Sanghar PO- Baste, Pithoragarh- 262501		
20.	Dr Abhishek Tiwari, Principal, Devsthali Vidyapeeth Institute of Pharmacy, Kachhi Khamaria, Kichha Road, Lalpur, Rudrapur	National Seminar on “Current Trends in Pharmaceutical Sciences”	2017-18
21.	Dr Seema Nainwal, Uttaraanchal PG College of Bio-Medical Sciences & Hospital, Sewla Khurd, Dehradun	National Conference on “Perspective in Natural and Applied Sciences”	9 <sup>th</sup> -10 <sup>th</sup> March, 2017
22.	Dr Prashant Singh, District Coordinator, UCOST, Dehradun and Associate Professor, D.A.V Govt. (PG) College, Dehradun	Financial support for participation of the official delegation in 105 <sup>th</sup> Indian Science Congress at Imphal	16 <sup>th</sup> -20 <sup>th</sup> March, 2018
23.	Prof Jayanti Semwal, Dept of Community Medicine, Himalayan Institute of Medical Science, Swami Rama Himalayan University, Swami Ram Nagar, Jolly Grant, Dehradun 248016	Symposium on “Precision Medicine: Gene, Environment & the Data Challenge”	10 <sup>th</sup> March, 2018
24.	Mr Uday Kirola, Secretary, Bal Sahatiya Sansthan Uttarakhand, Darbari Road, Purva Pokarkhali, Almora, Uttarakhand – 263601	Two 05 day’s Workshop on Science culture popularization among children	18 <sup>th</sup> -22 <sup>nd</sup> May 2018 and 13 <sup>th</sup> -17 <sup>th</sup> June, 2018
25.	Dr Vandana Kumar Dhingra, Organizing Secretary, Associate Professor, Dept. of Nuclear Medicine, AIIMS Rishikesh-249203, Dehradun	Symposium in Nuclear Medicine: Unconventional Nuclear Medicine: Getting the most from your SPECT/CT	7 <sup>th</sup> -8 <sup>th</sup> April, 2018
26.	Sh Geeta Ram Gaur, President , Lakhamandal C/O B-87 THDC Colony, Ajabpur Kalan, Dehradun	mRrjk[k.M lkaLd` frd ek?k egksRlo&2018	17 <sup>th</sup> -19 <sup>th</sup> Feb, 2018
27.	Dr Geeta Bhandari, Organising Secretary-CME & Workshop, Secretary – Uttarakhand Society of Anaesthesiologist, Dept. of Anaesthesiology & Critical Care, Govt. Medical College & S.T Govt. Hospital, Haldwani, Nainital (UK)	CME cum Workshop on theme “Pain & Palliative Care”	29 <sup>th</sup> April, 2018



28.	Dr Chetna Pokhriyal, President, M.K.P (PG) College Teachers Association, 10 New Road, Dehradun	Conference on Women and Higher Education: Present Socio Economical Standpoint and Future Perspective	27 <sup>th</sup> -28 <sup>th</sup> March, 2018
29.	Dr R. A Singh, Organizing Secretary, Associate Professor, Dept. of Geology, L.S.M Govt. P.G College, Pithoragarh- 262502	Three day*s National Workshop on “Landslides”	23 <sup>rd</sup> -25 <sup>th</sup> May, 2018
30.	Dr M.C Purohit, Organizing Secretary, Assistant Professor, Dept. of Chemistry, HNB Garhwal University, BGR Campus Pauri Garhwal	National conference on “Recent Advances in Chemical and Nano Sciences”	8 <sup>th</sup> -9 <sup>th</sup> June, 2018
31.	Sh Nitish Negi, Secretary, Rudra Himalaya Jan Jagriti Samiti, Village- Devor, PO- Devor Khadora Via Gopeshwar, Chamoli- 246401	Workshop on “S&T Inputs and Need Assessment for Joshimath & Around”	15 <sup>th</sup> -16 <sup>th</sup> June, 2018
32.	Dr Anil K. Jain, Head HR and Training, CSIR- Indian Institute of Petroleum, Mohkampur, Haridwar Road, Dehradun-248005	Collaborative project & Sponsorship of Skill Development Training Courses a part of Pradhan Mantri Kaushal Vikash Yojna (PMKVY)	June- July, 2018

### Travel Grants Sanctioned in 2017-18

S.No.	Name & Address	Name of the Workshop/ Conference / Seminar / Training	Place of Visit	Date of Travel
1.	Dr Meena Bakshi Scientist-E Plant Physiology (Botany Division) Forest Research Institute (Deemed) University, PO- New Forest, Dehradun- 248006	IUFRO all division 5th Conference on “Forest Sector Innovations for a Greener Future”	Canada	12th -16th June, 2017
2.	Dr P.S. Negi Scientist-D Wadia Institute of Himalayan Geology (WIHG) 33 GMS Road, Dehradun 248001	International Conference on Sustainable Development 2017	Ottawa, Canada	9th -10th August, 2017

3.	Dr Rashmi Uniyal Assistant Professor Dept. of Physics Govt. Degree College Narendra Nagar Tehri Garhwal	Summer School on “Between Geometry & Relativity”	Austria	17th July - 21st July, 2017
4.	Dr Santosh Kumar Professor Dept. of Geology D.S.B Campus Kumaun University, Nainital	Accessory Minerals (CAM 2017)	Austria	13th -17th Sept, 2017
5.	Dr Ramesh Chandra Associate Professor, Dept. of Physics D.S.B Campus, Kumaun University Nainital, Uttarakhand	International Study of Earth Affecting Solar Transients (ISEST) 2017	Jeju, South Korea	18 <sup>th</sup> -22 <sup>nd</sup> Sept, 2017
6.	Ms. Pranjali Singh M.Sc Student, Dept. of Microbiology College of Basic Sciences & Humanities G.B. Pant University of Agriculture & Technology, Pantnagar	DEFIAA Project (Developing French Indian Exchanges in Agrofood and Agronomy)	Rodez, France	17 <sup>th</sup> Jan- 10 <sup>th</sup> Mar 2018
7.	Dr Mukesh Prasad National Post Doc Fellow Dept. of Physics, Indian Institute of Technology, Roorkee- 247667	6 <sup>th</sup> International Geo- hazard research symposium	Dresden, Germany	4 <sup>th</sup> -9 <sup>th</sup> Mar, 2018
8.	Dr Devi Datt Chauniyal Professor Dept. of Geography H.N.B Garhwal University Srinagar (Garhwal), Uttarakhand	European Geosciences Union (EGU) 2018 Conference	Vienna, Austria	6 <sup>th</sup> -16 <sup>th</sup> Apr, 2018
9.	Ms Sapna Semwal Research Scholar Dept. of Geography	European Geosciences Union (EGU) 2018 Conference	Vienna, Austria	6 <sup>th</sup> -16 <sup>th</sup> Apr, 2018

	DBS(PG) College, Dehardun Uttarakhand			
10.	Dr Achyut Narain Pandey Assistant Professor Dept. of Ophthalmology Veer Chandra Singh Garhwali Medical College & Research Institute (VCSGMC & RI), Srinagar (Garhwal)	Short term training/ observing in Singapore National Eye Center	Singapore	16 <sup>th</sup> -25 <sup>th</sup> May, 2018
11.	Ms Shweta Singh Research Scholar Wadia Institute of Himalayan Geology, GMS Road, Dehardun Uttarakhand	European Geosciences Union (EGU) 2018 Conference	Vienna, Austria	6 <sup>th</sup> -16 <sup>th</sup> Apr, 2018
12.	Dr R.C Ramola Professor Dept. of Physics HNB Garhwal University Badshahi Thaul Campus Tehri Garhwal – 249199	CARST's 7 <sup>th</sup> Annual Radon Conference	Ottawa, Canada	22 <sup>nd</sup> -24 <sup>th</sup> Apr, 2018

#### 4.3.1. Organization of Scientific Events:

- **National Academy of Sciences, India**

National Academy of Sciences, India founded in the year 1930, is a society registered under the registration of society's act 1860. The main objective of the Academy was to provide a national forum for the publication of research work carried out by Indian scientists and to provide opportunities for exchange of views among them.

- **World health day programme on theme "Beat Diabetes" at IMA Dehradun**

Director General UCOST invited as a Guest of Honour for celebrating the world health day with the theme beat diabetes on 7th April 2016 at 08.30 PM at IMA Hall, 1 Narendra Vihar, Dehradun. The chief guest of the occasion will be **Dr. (Mrs.) Kusum Nariyal (DGHS Uttarakhand)**, and guest of Honour will be **Dr. Rajendra Dobhal (DG UCOST)** and **Dr. Sadnand S.R. Date (SSP Dehradun)**. The other prominent speakers of the Occasion will be Dr. J.S Hanspal (Prof. & HOD, SMMH Gov. Medical College, Saharanpur), Dr. Rajeev Tyagi (DM Endocrinology), Dr. Rajesh Mishra (MD, Principal Subharti Medical

- **Awareness workshop on Industrial Design & Analysis (FEA & CFD)**

Uttarakhand Council for Science & Technology is organizing an awareness workshop on Industrial Design & Analysis (FEA & CFD) for B.Tech, M.Tech & Ph.D students (Mechanical, Aeronautics, Automobile & piping domain) and industry professionals at its premises proposed in the month of May 2016 in collaboration with CPDLR (Centre for Professional Development Learning & Research), a renowned training institution which is associated with Technology, Training & Research Institute, Bengaluru known to impart skill development programs in line with industrial expectations.

Talk objective was to educate and inform the participants regarding growth in Computer Aided Design Modelling & Simulation so as to employ the benefits in Career Planning, Academic Research & Employability skill enhancement.

- **Earth Day celebration in Vigyan Dham**

Earth day on 22nd April, 2016, with the help of Uttarakhand State Science and Technology Council (UCOST), Dehradun, Ministry of Earth Sciences, Government of India, New Delhi and National Academy of Sciences, India, Uttarakhand Chapter, Dehradun and Speaks, Dehradun. The Day-2016 event was organized in the UCOST Auditorium.

In his address on 'Careing Mother Earth' theme on the occasion, Dr. Rajendra Dobhal, Director General of the UCOST said that after a long research and research of scientists around the world, it has come to the conclusion that it is necessary to save the Earth that its culture to be saved.

In his address on the occasion of organizing the Earth Day program, Padmanabha Shri Prof. N. Purohit, former Vice Chancellor of Bahuguna Garhwal University, Srinagar, said that the Earth Day was started from 1962 and after its passing

from the American Parliament in 1969, its Formal introduction Prof. Purohit said that along with the increase of human population, the number of other types of organisms and plants has also increased. Dr. AK Dube, a former senior scientist, Wadia Himalayan Institute of Geology, speaks at the



popular science lecture organized in the Eakasta, told young students and teachers that our Himalaya is life-saving because many rivers come out of it. The Himalayas must be established for this monsoon in the region. Dr. Dubey described various types of thrusts in the trans-Himalayan region as responsible for gravity with their temperature and pressure. In his lecture,

Dr. Dubey explained to the participants about the "Geological structure of Himalaya and earthquake in this area". In Uttar Pradesh, a poster competition was organized on 'Cleanliness of the city' for students of different educational institutions of Dehradun

- **Sh. Kunal Satyarthi, IFS, Member Secretary, HP Council visited UCOST**

Sh. Kunal Satyarthi, IFS, Member

Secretary, State Council for Science, Technology and

Environment Himachal Pradesh visited Vigyan Sadan

Regional Science Centre at Uttarakhand State Council  
for Science & Technology on 9th May 2016.



- **UCOST celebrated National Technology Day –2016**

A Programme was held to mark the occasion of National Technology Day which was inaugurated in the premises of Vigyan Dham. The program was jointly organized by Uttarakhand Council for Science & Technology with the help of TIFAC, DST Govt. of India and NASI. During the occasion Prof. A.N Purohit, Former VC, HNB, Garhwal University, Srinagar (Garhwal) was the Chief Guest. He shared his view about the value addition and he emphasis to develop mountain specific technologies for the betterment of the hill people. Dr. Prabhat Ranjan, Executive Director, TIFAC, as an special guest. Delivered a popular lecture on “Vision 2035 for Science and Technology for common masses”.

- **Popular lecture on the world of science and philosophy**



A popular lecture was held in the Dnyan Dhan on 13th May, 2016 in the joint working of Uttarakhand State Science and Technology Council (UK), Dehradun and National Science Academy, India, Uttarakhand Chapter. Popular lecture was given by Dr. Vineet Mehrotra,

professor, Department of Biochemistry, Himalayan Institute, Joligrant, on the topic of **Science and Science**. During the popular lecture, all the officers / employees of the Yukast were present along with Dr BP Purohit, Dr. D P Uniyal, Smt. Mehrotra.

- **Popular Lecture on National IPR Policy 2016 by Mr.Yashwant Dev Panwar (Head, PFC, New Delhi)**



A lecture was organised on National IPR policy 2016 on 20<sup>th</sup> May 2016 at Vigyan Dham,UCOST. The DG, UCOST welcomed the key speaker Mr. Yashwant Dev Panwar, Head, Patent Facilitation Centre, New Delhi and spoke on importance of a robust IP policy for a diverse state like India. Mr. Yashwant Dev Panwar, thoroughly explained the objectives on which National IPR policy was

formulated and how the amendments in rules serve to meet the objectives proposed in the national IPR policy.

- **Popular lecture on “An overview of Birla Science Museum, Pilani, Rajasthan” by Dr. V.N Dhaulkhandi**

Popular lecture on “An overview of Birla Science Museum, Pilani, Rajasthan” by Dr. V.N Dhaulkhandi, Director, Birla Museum, Pilani Rajasthan.



- **Two day workshop on National Academy of Sciences (NASI) organized at Vigyan Dham**

Dr. Rajendra Dobhal, Director General, UCOST welcome young & eminent scientists from State and Country at Vigyan Dham. Padmavibushan Prof. Manju Sharma, Former Secretary, Biotechnology, Govt. of India, New Delhi focused on rural economy and told that the main objective to organize the workshop is mainly for researchers, scientists, NGO's. Small

Industrialists, businessmen living in mountains can mingle latest scientific and traditional knowledge to create different things. Keynote speaker Prof. LMS Palani, Former Director, GB Pant Himalayan Institute spoke on “Science & Technology for Rural Economy in Mountain Ecosystem”.

• **86<sup>th</sup> NASI Annual Session: Technical Sessions held on 2<sup>nd</sup> – 4<sup>th</sup> Dec at UCOST, Dehradun**

The first session was with the theme “Connecting Academia and Industry”, chaired by Dr. V. P Kamboj (Former President NASI) and Co-chair person Dr. Pramod Tondon (CEO Biotech Park Lucknow). The first lecture was delivered by Dr. G. Padmanaban, in the memory of Padma



Bhushan, Dr. V. P. Sharma, an entomologist, known for his work in vector biology and bio environmental control of [malaria](#). The title for the lecture was “Curcumin from Turmeric: A wonderful drug in waiting”, which focused on tremendous potential of Curcumin as anti-malarial drug.

• **Plantation in Vigyan Dham Complex**

Uttarakhand State Science and Technology Council, Dehradun National Academy of Sciences India, Plantation was done at a large scale in the

science fair campus of Jajraara on 30th July, 2016, by joint efforts of Uttarakhand Chapter and Wildlife Preservation Society of India, Dehradun and subject experts have their own views in bio-diversity, environmental change etc. More than 300 species of different species were planted in the premises and resolved to protect them in the



future. Bamboo was also planted on a marked site, mainly with Rudraksh, Ashok, Jamun, Kaner, Nebun, Mango. The main guest of this program was provided detailed information about how the tree is useful for human life by Dr. S. S. Negi, Director General and Special Secretary, Ministry of Forest and Environment, Government of India, New Delhi.

- **UCOST Organized Popular Lectures on “IPR Awareness“ at All India Institute of Medical Sciences, Rishikesh**

Two Popular Lectures focusing on “Overview of IPR” & “IPR related Inventions in Medical Sciences” was organized at All India Institute of Medical Sciences, Rishikesh on 23rd August, 2016. Prof. Sanjeev Mishra, Director, AIIMS welcome Dr. Rajendra Dobhal, DG UCOST, PIC Officials and the participants.



Dr. Rajendra Dobhal, gave first lecture on topic “Intellectual Property Rights: an Overview”. Dr. Anju Rawat, Scientist-B, PIC, UCOST gave her Lecture on “IPR related Inventions in Medical Sciences”.

- **2 Day’s National Seminar on “Lokpriya Vigyan Lekhan: Samasyayein evam Sambhawnayein”**



A two day’s national seminar on “Lokpriya

Vigyan Lekhan: Samasyayein evam Sambhawnayein” jointly organized by Uttarakhand State Council for Science & Technology (UCOST), Dehradun and Peoples Association of Hill Area Launchers (PAHAL), Pithoragarh at Doon University, Dehradun on

23<sup>rd</sup> -24<sup>th</sup> , 2016.

- **Wildlife Week Celebration at UCOST**

Uttarakhand State Council for Science & Technology (UCOST), Dehradun in joint collaboration with Wildlife Preservation Society (WPS) and

National Academy of Sciences India, Uttarakhand Chapter celebrated 78<sup>th</sup> Wildlife Week on 5<sup>th</sup> Oct, 2016 at Vigyan Dham Premises which is observed from 1<sup>st</sup> to 7<sup>th</sup> October every year in India. Dr. V. B. Mathur, Director,





Wildlife Institute of India Dehradun was the chief guest of the program and Shri Jai Raj, PCCF, Uttarakhand Forest Department was the Guest of Honor. This year's theme of this week is Members Matter: Working Together for Wildlife, focuses on the contributions that individuals, schools, and communities can make for the wildlife in their own areas and across the nation.

- **A workshop on “Understanding Science and Technology Based Startup Business Model Innovations”**



A workshop on “Understanding Science and Technology Based Startup Business Model

Innovations” was conducted by UCOST, funded by NCSM, Kolkata under Spices Scheme on 19th Nov, 2016 in collaboration with SPECS, Dehradun.

- **86<sup>th</sup> NASI Annual Session Preparatory**

**Meeting held at UCOST on 25<sup>th</sup> Nov 2016**

86<sup>th</sup> NASI Annual Session Preparatory Meeting held at UCOST on 25th Nov in the chairmanship of Prof. A.N. Purohit, Former VC, H.N.B Garhwal University & Chairman NASI UK Chapter with Dr. Neeraj Kumar, Executive Secretary, NASI, Allahabad along with UCOST staff.



- **Inaugural Session of 86th NASI Annual Session & Symposium commenced at Convocation Hall, FRI Dehradun on 2nd Dec, 2016**

Inaugural of 86<sup>th</sup> NASI Annual Session and Symposium on “Science Technology and

Entrepreneurship for Human Welfare in the Himalayan Region” commenced at Convocation Hall, FRI Dehradun on 2<sup>nd</sup> Dec, 2016. During

the inaugural session Honorable Governor of Uttarakhand, Dr. K.K.Paul, Guest of Honor, Prof. G. Padmanabhan, Chief Guest, Prof. Manju Sharma, Prof. Akhilesh Tyagi, Prof. A.N. Purohit, Dr. Savita, Dr. Rajendra Dobhal, Dr.



Veena Tandon and Dr. Neeraj Kumar were present on the dice. There were 450 participants (NASI Fellows, Council Members & Past presidents, UCOST Staff and eminent personalities from the local institutions) in the inaugural session

- **86<sup>th</sup> NASI Annual Session: Technical Sessions held on 2<sup>nd</sup> – 4<sup>th</sup> Dec at UCOST, Dehradun**

The first session was with the theme “Connecting Academia and Industry”, chaired by Dr. V. P Kamboj (Former President NASI) and Co-Chair person Dr. Pramod Tondon (CEO Biotech Park Lucknow). The first lecture was delivered by Dr. G. Padmanaban, in the memory of Padma Bhushan, Dr. V. P. Sharma, an entomologist, known for his work in vector biology and bio environmental control of [malaria](#). The title for the lecture was “Curcumin from Turmeric: A wonderful drug in waiting”, which focused on tremendous potential of Curcumin as anti-malarial drug.

A symposium was organised titled “**Alternate approaches for addressing the problem of Human-Animal Conflict in Agriculture Sector**” which was organised at the meeting room, Vigyan Dham, Dehradun. The session was chaired by Dr. S. S. Negi, MoEF & CC, DG, and co-chaired by Mr. D V S Khati, PCCF (Wildlife), Uttarakhand and Dr. B.S. Barfal, Ex-PCCF, Uttarakhand Forest Department, were the invited guest for the session of Curcumin as anti-malarial drug.

- **A Popular Lecture on “IPR & its Importance for Scientific Community focusing on Young Researchers” at Regional Science Centre**

(RSC), Dehradun on Feb 02, 2017.

A Popular Lectures focusing on “**IPR & its Importance for Scientific Community focusing on Young Researchers**” was organized By PIC,

UCOST at Regional Science Centre (RSC), Dehradun on Feb 02, 2017. Dr. Anju Rawat,



Scientist-B, Patent Information Centre (PIC), UCOST gave lecture on topic “**IPR & its Importance for Scientific Community focusing on Young Researchers**”.

- **Popular Lecture on “Intellectual Property Rights: Importance & Scope for Researchers & Students as a Career Option” at Regional Science Centre (RSC), Dehradun on Feb 21, 2017.**

An IPR Camp focusing on “**Intellectual Property Rights: Importance & Scope for young Researchers & Students as a Career Option**” was organized By PIC, UCOST on Feb 21, 2017 at Regional Science Centre, Dehradun. Dr. Anju Rawat, Scientist-B, Patent Information Centre (PIC), UCOST gave lecture on topic “**IPR: Importance & Scope for young Researchers & Students as a Career Option**”.

Organization of State Science & Technology Congress and Children’s Science Congress, NASI best Science teacher award is also a flagship programme of the Council for the promotion of Science in the state and to provide platform to the young researchers/school students/science teachers and interactions with various eminent scientists across the country.

#### 4.4. Patents:

Type of IPR	Year	Applicant Name	Title of Application	Patent No.
Patent	2017-18	Mr. Mukesh Vidyarithi Awas Vikas Colony Haldwani	(CRAIM) Charge Recirculation Air Intake Main ford	20181100 4232
		Dr. Ashish Bagwari Assistant Professor Dept. of Electronics UTU, Dehradun	An Improved Dual Detector Spectrum Technique for Cognitive Radio Network	20181101 3445
		Mr. Subham Panwar Resident Dehradun	A Brick making Machine and Method to use thereof	20171104 6475
		Dr. R.B kalia Associate Professor, Department of Orthopedics AIIMS Dehradun	Dynamic Plating Unit	20171101 0703
	2016-17	Digvijay Singh Pokharia Student Dehradun	Economical Still Water Electricity Generator	20171101 4029
		Mr. Mukesh Vidyarithi Awas Vikas Colony Haldwani	“Charge air Pipe”	20171100 8062
		Mohamad Taayab Vikas Nagar Dehradun	a conveyor based hydrokinetic system	20171101 2832
		Mr. Tayyab Sekih	Air Turbine	20161103

		Vikas Nagar Dehradun		4117
Trademark	2017-18	UCOST	LOGO	2385305 (Granted)
		TechCounsellor	LOGO	3700571
		Tribal Woolen Crafts	LOGO	3723574
	2016-17	Mr. Ashutosh Kandpal Hills2Home, Shivpuri Jawahar Jyoti, Damudhunga, haldwani (Nainital)	Name & Logo of "Hills2Home"	3383473 (Granted)
		Mr. Chandra Mohan Bahukhandi Owner Bahukhandi Arts Dehradun	LOGO of Bahukhandi Arts	3395171
		Mr. Chandra Mohan Bahukhandi Owner Bahukhandi Arts, Dehradun	Name of Bahukhandi Arts	3395172
2017-18	Mr. Nishant Sharma	Non Interactive Mechanism; Non-interactive Mechanisms. Cosmological Concepts. Nishant Effects. Theory of Infinity. Phenomena Lead By Non- interactive Particles in Matter	11648/2017-CO/L (Registered)	
	Mr. Manohar Singh Pal	Classical Physics Revolution	18306/201	

Copyright				7-CO/L (Registered)  18308/2017-CO/SR
	2016-17	Mr. Nishant Sharma	Birth of Atoms & Nucleus	8032/2016-CO/L (Registered)
		UCOST Dehradun	An Expert System for Integrated Solid Waste Management in Dehradun City	6931/2016-CO/SW
		Mr. Shivendu	Shivendra's Method of Uniquely illustrating on a number line	L-72914/2018 (Registered)
Geographical Indications	2017-18	Mrs. Shanti Parmar Sankalp Samajik Sanstha Uttarakashi	Hand Knotted Carpet (Dann) of Uttarakhand.	589

#### 4.5. ANY NEW INNOVATIVE ACTIVITIES:

- **Field Testing Kit for Water analysis:**

Natural surface water may get polluted in different ways and polluted water should never be used. Generally in hills, the water becomes polluted during pre-storage as well as during storage. It therefore, becomes imperative to assess the quality of water being used for drinking and household needs, since it may contain substances which are harmful to human health. In difficult hilly terrains of Uttarakhand, the piped and treated water supply is still difficult and sometimes not possible. As per Census 2011 in Uttarakhand, still 14.3% households take tap water from untreated sources for drinking purpose, which may impact the public health in various ways. The water available from natural sources and being used by local inhabitants for drinking and domestic needs should be tested to assess the quality of water before consumption and use. This will not only protect human health from various diseases in general but will also save them from massive hazards owing to bacterial contamination in particular.

Therefore, a low cost Field Testing Kit (FTK) for water quality testing has been developed and successfully demonstrated taking into consideration the requirement of simple and reliable water quality testing tool in hills of Uttarakhand.



- **Cultivation protocol for horticulture crops by Tissue culture techniques:**

Full-fledged tissue culture lab was established in Naugaon, Uttarkashi district with the financial support of Department of Science and Technology, New Delhi. It aims at improving the quality of fruits, flowers and other products, diffusion of advanced technologies among the local farmers to minimize post and pre harvest losses, along with generating a better atmosphere for the marketing of the products. The protocols development of all 4 apple rootstocks, carnation cultivar and Lilium and hardening of the in-vitro raised plants of carnation and Lilium have been accomplished. Established healthy and disease free germplasm of carnation, Lilium and strawberry.



- **Development of Resource Atlas for Uttarakhand state:**

Preparation of Resource Atlas for Himalayan State of Uttarakhand is an environment concerned project. All the thirteen districts of the state are taken into account with the suggested resources. Fourteen resources of the state on which the inhabitants depend directly or indirectly are District at a Glance, Topography, Population, Education, Health, Forest & Wildlife, Agriculture & Livestock, Water, Energy, Industries, Tourism, Transport & Communication, Science & Technology, Disaster & Disaster Management. The project is funded by National Mission on Himalayan Studies-Himalayan Research Fellowship (MoEF & CC), Government of India. This project is worked out at Uttarakhand State Council for Science and Technology (UCOST), Vigyan Dham. Duration of the project is three years.

The Objectives of the Project are Mapping the entire environmental concern of each district of the state including parameters that will help in understanding the current scenario of the Himalayan Region of the State, assessing the “Time Series” pattern of changes occurring in the environment and climate, Publication and Digitization of the Resource Atlas with brief details of each district of Uttarakhand and generating the policy recommendation for the development of the Uttarakhand State which mostly constitute Himalayan region, keeping “Environment” concern in background. Regarding the secondary data collection of different resources of the project, various government departments have been visited so far such as Watershed Management Directorate, India Meteorological Centre, Geology and Mining Unit, Uttarakhand Irrigation Department, Directorate of Agriculture, Uttarakhand Renewable Energy Development Agency (UREDA), Uttarakhand Power Corporation Limited, Forest Survey of India etc. 85% data has already been collected for the thirteen districts on the suggested resources and the remaining data is in the process of procurement from various concerned departments. At present, the process of compilation is being done. The collected data is now being analyzed statistically and district wise segregation is in process.

- **Establishment of Center of Excellence for forest based livelihood:**

A innovative approach initiated by the Council to establishes the “**Centre of Excellence on Forest based Livelihood in Uttarakhand**” in collaboration of Ministry of Environment, Forest & Climate Change (MoEF & CC) and National CAMPA Advisory Council created a Centre of Excellence (CoE) on Forest based Livelihood in Uttarakhand with Uttarakhand State Council for Science and Technology (UCOST) to explore the aspect of livelihood and forest related issues in Uttarakhand. A first of its kind in the state, the CoE delves on issues related to forest based products and dependence of forest fringe dwellers on forest resources.

Forests of Uttarakhand have been an essential part of the state development and nearly 80% people are directly or indirectly dependent on forests either for their sustenance or subsistence. Forests provide fodder, fuelwood, many wild foods, construction material, medicines etc. and also create microclimate for cultivation of several crops of the hill. Non



Timber Forest Products (NTFPs) mainly medicinal plants and bamboo are gaining importance in bringing better livelihood opportunities. CoE thrives to generate datasets on forest based livelihood and income generating opportunities. Information generated by this study will be helpful in sustainable non-wood forest product management and in exploring more livelihood opportunities of the State. Vision of the CoE is to become a resource and knowledge centre on forest based livelihood and contribute towards sustainable livelihood opportunities in the state. The CoE will be the nodal hub in providing the updated dataset and information related to forest based livelihood in State. The objectives are undertaken during the project are as to collect all the available data on forest based produce with focus on non-timber products like medicinal plants and bamboo and to create a clearing house for the same, create a resource directory of various government and non-government organisations, private institutes and experts working in the area of forest livelihood, interact with people through Focused Group Discussion (FGD) and to estimate their dependence on forests for their livelihood, conduct socio-economic analysis and estimate cultural dependence of the forest fringe villages on forestry and do value and supply chain analysis for different forest products. During the project study Secondary data was collected from different government agencies such as the State Forest Department, Uttarakhand Forest Development Corporation (UAFDC), research organisations, Non Government Organisations (NGOs), published reports and research articles, along with household surveys and Focussed group discussions (FGDs) are conducted in some selected forest fringe villages of Chamoli, Nainital, Uttarkashi and Pauri Garhwal districts of Uttarakhand, Resource directory having contact information of various government and non-government organisations, private institutes and experts working in the area of forest livelihood in Uttarakhand is prepared by the Centre and uploaded on the webpage of the council (<http://www.ucost.in/document/COE/COE-Resource-Directry.pdf>). A Non- timber forest product (NTFP) gallery was set up at Centre of Excellence and Dissemination of collected information on forest & related issues and study of Centre was done in workshops, newspapers and research articles.



Photo- PAC meeting CoE



Photo- Review meeting of CoE



Photo- Village survey at Uttarkashi district

Photo- Visit to UAFDC mandi, Ramnagar

- **Development of High nutritional valued products by wild edibles of Uttarakhand:**

A project “Enhancing livelihood of Himalayan communities through action research and transforming wild produces into high value products” is funded under National Mission on Himalayan Studies by MOEF &CC, GoI is being jointly implemented by UCOST & HARC Uttarakhand in Chamoli and Rudraprayag district with 3000 producers. The main intend of the project is enhancing livelihood through adding value in the available wild commodity. To implement it systematic manners, conducting scope study is major intervention under the project. The Himalayan communities are majorly dependent on forests for their livelihood and thus have acquired immense knowledge about wealth and utilization of plants and their products.

The Himalayan region rural communities, acquires enormous knowledge of wild plants having nutritional and medicinal uses, but with the use of commodity based ready foods, these resources are either getting misused or left untrapped. The lesser known crops and wild edible berries, fruits and nuts are on the verge of depleting their value due to the migration of the people from the hills of Uttarakhand. The mandate action plan is to form various value added products from these potential wild edibles. By promoting wild edibles as a link among the communities, science and culture, the concept can be enchased to maintain not only the biodiversity of the region but also sustain livelihood of communities of the region.

- **Development of High valued products from nutritionally rich traditional crops.**

Millets and other coarse grains like finger millet, foxtail millet, barnyard millet has been grown and consumed traditionally in Uttarakhand, but now their cultivation is on decline owing to various reasons like, poor returns from market, unavailability of urban market and change in food consumption behaviour of local families. A project entitled “Technology Resource Centre for improving livelihood in Uttarakhand, promoting traditional grains and their value added products” was sanctioned to Dr. SumanSahai, Chairperson, Gene Campaign.

Under the project a technology resource centre was established which provided various field and processing equipment like dehuller, pulverizer, thresher, mechanised namkeen maker etc.

- **Generation of drinking water quality database throughout the Uttarakhand State:**

As the Uttarakhand state has a megha natural water sources system for the utilization of drinking water, project implemented by Uttarakhand State Council for Science & Technology with the

collaboration of Uttarakhand Jal Sansthan (UJS) Dehradun & DAV PG College Dehradun with the objectives, Establishment of "State Level Water Quality Analyses Laboratory, Physico-Chemical and bacteriological water quality parameters analyses of 13 districts of Uttarakhand. Drinking water quality database has been developed under the project Physical and Chemical Analysis, Testing, Training and Awareness of Potable Water and Water Sources of Uttarakhand State, funded by Department of Science & Technology (GoI), New Delhi.

During the course of research under this project a "State Level Water Quality Analyses Laboratory" Established under WTI Programme in Dehradun in the premises of UJS for the testing of water samples across the state. During the project Drinking water sources as water sample collection sites in 13 districts of Uttarakhand and analyses as per BIS and APHA specifications. On the bases of water analysis Monitored of water quality of raw and supply water samples along with assessment of seasonal variation (pre-monsoon and post-monsoon) on water quality during the course of project. Water Quality Data Resources of 708 drinking water sources of Uttarakhand has prepared for 2010, 2011 and 2012 on 29 parameters. According the data generated on water samples on Water Quality, Maps of State on quality water, Garhwal and Kumaun regions and 13 districts of Uttarakhand prepared for 2010, 2011 & 2012 has generated.

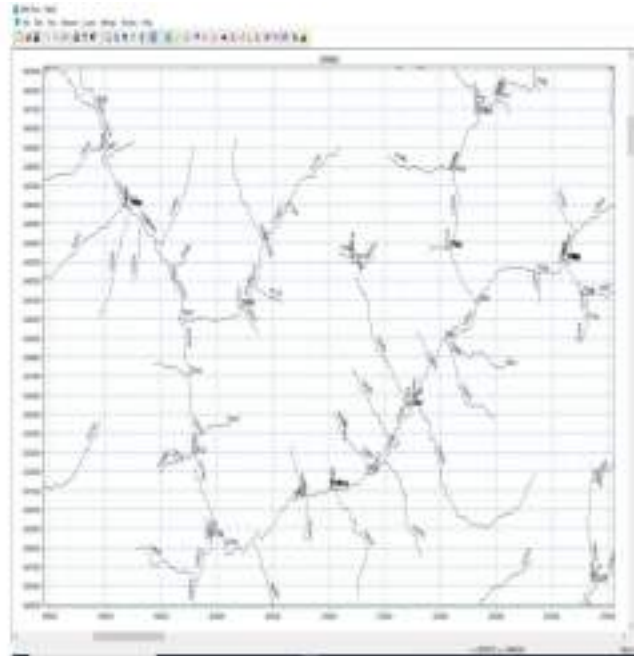
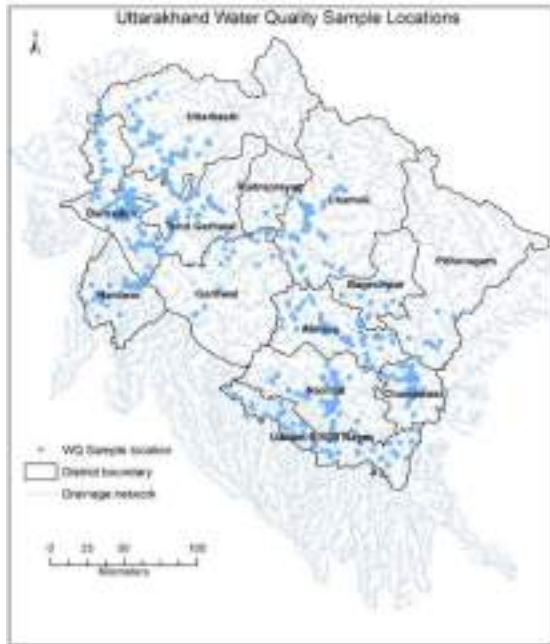
- **Generation of Geospatial map for drinking water quality sources throughout the Uttarakhand State:**

The 13 districts of Garhwal and Kumaun region of Uttarakhand namely Dehradun, Haridwar,

Pauri, Tehri, Chamoli, Uttarkashi, Rudraprayag, Nainital, Almora, Pithoragarh, Bageshwar, Champawat and Udham Singh Nagar had been selected for the study of water quality monitoring data obtained during the period of 2010-16 by Uttarakhand State Council for Science and Technology (UCOST), Dehradun and Uttarakhand Jal Sansthan (UJS), Dehradun under different joint WTI, DST sponsored research projects on water quality of Uttarakhand. These studies had effect of seasonal variations on water quality during pre-monsoon and post-monsoon seasons. Under these programmes, through several researches conducted on raw and supply waters, it was observed that limited study was conducted to find out the severity of quality. Therefore, under the study a innovative approach made by the Council to generate drinking water quality Geospatial map of Uttarakhand under spatial temporal domain. In the present study both spatial domain and temporal domain have been selected to see the regional dynamics. The current study will assess total 26 water quality parameters namely colour, odour, taste, turbidity, pH, total hardness, iron, chloride, residual free chlorine, fluoride, total dissolved solids (TDS), calcium, magnesium, copper, manganese, sulphate, nitrate, phenolic compound, arsenic, cadmium, lead, zinc, chromium, aluminium, alkalinity and coliform bacteria (i.e. total coliform and fecal coliform) were identified as per BIS 10500 using the data from the previous projects. In the current project Hydro-Geospatial model and tools will be used to target the hot spots and take a decision to resolve problems of water quality in the various districts / catchment areas with sustainability of environment as key issues.

The findings of the water quality modelling studies, to be presented in the form of technical guidelines especially for hilly terrain conditions, are likely to help in finding solutions of the identified problems either directly or indirectly. The overall outcome of the work is expected to be fruitful for tackling the local environment degradation of water aiming at better human health and improved agricultural demand nearby urban cluster. This will also providing the scientific

solution to avail a potable per capita water demand in urban as well as rural area. It also aims to provide a feasible solution of sustainable water availability in hilly terrain conditions of Himalayan region that amounts to sustainable practice of water retention in urban & rural backgrounds that manifests as watershed model. This geospatial model will suggest decentralized inflow of water in the urban areas through various means like Rainwater Harvesting, Perched water harvesting for urban and surrounding rural areas for long retention of water and long sustainable water cycle.



- **MICRO TURBINE-PUMP-GENERATOR FOR UTTARAKHAND REMOTE HILLS**

“Low weight Micro Turbine-pump-Generator was also established for uplifting the water from natural low land streams for Uttarakhand hills. Being a mountainous state, there is paucity of water and electricity in remote villages of Uttarakhand hills. Water and/or electricity are to be provided for their development is also an utmost urgent need. As the rural masses are living in too remote far flung areas need to be connected with the power grid and it is



also not viable to built big dams for Hydro- electric power generation. Uttarakhand hills are blessed with rivers with great hydraulic power potential. The solution is to go for a net work of Micro Hydraulic Turbines-Generator and Turbines-Pumping System to supply the water and/or electricity to small remote villages. There is planed scope to make the dams and electric power grid.

The Micro Hydraulic Turbine-Generator and Turbine-Pump are developed to cater the different needs of water and/or electricity of the people of small hills villages. Council has developed modular Turbine-Generators and Turbine-Pumps with different types of Draft Tubes. These are very compact, having high efficiency, lowest cost, trouble free running and ease of maintenance. These may be used in different combinations, (in-series and /or in parallel) to meet the specific local site requirements.

Gunji is a village in [Pithoragarh district](#) in the [northern](#) state of [Uttarakhand, India](#). It is near the borders of [Tibet](#) and [Nepal](#) and the confluence of the [Kutti River](#) and [Kali River](#), at the east end of the [Kutti Valley](#). It is a very small village populated only seasonally, with winters coming people migrate to lower places (mostly to Dharchula, in the same district), But Sashastra Seema Bal, Indo Tibet Border Police and GREF personnel remain there throughout the year. Its a beautiful village giving you the view of mount Api (in Nepal). Construction of road link with Dharchula is still in progress. Gunji village located at 30° 11' 10". 281 latitude and 80° 51' 10".274 Longitudes and 3200 mtr heigh from sea level.

The power generation through mini and micro HEPs (Hydro Electric Projects) over parrineal tributaries or sub streams across the interior highlands of Uttarakhand has numerous social and economical implications. Government has taken initiatives to promote such mini and microhydels to generate electricity and employment to the remote areas of this hilly state also. For the successful running of these project, community based self help group can be formed for sustainable running of the project a village samiti. They need to know the technology and proper handling of HEPs along with official and human resource management practices. Therefore, training and capacity building of the Samiti members is urgently needed to ensure proper functioning of this water project.

Earlier the projects were constructed on basis of Payjal Nigam Govt. of Uttarakhand has decided to construct mini and micro water pump for village drinking & electrification for

## Testing of turbine at IIT Roorkee



### Likely impact on the society after implementation

- Almost 350 families and more than 2000 individual and pilgrims of Aadi Kailash, Om parvat, and Kailash mansarover might quench their thirst.
- work towards increasing the power production in their respective HEPs up to their maximum limit.
- explore some additional benefits of HEPs such as fisheries, horticulture and forestry etc.
- installation of same project in other location of Uttarakhand.

## Site Survey of Gunji village



community. Payjal Nigam has commissioned large number of Payjal Yojanas in the remote areas of Uttarakhand state where the national or state grid cannot be extended.

- **Organization of State Science Congress to provide the platform for young researchers to interact with eminent scientists across the country.**

The mountain states of the country have fervour of its own, besides a scanty & scattered population; their raging fascination towards movement is apparent. Essentially, this charm is due to the fact that the population at large is devoid of the basic luxuries of life and therefore seeks to garner them by imbibing & learning contemporary knows hows. This innate quality of being a

seeker is an advantage to the races existing in the regions. Employing this inherent feature of the mountain people to a larger perspective is the purpose of the government. Furthermore, if science

& technology is infused in the learning's of the people then its affect will not only enhance their subsistence level but also take the national economy to a higher level. Relying on this intent, the Uttarakhand State Council of Science & Technology (UCOST) infact tends to galvanize this approach by organizing the State Science Congress (USSTC) annually. The aim of USSTC is to provide a common platform to researchers/ individuals/ faculties working in different S&T research institutes, universities and colleges and other organizations to share their expertise and experiences.

The USSTC has always been a grand event. Providing a platform to researchers of the state to showcase their inventions, innovations and research in front of eminent personalities from all over India has been the main facet of the congress. All through the evolution of the USSTC many adaptations, alterations and modifications were made, the present form erupted only through the toil and hardship by the illustrious team of the UCOST headed by an energetic, dynamic & a visionary person. During the course of the event, the congress has received representations in the form of session experts from nearly all the states. The judges being, from the most reputed institutes and scientific organizations of the country, their coming together and mingling with the researchers of the state boosted the morale and confidence of the young minds. Another obvious observation was the gradual increase in the participation of the presenters and the number of awardees. It started with just 113 papers which have now reached to 700 in numbers. As of till date around 5900 people have presented their papers during the event in which 518 young researchers awarded by Young Scientists Award and 08 are awarded by Best Innovator. These numbers are just the number of paper presenters, however if we add the judges and participants of the brainstorming sessions too, the number surpasses 1000. As a consequence of this spurt in participation, the number of award recipients has also spiralled i.e. from 19 in first year to 50 young scientist awardees this year. A matter of pride is the fact that nearly all the award recipients are suitably employed. Besides this, the annual feature of organizing brainstorming sessions on topical and relevant issues have brought together professionals specialist in their own realm to delve on state specific issues. Nearly 120 experts congregate just for the brainstorming sessions each year. In essence, all these attributes have actually accentuated the impact of the science congress. A feel good factor of science congress is the taking away of intellectual memories both by the participants as well as the experts.

12<sup>th</sup> Uttarakhand State Science and Technology Congress held at Vigyan Dham, UCOST, Dehradun during 7-9<sup>th</sup> March, 2018. This mega event was inaugurated by Dr Krishan Kant Paul, H.E. the Governor, Uttarakhand. Total 510 researchers/ individuals/ faculties working in different S&T research institutes, universities and colleges and other organizations shared their expertise and experiences. 54 participants got the Young Scientist Award.

- **Organization of State Children's Science Congress to provide the platform for young researchers to interact with eminent scientists across the state.**

Uttarakhand State Council for Science and Technology dedicated to science popularization in the state. Being a maximum representation form hilly areas of the state, it is utmost urgent need of

the hour to disseminate the science in far flung rural area of the state. The 25<sup>th</sup> children science congress 2017 has organized at council premises on 20<sup>th</sup> December 2017 under seven themes in which 130 schools students represented their poster/oral/science models form 11 districts.

As the Uttarakhand state is Himalayan state carved out from Uttar Pradesh during 2000 having maximum area under mountainous region, the rural children have been educated from Government primary schools and inter colleges situated in typical geographical conditions. Being a mountainous state it is difficult to communicate science. To generate curiosity and develop scientific temper among the school children in rural folk of the state is most important, so that they can adopt science as a career option and they will also be aware about the science around them and scientific activities across the globe. As the decade 2011-2020 has many global scientific concerns like climate change, biodiversity conservation, information technology and agriculture productivity etc. It is important to address these issues among students to generate scientific curiosity at small scale and awareness about the scientific activity across the globe. Hence, Science and Technology communication should be taken in the wider sense and includes interactions.

National Council of Science and Technology Communication, Department of Science and Technology, Government of India, New Delhi organizes various scientific programs across the country to disseminate the science in the society. National children science congress is the one of mega flagship programme organizes from block level to national level in different state, throughout the country. Uttarakhand State Council for Science & Technology (UCOST) being a nodal agency of this organization hosted 25<sup>th</sup> State Level Science Congress consisting sub themes, viz., Ecosystem and Ecosystem Services; Health, hygiene and Sanitation; Waste to Wealth, Society; Society, Culture and Livelihoods and Traditional knowledge systems. Considering all these the focal themes for 2018 and 2019, National Children's Science Congress has been chosen as "Science, Technology and Innovation (STI) for a clean Green and Healthy Nation". With clear understanding of these areas narrated so far, local and regional issues may lead one for innovative thinking and come up with new solution(s) while considering the overall health of nation as one cannot ignore the role of society and culture and its interconnectedness to livelihoods, lifestyles and sustainable progress.



- **Establishment of Biodiversity park, Herbal garden at UCOST:**

A well planned Biodiversity Park has been established at UCOST with the financial support of Satluj Jal Vidyut Nigam (SJVN) under its CSR policy and Himalaya drug Pvt. The Forest



Research Institute (FRI) Dehradun has been deputed as executive agency which has started the work since August 2016. Besides, a massive plantation has also been conducted in entire UCOST premises during this monsoon.

The consists many important species of trees, shrubs and herbs which are occurred in the state. The aim of park is to provide platform to the school childrens to know the biodiversity occurred in the state and its conservation and scientific values as well.

#### 5. List 5 success stories:

- **Development of High Valued products by traditional grains of Uttarakhand**

Millets and other coarse grains like finger millet, foxtail millet, barnyard millet has been grown and consumed traditionally in Uttarakhand, but now their cultivation is on decline owing to various reasons like, poor returns from market, unavailability of urban market and change in food consumption behaviour of local families. A project entitled “Technology Resource Centre for improving livelihood in Uttarakhand, promoting traditional grains and their value added products” was sanctioned to Dr. SumanSahai, Chairperson, Gene Campaign.

Under the project a technology resource centre was established which provided various field and processing equipment like dehuller, pulverizer, thresher, mechanized namkeen maker etc. Training was provided to the farm women and local villagers regarding development of value added products from locally available millets like finger millet, buckwheat grain amaranth etc. A total of 25 mahila samitis encompassing 400 women were trained to develop nutrition dense novel food based on millets and amaranth, like non-gluten flours, breakfast cereals, sweets and savoury snacks, pancake and porridge mixes, mixes for halwa, laddu and barfi etc. The products were packaged, labelled and sold at local shops in Ramnagar, various kisanmelas and haats in Delhi, Ahemdabad and Mumbai. There is a lot of interest among urban consumers for these health foods based on traditional grains and thus there is great potential to create farm based income sources for women and other farmers. Also, the revival of the cultivation of a hardy, climate resilient crop like millets and other traditional grains that will withstand the climate turbulence threatening the Indian subcontinent, very particularly its vulnerable mountain areas will help support better food availability.

- **Development of High valued nutraceutical and therapeutic importance products by wild edibles of Uttarakhand**

A project is funded under National Mission on Himalayan Studies by MOEF &CC; GOI is being jointly implemented by UCOST & HARC Uttarakhand in Chamoli and Rudraprayag district with 3000 producers. The main intend of the project is enhancing livelihood through adding value in the available wild commodity. To implement it systematic manners, conducting scope study is major intervention under the project. The Himalayan communities are majorly dependent on forests for their livelihood and thus have acquired immense knowledge about wealth and utilization of plants and their products. The Himalayan region rural communities, acquires enormous knowledge of wild plants having nutritional and medicinal uses, but with the use of commodity based ready foods, these resources are either getting misused or left untrapped. The lesser known crops and wild edible berries, fruits and nuts are on the verge of depleting their

value due to the migration of the people from the hills of Uttarakhand. The mandate action plan is to form various value added products from these potential wild edibles. By promoting wild edibles as a link among the communities, science and culture, the concept can be enched to maintain not only the biodiversity of the region but also sustain livelihood of communities of the region. The objectives undertaken during the project are, to undertake action research based interventions and convert low value wild produce into high value commercially viable produce, uses of traditional knowledge and promote high value products thereby benefitting both rural communities specially women and consumers and to establish successful community model that is replicable and promote sustainable use of nature and wild products of Himalayan region against Climate change. The main products focused in the project are Wild Berries, Wild Nuts, Wild Fruits in Joshimath block, Ghat and Karanprayag block and Ukhimath block. The outcome from the project are sustainable use of wild berries, fruits and nuts increases directly among 3000 rural communities, thereby increasing biodiversity of the region and also sustains livelihood and income of communities of the region, development of women cooperatives in selected villages and set up of small-scale federations and industries.



❖





- **Generation of drinking water quality database throughout the Uttarakhand State:**

As the Uttarakhand state has a Megha natural water sources system for the utilization of drinking water, project implemented by Uttarakhand State Council for Science & Technology with the collaboration of Uttarakhand Jal Sansthan (UJS) Dehradun & DAV PG College Dehradun with the objectives, Establishment of "State Level Water Quality Analyses Laboratory, Physico-Chemical and bacteriological water quality parameters analyses of 13 districts of Uttarakhand. Drinking water quality database has been developed under the project Physical and Chemical Analysis, Testing, Training and Awareness of Potable Water and Water Sources of Uttarakhand State, funded by Department of Science & Technology (GOI), New Delhi.

During the course of research under this project a "State Level Water Quality Analyses Laboratory" Established under WTI Programme in Dehradun in the premises of UJS for the testing of water samples across the state. During the project Drinking water sources as water sample collection sites in 13 districts of Uttarakhand and analysed as per BIS and APHA specifications. On the bases of water analysis Monitored of water quality of raw and supply water samples along with assessment of seasonal variation (pre-monsoon and post-monsoon) on water quality during the course of project. Water Quality Data Resources of 708 drinking water sources of Uttarakhand has prepared for 2010, 2011 and 2012 on 29 parameters. According the data generated on water samples on Water Quality, Maps of State on quality water, Garhwal and Kumaun regions and 13 districts of Uttarakhand prepared for 2010, 2011 & 2012 has generated. Trainings / workshops eight Programmes on water quality also organized for water managers/ users by project collaborators to develop the awareness among the inhabitants of the state as well as the water supply department.

The State Level Water Quality Analyses Laboratory" was established with ppb level analysis of 34 water quality characteristics/ parameters. "Water Quality Data Resources" of Uttarakhand (2010, 2011 and 2012) of 708 drinking water resources has developed. State level, regional level and district level 44 "Water Quality Maps" of Uttarakhand of 2010, 2011 and 2012. More than 1100 beneficiaries/ human resource from training/awareness/ capacity building of water quality testing.

**WTI/ DST/ UCOST Project Review at UCOST-**



**Visit of Adviser & Head (TMC), WTI Programme, DST, Govt. of India,  
 Visit of Secretary, Department of Drinking Water, Govt of India  
 Visit of WTI/ DST PRC in Lab**

- **Development of Standard Based Uttarakhand State GeoPortal for Decentralized Governance:**

National Spatial Data Infrastructure (NSDI) defined as the technologies, policies, and people necessary to promote sharing of geospatial data throughout all levels of government, the private and non-profit sectors, and the academic community.

The goal of this Infrastructure is to reduce duplication of effort among agencies, improve quality and reduce costs related to geographic information, to make geographic data more accessible to the public, to increase the benefits of using available data, and to establish key partnerships with states, counties, cities, tribal nations, academia and the private sector to increase data availability.

The fundamental objectives of the present project are to develop a standards-based GeoPortal and Clearinghouse for Uttarakhand State and demonstrate its utility in Decentralized Governance, to build technical capacity of various government departments in geographic information management for sustained maintenance and use of the Portal and to increase awareness and understanding of the vision, concepts, and benefits of Spatial Data Infrastructure at different hierarchical levels.

The methodology involves developing and hosting a pilot scale experimental State Geo-portal and Clearinghouse at UCOST Dehradun. The NRDMS database at UCOST will be the core data sets for the experiment. The concept of web GIS will be used for the storage, updation/maintenance and application of existing data sets on a centralized server around Oracle 10g with spatial extension. Commercial Geo-portal application software with relevant modules for provision of geo-web services from the Centralized database server is proposed to be used for making the Uttarakhand data sets discoverable and accessible over the web. Geo-web services like registry service, map service, feature service, catalogue service, and coverage service are proposed to be made available through the Geo-portal. Based on the assessment of needs of the end-users and the research activities at the Centre, a limited set of spatial data sets will be prepared for experimentation. To facilitate spatial data integration from different sources hosting

spatial data sets for Uttarakhand State, standard specifications from the Open Geo-spatial Consortium (OGC)/ International Standardization Organization (ISO) are proposed to be used in the development of the Geo-portal and the database. The set-up will be used for teaching and further research at the Centre.

### **Development of Web-GIS**

To develop and demonstrate methods and techniques for better managing geo-spatial data sets in Uttarakhand State - attempt shall be made to generate pilot database (Web GIS) for identified resource sectors of selected districts of (based on end user needs), clearinghouse prototype (containing metadata on spatial data sets of different departments) and geo-portal prototype (for data updation and sharing of up-to-date data through geo-web services). In the first phase the Server of the Centre of Excellence for NRDMS of Uttarakhand shall be connected with the State Govt. node at UCOST Dehradun through Wi-Fi networking. In the second phase attempt shall be made to connect the different users of the State Govt. Line Departments by which they could make use of maps/data in planning and implementation of developmental projects.

### **Geo-portal**

A geo-portal is a web site that provides a view into a universe of spatial content and activity through a variety of links to other sites, communication and collaboration tools, and special features geared towards the community served by the Geo-portal.

As an open Web resource, a geo-portal should connect through open interfaces to data and services with similar interfaces. Catalogs and registries that conform to Open GIS Specifications play an important role in geo-portals.



### **Clearinghouses**

A clearinghouse is a decentralized system of servers located on the Internet that contain descriptions of available digital spatial data. This descriptive information, known as metadata, is collected in a standard format to facilitate query and consistent presentation across multiple

participating sites. A clearinghouse uses readily available Web technology for the user side and uses standards for the query, search, and presentation of search results to the Web client. A clearinghouse provides information about who is providing which authorized geo-information for which application. The GeoPortal and the clearinghouse mechanism will be used by various stakeholders for accessing required information with the help of geo-web services.

### **Information Need Assessment**

The focus of the activity will be on identifying the users associated or to be potentially associated with the use of GIS data in the context of Decentralized Planning and climate change studies. Nodal officers shall be identified in various line departments to interact with Uttarakhand GeoPortal as regard their GIS requirements. Interactions have been held with these nodal officers of various line departments/ agencies of the Government of Uttarakhand for assessing their data/ information needs.

### **Centralized database**

To begin with, a web-enabled centralized database of various existing spatial, attribute or statistical data is required to be developed to store spatial, attribute or statistical data sets already available with UCOST. The spatial datasets are available mostly in ESRI Shape formats linked to various attribute and statistical data. Proper indexing mechanism of data sets shall be adopted to facilitate efficient search and access. Associated metadata for the GIS data sets shall also be appropriately included into the database to support discovery and access by a group of concurrent users over the net. Number of concurrent users is expected to increase over the years. Mechanism for updation of existing data sets on the database using OGC standards-based Web Feature Service (WFS) shall be provided to facilitate updation/maintenance of the database from users located in the individual Line Departments/ Agencies of the Government of Uttarakhand. In due course, depending on requirement, individual Line Departments/ Agencies of the Government may be persuaded to develop and maintain their spatial/attribute data nodes as per their mandates in the interest of users/ stakeholders of Local Level Planning.

### **Publishing metadata of data providers in the Geo-portal/ Clearinghouse**

A provision shall be made in the system to permit various GIS data providers in the State to publish their metadata sets into the Geo-Portal/ centralized database and get them registered either directly at UCOST. Metadata standards prescribed in ISO 19115 shall be adopted.

### **Creation of Geo-portal**

Following the specifications of OGC's Geo-spatial Portal Reference architecture, a Geo-portal be developed, demonstrated and installed to provide portal services, portrayal services, data services, and catalogue services. The portal services shall be available to address the needs of the viewer clients, discovery clients, management clients, authentication & access control and exposed



services. The portrayal services shall include map services, styling services, coverage services, and the map context services. The data services shall include features, coverage, and symbology management. The catalogue services shall include data discovery, service discovery, catalogue update, and query language. The development shall be done in an iterative way based on feedbacks received from the users.

### **Establishment of Project Management Unit (PMU) for Water Quality Testing & Monitoring**

Project Management Unit (PMU) comprising of Uttarakhand Jal Sansthan (UJS) Dehradun was established at Uttarakhand State Council for Science and Technology (UCOST), Dehradun. This joint programme established to supervise the execution of the overall Scope of work, Approach

& Methodology and Schedule for **“Implementation of water Quality Monitoring and**

**Surveillance (WQM&S) Programme in 13 District in 26 loactions for Water Quality Analysis under National Rural Drinking Water Programme (NRDWP) in Uttarakhand”**.

The objectives of the unit to provide safe and good quality drinking water to the peoples of Uttarakhand State, to collect time to time water samples from different water sources including Springs, Rivers, Gadhera, Tube-wells and hand pumps which comes in 13 districts of Uttarakhand state and to analyze the water samples as per drinking water protocol IS: 10500 (2012) for 19 identified parameters (i.e. PH, Residual Free Chlorine (RFC), Chloride, Alkalinity

, Turbidity , Nitrate, Total Dissolved Solids (TDS), Fluoride, Sulphate, Total Hardness, Calcium , Magnesium, Arsenic, Copper, Aluminium, Manganese, Iron , E-Coil and Fecal Coil form.

Under the PMU approximate 19000 drinking water samples are analyzed as per drinking water protocol IS 10500 from 13 districts of Uttarakhand States, Capacity building programme conducted at different districts of Kumaun and Garhwal region of Uttarakhand State.

### **Establishment of Regional Science Centre to provide the platform school science students/local masses for the development of scientific temper:**

UCOST harbours a state-of-art Regional Science Centre (RSC) which was developed in collaboration with National Council for Science Museum (NCSM). It was inaugurated on 3<sup>rd</sup> February, 2016 by Shri Harish Rawat, Hon<sup>“</sup>ble Chief Minister, Uttarakhand; Dr Mahesh Sharma, Hon<sup>“</sup>ble Minister, Tourism & Culture, Govt. of India; Shri Surendra Singh Negi, Hon<sup>“</sup>ble Minister, S&T, Govt. of Uttarakhand. In addition to Science Park and Dino Park, the sprawling campus of RSC is houses Fun Science gallery, Frontiers of Technology gallery, Himalayan gallery, Innovation Hub, 3D Film theatre, Taramandal (Planetarium), Chemistry Exhibition, auditorium with 210 sitting capacity and a conference hall. The total are of RSC is 30450 m<sup>2</sup>. Following is the summary of various resources in RSC Dehradun:

- **Science Park:** Well developed garden consisting of 30 outdoor interactive fun-filled exhibits

- **Dino Park:** Prehistoric Park in which 10 dinosaurs of different era are presented in their natural setting
- **Fun Science Gallery:** Consists of hands-on and mind-on exhibits on fluidics, sound, optics, illusion, energy etc. depicting various scientific principles
- **Frontiers of Technology Gallery:** Provides an opportunity to visitors to look beyond new technologies and to explore them in broader scientific contexts
- **The Himalaya Gallery:** It reveals untold stories of the Himalaya through interactive exhibits, digital medium, and stunning images
- **3D Film Show:** A thrilling and unique experience of 3D film which portray matters related to science & society
- **Planetarium (Taramandal) Show:** Interactive inflatable planetarium provides an opportunity to observe the night sky sitting inside the dome
- **Innovation Hub:** A multi-disciplinary laboratory equipped with moderate set of tools and scientific instruments to inspire innovations by young minds



RSC Dehradun works on following objectives:

- To incorporate scientific temper among inhabitants of state and to supplement science education in the schools of the State
- To act as nerve centre to promote innovation by engaging school students in innovative and creative activities

RSC Dehradun has emerged as prominent destination for families, school & college students, researchers, domestic & foreign tourists and science enthusiasts. A total of 31634 visitors have visited the science centre since its inception.



In addition to the facilitation of school or college students and general visitors in the centre, *Vigyan Mela* of *Sarv Shiksha Abhiyan* of Dehradun District and three “*Hands-on Training on Robotics*” were also organized by RSC Dehradun.

**6. Has the council developed any specific state related S&T and innovation policy? If so the details to be provided.**

The Publication and release of Uttarakhand S&T Vision 2022 which chart out the Councils S&T strategy in the coming ten years, is a document of policy perspective. The evolving national milieu undergoing rapid changes currently rests on three main dimensions namely i) the knowledge society, ii) Technology-driven industrial innovation and iii) inclusiveness of growth. Consequently, Uttarakhand State Council for Science & Technology to redraw its S&T Strategy, realign it with the national one and restructure its capability set and, reshape its engagement with the society and economy called for a committee meeting of Vision Group (VGM) for next ten years under the chairmanship of none other than Prof. M.G.K. Menon himself. This initiative brought together 24 experts from various fields and a daylong deliberation took places at Dehradun. This was followed by interaction with the experts via mail or other means and helped us to come up with the final vision statement for the council for future action.

The publication of UCOST: An Overview 2005-2011 has also historically provided a panoramic view of the works undertaken by the council. It measured the extent of use of resources and materials, the execution of activities and the partial results reached in the relation to the set plans.

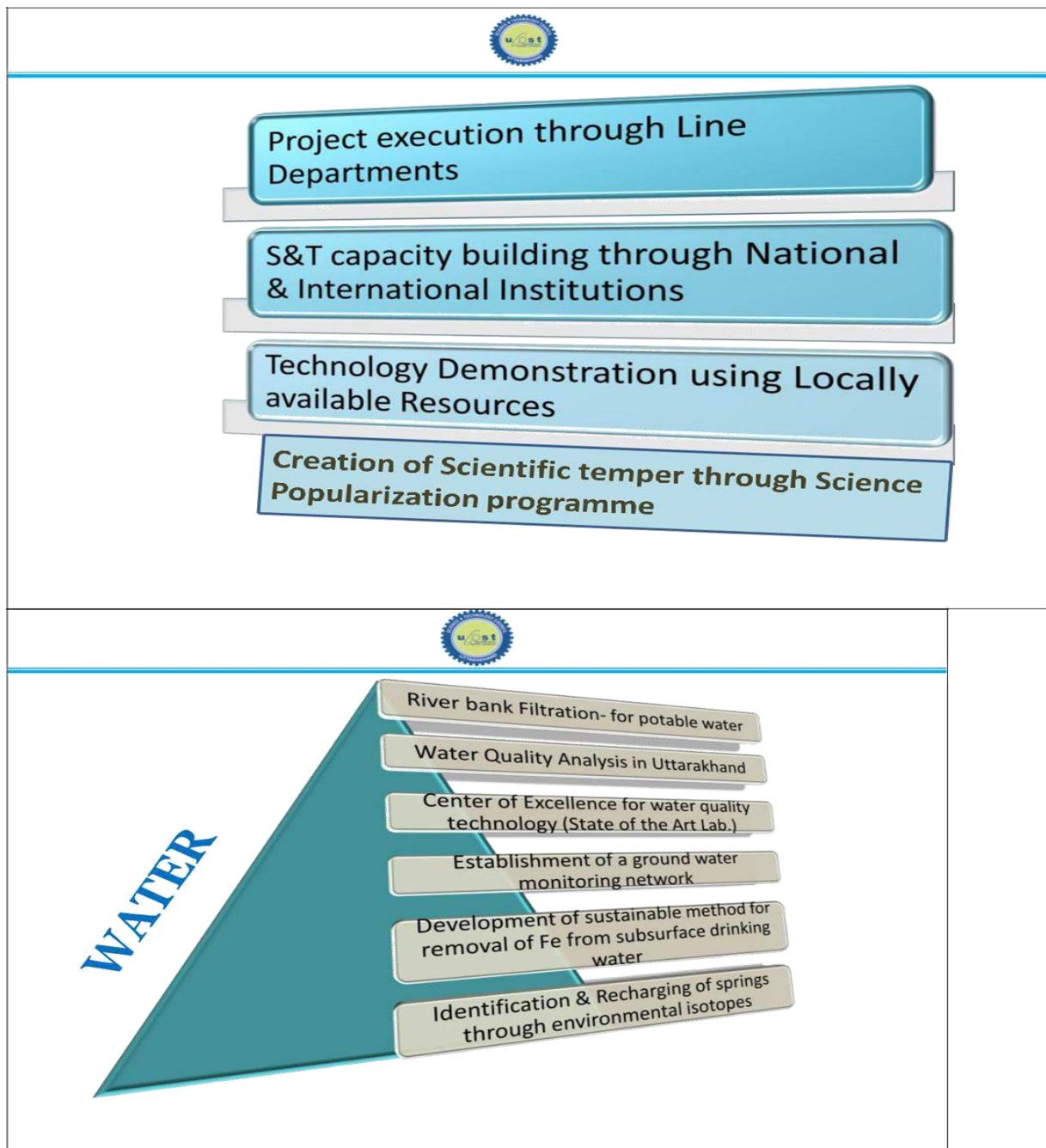
**7. How strong are the links between other state government /departments If so provide details?**

The Council through its flagship programmers has developed very strong links with various line departments of the State. Some of them are

- a) Jal Sansthan
- b) Department of Health
- c) Uttarakhand Environment & pollution control Board
- d) Forest Department
- e) Agriculture Department
- f) Horticulture Department
- g) Department of Higher Education
- h) Uttarakhand Renewable Energy Development Authority

- i) Department of School Education
- j) Department of Medical Education
- k) Department of Higher Education

## STRATEGY



**8. How strong are the links of the council with local industry units/associations?**

The Council has been taking the initiative of forming a collaborative network with the industry associations specifically with the local associations- Industry association of Uttarakhand (IAU) and CII, UK Chapter focusing on the MSME sector.

2.

S.No.	Name of Program	Collaborator
1.	Celebration of World Environment Day	CII Uttarakhand Chapter
2.	Setting up of S&T stall at Industrial Expo	IAU Uttarakhand
3.	IPR Workshop	IAU Uttarakhand
4.	Govt. Achievements and Scheme Expo at New Delhi	Dept. of Industries, Govt. of Uttarakhand
5.	Facilitating IP application for self Entrepreneurs and MSMEs	Individuals

“Industry and academia meet was also organized at UCOST For the sustainable development of the state through S&T interventions. In this meet all the industrialists were participated and interact with academia to find out the solution for sustainable development of the state and role of the industry to convert the technologies/inventions in commercial platform.

**9. List 5 major technology area, where the council can play an important role by finding convergent technological solutions.**

- Management and Scientific Utilization of Natural Bio-resources in Uttarakhand.
- Utilization of Renewable energy sources for energy conservation.
- Intervention of improved technologies for sustainable agricultural production.
- Development database on health status in far flung rural areas of Uttarakhand.
- Development of Scientific temperament in far flung rural areas of Uttarakhand through scientific activities.

- Development of Linkage/co-ordination between scientific institutions in the state for knowledge sharing.

## 10 Proposed programme and budget outlay for the 2018-19

Manpower					(Rs in Lakh)	
Sl. No.	Items	No. of Persons	Pay Level	DST (GOI) Monthly Emoluments	State S&T	Total Annual Emoluments
<b>A</b>	<b>Recurring Expenditure</b>					
	<b>I Manpower Salary</b>					
	a) Director General	01	14	2.54		30.48
	b) Executive Director*	01	13 1/4d1/2	1.63		19.56
	c) Project Director*	02	13	2.96		35.52
	d) Additional Director* (Administration/ Public Relation)	02	13	2.96		35.52
	e) Joint Director*	03	12	4.11		49.32
	f) Project Officer	01	11	0.86		10.32
	g) Sr. Scientific Officer	03	11	2.58		30.96
	h) Scientific Officer	06	10	4.26		51.12
	i) Scientific Assistant	08	7	2.10	2.46	54.72
	j) Manager (PR)	01	10	0.71		8.52
	k) Administrative Officer	01	8	0.54		6.48
	l) Computer Operator/ Stenographer	04	5	1.00	0.48	17.76
	m) Accountant	01	6		0.46	5.52
	n) Library/Accounts cum Office Assistant	03	2	0.25	0.50	9.00
	o) Driver (Out source)	04	2	0.50	0.50	12.00
	p) Peon	09	--	1.20	1.60	21.6
	q) Guard/Chowkidar (out source)	06	--	1.20		14.4
	r) Jr. Scientific Assistant	02	5	0.34	0.40	8.88
	s) Manager Marketing	01	10		0.71	8.52
	t) DTE Operator	02	6	0.45	0.45	10.8
	u) Demonstrator	02	6	0.45	0.45	10.8

v) Plant Operator	01	3	0.27		3.24
w) Junior Sci. Officer	02	7	0.44	0.70	13.68
x) Curator**	02	10	1.42		17.04
y) Education Assistant**	02	5	0.74		8.88
z) Technical Assistant**	01	5	0.37		4.08
aa) Technician**	08	2	2.00		24.00
ab) Assistant General**	02	6	0.90		10.8
ac) Upper Divisional Clerk**	01	5	0.37		4.44
ad) Lower Division Clerk**	02	3	0.54		6.48
ae) Junior Stenographer**	01	4	0.32		3.84
<b>Sub Total</b>	<b>78</b>		<b>38.01</b>	<b>8.71</b>	<b>560.64</b>

# West Bengal

## 1. Details of State S&T Council :

Name of the Secretary & Member Secretary:

**Dr. R. S. Shukla, IAS,**

Additional Chief Secretary,

Department of Higher Education and Science & Technology and Biotechnology,  
Govt. of West Bengal

&

**Member Secretary,**

West Bengal State Council of Science and Technology

**Address :** Vigyan Chetana Bhavan, 26/B, DD Block, Sector- I, Salt Lake, Kolkata- 700064.

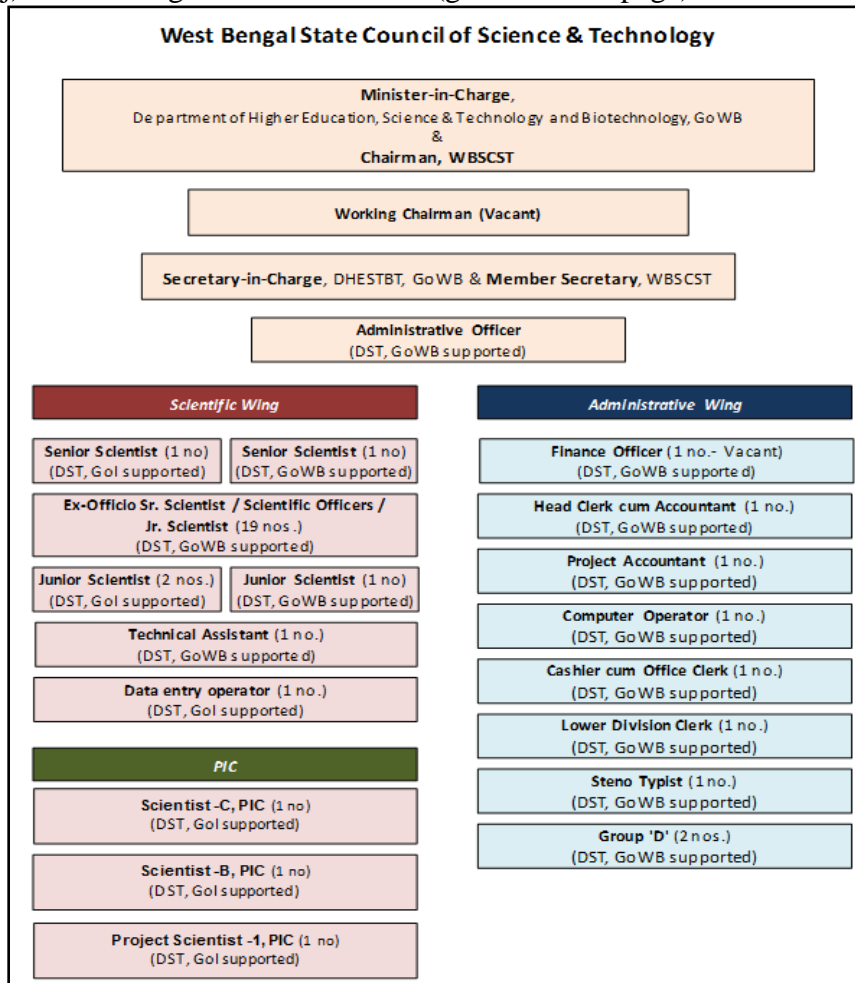
**Phone:** (033)2334-4616/2969/5809 **Email:** wbscst@gmail.com

**Fax:** (033)2334-2969/2321-7220

## 2. Structure of the Council:

i) Date of Establishment: 1988

j) Organization Structure (given in next page)



k) Strength of approved manpower (Central (DST)supported) – Secretariat Assistance

Sl. No.	Name of the Post	Date of creation of post	Name of the incumbent working	Promotion if given date of promotion	Date of Joining	Present Designation	Pay scale	Approximate monthly emoluments#	Annual Salary #	Proposed salary for the 2017-18#
<b>Scientific and Technical manpower</b>										
1	Senior Scientist	2002	Dr. Maitreyi Banerjee	No	19.10.2005	Senior Scientist	P.B.-4; 28,000 - 52000/- G.P. 7,600/-	93,221/-	11,18,652/-	12,32,616/-
2	Junior Scientist	2002	Dr. Subhasish Mondal	No	01.11.2010	Junior Scientist	P.B.-4A; 15,600 - 42,000/- G.P.5,400/-	59,479/-	7,13,748/-	7,87,788/-
3	Junior Scientist	2002	Dr. Sharmistha Gupta	No	01.11.2013	Junior Scientist	P.B.-4A; 15,600 - 42,000/- G.P.5,400/-	52,779/-	6,33,348/-	6,99,024/-
Total (A)	-	-	-	-	-	-	-	2,05,479/-	24,65,748/-	27,19,428/-
<b>Administrative manpower</b>										
1	Data Entry Operator	2002	SubhajitSardar	No	27.06.2017	Data Entry Operator	P.B.-2; 5,400-25,200/- G.P. 2,600/-	18,807/-	2,25,684/-	2,31,684/-
Total (B)	-	-	-	-	-	-	-	18,807/-	2,25,684/-	2,31,684/-
Grand	-	-	-	-	-	-	-	2,24,286	26,91,	29,51,

d Total (A)+ (B)									/-	432/-	112/-
<b># Including Employer's share of EPF &amp; Administrative Charges</b>											

Strength of approved manpower (Central (DST) supported) - PIC

Sl. No.	Name of the Post	Date of creation of post	Name of the incumbent working	Promotion if given date of promotion	Date of Joining	Present Designation	Pay scale	Approximate monthly emoluments (Rs.)	Annual Salary	Proposed salary for the 2018-19	
<b>PIC Manpower (State S&amp;T Programme)</b>											
1	Scientist C	05.09.2013	Dr. Mahuya Hom Choudhury *	No	02.03.2015	Scientist C	Rs.15,600/- to Rs.39,100/--GP 6600	55,278/-	6,63,336/-	As approved by DST, GoI	
2	Scientist B	05.09.2013	Smt. Paramita Saha *	No	02.03.2015	Scientist B	Rs.15,600/- to Rs.39,100/--GP 5400	52,290/-	6,27,480/-	As approved by DST, GoI	
3	Project Scientist-1	Sep. 1997	Smt. Sangita Sengupta	No	19.09.2016	Project Scientist-1	Not as per scale (Consolidated)	23,000/-	2,76,000/-	As approved by DST, GoI	
Total (A)	-	-	-	-	-	-	-	<b>1,30,568/-</b>	<b>15,66,816/-</b>	As approved by DST, GoI	
<b>Administrative manpower</b>											
-	<b>NIL</b>	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Total (B)	-	-	-	-	-	-	-	Nil	Nil	Nil	



Grand Total (A)+(B)	-	-	-	-	-	-	-	1,30,568/-	15,66,816/-	As approved by DST, GoI
*Previously employed under Project Scientist Posts in consolidated pay.										

**3. Budget allocation to your state S&T council for last five financial years including central government, State government & any other sources.**

Sources	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
DST, GOI	1,22,66,121/-	1,10,11,000/-	61,96,750/-	1,60,61,240/-	1,15,18,410/-
State Govt.	15,59,09,000/-	17,63,49,000/-	19,74,73,000/-	21,75,69,000/-	23,17,84,000/-
Other Sources	3,04,68,000/-	16,70,000/-	7,25,69,600/-	1,64,71,630/-	3,48,000/-

**4. Key activities under taken during the last two years in the area of:**

**4.1. Technology Development:**

- Algal Filter for Removal of Arsenic
- RS-GIS activities: GIS based mapping of 32 Cities of the state of West Bengal were carried out under in the 1st Phase of National Urban Health Mission (NUHM), Ministry of Health & Family Welfare, GoI. The GIS database (on scale 1:5000) along with collateral data related to health and urban infrastructure has been generated. Under NUHM-Phase II, out of 57 cities 24 cities mapping have been completed and submitted to the funding agency, with one day orientation training programme of respective municipality / municipal corporation representatives)
- R&D projects on Medicinal & Aromatic Plants

**4.2. Technology Demonstrations:**

- Demonstration of the benefits of Tissue culture raised plants were done through planting of tissue culture raised bamboo plants on the bank of a canal in 24 Parganas (South) which will serve both the purpose of demonstration of the benefit of tissue cultured plants & getting bamboo culms when they are ready and protecting the canal banks. Thus, the work had been done in RajapurKarabeg Gram Panchayat without wasting cultivable land, through local people and in a “by the people for the people” model. The full benefits are yet to observe. However, the earlier projects of this type were really successful.
- Simultaneously, identification & mapping of the different species of bamboo in the non-forest areas of 6 districts of South Bengal have also been completed.
- Prototype development facilitation and Grass-root Innovation protection: Carbon filter, thermal cooling jacket, cost effective lift technology, jute ribboner.
- Research Fellowship Award and Research Grant Awards which are provided to the Students and Teachers respectively, have strict guideline to demonstrate its practical applicability of the technologies developed with this fund award.

### 4.3. Population of science:

- The Council has a special programme called “Bengal Science Initiative” for popularization of science at various levels. Special mention may be made of “Residential Science Camp” which is organized by the Council itself, targeted persons being the school students. At least 4 such camps are organized each year.
- Apart from Science Camp another programme is organized regularly under Bengal Science Initiative viz. Bengal Science Lecture. Last year, fund was given to 34 no. of schools from all the districts of this state. Besides, this programme is organized by the Council for its own scientists to strengthen its own base and capacity. Also, 8 no. of programmes were organized through colleges and Universities which include day long activities & lectures by eminent scientists from all over the country.
- To enthuse the children to pursue science activities the Council supports an important programme at the district and state level viz. Children Science Congress, and help to organize the programmes at various levels in collaboration with “Science Communicators Forum”, an NGO. 30 child scientists are selected from these programmes who are sent for national level programme, again supported by this council.
- Promotion and Popularization of Science & Technology
- District Level Residential Science Camps by W.B.S.C.S.T
- WBSCST has been organising District Level Residential Science Camps among class IX-XII school students mainly from backwards/rural areas of a district in all throughout the year in West Bengal in association with different schools, colleges and universities since 2013. This ongoing programme includes different sessions on hands on experiments in Science subjects, Vedic Mathematics, seminars, workshops, night sky watch and field study during three days-two nights camp period for creation of scientific temperament and awareness for the high school students. One camp has a financial budget of Rs. 1,50,000. Approximately 2000 students from 340 schools in different districts successfully participated and benefited from the Camp in till date. Students and teachers expressed their satisfaction, happiness during feedback session at the end of each camp. They shared their personal feeling and analysis for speakers who inspired them to take Science as a career for their future endeavors. Camps have been organized in the district of Howrah, Hooghly, Nadia, Burdwan, East and West Midnapore, North and South 24 Parganas, Birbhum, Bankura, Purulia and Murshidabad in cooperation of different schools, colleges and university.



- The Council also organize a special programme every year as a part of science popularization viz. WB State Science & Technology Congress and special effort is given for presentation of papers in vernacular language. For last two years the programme is organized at the regional level followed by state level events for further popularization of the programme.
- For popularization of science among children a section has been introduced within the WB State Science & Technology Congress viz. Children Science Session and the events under this programme include presentation of papers, lectures on popular topics, interactive sessions like “meet the scientists” etc.
- To strengthen the scientific base of the State, the Council has introduced Research Fellowships to support research on important issues and help to get the PhD degree at the same time.

- To promote scientific research for the benefit of the rural people the Council has introduced two Research Grants for the college & University teachers.
- Display stall of G.I. products and some of the patented technologies of the state at W.B State Science & Technology Congress, 2017
- Funding for Setting up of Model Innovative Science Laboratories in SC/ST dominated District Schools of West Bengal
- IPR Seminars and Workshops



Exhibition of GI registered goods and Technology facilitated by PIC, WBCSST on 25<sup>th</sup> State Science Congress, West Bengal on 4<sup>th</sup> - 5<sup>th</sup> march, 2018

#### 4.4. Patents:

PIC has assisted in the filing of the patents of these innovators and facilitated exhibition of their technology at different industrial fair & technology meet with the dual objective of commercialization of existing innovations/patent and handholding and entrepreneurship development among scientists, students and grassroot innovators. Currently we are facilitating startup registration of these innovators and facilitated 23 projects last year for filing.

##### 4.4.1. IP filing:

- Patent filed :22 Granted-5
- G.I filed : 2 nos. filed, 8 Registered
- Novelty Search for Patentability assessment- 63

#### 4.4.2. Guidance for Intellectual Property filing :

- A. Patent :92
- B. Trademark :4
- C. Copyright :3
- D. Geographical Indication :5
- E. Technology incubation : 4

#### 5. List 5 success stories with brief about 1 page each including photograph, if available.

**5.1. RS-GIS activities:**The Geo-informatics & Remote Sensing Cell of this department has initiated 8(eight) new projects for generation of spatial database using RS & GIS technology for developmental planning activities of the state. Projects are Empowering Panchayati Raj Institutions Spatially(EPRIS), NRC 50K : Natural Resources Census : Landuse/Landcover (3<sup>rd</sup>Cycle), Monitoring of Integrated Watershed Programme (IWMP) Watersheds using Geospatial Technologies, Vulnerability Assessment under National Mission for Sustaining the Himalayan Ecosystem, Impact Assessment of Industrial Waste-Water Effluent on surrounding land & Water Bodies using High Resolution Satellite Data – A Cadastral level Pilot Scale study over parts of Hooghly Industrial Belt, Generation of Cadastral database of West Bengal on GIS Platform for entire state of West Bengal and GIS Mapping of cities covered under the National Urban Health Mission (NUHM)-Phase II. Total budget of these projects is Rs.13,75,61,332/-

Conducted 2 Nos. training courses on RS& GIS and 1 No. PG Diploma in Geoinformatics.

Sl no.	Name of the Geographical Indications	Application no.	Status
1.	KrishnanagarSarpuria	579	Filed on 25-5-2017 Examination completed
2.	KrishnanagarSarbhaja	580	Filed on 25-5-2017 Examination completed
3.	Tulaipanji rice	530	Registered on 24/10/2017
4.	Gobindobhog rice	531	Registered on 24/10/2017
5.	BanglarRasogolla	533	Registered on 14/11/2017
6.	Dokra of West Bengal	563	Registered on 28/03/2018
7.	Bengal Patachitra	564	Registered on 28/03/2018
8.	PuruliaChhau Mask	565	Registered on 28/03/2018
9.	Wooden Mask of Kushmandi	566	Registered on 28/03/2018
10.	Madurkathi	567	Registered on 28/03/2018

#### 5.2. District wise projects for G.I Filing:

**5.3.** Assistance for creation of **Model Innovative Science Laboratories** in the **SC & ST dominated** district schools of West Bengal.

A grant of Rs. 10.00 lakhs to each of the selected schools have been given (Govt. of WB funded project) to develop three innovative laboratories (Physics, Chemistry & Biology) with modern facilities.

**5.4.** The Council is supporting a project for production of seeds of **elephant foot yam through tissue culture**. The seeds, after production, are being distributed among the farmers of 6 agro-climatic zones of this state. The farmers, in turn, are evaluating the seeds in their land and utilizing the same for production of fresh lot of seeds for their own use. The work is being done through Vivekananda Institute of Biotechnology, Nimpith. Thus, the technology for generation of seeds of elephant foot yam, both in vivo & in vitro, is being transferred to them. The farmers can also generate some revenue through the trials of this project.

**6. Has the council developed any specific state related S&T and innovation policy? If so the details to be provided.**

Council has formulated and shortlisted 15 innovative R&D projects on “**Location Specific Challenges of West Bengal**” from different State Universities, Colleges and Research Institutes. (to be funded with approval of DST, GoI)

**7. How strong are the links between other state government /departments. If so, provide details.**

Linkage Developed with other line Departments of the State:

- i. West Bengal Biodiversity Board
- ii. Directorate of Agriculture, GoWB
- iii. West Bengal Pollution Control Board
- iv. Department of Disaster Management GoWB
- v. Department of Health, GoWB
- vi. Department of Land and Land Reforms, GoWB
- vii. Directorate of Food Processing, GoWB
- viii. Kolkata Metro Rail Corporation Ltd.
- ix. Directorate of Youth Service, GoWB
- x. District Industries Centre-Burdwan, Nadia, North 24 Pgs, GoWB
- xi. Rice Research Station, Chinsurah
- xii. Directorate of MSME, GoWB
- xiii. District Offices and Gram Panchayats etc.
- xiv. Dept. of Physics, Jadavpur University

**8. How strong are the links of the council with State line Departments, local industry units/associations?**

The RS & GIS wing of the Council has been conducting certificate training courses of different durations (1week, 6weeks) for interested students and working professionals of various other Departments and industry sector.

Patent Information Centre under West Bengal State Council is trying to develop strong linkages in respect of Innovation mapping and Technology Transfer with local industries through MSME Directorate and other line Departments.

**9. List 5 major technology area, where the council can play an important role by finding convergent technological solutions.**

a) **RS-GIS:** Mapping and Project coordination with other line Departments and institutions. Developing of a State of the art Remote sensing center is under construction (about to be completed soon) for manpower training especially from different industries and providing laboratory facilities and online data to meet the need of the specific demands of external agencies.

b) **Conservation of Biodiversity:** Establishment of State of the Art plant tissue culture and molecular biology laboratory, in compliance with NCS-TCP and supported by BCIL.

- c) Mapping and Promotion Grass Root Innovation and Technology Development. District wise Dissemination of Appropriate Patented Technology for Socioeconomic Development.
- d) Branding & Promotion of Registered Geographical Indications

Sl. No.	Sanctioned Heads	Requirement of funds up to 31 <sup>st</sup> March of current Financial Year (2018-19)(Rs.)
<b>A. RECURRING EXPENDITURE</b>		
1	Manpower (Scientific and Administrative approved by DST)	35,00,000
2	TA/DA	3,00,000
3	Other Items/Office expenditure	5,00,000
4	Capital Grant	5,00,000
5	Consultant	0
6	Project Related Grant (PRG)	3,27,49,801
<b>B. NON-RECURRING EXPENDITURE</b>		

- e) Mapping, Digitization and Intellectual Property protection of Medicinal and Aromatic plants of West Bengal and Molecular Characterization

**10. Proposed budget outlay for the 2017-18 commensurate with the plan of activities:**

7	Capital Head	3,00,000/-
<b>C. For Establishment and Infrastructure development</b>		
8	Plant Tissue Culture, Molecular & Biochemical Research and Incubation Facility	20,00,00,000
9	Model State Data Centre	20,00,00,000
10	Setting up of District Science Centers	2,50,00,000
11	Model Science Lab in SC/ ST schools (augmentation with matching grant)	2,00,00,000
12	Research Fellowship for science Students	2,50,00,000
<b>Total:(A+B)</b>		<b>50,75,49,801</b>