

CHAPTER 23

SCIENCE AND TECHNOLOGY

Role of State S&T Councils

The role identified for State councils for Science and Technology is given in Box 23.1.

Box -23.1

Role of State S&T Councils

- Formulation, planning, coordination and promotion of S&T activities within their respective States.
- Preparation of State S&T Plans.
- Compilation and dissemination of S&T information.
- Take up programmes relating to promotion and utilization of S&T in the States (e.g. Popularization of Science, Rural Development, assisting the National Technology Missions, use of Remote Sensing Technology ect.)

23.2 A detailed review of environmental issues and the work being done in that field is given in chapter VI. In this chapter, S&T activities are reviewed.

23.3 The Kerala State Council for Science, Technology and Environment (KSCSTE), came into existence in November 2002 as a society registered under the Travancore Cochin Literary Scientific and Charitable Societies Registration Act, 1955. Originally, there were seven R&D centres amalgamated with the Council. However, with the attachment of ANERT with the Power Department, there are only six R&D centres under the Council now.

A brief account of activities and achievements of the Council during 2003 is given here.

KSCSTE Science Research Scheme

23.4 Under its "Science and Technology Promotion" programme KSCSTE promotes R&D projects in emerging and challenging areas of science and engi-

neering by providing financial support for the implementation of the projects. The maximum grant for a project is limited to Rs.10 lakhs for three years. The host institution is also eligible for an overhead of 10% of the grant. The project proposals are subject to peer reviewing, presentation by the Principal Investigator(P.I) and a selection process by the Research Council for Science and Engineering (RCSE). During the year under report, two RCSE meetings were held and 61 projects with a total outlay of Rs. 233.7 lakhs for three years were approved. The approved projects include 25 in agriculture, 24 in life sciences and 12 in physical sciences.

KSCSTE Research Fellowship

23.5 A research fellowship scheme to promote R&D interest in research among young research students was introduced in 2002. First five post graduate rank holders in Physics, Chemistry, Botany, Zoology, Engineering, Mathematics and Agriculture from the universities in Kerala are eligible to apply for the fellowship during the current year. The selection procedure involves a written test in general research aptitude and optional subject followed by an interview. Candidates selected could avail the fellowship grant and join for Ph.D programme in Kerala. During the year 2002, 5 candidates were selected (one fellowship was offered in each subject) while four students availed of the fellowship. During 2003, two fellowships were offered in each subject and a total of 14 candidates were selected. The fellowship amount is Rs. 8000/- per month during the first two years of Ph.D programme and Rs. 9000/- per month during the third year with an annual contingency of Rs. 10000/-

Sastraposhini – a scheme for establishing model science laboratories in schools

23.6 The programme "Sastraposhini" was launched to create scientific interest and aptitude in high school students of the State by establishing model science laboratories in Government schools, one in each educational

district, with the help of the State education department.

23.7 In 2003 ten model laboratories were set up after imparting necessary awareness and training to teachers. Another sets of 10 model laboratories are being established and will start functioning by 26th January 2004. Model laboratories in all the 36 educational districts will be established by the end of March 2004.

Refresher Course 2003

23.8 The Council in association with the Indian Academy of Sciences has initiated a refresher course programme for college teachers in Kerala. Mahatma Gandhi University, Cochin University and University of Kerala were selected for conducting the courses in Chemistry, Physics and Biology respectively. Accordingly, one professor each from MG University, Cochin University and Kerala University were identified as nodal persons to conduct the programme. Refresher Course in Physics was conducted for two weeks in the Cochin University of Science and technology during October 2003 and was attended by 30 college teachers.

Patent Information Centre

23.9 A Patent Information Centre (PIC) was started in May 2003 to support patenting activities in Kerala and to create awareness on Intellectual Property Rights among researchers, academicians and industrialists. Besides, the Centre would provide search facility for patentability for inventions/discussions and assistance in filing patents to promising cases. The Centre acts as a satellite unit of the Technology Information Forecasting Centre (TIFAC), New Delhi.

Selective Augmentation of R & D

23.10 Selective Augmentation of R & D (SARD) is a scheme started by the Council for improving and promoting infrastructure in colleges and university departments such as, modernisation of laboratories, acquisition of essential equipments and upgrading the existing facilities for R&D activities. Eight projects were sanctioned in 2003. Eleven projects will be considered in January 2004.

Seminar/Symposia/Workshop/Training Programme

23.11 The Council is providing funds for promoting

Source: Kochi Port Trust

scientific seminars, symposia, workshops and training programmes. A new committee has been constituted in 2003 for this purpose. So far, 154 applications have been received of which 100 have been sanctioned.

Kerala Science Congress

23.12 KSCSTE conducted the 15th Kerala Science Congress 2003, which provided a venue for presentation of research papers on various themes. The aims of Science Congress are:

- Revitalise R&D in the State
- Sensitise young Scientists and in particular women scientists to the problems of development
- To shift focus of R&D towards solution of developmental problems of the State

23.13 The 16th session of the Kerala Science Congress will be held during 29th to 31st January, 2004, at CWRDM. Focal theme of the congress is: "Traditional and appropriate technologies for development of Kerala".. Out of 350 research papers received, 161 papers were accepted. These included 20 in the contest category, 75 for oral presentation and 66 papers for poster presentation. Proceedings of the Congress will also be published.

GIAN Centre – Kerala

23.14 The National Innovation Foundation (NIF) has set up Gian Centres in different regions of the country primarily to provide a helping hand to grassroots innovators to convert their innovations into enterprises. There is a proposal to establish one such GIAN centre in Kerala also.

Scientometry

23.15 Data on the research outputs of all the R&D Centres both in Government and private sectors, affiliated colleges and university departments of Kerala are collected. 16 R&D centres, 38 affiliated colleges including universities, 11 industries and 2 non governmental organizations of the state were contacted. Details regarding research publications, on-going research projects, scientific strength etc of the state will be published with a view to helping assessment of scientific potential. Similarly,

the Council is also publishing the revised R&D Directory, 'Gaveshini' of 1986.

Kerala Coastal Zone Management Authority (KCZMA)

23.16 In exercise of the powers conferred by Environmental Protection Act, 1986 and in supersession of the notification of the Government of India in the Ministry of Environment and Forests Number 1001 (E) dated, the 26th November 1998, the Central Govt. has constituted an authority to be known as the Kerala State Coastal Zone Management Authority which functions in the KSCSTE. The authority mainly deals with the issuance of CRZ clearances for projects and CRZ related violations in the state. The KCZMA met four times during the year and cleared about thirty projects. It also deals with CRZ related legal disputes in the court.

Science Popularization Programmes

a. National Science Day - 2003

23.17 The National Science Day 2003 was celebrated on 28th February and KSCSTE organized a workshop at RGCB. This year's focal theme was "50 years of DNA and 25 years of IVF – The Blue Print of Life". A compendium on the focal theme was also released. Invited talks by eminent scientists along with various competitions for students were held. The Council also co-ordinated celebrations of National Science day by the selected scientific agencies all over Kerala and the entire programmes were conducted with the partial financial assistance of Department of Science and Technology, Government of India.

b. National Technology Day – 2003

23.18 As a part of this programme, a one day state level seminar was held in Thycaud guest house. Innovations made by the R&D centers of the Council were presented. A total of 88 agencies selected in the state, including Non Governmental Agencies, organized different programmes in connection with the National Technology Day.

Research and Development Activities through Major Institutions

23.19 The major activities of Research and Development Institutions are summarised below.

1. National Transportation, Planning and Research Centre (NATPAC)

23.20 National Transportation, Planning and Research Centre (NATPAC) was established in 1976 as a unit of Kerala State Electronic Development Corporation (KELTRON). In 1982 NATPAC was reconstituted as an R&D institution under the Department of Science, Technology and Environment. NATPAC is undertaking research, sponsored projects and extension activities in the field of traffic engineering and transportation planning, highway engineering public transport system, alternative option for transport system, transport energy, inland water transport, tourism planning and rural roads.

Activities of NATPAC

- Research study on "Processions and Protest marches –its impact on general public"
- Research study on the Impact of Road Development on Road safety
- Organized State and Regional level Seminars/workshops on Road
- Safety and panel discussion on "Transportation needs of disabled and Senior citizens"

1. Tropical Botanic Garden and Research Institute (TBGRI)

23.21 Tropical Botanic Garden and Research Institute (TBGRI), founded in 1979, situated at Palode in Thiruvananthapuram is devoted to conservation and sustainable utilisation of tropical plant wealth. It also functions as the national Gene Bank for Medicinal and aromatic plants of peninsular India and has a Bioinformatics Distributed Information sub Centre of DBT.

Activities of TBGRI

- Over 300 accessions of medicinal plants, trees, palms, bamboos, orchids, ferns and rare endemic species were introduced into the Garden.
- Described 1 family, 1 genus and 27 species new to science, rediscovered 18 species and 12 species were recorded new to the country.
- Root cultures of 3 medicinal plants were developed for *in vitro* production of Phytochemical/Bioactive compounds.

- The Bioinformatics sub Centre has developed a database model “**Plant Info**” in which all types of data related to plants were stored.
- Ethnomedical informations on 30 plant species were gathered from different tribal communities.
- Ethnopharmacological assays were carried out with 3 important medicinal plants of the Western Ghats.
- Studies completed on the amphibian diversity of tropical evergreen forests of the Western Ghats led to the identification of 230 species including 4 new genera and 120 new species.
- Population biology of endemic *Janakia arayalpathra* was completed..
- Collection, documentation and quantification of 65 Non Wood Forest Products (NWFPs) in South Kerala were accomplished.
- Brought out a comprehensive status report on Nilgiri and Gulf of Mannar Biosphere Reserves, in accordance with UNESCO’s nomination forms..
- Basic practical training was given to over 75 individuals on Mushroom cultivation.
- Basic practical training was given to students of various Universities in Biotechnology, Molecular Biology, Microbiology and Phytochemistry.
- Scientists of the institute supervised student research programmes and 4 Ph.D were awarded.

3. KERALA FOREST RESEARCH INSTITUTE (KFRI)

23.22 The Kerala Forest Research Institute (KFRI), established in 1975 at Peechi, Thrissur undertake research on all aspects of forestry including wild-life management, agro forestry, wood science and man forest interaction. It provides technical support to the forest department, wood using industries and the general public of forest related matters and contributes to scientific understanding of the forest ecosystem.

Activities of K F R I

- Organised an International Teak Conference on “Quality timber Products of Teak from sustainable Forest Management”
- Project entitled “Linkage of trade and industrial processing of forest products to sustainable forest management and environmental conservation in India” has been approved for funding by the International Development Agency (IDA) of Global environmental Facility (GEF).
- A project to establish a Forest Seed Centre (FSC)

at Peechi at a total cost of Rs.6.86lkhs for three years.

- A Collaborative project - the Forest seed centre.
- Taken up construction of Herbarium
- **Twenty-three** Research Projects completed and Final Reports published/Submitted to the sponsoring agencies.
- Forty seven research projects were under operation.

4. Rajiv Gandhi Centre for Bio technology (RGCB)

23.23 The C-DEST (Centre for Development of Education, Science and Technology) which started functioning at Thiruvananthapuram in 1990, became the R&D Centre of excellence in Biotechnology under STEC in 1994. The Centre was renamed as Rajiv Gandhi Centre for Biotechnology (RGCB) in 1996, undertakes activities on research and manpower development in biotechnology, health care, animal science, agriculture, environment and in the basic sciences.

Activities of R G C B

- Remarkable progress in the ethnopharmacological screening of hepatoprotective agents.
- The peptide chemistry group has recently come up with new designs for the development of new matrix supports will provide an additional momentum in our peptide generation programmes.
- Studies on cervical cancer progression with reference to the biology of the nuclear transcription factor NFκB clearly indicated the activation of NFκB during cancer progression.
- The neurobiology research group, in one of their recent studies that has been published, observed that alle - Asn motif in the NR2A subunit of the neuronal N-methyl -D aspartate type glutamate receptor caused lowering of the affinity of NR2A towards calcium/calmodulin dependent protein kinase II.
- The molecular endocrinology section that has been active in studies on the plasma membrane localized alternate form of uterine estrogen receptor and the receptor associated proteins provided the first ever evidence for a functional role for this receptor in post transcriptional control mechanisms including the nucleocytoplasmic transport of rib nucleoproteins.

5. Centre for Water Resource Development and

Management (CWRDM)

23.24 Centre for Water Resource Development and Management (CWRDM) was established in 1978 carries out research, development and extension activities on surface and ground water hydrology, land and water management and water quality and environment.

Activities of C W R D M

- The Centre has completed 15 research projects and 42 ongoing projects
- Completed projects in surface water hydrology include sedimentation survey of hydroelectric reservoirs of Kerala, Preparation of water atlas for Lakshadweep and Andaman Nicobar islands, generation of hydrologic data in domestic, agricultural and environmental sectors in hydrologically sensitive areas of Kerala.
- In the ground water hydrology programme, projects completed include innovative water harvesting structures for ethnic communities, evaluation of a mini drinking water scheme for Kozhikode district, hydrological information for Kasaragod district, assessment of water resources of Neyyattinkara Municipal area.
- Completed project in land water management includes a modern water saving method for crop production and evaluation and surface drainage requirement in paddy cultivation.
- In the water quality and environment programme, studies on the application of isotope techniques for ground water investigations, studies on the pollution to drinking water sources due to textile mill effluents were included.
- The Centre undertook a total of 28 consultancy works during the reporting period. This mainly include feasibility studies of ground water extraction, rain water harvesting, water analysis, portability studies, environmental impact studies, analysis of heavy metals and on Eco restoration studies.
- The extension project and programmes carried out by the Centre during 2000-2001 is for transferring methods, ideas and information to vari-

ous target groups in the conservation and utilization of resources.

- Cohile three extension projects are completed, four projects are continuing.
- CWRDM & AIR jointly organized a radio lesson in farum and Home programme.
- The Centre has furnished 38 articles in various national and international journals.
- 32 research/final reports, several popular articles, books and leaflets were also published.
- During the reported period, 44 research papers were published in international and national journals/proceedings.
- While twenty research reports have also been brought out, another twenty-five research papers are in the process.

Centre for Earth Science Studies (CESS)

23.25 CESS established with a core philosophy of integrating the research on lithosphere, atmosphere and hydrosphere has achieved many of its objectives that set in 1978. It has developed a unique multi disciplinary scientific culture even while establishing its credentials in the various studies related to Earth Systems, Natural Hazards, Natural Resources and Environment. The Programmes of CESS includes

- Natural hazard management with special emphasis on earthquakes
- Environmental studies with special emphasis on impacts
- Coastal Zone Management with special emphasis on coastal protection
- Geo dynamics and crustal evaluation with special emphasis on the establishment of sophisticated analytical facility
- Natural resources data management with special emphasis on local level development

Activities

23.26 During 2003 CESS has intensified its programmes under earth system studies. The most important among these are to unravel the palaeomagnetic history of the mafic dyke swarms of south India and to understand the evolution of granulite facies rocks of south India. On another front, considerable initiatives were made to understand the rainfall intensity and associated factors adding new dimension to our knowledge of monsoon. Studies of natural hazards

like landslides, earthquakes, lightning and coastal erosion continued.

23.27 CESS had been continuing its activities on coastal zone management. CESS initiatives in coastal regulation zone related works were extended to other states of India and it was gratifying to see that CESS expertise is sought for demarcating CRZ in states like Gujarat, Lakshadweep and Maharashtra.

23.28 This period was particularly productive for CESS in ground water research. The ground water prospecting map of Kerala was completed under the Rajiv Gandhi Drinking Water Mission. Also tribal settlement maps for the southern districts of Kerala were completed and the micro watersheds of the tribal areas received special attention. Considerable attention was given on various aspects such as quality, land use changes, EIA, etc. of Chalakudi basin.

23.29 CESS initiated pioneering work in local level resource mapping using high resolution remote sensing data. Recognising CESS initiatives ISRO has sponsored the above programme and supported to establish a Geomatics laboratory in CESS to take up further strides in this emerging area. The laboratory is now fully functional.

23.30 As in the past, CESS was extending its expertise in various spheres of developmental activities like pollution assessment, EIA and environmental management planning to various agencies. Also CESS expertise in these directions received considerable acclaim from Central Government departments responsible for giving clearances. Many corporates, both national and multinational, are approaching CESS for getting EIA clearances and it is a testimony to CESS' expertise.

23.31 Under the coordination of the KSCSTE, a major project for shoreline protection of Kerala with an outlay of Rs. 80 lakhs over a period of five years has been taken up by CESS with financial assistance from the Department of Ocean Development. The technical assistance would be received from the National Institute of Ocean Technology (NIOT), Chennai.

23.32 CESS initiatives in sand mining related environmental problems also received wide acclaim. CESS assessed the mineable quantities of sand from the various rivers of Kerala to help regulate illegal sand mining and the Government made use of CESS expertise to enact the sand mining act.

Biotechnology policy and programmes

23.33 The biotech revolution is now sweeping the world in agriculture, healthcare, industry and environment-related services through development of new products and processes. The biotechnological interventions are particularly relevant in an agrarian and developing economy like ours. The Kerala Biotechnology Board under the chairmanship of the Chief Minister and the Kerala Biotechnology Commission under the Chairmanship of Executive Vice President, KSCSTE, have been constituted.. The BT policy of the State envisions the creation of biotech knowledgebase and human resources by establishing world-class centres of education and R&D in biotechnology and development and application of biotech tools for enhancing crop productivity, value addition to crop produce, conservation of biodiversity, improving healthcare, sustaining quality of the environment and facilitating intellectual property rights. Both the Board and Commission are functioning as part of the Council's activities.

23.34 The Council has taken steps to implement the recommendations of the Board in initiating R&D activities in agriculture and human and animal health. In this connection two workshops were held in the Rajiv Gandhi Centre for Biotechnology, Thiruvananthapuram, for identifying problems for biotech interventions to develop commercially viable products and processes. Three projects, one each on cancer and typhoid and the other on anthrax disease in animals are on the anvil. A workshop involving progressive farmers, agricultural extension functionaries, scientists and biotech firms, is to be held shortly to discuss the problems in productivity of black pepper and vanilla production, two important export-oriented spice crops of Kerala. The workshop will identify specific areas requiring biotechnological research. These initiatives are expected to yield results in a couple of years in terms of new products and processes suitable for commercial exploitation.

Biodiversity Action Plan

23.35 In line with the Biological Diversity Act 2003, KSCSTE has initiated steps for the constitution of the Kerala Biological Diversity Board, the proposal for which is under finalisation. The Board will have the following mandate.

- (a) Development of state-wide strategy for implementing biodiversity programmes.
- (b) Preparation of an exhaustive inventory of the biodiversity based on genetic, species and ecosystem criteria.
- (c) Training programmes for Panchayat level committees to implement the action plan