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under articles 16 and 17 of the Covenant

Combined second, third, fourth and fifth periodic report of

INDIA * **

[23 October 2006]

* The initial report (**E/1984/6/Add.13**) concerning rights covered by articles 6 to 9 of the Covenant, (**E/1980/6/Add.34** and **E/1980/6/Add.34/Corr.1**) concerning rights covered by articles 10 to 12 of the Covenant, (**E/1988/5/Add.5**) concerning rights covered by articles 13 to 15 of the Covenant submitted by India was considered by the Committee on Economic, Social and Cultural Rights at its fourth session in 1990 (see documents **E/C.12/1990/SR. 6, 8, 16, 17, 19, 20 and 24**).

** In accordance with the information transmitted to States parties regarding the processing of their reports, the present document was not formally edited before being sent to the United Nations translation services.

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Science and Technology

736. The country is always committed to achieve scientific progress and enable all its population to enjoy the benefits from the progress. The Constitution directs all citizens, to develop scientific temper and to strive towards excellence in all spheres of individual and collective activity so that the nation rises to higher levels of endeavour and achievement. The scientific policy resolution of 1958 was formulated to encourage individual initiative and to ensure that creative talent of men and women finds full scope in scientific activity. Over the past five decades various agencies, institutions and departments have been put in place to promote and aid the science and technology activity in the country.

737. At Central level the Ministry of Science and Technology is the nodal agency with three departments, Department of Science and Technology [DST], Department of Scientific and Industrial Research [DSIR] and the Department of atomic Energy. Electronics, ocean development, and space are other scientific departments. The Ministry of Environment and Forests and the Ministry of Non-conventional energy sources are also concerned with scientific endeavours. To enable various socio economic ministries to formulate long-term S & T programmes, Science and Technology Advisory Committees have been set up in individual ministries. Inter-sectoral S & T advisory committees [ISSTAC] have been set up for coordinating the efforts of STAC and monitoring the activities of the various ministries.

738. States and Union Territories also have science and technology councils. Integration of S&T planning with national socio economic planning is done by the planning commission, with the effective participation of scientific community at national, agency, laboratory and university levels. There also exists a three level apex structure for coordinating science and technology activities comprising (1) a cabinet committee on S & T under the chairmanship of Prime Minister, (2) a committee of secretaries of S & T under the cabinet secretary and (3) a scientific advisory committee to the cabinet (set up in 1997 consisting of several eminent scientists, academicians, technologist, and social scientists as well as representatives of the industry and the NGO sector).

739. Science and technology activity in India are carried out through a wide set up consisting of government departments, autonomous funded agencies under government departments at the central and the state level, universities, higher institutes of technologies, private and recognized research institutions receiving grants, public and private sector industries with in house R & D centers and non profit institutions/associations. There are over 1200 in- house research and development units in industrial undertakings supporting research in their respective industries.

Science and Technology Policy

740. The major direction of the S & T activity in the country is as underlined in the scientific policy resolution 1958. During the first three decades of S & T activity the country was heavily dependant on imported technology and much of that did not cater to national priorities and also put a heavy burden on the resources. As a result a Technology Policy statement was evolved in 1983 laying emphasis on the development of indigenous technology and efficiency for absorption and adoption of imported technology appropriate to the national priorities and resources. Major developments took place in almost all areas of S & T and many programmes for the development of rural areas were implemented reaching the grass root level. This has led to considerable improvement in the standard of living in the country.

741. The emergence of globalization and the consequent structural reforms in the Indian Economy and other developments in the International Scenario brought in new areas of concern/ set of challenges, which necessitated a rethink on the S & T front. A new technology policy statement was evolved in the year 1993 addressing these new fronts.

The policy aimed at upgrading existing technologies and building newer technologies comparable to international levels and developing state of the art cleaner technologies for limiting the effect on environment and natural resources and stressed the need for enhancing investment in Research & Development & Engineering and improving the human resources in the country. The need for easy access and greater spread use of technology and development of such technologies were stressed aimed at improving the quality of life especially of the vulnerable/ weaker sections

742. After a decade of initiatives the government has evolved a science and technology policy in the year 2003 giving a blue print for future programmes and initiatives of science and technology. The policy, among other things, highlights the following objectives.

- [a] Utilization of physical and knowledge resources on the issues of national concern
- [b] Fostering scientific research in higher educational institutions and attracting young persons to concerns in S&T by creating suitable environment and creating centres of excellence to raise the level of work.
- [c] Empowering women in this field
- [d] Dissemination and communication of science to all people to advance scientific temper and for its application for human welfare.
- [e] Establishment and protection of intellectual property regime
- [f] Development of systems and technologies for mitigation and management of natural hazards
- [g] Encouraging interaction in key areas between public and private institutions and
- [h] Promoting international cooperation.

These objectives are also stressed by the Tenth Plan document.

Promotion of Science and Technology Activities

743. The Department of Science and Technology coordinates and supports the S&T activity by providing grants in aid to 16 autonomous scientific institutions and professional bodies in the country. It implements various programmes for augmentation of infrastructure at research institutions, provides scholarships and fellowships to encourage young scientists in research work and implements programmes for promoting and encouraging research in newly emerging/ advanced and challenging areas of science and engineering through a Science and Engineering Research Council (SERC) established in 1974. Every year around 1000 projects are received for consideration in the department.

Infrastructure Development

744. The SERC implements a scheme called Intensification of Research in High Priority

Areas (IRPHA) under which core groups/units are created around an outstanding scientist, national facilities in areas of high priority are set up and programmes are evolved for coordination in high priority multi-disciplinary areas and training is given to young scientists in these areas.

745. Many Sophisticated Analytical Instrument Facilities (SAIFs) have been set up in different parts of the country to provide such facilities to the research workers in general and to those specially from the institutions which do not have access to such instruments to enable them to keep pace with developments taking place globally. This benefits currently about 6000 users from all over the country.

746. A major initiative called "Fund for Improvement of S&T infrastructure in universities and higher educational institutions (FIST)" has been launched to rebuild the Science & Technology infrastructure, promote R&D in new and emerging areas and to attract fresh talent in the universities and other related institutions. The State governments are implementing a project with World Bank assistance to upgrade the polytechnics (institutes for training technical manpower at middle level) in quantity, quality and efficiency.

747. A number of inter-university centres have been set up to provide common research facilities to research scientists from various universities. A Programme has been started in consultation with the committee for strengthening of infrastructure in science and technology [COSIST] to help, selectively, the established university departments to achieve international standards.

748. The government has recently converted 10 out of 17 Regional Engineering Colleges (RECs) into National Institute of Technologies (NITs) and one REC into an Indian Institute of Technology (IITs) effecting a change in their status and management. The NITs have been granted deemed to be university status giving them full autonomy in academic matters in addition to complete administrative freedom to decide their own affairs.

Human Resources Development

749. The DST supports different programmes aimed at identifying new talent and providing them with financial assistance in the form of fellowship for pursuing research in front line areas of science and technology. The scheme are outlined below. It also supports training programmes, summer schools and contact programmes. Financial assistance is provided to professional bodies, seminar/symposia and journals and also to Indian scientists for participations in conferences/ international events abroad.

750. A *Swarna Jayanti* Fellowships scheme is being implemented from the year 1997 under which a selected number of young Indian scientists (from India or abroad), with proven track record are extensively supported⁹⁸ to enable them to pursue basic research in frontier areas of science and technology with a freedom and flexibility in terms of expenditure for a period of five years.

751. Young scientists below the age of 35 years are supported for a period of three years under the FAST TRACK PROPOSALS FOR YOUNG SCIENTISTS to undertake quick research, of high standard in frontier areas of science and engineering, subject to peer review and other suitable mechanisms. Another programme called the "Better Opportunities for Young Scientists in Chosen Areas of Science & Technology (BOYSCAST)" provides fellowships of three to twelve months duration every year to the selected young Indian scientists/technologists holding regular positions in recognized S & T institutes in India to visit international institutions for gaining exposure to latest research techniques and to enable them to participate and contribute to the latest developments in specially chosen areas of science & technology.

752. A scheme of SERC Schools encourages Young Scientists to take up challenging research and development activities. A Program Advisory Committee is promoting the program in disciplines like Life, Chemical, Physical and Engineering Sciences. An active Scientist is identified as course director. During the 5-year tenure a group of around 40 students in each school is taken up for duration of 2-3 weeks.

753. Women Scientist scheme has been launched during the year 2002 providing approximately 100 scholarships under specialized subject areas. Under the Utilization Of the Scientific Expertise Of Retired Scientists (USERS) the country also utilizes the expertise and potential of large number of eminent scientists in the country in S&T development activities even after their retirement especially in preparation of books /monographs/ state-of-the-art reports.

754. A National Children Science Congress is conducted every year for children in the age group of 10-17 years from all over the country to encourage students to relate the learning of science to the environment around to their immediate social and physical environment and provide them a forum to interact with scientist.

755. The Central government is providing financial assistance to State/UTs under scheme called 'improvement of science education in schools' for provision of science kits to upper primary schools, setting up/upgradation of science laboratories in secondary/senior secondary schools and training of science and mathematics teachers. Voluntary agencies are also assisted in conducting experimental and innovative programmes. Under this various delegation of students have been sent to international science symposiums successfully winning four gold, nine silver, and six bronze medals during 2002.

756. A National Science Olympiad Programme covering Mathematics, Physics, Chemistry and Biology is operational in the country for promoting excellence in science among pre-university students and selecting teams to represent the country at the respective International Olympiads. The students from the country have performed well in the International Olympiads 2001 with 3 gold, 2 silver in Physics; 1 gold and 3 silver in Chemistry; and 1 gold and 3 silver medals in Biology.

757. Talented students of Science, Engineering and Medicine are encouraged under

Kishore Vaigyanik Protsahan Yojana (KVPY) to take up careers in research in these fields ensuring that the best scientific talent is tapped for research and development establishments. A generous scholarship is provided (up to the Pre-Phd level) to the selected students. In addition, summer programmes in prestigious research and education institutions in the country are organized, and preferential access to facilities such as libraries, laboratories, museums, etc. are provided.

758. The country also has institutions and schemes in place for S & T information, communication and popularization. The National Science and Technology Management Information System [NSTMIS] collects, collates, analysis and disseminates vital scientific and technological information. Information on manpower and financial resources devoted to S&T activities is made available so that a judicious utilization of scarce resources may be planned. The National Council for Science and technology, Communication [NCSTC] for S & T communication/ popularization and inculcation of science and temper among the people. *Vigyan Prasara* established in 1989 also takes up large-scale science popularization programmes through mass media. It also strives to create awareness about science and encourage scientific methodology in practical life through a network of science clubs.

Technology Development Programmes

759. A Technology Information, Forecasting and Assessment Council (TIFAC) was set up by DST in pursuance of the technology policy statement of 1983 to generate technology forecasting, technology assessment and techno market survey documents. It has set up a technology information system TIFACLINE that is interactive and nationally accessible. It has also created a new database and has linkages with industrial bodies and other multilateral regional associations. TIFAC has carried out its activities in areas of human settlement planning, building technology and skills, steel, sugar industry, materials technology and skills, steel, sugar industry, materials technology and prospects for bio technological products in India. New initiatives have been taken in surface engineering and high performance computational facilities among other things. It has also bought out a 25-volume report *Technology Vision 2020* presenting a long-term technology forecast in diverse areas.

760. Patent Facilitating Centre (PFC) was set up by DST under TIFAC as a single window facility on All-India level to provide patent support to the academic sector and smaller scientific institutions in the Central or the State sector where in-house facilities are not available unlike other major scientific establishments. PFC has facilitated filing of 231 patent applications during the period June 1995 to September 2003.

761. The DST has been promoting the area of Instrumentation through its Instrumentation Development Programme (IDP), which makes a great impact on vital sectors of national activities such as education, scientific research, industry, agriculture, medicine and health etc. A scheme on 'Drugs and Pharmaceuticals Research' is also implemented to support collaborative R&D projects jointly submitted by drug companies and the academics national R&D institutions aimed at development of new drugs and

cleaner processes technologies and enhance the nation's self-reliance in drugs and pharmaceuticals especially in areas critical to national health requirements.

762. The Government of India constituted a Technology Development Board as a statutory body 1996 to provide financial assistance to industrial concerns attempting the development and commercial application of indigenous technology or adapting imported technology to wider domestic application. So far the Board assisted 97 projects in the emerging areas of health and medicine, engineering, chemical, agricultural, energy and waste utilisation, air and road transport, information technology and telecommunication, etc.

763. A New Technology Fund is established for providing financial assistance for commercial application of indigenous technology and for the research and development institutions engaged in developing indigenous technology or adaptation of imported technology. Many products have been successfully produced and marketed as a result of the assistance. The Fund is kept at the disposal of DST and is administered by the Technology Development Board. The board has instituted a 'National award for successful commercialization of indigenous technology' by an industrial concern from 1999 onwards.

764. The DST has initiated multi institutional programmes in emerging areas of technology; such as instrument development, advanced materials, critical technology, sugar technology, fly ash utilization and advanced composites.

Entrepreneurship Development

765. A National Science and Technology Entrepreneurship Development Board [NSTEDB] established in 1982 operates various entrepreneurship development programmes to encourage young scientists to become entrepreneur in applying scientific and technological development to the social sector, especially in backward and the tribal areas.

766. Science and Technology Entrepreneur Parks [STEP] and Entrepreneurship Development Cells have been established in and around several S&T institutions in the country to facilitate to promotion of entrepreneurship and provide avenues of selfE/ employment among qualified S&T persons. A technopreneur promotion programme [TePP] is being implemented under which various forms of assistance including financial support forwards improving the idea/innovation know how/designs to working models] prototypes/pilot plants, appropriate R&D facilities, patent facilitation and interface as tie up with financial institutions for commercial exploitation are provided to projects of individual innovators.

Societal programmes

767. The DST has evolved and implemented a number of programmes with S&T inputs to improve the quality of the life of people by creating productive jobs, reducing

drudgery, improving general health and environment and inculcating scientific temper among people. Some of these programmes are as follows:

768. *Science and technology for women*: Under this programme various projects covering herbal plants, horticulture, sericulture, wasteland improvement and mahila vigyan project are implemented for the benefit of women belonging to the weaker sections of the society. The Mahila Vigyan Project aims at developing software for training of and creating awareness among women involved in income generating activities.

769. Science and technology application for weaker sections [STAWS]: Many projects relating to diverse areas are implemented for the benefits of the weaker section. Some of the important activities are:

- (a.) Programme on electrical, electronics and computer technology training servicing and production activities
- (b.) Project on sustainable livelihood through energy enterprises technology choice and dissemination.
- (c.) Project for development of rural artisanal pottery and
- (d.) Projects in the agriculture, animal husbandry and allied fields.

770. Science and Technology application for rural development: Outstanding work has been done under this in development, modification and adaptation of appropriate technology for rural development with noticeable achievements in [1] low cost construction technology [2] integrated land, weaker and cover management [3] upgradation of artisanal skill and [4] small and medium enterprises based on local available resources and [5] renewable energy systems.

Tribal sub-plan

771. With the full participation of the tribal people S & T inputs in the field of agriculture, watershed development, collecting and storing of stream water and in-situ conservation and runoff control are imparted to them. In pursuance of a project on 'production of good quality crude drugs by *adivasis* of Western Ghats' the tribal people have undertaken propagation of medicinal plants by quick vegetative means and processing the plant parts for producing crude drugs.

Special Component Plan [SCP]

772. Projects are implemented for improving the habitations of scheduled caste people; training is imparted to adopt new technologies for improving activities like spinning, meaning, mushroom, cultivation etc. Projects involving low cost latrines, treatment of sewage water for irrigation are also implemented. Children of scavengers among scheduled castes are given training under this project in activities like signboard/screen printing, computer graphics, photography, maintenance of electrical appliances and fabrication of garments.

Young Scientists in Societal Programmes

773. Young scientists are given opportunity for pursuing and applying innovative research ideas for solving day-to-day problems faced by the weaker sections of society. Some of the projects being assisted are [a] low cost animals feeds using feed stuff available in rural areas [b] soil fertility management strategy for *ragi* and ground nut [c] bio-environmental methods for control of malaria [d] low cost technologies for water shed management and [e] optimizations of oyster mushroom and its cultivation techniques.

Science and Society Programme

774. Science & Society Division (SSD) aims at providing opportunities to motivated scientists and field level workers to take up action oriented and location specific projects aiming towards socio-economic upliftment of poor and disadvantaged sections of the society through appropriate technological interventions especially in the rural areas. Under this program efforts have been made to associate concerned National Labs or other specialist S&T institutions with each major program so as to build-in expert input, utilize national S&T infrastructure and link it up with grassroots S&T interventions/initiatives.

Media Lab Asia

775. The Media Lab Asia is a network of national as well as overseas people, projects, and laboratories established as company under the Indian Companies Act. The basic idea is to facilitate the invention, refinement and deployment of innovation of the most advanced information technologies to the neediest people in the remotest areas of the country. There are 24 ongoing projects in various research themes of Media Lab Asia.

Legal Measures

776. The country has a well-developed Intellectual Property Regime. The Copyright Act 1957 protects the literary, musical and artistic creations. The computer programmes are considered as literary creations under protected under the Act. The Indian Patents Act 1970 provides for grant of patent for inventions. The Act has been recently amended to bring it in line with the WTO-TRIPS provisions. The Designs Act 2000 has been enacted separating the protection of designs from the patents Act for non-utility designs.

777. The country has also taken steps for protection the traditional knowledge and entails benefits of such protection to the interested persons. The Biological Diversity Act 2002 is a step in that direction, which provides for equitable sharing of benefits arising out of the use of biological resources traditional knowledge and matters related to it. The protection of plant varieties and farmers right Act 2003 gives rights to farmer entitling them for benefit sharing for the use of bio-diversity conserved by the farming community.

778. To encourage the electronic commerce and provide legality for the transactions in the electronic environment the government has enacted the Information Technology Act

2000, and has notified rules under the Act. Hacking of websites, breach of Confidence and Privacy in the Internet are punishable under the Act.

International Cooperation

779. There are three levels of international science and technology cooperation; bilateral cooperation with developed and developing countries, regional cooperation such as with SAARC, ASEAN and BIMSTEC countries, and multilateral cooperation through NAM Science and Technology centre, COSTED, UNESCO etc. India has bilateral science and technology cooperation programmes with more than 57 countries of the world.

780. A major bilateral programme in the form of Indo-US Science and Technology Forum has been launched. It has been registered as an autonomous society in India. The forum has received an endowment grant from the US side whereas the Indian side will contribute an annual matching grant on the interest of the endowment. A new project based personnel exchange programme with German Academic Exchange Service [DAAD] has been launched.

781. Indian, scientists have conducted experiments in various fields, and received advanced training and international research facilities under various international science and technology cooperation programmes. The following joint R&D centres have been established under international science and technology cooperation programme; Indo Russian Research Centre in Advanced Computing, at Moscow; International Advanced Research Centre for Powder Metallurgy [ARC-I], at Hyderabad; Indo Uzbek Centre for Medical Application of Low Level Lasers for treatment of Tuberculosis and Allied Diseases, at New Delhi.

97The Council includes eminent scientists, technologists drawn from various universities/national laboratories and public and private sector industries.

98 In addition to fellowship, grants for equipment, computational and communication facilities, consumables, contingencies, administrative support, national and international travel and other special requirements are covered.