



# Chapter 5



## Education Training and Public Awareness



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Environmental protection and sustainable development are India's key national priorities. This commitment is reflected through outreach and education efforts undertaken by the government, civil society organizations, academic and research institutions, industry associations and the media. .

### MINISTRY OF ENVIRONMENT AND FORESTS

The Ministry of Environment and Forests (MoEF) is the nodal agency for the subject of climate change in India. The MoEF has created various mechanisms for increasing public awareness and enhancing research in climate change by giving grants for wide-ranging research programmes and creating centres of excellence. These encompass issues related to environment as well as climate change. Some notable initiatives are as under:

### Awareness generation

The first step towards meeting the challenges posed by climate change is to create awareness among civil society as well as policy-makers about its causes and potential consequences. The MoEF has instituted variety of measures, for information dissemination and outreach. The Government of India has a long-standing commitment and policies for dissemination of environmental information. The Environmental Information System (ENVIS) was instituted as a plan programme in December 1982. Since its inception, the focus of ENVIS has been on providing environmental information to decision makers, policy planners, scientists and engineers, research workers, and other stakeholders all over the country. (See Box 1).

Since environment is an all encompassing and multi-disciplinary subject, building a comprehensive information system on the environment necessitates

#### Box 5.1: ENVIS

This is a virtual system managed under the umbrella of the MoEF for archiving information and data on various environment-related activities including climate change. The website of this activity is [www.envis.nic.in](http://www.envis.nic.in)

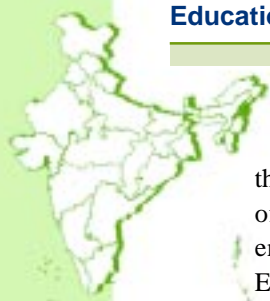
The subjects covered include:

- Chemical waste and toxicology
- Ecology and ecosystems
- Flora and fauna
- Environmental law and trade
- Environmental economics
- Environmental energy management
- Media, environment education and sustainable development
- State of the environment report and related issues

#### ■ Population and environment

The ENVIS Focal Point publishes *Paryavaran Abstracts*, a quarterly journal carrying abstracts of the environmental research conducted in the Indian context. It also publishes *ENVIRONNEWS*, a quarterly newsletter that reports important policies, programmes, new legislations/rules, important notifications and other decisions taken by the ministry from time to time.

The website of the ministry, [www.envfor.nic.in](http://www.envfor.nic.in), has been developed and is maintained by the ENVIS Focal Point. The ENVIS Secretariat also maintains the web site [www.sdnpc.delhi.nic.in](http://www.sdnpc.delhi.nic.in), which provides information on climate change and on several related topics such as disaster management, energy, forests, pollution and poverty.



the involvement and effective participation of a range of institutions and organizations in the country engaged in different spheres of the environment. ENVIS has therefore expanded as a network of numerous participating institutions and organizations. A network comprising 85 ENVIS Nodes with 25 ENVIS Centres have been established that cover the diverse subject areas of environment, with a Focal Point in the MoEF. The ENVIS nodes now exist in 30 government departments, 34 institutions and 21 NGOs.

### Participation in World Summit on Sustainable Development (WSSD)

India participated in the WSSD held in Johannesburg in 2002, the primary objective of which was to review the progress made towards the commitments made 10 years ago at the Earth Summit, with reference to *Agenda 21* and other Rio agreements, including the Framework Convention on Climate Change. During the run up to the WSSD, MoEF initiated a preparatory process, which involved several multi-stakeholder consultations at the national and regional levels, to identify and discuss issues relevant for India at the Summit. More than a 1,000 people participated in these consultations. Based on India's participation, a document titled *Sustainable Development: Learnings and Perspectives from India* evolved. To involve a wide cross-section of civil society in the discussions, a media campaign was undertaken to disseminate commissioned articles and background information on WSSD-related issues.

The MoEF also sought to create awareness about sustainable development and WSSD among children, by organizing essay writing, painting, poetry writing and photography competitions across the country. More than 100,000 students from 14,000 schools participated in these competitions.

### Hosting of COP-8

As a party to the UNFCCC, India had the privilege of hosting the Eighth Conference of Parties (COP-8) in New Delhi from 23 October to 1 November 2002. More than 4,300 delegates from 170 countries attended the Conference, 52 officials and 395 NGO and other civil society delegates from India

participated in various official and side events. On the final day, the parties adopted the *Delhi Declaration on Climate Change and Sustainable Development*, which reaffirms development and poverty eradication as the overriding priorities in developing countries, and implementation of the UNFCCC commitments according to the parties' common but differentiated responsibilities, development priorities and circumstances.

In order to create awareness among various stakeholders in the country about climate change issues, the ongoing international negotiations, and the emerging challenges and opportunities, the MoEF organized several events leading up to COP-8. In March 2002, it organized a high-level consultation of environment ministers and delegates from 35 countries who endorsed India's proposal for a Delhi Declaration. In addition, the MoEF facilitated 44 events by NGOs, half of which were organized by Indian NGOs, academic institutions, industry associations, and government ministries and departments. The events ranged from a cartoon exhibition on climate change to workshops and seminars on the Clean Development Mechanism, and climate change mitigation and adaptation strategies.

### Initiatives under the aegis of India's Initial National Communication

As a part of its commitment to the UNFCCC, the Government of India, through the MoEF initiated the project titled 'Enabling Activities for the Preparation of India's Initial National Communication to the UNFCCC', or the NATCOM project in 2001. The MoEF was the executing and implementing agency for this project.

The process for the preparation of the National Communication adopted a broad participatory approach involving research institutions, technical institutions, universities, government departments and NGOs, necessitated by the vast regional diversity and sectoral complexities in India, duly utilizing and enhancing the diverse extant institutional capabilities. To facilitate the process, under the aegis of the project, 27 seminars and workshops have been conducted all over India for planning the work, developing linkages between climate change issues and developmental and

economic processes, and for training and raising awareness on issues pertaining to different components of the National Communication (Figure 5.1).

The process has initiated efforts to identify areas of future research to strengthen the Initial National Communication experience, gaps and future needs have been identified for the development and strengthening of activities for creating public awareness, ensuring meaningful inputs into education, and enabling access to information. A website (www.natcomindia.org) has been developed for dissemination of information and publications arising out of the project.



The website of India's Initial National Communication.

### Industry and Climate

As industry is one of the major contributors of GHG emissions, the MoEF organized conferences on 'Climate Change: Issues, Concerns and Opportunities' at different locations in collaboration with various chambers of commerce and industry. To create awareness about climate change issues related with the sector of economy most vulnerable to the consequences of the phenomenon, MoEF collaborated with the MoA, UNEP and the Consultative Group of International Agriculture Research, to organize a workshop on 'Adaptation to climate change for agricultural productivity: the South Asia expert workshop'. The MoEF also organized a workshop to brief the media and enlist their involvement in providing wide and informed coverage to the proceedings and activities of COP-8, as well as to the issues related to climate change.

### Other Initiatives and Events

The MoEF promotes and supports other initiatives that in some way, direct or indirect, are significant in the context of climate change vulnerability, adaptation and emission abatement. Most of these have an education, training or outreach component. Some of these initiatives are listed below:

### Afforestation

The principal aim, as stated in the National Forest Policy, 1988, is that it must 'ensure environmental

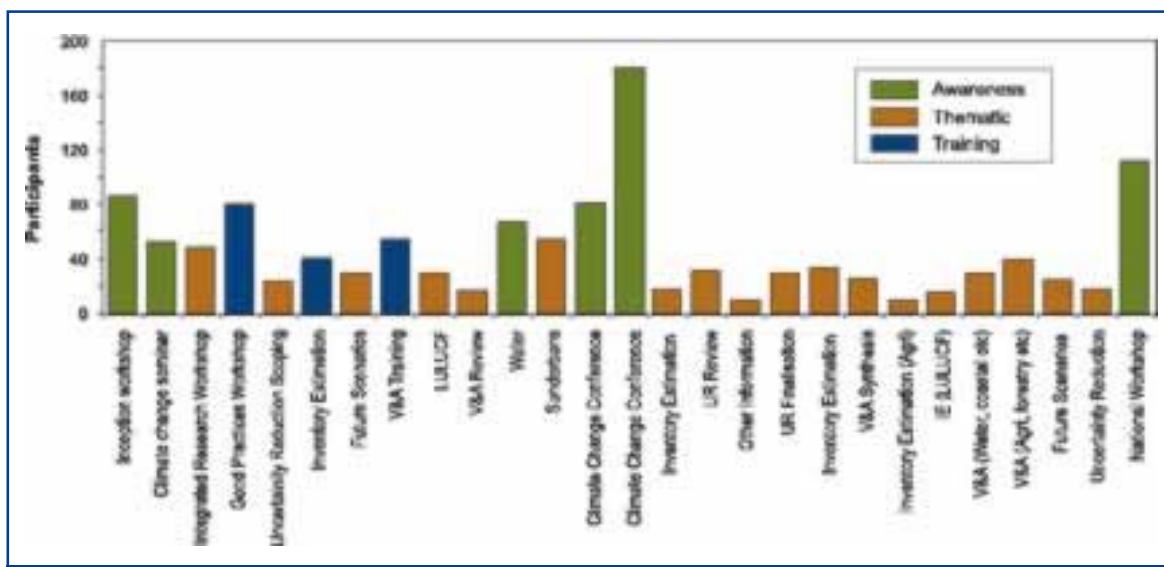


Figure 5.1: Workshops conducted under the aegis of India's Initial National Communication project.



Afforestation on common land through peoples' participation.

stability and maintenance of ecological balance including atmospheric equilibrium, which are vital for sustenance of all life-forms, human, animal and plant' ([www.envfor.nic.in](http://www.envfor.nic.in)). The National Afforestation and Eco-Development Board is responsible for promoting afforestation, with special attention to degraded forest areas. One of its main function is to create awareness and help foster people's movement for promoting afforestation and eco-development with the assistance of voluntary agencies, NGOs, *Panchayati Raj* institutions, and others. The National Wastelands Development Board under the Ministry of Rural Development is similarly responsible for the restoration of degraded private lands.

### **Joint Forest Management**

Recognizing that forests cannot be protected or regenerated without the active and willing involvement of the forest-fringe communities, the MoEF adopted the JFM strategy more than a decade ago. So far 27 states have issued orders to enable the participation of local communities with active support of state forest departments and NGOs (MoEF, 2002).

### **Coimbatore Charter**

In January 2001, a national conference on environment and forests was held at Coimbatore, which resolved to protect and improve the environment and forests of the country in accordance with several measures decided upon. One of the resolutions of the Coimbatore Charter was that the

central government would keep the state and UT governments informed about the developments on international issues related to the protection of the environment and forests. These would cover all subjects addressed under the various UN Conventions and agreements, including climate change.

### **GLOBE**

The MoEF is the coordinating agency in India for GLOBE, a hands-on, internet-based science and education programme, which involves primary and secondary level students in more than 10,000 schools in nearly 100 countries. These students study, observe, explore and take environmental measurements related with atmosphere, water, soils, and land cover and biology. They report this data through the Internet to the GLOBE data archives, create maps and graphs to analyze the data, and collaborate with scientists and other students around the world on projects to better understand their local and the global environment, and the earth as a system ([www.globe.gov](http://www.globe.gov)).

### **Research**

The MoEF has been funding research in multi-disciplinary aspects of environmental and ecosystems protection, conservation and management at various universities, research institutes and NGOs. The MoEF has also identified several areas for priority action, which include Clean Technologies and climate change. The MoEF and the UK Department for Environment, Food and Rural Affairs (DEFRA) are collaborating on a joint research programme on Impacts of Climate Change in India. The findings, data and knowledge generated by the various research projects provide valuable inputs for climate change awareness, education and training efforts (MoEF, 2002).

### **Education, training and outreach**

The MoEF has a well-established institutional structure for education, training and public awareness. The Indian Council of Forestry Research and Education (ICFRE), Dehradun, is an autonomous organization of the ministry. It organizes and manages research, education and extension in the field of forestry, and runs doctoral and postdoctoral research programmes in various disciplines of forestry at different institutes under ICFRE. The Indira Gandhi National Forest Academy and the Directorate of

Forest Education, both at Dehradun, impart in-service professional training to the Indian Forest Service probationers, the State Forest Service and Forest Range Officers.

The Indian Institute of Forest Management, Bhopal, provides training in management and related subjects to officers from the Indian Forest Service, Forest Departments, Forest Development Corporations and forest-related industries, with a view to inculcating professionalism in forestry management. It also runs a two-year post-graduate diploma in Forestry Management, and a one-year M.Phil-level course in Resource Management. The Wildlife Institute of India, Dehradun, imparts training to government and NGOs, and conducts research and training on conservation and management of wildlife resources.

The National Museum of Natural History, in New Delhi, and the three regional museums at Mysore, Bhopal and Bhubaneswar, promote non-formal environmental education and creates environmental and conservation awareness through various outreach activities.

To strengthen public awareness, research and training in priority areas of environmental science and management, and environmental education, the MoEF has set up eight Centres of Excellence. Of these, the Centre for Environment Education, Ahmedabad; the CPR Environmental Education Centre, Chennai; and the Centre for Ecological Sciences, Bangalore, have been particularly active in organizing workshops, training programmes and seminars for teachers, communicators, NGOs and others on a variety of themes in environment and development, and pure and applied ecology respectively. All the eight Centres have the potential to increase climate change education, training and outreach efforts in their respective spheres of work.

The National Environment Awareness Campaign is a nation-wide programme supported by the MoEF to encourage NGOs and institutions to undertake programmes to create awareness about environmental issues. The ministry runs the Eco-clubs programme to mobilize youth for environmental action. The student members of Eco-clubs constitute the National Green Corps (NGC). The programme already reaches

out to more than 50,000 schools across the country. The NGC has already initiated energy-related activities, to which climate change education could be added easily and seamlessly.

## ROLE OF OTHER MINISTRIES AND DEPARTMENTS

While the MoEF is the nodal ministry in the Government of India for the subject of climate change, other ministries and departments have also been actively involved in creating awareness about energy conservation and climate change issues through sectoral initiatives, extension services, educational and training inputs and providing research support. As the energy sector is the major emitter of GHG, contributing about 61 per cent of the country's emissions in 1994, several outreach initiatives have been taken by various ministries in this area.

### Ministry of Agriculture (MoA)

Agriculture, especially in the arid and semi-arid tropics, is the activity that is most vulnerable to climate change. A projected one-metre rise in the sea-level is expected to inundate about 1,700 km<sup>2</sup> of agricultural land in Orissa and West Bengal alone (IPCC, 1992). The most vulnerable section of society will be the poor, the marginal farmers and the landless agricultural labourers. The increasing frequency and intensity of extreme weather events will also have a direct bearing on agriculture. Recognizing the need for urgent action, the need to build capacity and to deal with climate change issues related to agriculture, a dedicated unit—Climate Change Cell—has been set up within MoA.

In the Ninth Plan Period (1997-2002) the MoA launched the National Agriculture Technology Project to strengthen research, education and human resources development in agriculture, through its national grid comprising 46 institutes including universities, research centres and regional stations. All of these form a large infrastructure for climate change research and outreach activities.

As agriculture in most developing countries is vulnerable to the impacts of climate change, the need for adaptive strategies becomes paramount. Thus, this became the focus of the MoA's activities at COP-8,



Educating farmers on manure management.

where it hosted workshops for experts, policy planners, negotiators and civil society on adapting agriculture to climate change.

### Ministry of Home Affairs

The Ministry of Home Affairs (MoHA) is the nodal ministry for disaster management. Through the Disaster Risk Management Programme initiated in 2002, the United Nations Development Programme (UNDP) proposes to accelerate capacity building in disaster reduction and recovery activities at the national level and in some of the most vulnerable regions of the country, through community-based activities. The programme will support the MoHA to set up an institutional framework for disaster preparedness, prevention and mitigation. The focus of the programme is on awareness generation and education, training and capacity development of government officials in the areas of disaster risk management at the community, district and state levels. This will also enable them to help communities develop disaster plans.



Biogas plants and lanterns help rural households with their lighting and cooking needs.



Learning-by-doing workshop for children and villagers on various types of solar cookers.



An Energy Park at an institution in Gujarat.

As a joint initiative of the UNDP and the MoHA, a module on disaster management has been introduced in the revised curriculum of the Central Board of Secondary Education for classes 8, 9 and 10.

### Ministry of Non-Conventional Energy Sources

The Ministry of Non-Conventional Energy Sources (MNES) manages one of the world's largest renewable energy programmes. The Indian Renewable Energy Development Agency Limited (IREDA), an agency of the MNES, conducts publicity campaigns to disseminate information about renewable energy technologies through the print and electronic media, seminars, exhibitions and business conferences. It has taken a number of initiatives for empowering women through renewable energy programmes. The MNES has set up the Information and Public Awareness (I&PA) Programme to create mass awareness about new and renewable sources of energy systems and devices throughout the country. These include initiatives such as, biogas plants (See Box 5.2), solar

### Box 5.2: Managing Methane

The Satia Paper Mills, Muktsar, Punjab, used to generate large amounts of organic waste, including methane, as a result of its manufacturing process. They also used 20 tonnes of rice husk per day in their boilers, leading to the substantial emission of GHG. The conventional effluent treatment system was not able to meet the norms set by the Pollution Control Board, and the mill had become economically unviable.

In 1997, the mill switched to a technology, which provided a solution to both its effluent treatment and energy requirement problems. As part of the UNDP-supported “Development of high rate Biomethanation Processes as means of reducing Greenhouse gases emission” being implemented by the MNES, an Upflow Anaerobic Sludge Blanket Bioreactor was installed at the mill. The reactor uses the organic waste from the mill to produce biogas. The biogas is used in the boilers, resulting in the net

saving of the operating cost of the mill. The use of rice husk is also avoided, which further reduces its emission levels. The new technology has meant 45 per cent reduction in chemical oxygen demand and around 80-85 per cent biological oxygen demand reduction.

This technology can be used in a variety of production processes where organic waste levels are high, including leather factories and tanneries, dairies, confectioneries, food processing units and breweries. Started in 1994, the MNES project serves not only to control emissions of methane but also utilizes it as a clean fuel. The project aims to provide technical assistance and institutional preparation for formulating a national strategy for biogas generation and utilization, in introducing, demonstrating and standardizing a wide variety of technologies, and in bringing about awareness amongst policy-makers, waste generators, and the general public.

cookers, improved wood stoves, solar lanterns, home lighting systems, street lighting systems, and solar water pumping.

To create awareness about the use and benefits of renewable energy products and devices, the MNES has also initiated an Energy Park Scheme. These parks are set up at public places and institutions that have a large inflow of people.

The MNES organizes business meets, workshops and seminars to promote renewable energy technologies; it also funds NGOs and other institutions to organize such events. The MNES has set up specialized technical institutions to constantly work on the upgradation of renewable energy technologies, and for manpower training. It also supports technology-specific training courses at academic institutions. The MNES has also instituted the National Renewable Energy (NRE) fellowships for Masters and Doctoral programmes in renewable energy.

Scientists and technologists working with the ministry, the state nodal agencies and other institutions engaged in R&D are sent abroad for training, study tours, conferences, and workshops to update their

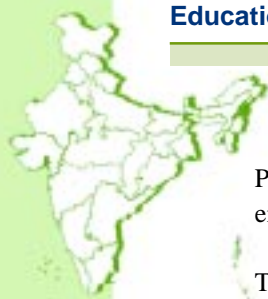
knowledge and skills.

Under the Government of India / UNDP Rural Energy Programme Support, the MNES has undertaken as a climate change mitigation effort, a demonstration project of community-managed gasifiers in the tribal areas of Jharkhand. A few UNDP/GEF assisted projects on reducing GHG emissions such as by developing small hydel resources in hilly regions have already been implemented, and others are also being proposed (MNES, 2002).

### Ministry of Petroleum and Natural Gas

Every year since 1991, all the constituents of the Ministry of Petroleum and Natural Gas devote a full fortnight to improving the awareness on the importance and need for oil conservation.

In 1976, the Ministry established the Petroleum Conservation Research Association (PCRA). PCRA's outreach activities include the use of mass media, printed literature and outdoor publicity for increasing awareness about petroleum conservation among consumers. It also publishes a quarterly journal *Active Conservation Techniques*, and a newsletter. The



PCRA website ([www.pcra.org](http://www.pcra.org)) carries articles on energy conservation.

The PCRA organizes seminars, technical meets, workshops, clinics, exhibitions and *kisan melas* (farmers' fairs) for the dissemination of conservation messages and demonstration of conservation techniques and technologies. Its consumer meets bring together energy consumers, equipment manufacturers and energy consultants to solve the energy conservation problems and create awareness. The PCRA also supports energy efficiency and energy service companies (EECOs and ESCOs).

The Ministry of Petroleum and Natural Gas has also initiated the following innovative programmes:

- “*Boond Boond ki Baat*” (Story of Each Drop) is a radio programme launched in 2002-2003 presenting highly technical matter in simple language.
- “*Khel Khel Mein Badlo Duniya*” (Change the World through Simple Ways) is an educational TV programme for youth on the conservation of energy, water, environment, etc., and providing vocational guidance in vermiculture, integrated farming, etc.
- Involving school children in agriculture surveys and science exhibitions in select districts of the country.
- Organization of two-wheeler rallies for women during the annual oil and gas conservation fortnight with the twin aims of women empowerment and sensitivity towards oil and gas conservation.

### Ministry of Power

The Ministry of Power (MoP) is the coordinating agency for matters relating to energy efficiency for all conventional energy sources. Various steps initiated by Ministry of Power in the field of energy conservation and building public awareness are enumerated below:

**Energy Conservation Act, 2001:** The Energy Conservation Act, 2001, reflects India's commitment to climate change efforts through efficient energy utilization. The Act focuses on the enormous potential for reducing energy consumption, by adopting energy efficiency measures in various sectors of the economy.

Under this Act, the Bureau of Energy Efficiency (BEE) has been created by merging the existing Energy Management Centre (EMC). The functions of the BEE include prescribing guidelines for energy conservation, creating consumer awareness and disseminating information on the efficient use of energy.

The Ministry of Power has instituted National Energy Conservation Awards to recognize the participating industrial units that have made special efforts to reduce energy consumption. In the last five years of above award scheme, which is coordinated by the Bureau of Energy Efficiency, the participating industrial units collectively have saved 2397 million units of electrical energy; 9067 kilo litre of furnace oil; 2.76 Mt of coal and 11,585 million cubic metre of gas per year, resulting in substantial reduction in greenhouse gas emissions.

**CENPEEP:** The National Thermal Power Corporation (NTPC) of MoP, which today is the largest power utility in the country, established the Centre for Power Efficiency and Environment Protection (CENPEEP), a resource centre for state-of-the-art technologies and practices for performance optimization of thermal power plants. The CENPEEP was awarded the CTI World Climate Technology Award for supporting the adoption of more efficient coal-fired power plants in India. The Centre regularly holds workshops and offers hands-on training for power sector officials from the NTPC and SEBs. Dissemination of practices for improvement of efficiency of existing coal based power stations would help abating CO<sub>2</sub> emissions.

**Mass Awareness:** A multimedia mass awareness campaign was launched country wide by the MoP to enlist the active cooperation of all stakeholders for the steps that have to be taken to improve the quality of supply and service as well as for the policy changes that are emerging to make the sector sustainable. This included awareness about the necessity of energy savings through energy conservation, thereby offsetting the additional requirement of power (generated primarily through coal, the mainstay of the Indian power sector) and therefore reducing GHG emissions. Both the print and electronic media was actively involved during the mass awareness

programme. Information on various programmes/initiatives taken up by the Ministry of Power in various areas of power sector are regularly disseminated through print/electronic media, MoP's website, workshops and conferences.

**Training:** The NTPC and other central PSUs under the MoP regularly conduct environment awareness training programmes for their employees. Further, the concerned specialists working in various areas are regularly deputed for specialized training, study tours, conferences and workshops, to enable them to update their knowledge and skills for overall improvement in the respective areas.

The Power Management Institute of NTPC organizes training courses in the field of environment for its employees and other power utilities for general awareness and improving their skills.

The Ministry of Power and central PSUs regularly conduct national and international level workshops, and conferences on various aspects of power plants to share best practices and to adopt efficient new technologies/systems and to stimulate discussion on key issues. Two of the recently held conferences are listed below:

- conference on 'Coal and Electricity in India' jointly organized by the MoP, Ministry of Coal and International Energy Agency (IEA), on 22 and 23 September 2003 in New Delhi.
- international conference on 'Thermal Power Generation—Best Practices and Future Technologies' organized by the NTPC on 13-15 October 2003 in New Delhi.

### Ministry of Road Transport and Highways

The Ministry of Road Transport and Highways is responsible for progressively introducing tighter auto emission norms and for the gradual alignment of auto specifications with the prevalent ECE standards, while taking into account the national requirements.

### Ministry of Science and Technology

The key to a strong and efficient global action on climate change lies in building an effective science - policy interface. The DST of the Ministry of Science

and Technology supports and fosters research in the area of atmospheric sciences, including meteorology and climate change. This research provides the knowledge that informs policy, and forms the basis for building sound strategies for sustainable development. It also forms the information base for outreach and education programmes.

The DST established the Technology Information, Forecasting and Assessment Council (TIFAC), an autonomous organization, to monitor global trends, to formulate preferred technology options for India, promote key technologies and undertake technology assessment and forecasting studies in selected areas of the national economy.

The TIFAC promotes and facilitates the commercialization of Clean Energy Technologies. Its outreach activities include various Technology Assessment and Technomarket Survey Study reports, that help both industry and financial institutions. These reports are available on line on the TIFAC website ([www.tifac.org.in](http://www.tifac.org.in)). It also brings out technology linked business opportunity publications on issues like techniques to improve the operational efficiency of thermal power stations. The TIFAC also conducts awareness and training workshops.

Every year since 1988, the Science and Engineering Research Council (SERC) of DST has been supporting summer/winter schools in emerging areas of Science and Technology at prestigious research and educational institutions in the country. Advanced Ph.D. students are considered to be the appropriate target group. A programme of two to four weeks duration is conducted by a faculty comprising of leading Indian scientists. Some of these programmes are in the area of atmospheric sciences, such as the one on Agro-meteorology (DST, 2000-2001).

*The National Council for Science and Technology Communication (NCSTC) under DST, and Vigyan Prasar* is an autonomous organization set up by the DST. The NCSTC undertakes various programmes and develops books, films and other resources for popularizing science and technology. Several of their efforts, although so far not strictly focused on climate change awareness, have immense potential for promoting the understanding about its various aspects (DST, 2001-2002).



### Other Initiatives

Other ministries and departments of the Government of India, and those of the states and UTs also have specific programmes on awareness generation and education on the environment and sustainable development. For example, a drought proofing and sustainable livelihoods programme for decentralized planning was undertaken by UNDP-DFID and the Government of Orissa, implemented through Panchayati Raj institutions. It involved the community in deciding approaches to drought proofing and achieving livelihood sustainability. Such programmes aim at vulnerability reduction and environmental sustainability, strengthen adaptation capability and therefore, address climate change.

### INDIAN INDUSTRY AND CLIMATE CHANGE

The Indian industry has played a crucial role in contributing to India's economic growth over the last few decades. However, as a major emitter of GHG and other pollutants, the industrial sector must be more socially and environmentally responsible ( See Box 5.3). In recent years, pressures generated by legislation, consumer awareness and environmental activism including by the judiciary, have led to a growing realization in this sector, that it makes

#### Box 5.3: Eco-fridge

A major initiative towards reducing the use of Ozone Depleting Substances (ODS) was taken by Godrej Industries Limited, a leading manufacturer of refrigerators in India. Godrej is now manufacturing Eco-fridges or environment-friendly fridges. The eco-fridge launched by Godrej Home Appliances under the brand name Pentacool is the result of the combined effort of Godrej and the NCL, Pune. The technology change is based on the use of safe pentane technology rather than choosing other harmful gases. The green refrigerator concept is being used to create awareness among the consumers about the adverse effect of harmful technology on the environment, and on the necessity of the adoption and use of environment-friendly technology.

economic sense to adopt cleaner production and energy efficient practices and technologies. The industry associations have played a significant role in creating awareness among their members and facilitating their access to information, technologies, and other mechanisms to help Indian industry become environmentally responsible. All the major industry associations have climate change divisions and are instrumental in spreading awareness about the links between GHG emission abatement, energy efficiency and global cooperative mechanisms. However, the implementation and monitoring of these require further strengthening.

### Associated Chamber of Commerce and Industry of India (ASSOCHAM)

The ASSOCHAM is the oldest apex chamber of India and is actively involved in environmental and climate change-related awareness generation, and capacity building in the Indian industry. It has recently started Green Initiatives—providing information on issues such as cleaner production options, ISO 14000, green ratings for the industry, greening supply chain, advanced EMS auditing course, environment legislation, pollution prevention and waste minimization, hazardous waste management, and energy auditing.

Apart from these, there are many sector-specific industry associations, such as the Cement Manufacturers Association, the Indian Sugar Mills Association, the All India Brick and Tile Manufacturers of India, the Society of Indian Automobile Manufacturers, the Steel Furnace Association of India, the All India Induction Furnace Association, the All India Air Conditioning and Refrigeration Association, the All India Small Paper Mills Association, the Jute Manufacturers Development Council. These are involved at different levels in educating their members in climate-friendly development, energy efficiency improvement and cleaner technology initiatives.

There are also many bilateral and multilateral initiatives in collaboration with the Indian industry for information dissemination and awareness generation on clean technology, process improvement, the Clean Development Mechanism (CDM), industrial ecology, corporate accounting of GHG emissions, etc.

### Confederation of Indian Industries

The Confederation of Indian Industries (CII) strives to strengthen the role of Indian industry in the economic development of the country while working towards its globalization and integration into the world economy. The CII has established the CII Climate Change Centre (also called 4C) whose main objectives are to spread awareness of climate change issues within the Indian industry; promote consensus on climate change flexibility mechanisms, particularly the CDM; and to build local capacity to develop climate change mitigation projects.

The Centre has developed a website ([www.ciionline.org/busserv/climatechange.html](http://www.ciionline.org/busserv/climatechange.html)) and has also set up searchable databases for information dissemination. It organizes workshops and training programmes, and publishes books, reports, policy papers, newsletters and case studies. The website provides information on issues such as mitigation opportunities in various sectors, and also helps facilitate partnerships with foreign collaborators.

In an effort to involve the industry in contributing to climate change negotiations, 4C has organized several events to create awareness among industry leaders about the implications of climate change for the Indian

industry, and about the flexibility mechanisms being negotiated. The Centre also helps facilitate linkages between industries to promote the transfer of efficient technology with the help of foreign collaborators.

CII is a programme partner in the Greenhouse Gas Pollution Prevention Project-Climate Change Supplement, which aims to build local capacity and create a forum for greater dialogue and technical cooperation between the US and Indian governments and other stakeholders ([www.climatechangeindia.com](http://www.climatechangeindia.com)). Some issues of the *CII Newsletter* have focused on climate change. CII has also prepared a manual on *Climate Change Project Development* for the industry.

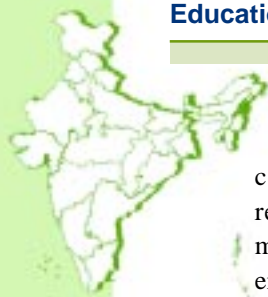
### Federation of Indian Chambers of Commerce and Industry

The Federation of Indian Chambers of Commerce and Industry (FICCI) has, over the years, influenced the corporate sectors' sensitivity to environmental issues. The Federation has taken notable initiatives towards disseminating information to Indian industry about climate change mitigation.

FICCI has established an Environmental Information Centre (EIC). The Centre aims at providing

#### Some Indian Websites on Climate Change

Website	Organization
<a href="http://envfor.nic.in/cc/index.htm">http://envfor.nic.in/cc/index.htm</a>	Ministry of Environment & Forest (MoEF)
<a href="http://sdnp.delhi.nic.in/resources/climatechange">http://sdnp.delhi.nic.in/resources/climatechange</a>	Ministry of Environment & Forest (MoEF)
<a href="http://www.natcomindia.org">www.natcomindia.org</a>	NATCOM Project, MoEF
<a href="http://www.emcisee.com">www.emcisee.com</a>	Ministry of Power and FICCI
<a href="http://www.teriin.org/climate">www.teriin.org/climate</a>	The Energy and Resources Institute (TERI)
<a href="http://www.cceindia.org/greenhousegases">www.cceindia.org/greenhousegases</a>	Centre for Environment Education (CEE)
<a href="http://www.cseindia.org">www.cseindia.org</a>	Centre for Science and Environment (CSE)
<a href="http://www.cleantechinitiative.com">www.cleantechinitiative.com</a>	Federation of Indian Chambers of Commerce and Industry (FICCI)
<a href="http://www.ciionline.org/climatechange/index.html">www.ciionline.org/climatechange/index.html</a>	Confederation of Indian Industries (CII)
<a href="http://www.climatechangecentre.org">www.climatechangecentre.org</a>	Development Alternatives (DA)
<a href="http://www.cleantechindia.com">www.cleantechindia.com</a>	Federation of Indian Chambers of Commerce and Industry (FICCI)
<a href="http://www.assochem.org/services/env">www.assochem.org/services/env</a>	The Associated Chamber of Commerce and Industry of India (ASSOCHAM)
<a href="http://www.developmentfirst.org/india">www.developmentfirst.org/india</a>	Indian Institute of Management, Ahmedabad
<a href="http://www.eeibs.com">www.eeibs.com</a>	Indian Institute of Management, Bangalore



comprehensive information about environment regulations, technology options, guidelines and manuals to enable Indian industry to become environmentally responsible and competitive. The EIC has four regional centres in Mumbai, Hyderabad, Delhi, and Kolkata.

EIC is also assisting the Indian industry in reducing GHG emissions through the Clean Technology Initiative (CTI). Under this initiative it has established a website [www.cleantechindia.com](http://www.cleantechindia.com), which is the virtual portal on 'clean technology' for the Indian industry. It serves as a clearing house of organized information for industry to address environmental issues, including those related to climate change, and as a platform for information sharing on environmental issues and solutions.

FICCI, in collaboration with the MoP's Energy Management Centre (EMC), has developed a web-based Information Service on Energy Efficiency (ISEE). The website [www.emcisee.com](http://www.emcisee.com) is the portal for EMC. It is the only Indian information service on the Internet dedicated to disseminating technical and commercial information to energy sector-related producers, manufacturers and service providers, besides providing energy efficiency guidelines and best practices manuals to the industry.

### THE ROLE OF CIVIL SOCIETY

Several civil society initiatives have sought to build capacity and create awareness about climate-friendly issues. Grassroot level activities are undertaken that seek to improve the ability of communities to manage their natural resources, generate sustainable livelihoods, develop infrastructure and participate in decision making, thereby improving their capability to cope with climatic stresses. Creating awareness and empowering rural womenfolk is an important initiative by many NGOs in India. These include facilitating creation and spread of grass root-level Self Help Groups.

Some leading professional organizations in India are involved in a wide range of climate change-related activities—research, awareness generation, advocacy, capacity building, developing technologies, developing and implementing projects. 'Adaptation'



Awareness generation in rural areas.

initiatives at the grassroots level have emerged in a variety of ways: some are initiated, catalyzed, organized and supported by NGOs; some by community-based organizations; and some are the efforts of individuals or groups who joined to tackle vexing local problems. Some of these initiatives tap resources through various development schemes of the government; some raise their own funds; while bilateral or multilateral funding agencies and programmes support others. The work of some leading NGOs is indicated below.

### Centre for Environment Education

The Centre for Environmental Education (CEE), is a national institute engaged in developing innovative programmes and materials to increase awareness about the environment among children, youth, the general community, and decision-makers. It was set up in 1984 as a Centre of Excellence in Environmental Education, supported by the MoEF.

The CEE developed an information kit and a website ([www.ceeindia.org/greenhousegases](http://www.ceeindia.org/greenhousegases)) on market opportunities in trading emission reductions in GHGs. Through its News and Features Service (*CEE-NFS*), it disseminates environment-related news items,



Capacity building for sustainable agriculture: A CEE initiative at Jasdan.

features and articles every month for non-exclusive use to several newspapers and magazines all over the country.

Its Internship Programme in Environmental Journalism, also offered through distance learning mode, has one module on climate change. The CEE also runs a Certificate Course in Environmental Education in partnership with the IUCN and WWF International. The CEE maintains an Environment Education Bank, a computerized database of environmental concepts, activities, case studies, and access information on books and other resources. As a coordinating agency for GLOBE, CEE helped initiate the programme by training teachers from schools all over the country, and developed activities to support the measurements related to weather and climate.

From 1995, the Rural Programmes Group of CEE has played a catalytic role to empower communities in 15 villages of Jasdan *taluka* in Gujarat, to upgrade and conserve their natural resources and undertake sustainable livelihood activities. These sustainable development activities contribute to enhancing the ability of the communities to adapt to climate change.

### Centre for Science and Environment

The Centre for Science and Environment (CSE) is an independent, public interest organization that aims to increase public awareness on science, technology, environment and development. Established in 1980, today CSE is one of India's leading environmental NGOs specializing in sustainable natural resources

management. Its strategy of knowledge-based activism is supported by campaigns, research and publications.

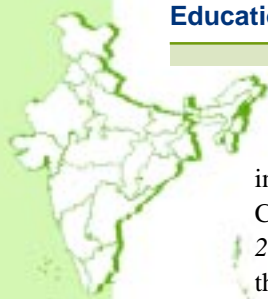
The CSE was one of the first organizations in India to become actively involved in creating awareness about climate change through research, publications and advocacy. It has sought to provide intellectual leadership by proposing strategies that will address ecology, economy, social justice and equity—the key principles of good governance. In 1991, CSE raised the issue of equity in managing climate change with its publication *Global Warming in an Unequal World*. The CSE's Global Environmental Governance (GEG) unit was created to educate civil society groups and government bodies about the issues, politics and science behind global environmental negotiations.

The CSE has also published the *State of Global Environmental Negotiations* (GEN) reports, which uncovered the issues and politics involved in these negotiations. It has launched a campaign to establish an equitable framework for a system of global environmental governance for climate change negotiations, and has been playing an important role at several international environmental negotiations. The GEG unit's popular newsletter *Equity Watch*, published on-site at such meetings, carries backgrounders, analysis, fact sheets and opinion about the climate change processes. The CSE also played an active role at the COP-8. It organized several side events, made presentations, brought out special editions of *Equity Watch*, issued press releases, made presentations and updated their website with news about the Conference.

CSE's fortnightly magazine *Down to Earth* regularly carries news and analyses of climate change issues, developments and events. From time to time, CSE also issues press releases and publishes briefing papers discussing various issues of the climate change debate. CSE's website [www.cseindia.org](http://www.cseindia.org) has a section on climate change.

### Consumer Unity and Trust Society

The Consumer Unity and Trust Society (CUTS) was established in 1983 as a consumer protection organization. Today, it works in several areas of public interest at the national, sub-continental and



international levels. Under sustainable consumption, CUTS is focusing its work on Chapter 4 of *Agenda 21*. The endeavour is to understand and disseminate the concept of sustainable consumption and also its inter-linkages with other related areas, such as poverty and climate change.

CUTS conducts campaigns, organizes events, and brings out newsletters. *Eco Consumer*, its quarterly newsletter, covers issues such as global warming, environment-friendly technologies and products. During COP-8, CUTS organized a workshop on the 'Impact of unsustainable production and consumption patterns on climate change: The role of consumer groups'.

### Development Alternatives

Development Alternatives (DA) is a non-profit research, development and consultancy organization established in 1983. The organization's work includes design, development and dissemination of appropriate technologies, environmental resource management methods, and effective institutional systems. DA's outreach activities seek to create awareness among various stakeholders, such as NGOs, government agencies, industries, financial institutions, and communities on climate change issues. Its Climate Change Centre (CCC) has developed training modules on incorporating sustainable development concerns in climate change projects in India. Its Industrial Environmental Systems Group works with, and organizes, awareness and training workshops for the corporate sector, and small and medium enterprises on energy efficiency and resource conservation issues. The Urban Environment System Group has a nationwide programme called CLEAN—India, to raise awareness among schoolchildren and resident's welfare associations about energy and resource conservation, and mobilizing communities for response measures.

The CCC organized the 'Inter-regional Conference on Adaptation to Climate Change' prior to COP-8, attracting over a 100 participants from 20 countries. The Conference deliberated on increasing community resilience for adaptation to climate change through sustainable development. It also organized an exhibition on environmental activities of school children, and another on sustainable handicrafts and

other non-agricultural livelihood activities of self help groups.

### The Energy and Resources Institute

TERI established in 1974, launched research activities on climate change in 1988, making it one of the first developing country institutions to work in this field. Its Centre for Global Environment Research (CGER) conducts research and outlines policy initiatives that integrate developing country concerns in addressing global environmental challenges. TERI constantly strives to spread awareness about climate change among the corporate sector ( See Box 5.4), civil

#### Box 5.4: Green Corporate

In March 2000, *Business Today*, a leading business magazine, and The Energy and Resources Institute (TERI) conducted a cross-country study to look at environmental practices in corporate India. It was a study aimed at exploring how environmentally conscious corporate India was. The study, which looked at about 50 companies, revealed that more than three-quarters had an environmental policy. About 60 per cent had an environment department, and four out of every 10 had formal environment certification (ISO 14001).

The study also found that 20 per cent of the companies had an environmental policy operational at both the corporate office and the factory level, while in a majority of the others it was either at the plant level or at the corporate office level. An environmental audit system was also in place in about 70 per cent of the companies.

The chemicals and pharmaceuticals sectors scored high with respect to environmental consciousness in comparison to the other sectors. The minerals and mining sector also fared well, with green policies prevalent at both the corporate office and plant level.

Overall, the findings reveal that businesses have found that greening makes business sense. They are now increasingly investing in greener technologies, and almost half of the companies surveyed planned to include environmental improvements in their expansion plans.

society and decision-makers in India and other Asian countries, through workshops, business meets and seminars, print publications and web dissemination. TERI also trains corporate managers on the risks and opportunities for sustainable business due to climate change.

In the run-up to COP-8, TERI developed a climate change website (<http://envfor.delhi.nic.in/cc>) for the MoEF. During COP-8, it assisted the ministry by coordinating NGO events, and publishing a book titled *India: Climate Friendly Development* and a film called *Global Warning*. It also facilitated the development of a Children's Charter on climate change, which was presented to the COP-8 Plenary.

TERI's website ([www.teriin.org](http://www.teriin.org)) has a climate change section, which provides updated information with particular reference to India. TERI has recently set up a website (<http://edugreen.teri.res.in>), which helps schoolchildren and their teachers explore the environment through games and activities related to several topics including climate change. TERI publishes three research journals, three digest journals, eight newsletters, one bi-monthly e-magazine, one data book, and two online databases. TERI has published more than 20 print and online publications specifically on climate change. To date, TERI has produced 11 documentary films on topics ranging from rural resources to global warming, bound together by a common message that environmental problems can only be overcome by people's initiative and participation.

### **Winrock International India**

Winrock International India (WII) is a non-profit organization working in the areas of natural resource management, clean energy and climate change. The Climate Change Programme at WII specifically addresses the challenge of climate change, working at the intersections of renewable energy and natural resources management. WII was the Facilitating Agency to the MoEF for preparing India's Initial National Communication (NATCOM) to the UNFCCC.

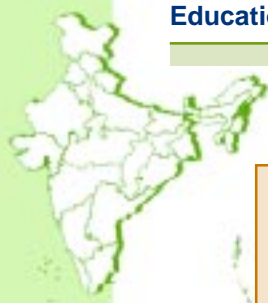
WII has a strong outreach programme whose repertoire of activities includes publications, education programmes, awareness and educational workshops

including skill-oriented training for decision-makers, study tours, stakeholder partnerships and exchanges, press coverage and electronic communication. Its website ([www.renewingindia.org](http://www.renewingindia.org)) is one of the few portals in India focusing on renewable energy and the environment. WII also operates the ([www.irenetindia.org](http://www.irenetindia.org)) site that answers questions on promoting the use of renewable energy in the rural sector in India. In addition to publishing several newsletters, most of them to renewable energy.

### **Other community-based initiatives**

Community development, knowledge sharing and grass root-level communication for rural people are important initiatives for a predominantly rural society like India. There are many NGOs in India that are working on strengthening the adaptive capacity of poor people to various stresses, including climate change, through education, training, public awareness and demonstration projects. It is not possible to list all of their efforts and achievements here, but they are making a positive change at the grass root-level. There are many successful experiments in India on increasing community resilience to stresses of various kinds, through shared local efforts. One such example is the rural electrification through a micro-hydel project at Thulappally in Kerala, undertaken by the Malanadu Development Society ( See Box 5.5 ). Not only has the project provided electricity to 160 households in this remote village, it has also led to capacity building of local people in community power management and energy conservation, reduced their dependence on the neighbouring forest for fuel wood, reduced deforestation, prevented carbon emissions that electricity from a thermal power plant would have generated, and also improved the quality of life of the villagers.

One of the best-known examples of rural development and self-reliance in India is that of Ralegaon Siddhi. This barren and drought-stricken village in Maharashtra has been transformed through community efforts, facilitated by a simple man called Anna Hazare. He made sure that each villager had a stake in the prosperity of the village. Through participatory decision making and collective action, and the selective tapping of government schemes, the village today is prosperous and self-reliant, and can withstand even years of harsh drought.



### Box 5.5: From Darkness to Light

Bounded by the River Pampa on one side, and the dense Sabarimala forests on the others, Thulapally in Kerala was till recently, fairly secluded from the rest of the world. Agriculture is the mainstay of the local economy and the land holdings are small and marginal. Animal husbandry is practised as a supplementary activity. There are mostly homestead-type farms, and houses are scattered across the village. Most of the domestic fuel needs are met by fuelwood.

The Malanadu Development Society (MDS) is a local NGO that has been working in this area for some time. Due to MDS facilitation, a 12-km stretch of road, and two major causeways across the rivers have been built. All of this has helped in the development of the village, but the community continued to feel the lack of electricity, as Thulapally was not connected to the main grid line, because it was too far away from it. It was in the late 1990s that the people of Thulapally requested the NGO to help them do something about bringing electric power to the village.

#### Power to the People

The Society's technical personnel surveyed the village and, on the basis of their study, felt that it would be possible to generate electricity through a micro-hydel project here. This suggestion was discussed at length with the local community. After several rounds of discussion they were convinced of its benefits and a local Committee was set up for the implementation of the project. Several sub-committees were formed to look after specific aspects like organizing people and collecting materials.

The financial resources came largely from the UNDP under the Small Grants Programme. The community too contributed. As the project beneficiaries were identified at the beginning of the project, it became easier for the MDS to seek their contributions for infrastructure, labour and other materials required for the construction activities in the project. Coconut poles were provided by the people to function as lamp-posts. The project gathered steam, and within 50 days, the people had power!

About 146 houses were given connections, as well as 10 shops and establishments, and five institutions. Each house was allowed four Compact Fluorescent Lamps. Additionally, 25 houses were given power for television sets. Electricity was to be supplied for about six hours everyday, and a monthly charge of Rs 50 (about US\$1) per household with four lamps was levied. The generators have a total installed capacity of 20 KW.

Almost overnight, the quality of life in the village changed. Quite apart from the immediate benefits, several long-term benefits are anticipated: a positive impact on the health of women, because of their reduced exposure to indoor air pollution; the long-term impact on educational attainments of the children of the village, who can now pursue their studies more easily; and reduced dependence on firewood from the nearby forests.

The management of the project is entirely in the hands of the local community. The technical maintenance of the generator is done by trained local youth. If there are problems in the distribution system, they are set right by the local electrician. There is a General Body of all power consumers that makes the policies and is the final authority. The General Body elects a nine-member Executive Committee that looks after the management and administration of the project.

If replication is the test of success, this initiative is indeed successful. In the nearby Moolakayam village, 28 families now have electricity generated through a similar initiative. In far away Idukki district, a similar micro-hydel project has been built, benefitting 51 families.

Small and mini-hydro power projects which have the potential to provide energy in remote and hilly areas, where extension of the grid system is uneconomical, is one of the thrust areas of the Government of India. By 2001, 420 small hydro power projects (up to 25 MW station capacity), with a total capacity of over 1423 MW, had been established in the country.

Another outstanding example is of work catalyzed by the Tarun Bharat Sangh (TBS), a voluntary organization, in reviving a traditional system of water harvesting in the drought prone Alwar district of Rajasthan state in western India, where the groundwater table had receded below recoupable levels. In 1985-1986, a severe drought hit the region, adding to the already bleak situation of vanishing livelihoods and mass migration. Convinced that one way to improve the situation would be to revive traditional practices that had sustained semi-arid Alwar and its populace in the past, TBS mobilized community action to revive the *Johad* (an earthen *bund* or check dam to conserve rainwater). Today more than 4,000 *Johads* are totally managed by the community. The changes brought about have been dramatic. Wells have been recharged; food production and biomass productivity have increased; the per capita income has also risen in the region. The effort has even brought back to life two rivers, the Aravari and Ruparel, which are perennial once more.

The government promotes and facilitates the adoption of information and communication technologies in rural areas, including Internet services. These are expected to provide information and knowledge centres to the rural population for activities, such as agricultural consultation, market information and health services.

## THE ROLE OF THE MASS MEDIA

The press and other mass media play a vital role in helping inform the public about climate change problems and their possible solutions.

### Print Media

An analysis of news clippings on climate change in *India Green File* for the period 1995 to 2002, shows that whereas till 2001, the number of items on climate change fluctuated within a range and did not show any significant trend, in 2002 there was a major spurt. In the period leading up to COP-8 held in New Delhi in 2002, the MoEF and some NGOs organized special briefings for the media to facilitate informed reporting. The Press Information Bureau, a government-owned news agency, issued at least two-dozen press releases during and immediately before COP-8.

The CSE's fortnightly magazine *Down To Earth* has carried the highest number of articles related to climate change of any periodical in India. These articles dealt with the Kyoto Protocol and international climate change negotiations (19 per cent); GHG emission abatement activities and strategies (11 per cent); general reporting on climate change and related issues (37 per cent); and reports on scientific studies and research (33 per cent). Among the mainstream English-language newspapers scanned by *India Green File*, *The Hindu* carried the maximum number of climate change news and articles. Among the financial newspapers, *Business Standard* had the highest coverage.

### Electronic Media

So far, the electronic media in India does not appear to have paid much attention to issues related to climate change. However, Development Alternatives produced 32 episodes of a weekly environment and business magazine called 'The Green Show' for three satellite channels. Several of the episodes were directly or indirectly related to climate change. A similar series of 30-minutes duration was commissioned and telecast on Doordarshan, India's national television service. TERI has produced 11 documentary films, some on energy and one on global warming, which were telecast on prime time national network as TERRAVIEW.

However, the access of Indian television viewers, is not limited only to Indian channels. International channels such as National Geographic, Discovery, as well as news channels such as BBC and CNN are also an important source of information about environmental issues and debates. Figures 5.2, 5.3 and 5.4 indicates the increasing trends of appearance of climate change issues in various media.

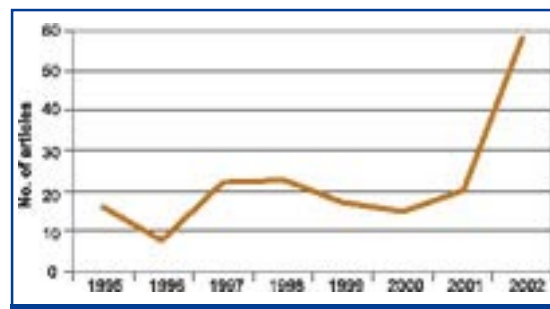
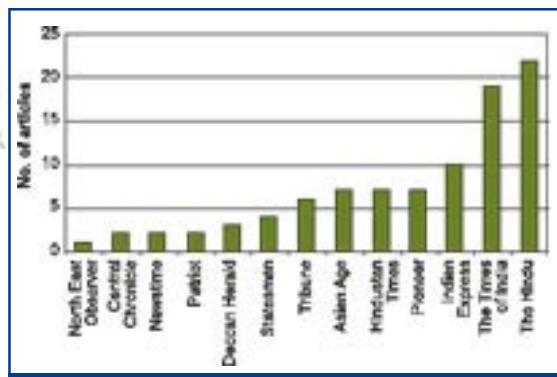
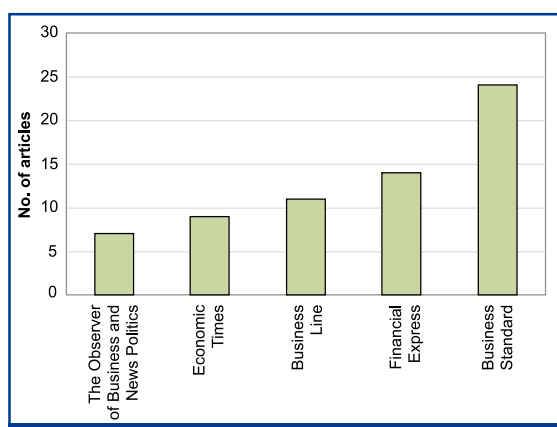


Figure 5.2: Trend of climate change reporting in India since early 1990s.



**Figure 5.3:** Number of articles on Climate change reported in news papers.



**Figure 5.4:** Climate change articles reported in financial dailies.

### Climate Change Outreach for Children

Environmental education, both through the formal and non-formal routes, is an important medium for creating awareness about climate change among children and youth. India today has a formal policy framework and an institutional structure in place, through which environmental education is being promoted.

The National Education Policy, 1986, addressed the significance of environmental orientation to education at all levels. Guided by this policy, the National Council of Educational Research and Training (NCERT) and the Departments of Education in various states of India have been working to incorporate environmentally relevant components in the curricula and textbooks. Simultaneously, NGOs all over the country have developed innovative



Students recording temperature data at a GLOBE school's weather station.

programmes and materials to address local environmental concerns. A few NGOs specializing in climate change and energy research have created programmes specifically on climate change. Some of these initiatives and ideas are gradually becoming part of the formal education system.

The Indian government has launched several environmental education initiatives, in addition to providing funding support to NGOs for such activities. Some examples of education and outreach efforts by the government and NGOs aimed specifically at climate change, energy efficiency, renewable energy and related issues, are described below.

### Non-formal Education and Outreach

#### GLOBE

In 2000, India joined the GLOBE programme, which is coordinated in India by the MoEF. This hands-on, Internet-based science and education programme links students, teachers and scientists in nearly a 100 countries. Students collect data on various environmental parameters related to atmosphere, water, soil and vegetation, and report their data to the GLOBE website. These observations, in conjunction with related learning activities, enhance the students' understanding of the earth as a system and factors regulating its climate.



Awareness generation on vehicular emissions amongst children.

### **Petroleum Conservation**

The Petroleum Conservation Research Association (PCRA) has been actively involved in promoting awareness about conserving petroleum products. Many of its activities and messages are also targeted at children. PCRA's website ([www.pcra.org/children](http://www.pcra.org/children)) has a section specifically designed to educate children about petroleum conservation.

### **Pollution Monitoring**

The CSE was one of the first organizations to actively work towards creating awareness about climate change among all sections of society, including children. The CSE has established a Pollution Monitoring Laboratory to monitor and analyze the ambient air quality of schools in Delhi. The project, carried out by the city's school children and youth, generates awareness among them about the local environment and helps them to better understand issues related to GHG and climate change. The CPCB and the Delhi government also help to create awareness among the general public and students on vehicular pollution.

### **PROBE**

The DST has launched a scheme called the Participation of youth in Real time/field Observation to Benefit Education (PROBE) linking students, teachers and the scientists in the collection of data on various meteorological observations. The programme was launched in 2002, in the state of Uttaranchal in a 100 schools. One objective of this

programme is to create a database on meteorology, climate, natural resources and related fields, so as to improve the scientific understanding of weather and climate and their local impact in mountain regions.

### **NEAC and NGC**

The National Environment Awareness Campaign (NEAC), launched by the MoEF in 1986, seeks to create environmental awareness among students, youth, teachers and rural populations. The National Green Corps (NGC) is another initiative by the MoEF to involve students in environmental action projects, thereby enhancing their understanding of and involvement in environmental issues.

### **Awareness on Renewable Energy**

The MNES has been instrumental in creating public awareness on various renewable energy sources and energy efficiency devices. Most of their outreach programmes are targetted at the general public, including children. The MNES organizes drawing, poster, working model and essay competitions on renewable energy, and has made a special effort to include mentally and physically challenged children in these competitions. It has also set up Energy Parks at several locations in the country, in order to create awareness among people, particularly students, about the use and benefits of renewable energy systems and devices.

### **Science and Technology Popularization**

The National Council for Science and Technology Communication (NCSTC) has been organizing and supporting numerous science exhibitions, fairs, street plays etc., on various themes for students across the country. One such event was a two-day awareness programme on the weather, environment and climate, organized by Karnataka Rajya Vijnana Parishad and the Indian Meteorological Society (IMS), Bangalore, in July 2001. Nearly 2,500 students and 500 teachers from 200 local schools attended the programme. The programme included displays by the ISRO and by the Disaster Management Cell of the IMD.

The NCSTC's science and technology popularization programme on the 'Application of Science and Technology in Industry' sensitizes students to various 'clean' industrial technologies and energy efficiency mechanisms, by facilitating visits to industrial units.



### School Energy Project

As part of the School Energy Project, eco-club members in Ahmedabad started action projects aimed at reducing energy bills in their schools and homes. 'Energy Rooms' have been set up in participating schools, which house posters, models, and other resources for creating awareness among students on issues related to energy, such as the need to conserve fossil fuel, and control particulate and GHG emissions. The CEE organizes the Clean Green Programme every summer and students often undertake action projects on energy conservation.

### Publications

The CSE brings out *Gobar Times*, a science and environment magazine for children. The post COP-8 issue of *Gobar Times* focused on climate change. TERI has published a book titled *Making Sense of Climate Change*, meant primarily to raise the awareness of secondary school students about climate change. Winrock International India (WII) brings out a newsletter named *REsource* on renewable energy education meant for secondary-level students and teachers. The newsletter disseminates information on the use and potential of clean renewable energy technology and encourages schools' involvement and interest in this sector.

### Websites

Websites such as EduGreen (<http://edugreen.teri.in>) helps students and their teachers explore the environment through games and activities related to topics such as air pollution, energy, and climate change. Similarly, portals that deal exclusively with issues on energy and environment and renewable energy for school children are [www.renewingindia.org/edu.html](http://www.renewingindia.org/edu.html) and [www.winrockindia.org/child/index.htm](http://www.winrockindia.org/child/index.htm), which also have a section on climate change. These websites have been developed by several NGOs.

### Activities at COP-8

The CSE also assisted students to produce a special edition of *Gobar Times* during COP-8, in which children interviewed delegates and reported on the various events. During COP-8, school and college students organized a demonstration and a protest march demanding the reduction in CO<sub>2</sub> emissions and equal per capita entitlements to the atmosphere.

Almost 120 students from 25 schools of Delhi prepared a Children's Charter on Climate Change, which they presented to the COP-8 Plenary. The MoEF and the United Nation's Environment Programme supported the event.

## CLIMATE CHANGE IN HIGHER EDUCATION

A judicial directive by the Supreme Court of India in 1991, mandated environmental education at every level of formal education. A growing number of universities and technical institutions are offering foundation courses that will sensitize students to environmental issues, including climate change. However, the need is being increasingly felt for special courses in different professional disciplines. For example, businesses are feeling the pressures of environmental legislation and the need for environmentally responsible management practices. Recognizing this trend several business schools in India, as also elsewhere, have already introduced environmental management courses in their MBA curriculum, with the IIM, Ahmedabad (IIMA) and IIM, Bangalore taking the lead.

### Agriculture Education

The Indian Agricultural Research Institute (IARI) is India's premier national institute for agricultural research, education and extension. The Division of Plant Physiology at IARI offers a course on Global Climate Change in the second trimester of its Masters programme, and has been conducting research on the impacts of climate change on crop productivity.

### Education for Civil Servants

The Lal Bahadur Shastri National Academy of Administration at Mussoorie, is the Government of India's premier training institution for higher civil services in the country. The Academy is introducing a clean energy curriculum that will focus on sustainable energy management and its linkages with GHG emissions, public administration, economics and management.

### Initiatives at Universities

Climate change is an active focus of activities at the Jadavpur University (JU) in Kolkata. The Department of Economics offers a masters-level course on

Resource and Environmental Economics, with a climate change component. The M.Phil. programme in Environmental Studies also deals with climate change. At the Ph.D. level, at least five research projects are in progress on climate change issues across various disciplines. The University has set up a Global Change Programme that proposes to start a teaching programme at the M.Phil. level on global change issues. It also conducts refresher courses for university and college teachers in economics, environmental economics, environmental science, power engineering, and international relations. All these courses have introduced a component on climate change issues over the past three to four years.

### Management Education

In pursuance of the objective of greening higher education, the MoEF has taken the initiative to introduce and enhance the environment content in business and management education. Under this initiative, three consultative workshops have been conducted so far and a website (<http://www.eeibs.com/>) has been launched to infuse environmental concepts into management education.

A review of the syllabi of environmental courses already being offered at some leading management schools in India such as the IIM at Bangalore and Kolkata shows that climate change is already part of some of the courses. Climate change research has been a major focus of the energy and environment policy studies at the Public Systems Group of the IIM, Ahmedabad. At least half a dozen students at IIMA are currently working on climate change-related topics for their doctoral research, and several have worked on such topics in the past decade.

### Research

Many eminent researchers in India have contributed and are contributing to climate change research. Their contribution to various reports of IPCC is significant. Similarly, many premier institutes, including IIMs, IITs and IISc, are involved in climate change research. Most of these research teams have participated in the preparation of this document. The research focus at the Centre for Ecological Studies, IISc, Bangalore has been on the impact of climate change on forests and natural ecosystems in India, on tracking carbon flow in Indian forests, the potential of forestry as a climate

mitigation option, and the economic and institutional aspects of forestry mitigation options and adaptation to climate change.

The IIM, Ahmedabad is the premier institute in India, with collaborations with the best research teams in the world, on economy-energy-environment modelling research. The Indira Gandhi Institute of Development Research (IGIDR) is an advanced research institute established in Mumbai by the RBI, for carrying out research on development issues from a multi-disciplinary point of view. It offers PhD and M. Phil. programmes on environmental studies, including climate change issues. The IGIDR also offers special lectures and short courses on climate change.

The Centre for Global Change Research, a unit of the Radio and Atmospheric Sciences Division at the National Physical Laboratory, New Delhi, conducts research in several aspects of climate change, and also offers a doctoral programme.

TERI School of Advanced Studies, set up in 1999, is evolving as a research university. The three Centres of the School namely, the Centre for Energy and Environment, the Centre for Bioresources and Biotechnology, and the Centre for Regulatory and Policy Research, offer doctoral programmes in their respective fields, which also include research on issues such as forestry and climate change, and policy development in energy, climate change, and transportation.

### Technical Education

Due to the interface of climate change with energy, at several institutions, climate change becomes a part of courses or programmes on Clean Energy Technologies and Renewable Energy as at the IIT, Delhi (IITD). The Department of Atmospheric Sciences at IITD is involved in scientific and technological aspects of climate change research such as climate modelling. The School of Management at IIT, Bombay focusses on research on the impacts of climate change. There are many more universities and institutes that have ongoing research on various aspects of climate change. Many of these have participated in preparing India's Initial National Communication to the UNFCCC.



### CONCLUSION

Based on the review of the existing programmes, some areas that need strengthening are: the link between research output and outreach input; a focused inclusion of climate change in academic curricula at various levels; a more active involvement of mass media in covering climate change issues; and the integration of climate change concerns into consumer education. The initiatives to create awareness among the industry also need to be stepped up to reach every industrial estate and unit in the country.

The need is obviously to go beyond current efforts by strengthening, expanding and sustaining outreach and capacity-building efforts. It is necessary not only to create a requisite level of awareness and set up information systems, but also to establish and institutionalize adequate mechanisms to ensure access to information, and also to build the capacity required for taking necessary action. Therefore, the task requires a multi-pronged and multi-layered approach, linking together of several players and stakeholders, and adequate sustained financial resources.

Effective action by the industrial sector, for example, would require creating awareness among not only local industrial associations and individual units, but also among the financial institutions who would fund initiatives to support clean technologies and GHG emission abatement options; consultants to industry to enable them to build emission concerns and emission trading options into their plans and strategies for their clients; lawyers specializing in industrial law so that they can advise their clients about compliance issues and penalties or disincentives, as well as incentives; business journalists who can contribute by their reports and

analyses of government policies and mitigation options; enforcement officials of the central and state Pollution Control Boards; and policy-makers who make industrial policies; and even legislators.

To create awareness in these groups would require structures and mechanisms. Integration of climate change issues and laws within the curriculum, and seminars and training programmes organized by the Bar Associations or other professional bodies, could be the pre-service and in-service routes for creating awareness and understanding among lawyers; media briefings, internships with environmental organizations, scholarships or sponsorships for focused research, and policies of the business media could be the routes for increasing the involvement of business journalists.

Outreach efforts of consumer societies, manufacturers of climate-friendly products, advertising agencies, the activation of the Ecomark scheme, and the Green Rating of products and their wide publicity, would contribute towards educating consumers to reject products that are not climate friendly in their manufacture, use or disposal. In addition, print and electronic media have an important role to play in influencing individuals and society.

The capacity of the present networks and institutional structures requires strengthening and enhancement. Several government agencies, professional bodies, NGOs and other civil society organizations are already involved in outreach and capacity-building efforts, and thus have the experience to continue and expand such efforts. There are possibilities to develop a synergistic framework of partnerships, drawing upon the expertise, experience and sectoral reach of its own institutional structure and others, some of whom may not be key players at present.