

# **CENTRE OF EXCELLANCE IN ENVIRONMENTAL ECONOMICS**

Madras School of Economics, Chennai

## **VISION DOCUMENT: 2007-2012**

### ***Taking Stock and Moving Forward***

#### **Introduction**

The Ministry of Environment and Forests, Government of India has designated Madras School of Economics as a Centre of Excellence in Environmental Economics in 2002. MSE is the only Centre established by the Ministry to focus solely on economics aspects of the environment. Although it is located in Chennai, the Centre has a national perspective and addresses issues of national importance.

Managing environmental resources is an integral part of the development process. It has become increasingly clear that an assessment of the trade-off between environment and development has to be made in various sectors and polices. These issues are particularly important in the context of opening up the economy and liberalizing various sectors such as trade and industry. Thus, the Centre of Excellence will have to play a crucial role in the formulation of environmental policy. It will have to anticipate events and emergent issues and undertake policy analysis of these issues. But care has to be taken to be selective, since there is a wide gamut of environmental issues that could be addressed. Setting priorities and choosing the critical issues will be necessary.

It was envisaged at the beginning that since the number of faculty in the Centre of Excellence is small, it is necessary it to collaborate with other institutions both within and outside the country in the area of environmental economics and environmental management. Further, it was felt that the Centre will have to function in cooperation with the corporate sector and other stakeholders of the environment. Economic analysis can be used to demonstrate that “green business” may yield long-term benefits to industry and society.

In was recognized that in the long run, the Centre will have to generate its own resources from various agencies and not be dependent on the Ministry to provide funding. With funding given on project mode, the Centre has successfully completed first five years of work in 2007. The support from the Ministry of Environment and Forests, Government of India has further been extended to additional five years – 2007 to 2012. This Vision document outlines the research priorities for the next five years at the Centre while taking stock of the work done so far.

#### **ORGANIZATIONAL STRUCTURE**

The Centre of Excellence in Environmental (COE) Economics was established at the Madras School of Economics as a result of a Memorandum of Understanding between

MSE and the Ministry of Environment and Forests (the original MOU has since been updated and a new MOU covering the current plan period of 2007-2012 has been signed between MSE and the MoEF). As per the agreement, the Secretary, MoEF will serve as a member of the Board of Governors of MSE. The work of the COE will be overseen by a Steering Committee chaired by the Additional Secretary, MoEF. MSE will be represented by the Chairman and Director. Prof. U. Sankar has served as the Member-Secretary for the first years of the Centre's existence and now serves as a member of the Steering Committee. Prof. Paul Appasamy has served as the Member-Secretary for the later part of the previous plan period and Prof. Kavi Kumar is currently serving as the Member-Secretary. There are also representatives from MoEF in the Steering Committee besides two external experts.

Within MSE, the primary responsibility for managing the COE is with the Member-Secretary. Faculty members working in the area of environmental economics spend part of their time on COE related activities. Project staff is recruited to work on particular research projects including the web-site and any policy related work. Maintenance of accounts, management of funds, auditing of accounts, etc. is done by the administrative staff of MSE under the guidance of the Director and the Administrative Officer.

The Steering Committee met twice a year in the initial part of the previous plan period and is presently meeting once a year to approve the annual work plan and budget. The faculty and staff time and institutional support provided by MSE is reimbursed by MoEF on a project basis. Funds have been provided in the budget for designing and operating an environmental economics website and also library support for creating and updating the website. MSE faculty members have been submitting project proposals in consultation with MoEF. The projects are executed by MSE faculty after getting approval from the Steering Committee.

Since inception, the COE was given the freedom to raise resources from other sources provided the objectives of additional project did not come in conflict with those assigned by the Ministry. During the first plan period (2002-07) the MoEF has also provided part of the funds from the World Bank Capacity Building project to construct a new building to house the COE. MoEF has carried out an evaluation of the activities of the Centre through an independent agency in 2007 and has extended the status of MSE as a Centre of Excellence in Environmental Economics for an additional five year period from April 1, 2007.

## **MAJOR OBJECTIVES**

The major objectives of the Centre of Excellence for Environmental Economics are as follows:

- (1) To assist the Ministry of Environment and Forests, Government of India in the formulation of environmental policy.
- (2) To carry out research projects in areas of environmental economics such as
  - domestic environmental policy (in particular, economic instruments and other measures to supplement existing regulatory structures);

- economic methodology (in particular, cost benefit analysis and related techniques to perform economic analysis of environmental problems);
  - and international environmental policy (in particular, trade and environmental issues).
- (3) To design and manage an environmental economics website which will contain all relevant information on environmental economics in India, manpower requirements, laws and court judgements, and on corporate environmental management.
- (4) To carry out capacity building of stakeholders by dissemination of latest developments in environmental economics through newsletters, brief discussion papers, and also by developing teaching materials for academic institutions. Also, to carry out training programmes, workshops, etc. on various themes in environmental economics for officials of the Ministry and other agencies like the Centre and State Pollution Boards, NGOs, and the corporate sector. The objective is to continue some of the capacity building programmes of the earlier World Bank project at a more modest level. However, the focus will be on the policy making bodies and the corporate sector rather than on academic and research institutions.

## **I. ROLE OF ENVIRONMENTAL ECONOMICS IN POLICY MAKING**

Environmental policy in India as in many other countries is based largely on a plethora of legislation and regulatory structures. During the last two to three decades, several important pieces of environmental legislation have been passed – the Air Act, the Water Act, the Environment Pollution Act, etc. in the area of pollution control. Similarly, legislation to protect forests, national parks, biodiversity, etc. have been passed. The Coastal Zone Regulations have been formulated to manage development of coastal areas. India is also a signatory to international conventions on climate change, biodiversity, toxic chemicals, etc. Environmental policy making in India has been influenced to a significant extent by legal and scientific expertise. But, economic principles have so far played a limited or negligible role in decisions taken on environmental issues.

There are many areas of environmental policy that can be informed by economic principles. New approaches and strategies may have to be formulated and implemented by the Ministry and by concerned agencies like the Central and State Pollution Control Boards and Departments of Environment. Environmental economics provides a set of useful concepts and tools for policy making<sup>1</sup>:

- Helps policy makers to analyze whether resources are being used efficiently. For example, environmental standards could be achieved at a lower cost using economic instruments.
- Enables the regulatory agencies to strengthen the case for conservation by valuing ecosystem services for forests, parks, wildlife, etc.
- Provides a better understanding of the tradeoffs and opportunity costs of particular

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<sup>1</sup> Hanley, Nick, Jason Shogren and Ben White (2001) “Introduction to Environmental Economics”, Oxford University Press, pp 339 - 342

decisions and results in more effective policy.

- Makes possible quantitative estimates of sustainability and enables movement towards sustainable development.

Most countries have realized that resources are finite and that it is economically not possible to achieve ambitious goals like zero discharge. Tradeoffs have to be made and priorities will have to be set. It may also be possible to achieve environmental goals at a lower cost through a system of economic incentives and disincentives rather than by pure regulation. Thus, “economic instruments” have been advocated to supplement existing regulations to reach these goals. It may be necessary therefore to experiment with instruments such as environmental taxes, charges, etc. based on economic principles. There are also instruments like bank guarantees that some State Pollution Boards have used to supplement their regulatory activity. Using such an approach would represent a sea change in the attitudes and mindset of the bureaucracy. Most of them view environmental goals / standards in absolute terms and are reluctant to accept the notion of tradeoff and efficiency that is inherent in economic analysis. MSE would therefore have to educate and increase the awareness of policy makers of these principles.

Secondly, opening up the economy has led to liberalization of the trade, industry and financial sectors. In the new policy context, environmental economics will necessarily have to play a greater role. For example, increase in exports of certain commodities like leather and textiles may have a negative impact on the domestic environment. Or environmental product regulations imposed by importing countries may have an impact on the volume and extent of trade. It may also be possible for polluting technologies or products to enter the country due to trade liberalization. Economic analysis will have to be used to study these impacts and design suitable policy responses.

Less regulation of industry should not lead to environmental degradation. In many countries industries have chosen to comply voluntarily with environmental requirements as good business practice. “Green business” has been advocated by institutions like the Confederation of Indian Industry to promote such voluntary compliance. Environmental economics principles can be employed to show that the quality of life of society increases not only from the output of industry but also by the steps that they take to protect the environment. In the long term, it would also save resources and lead to sustainable development. The Government, particularly the Ministry of Environment and Forests can work in partnership with industry to achieve these environmental goals.

It may also be of interest to the Ministry to see if the natural resources of the country – air, water, forests, biodiversity, soil etc. are being utilized in a sustainable manner. Many of these resources are a “source” for production and a “sink” for waste disposal. It is necessary to determine whether these resources are getting depleted / degraded over time due to unsustainable use. Policy measures have to be put in place to ensure that these resources are not irreversibly lost to the nation.

Over the past several years the debate on climate change has moved beyond the scientific circles and there is a greater urgency now to design and implement policy responses to

the climate change threat given that the Intergovernmental Panel on Climate Change has conclusively established in its fourth assessment report in 2007 that climate change is real and happening. Further it is also been well established that developing countries like India will face the brunt of the climate change due to their dependence on climate sensitive sectors and low capacity to adapt. The policy responses for climate change are broadly divided into mitigation of greenhouse gases and adaptation to climate change impacts.

Under the existing global agreements on the climate change, India need not participate in the greenhouse gas mitigation efforts as of now. However, in the future commitment periods of greenhouse gas mitigation, India along with other major developing countries may have to contribute towards mitigation.

- What is the scope for mitigation and what are the cost-effective strategies for mitigation?
- What are the implications of greenhouse gas mitigation on the growth potential of the economy?
- What is the scope for integrating the greenhouse gas emission mitigation efforts with the local pollution management?
- The need and scope for restructuring the existing environmental management system to address the climate change concerns along side the local pollution problems.
- The scope of mitigation potential and prioritization of mitigation across sectors through clean development mechanism

These are some of the key questions on which policy inputs would needed to the Ministry in the near future and the Centre work together with the Ministry in providing such inputs.

Irrespective of the extent and speed of implementation of the greenhouse gas mitigation efforts countries like India which have been affected by the climate extremes such as droughts, cyclones and floods on regular basis, would have to work towards improving the local adaptive capacities. Policy inputs on the emerging area of vulnerability and adaptation could soon become very crucial for the Ministry and the Centre through its research on this fast developing area may provide crucial inputs.

The use of economic instruments is one area in which MSE has already played a role in environmental policy making. Environmental management is a rapidly growing field and policy has to keep in step with fast changing events and circumstances. MSE can assist the Ministry of Environment and Forests to make more informed decisions and policies by employing the principles of environmental economics. However, it must be recognized that there are also limits to the use of these principles. Ethical issues regarding who gains and who loses, the political economy of regulation, and many such issues cannot be adequately addressed by economic analysis alone. Other disciplines and value systems may also have to be considered in the formulation of environmental policy.

Over the past five years the Centre of Excellence has been providing policy inputs to the Ministry on various issues including the submissions to the Financial Commission. Given

the constitutional constraints implementation of typical market based instruments for pollution control has been considered as not suitable for India. On the other hand the options such as eco-taxes on polluting inputs and outputs have been advocated by the Centre through its policy inputs to the Ministry. Continuing on similar line, scope for integrating the eco-taxes in the emerging goods and service tax regime and also combining the local and global pollution mitigation through eco-taxes will be explored.

## **II. RESEARCH PROJECTS**

Most environmental centres / institutions organize their research work by sectors such as air, water, land, forests, etc. However, the COE has been asked to organize its work on economic themes which are cross-cutting. Thus, a project or activity may relate to one or more sectors but will be subsumed by a particular thematic area. The Memorandum of Understanding suggests three such areas for research projects:

- Economic Instruments
- Cost-benefit Analysis
- Trade and Environment

One can consider these themes to fall more broadly into categories such as domestic environmental policy which subsumes economic instruments and other types of approaches (eg. community monitoring) as supplements to the regulatory process. Similarly, cost-benefit analysis can be considered to be an integral part of environmental economics methodology. Related methodologies include environmental valuation multi-criteria analysis, input-output analysis, risk assessment etc. Lastly, trade and environment forms part of the broader field of international environmental policy. Apart from trade *per se*, other topics include climate change, biodiversity, transboundary pollution, international waters, international transport of hazardous wastes, etc.

MoEF is keen that the projects executed by the COE do not overlap with other research funded by the Ministry. In an effort to avoid duplication of the work carried out at the Centre with that done at other centers of excellence, the COE is following the procedure of getting the project proposals screened by the Ministry before placing them before the Steering Committee for approval.

### **1. Domestic Environmental Policy – Economic Instruments**

The main contribution of environmental economics to regulatory policy is the use of “economic instruments” or creating markets for the environment. Although environmental problems are primarily due to market failure, in the sense that firms do not take into account the costs that they impose on society in the form of pollution or resource degradation, it is possible to design policy instruments that are based on the principles of the market. Economists have argued that market based instruments such as emission taxes or marketable permits will lead to more efficient outcomes.

Firms are given signals that they may have to pay for their polluting activity in the form

of taxes or take the necessary steps to abate pollution by which they would internalize the cost of pollution. More typical command – and – control approaches do not provide any flexibility to the firm on the level of abatement. If they do not meet standards, they would be considered to be in non-compliance and hence would be in violation of the law. Environmental taxes on the other hand permit the firm to abate pollution to the extent possible and pay taxes for the balance. Since different firms may face different marginal costs of abatement depending on the technology, age of the plant etc., they will have the flexibility to minimize costs by choosing an appropriate level of abatement.

In practice, it is difficult to set emission taxes at the optimum level, since one would have to be able to calculate the marginal cost of damage. If the tax is set too low, the firm would only be too glad to pay the tax and not incur the cost of abatement. If the tax is set too high, the firm may have no option but to meet the standard, providing it no flexibility. Also, in practice it would be difficult to continuously monitor emissions from every polluter and decide on the appropriate level of tax to be paid. Firms will be put to hardship if the agency keeps changing the tax rate from time to time.

Given the practical difficulties and the legal obstacles to taxing emissions, a second-best approach of taxing polluting inputs and outputs has been suggested. “Eco-taxes” have been introduced for several products in European countries using the same logic. In India, the Central Government already has the power to levy excise duty on items produced in the country. It would be possible to increase / decrease the excise duty depending on whether the product was environmentally damaging or environmentally friendly. For example, it would be possible to levy a higher excise duty on those automobiles which are more polluting.

One of the first research projects under the COE supported by the MoEF was on “Proposals to levy taxes on polluting inputs and outputs”. The following sectors were considered in the first phase:

- Quality of coal
- Automobiles
- Fuels (particularly diesel and petrol)
- Phosphate based detergents
- Use of chlorine in paper / viscose rayon
- Pesticides (particularly bio-pesticides)

This project demonstrated that it is possible to provide signals to encourage environmentally friendly (green) products or to provide disincentives for harmful or damaging products.

The experience with the “eco-tax” proposals has provided MSE indications of the political economy of regulation. Subsidies or reduction of taxes are likely to be easily approved. However, any proposals to increase taxes even if they are revenue neutral (in the sense that the revenue from the tax would be returned to the industry for research and development or other environmental improvements) would probably be opposed by those

affected. The need for protracted discussions with the affected parties / groups clearly exists. Since policymaking can take place only incrementally, the concept of eco-taxes first has to be accepted and can be introduced gradually by a step-by-step process.

Following the initial work on eco-taxes, the Centre has carried out another work for the Ministry (funded through research division of the Ministry) on the feasibility of incentive based environmental instruments in the state and central taxation regime. Subsequently a new study has been taken-up recently by the Centre on developing a framework for eco-taxes in the emerging goods and services tax regime.

Economic Instruments is a wide generic area under which many research projects / studies can be taken up in the future. For example, the potential of the water cess as an economic instrument may itself be a subject for study. There may also be other instruments or approaches such as voluntary compliance, community monitoring, etc. which can also be considered to achieve environmental goals. Studies in these areas could also be taken up by the COE.

## **2. Economic Methodology – Cost Benefit Analysis**

The most widely used methodology in environmental economics is cost benefit analysis, since the discipline has evolved largely as a branch of applied welfare economics. The central concept is that the welfare of society is improved if the benefits of environmental management exceed the costs. For example, by incurring the cost of abatement of pollution, there will be health or other economic benefits that will accrue due to the reduced damage. The major challenge is to value the benefits which are often widely dispersed and not easily amenable for expression in monetary terms. Thus, a subsidiary exercise in most environmental cost benefit analysis is valuation. The same principle can be used in the case of conservation or protection of natural resources like forests, biodiversity, etc. Most environmental problems caused by pollution or resource degradation can be studied in a cost-benefit framework, since controlling pollution or reversing resource damage has both costs and benefits. When the benefits are difficult to capture, techniques like contingent valuation have to be used.

One of the research projects for the COE approved by the Steering Committee was on the productive utilization of fly ash. Fly ash which is a serious pollution problem from power plants has the potential of being used as a resource in brick making. Apart from this benefit, the use of fly ash saves top soil which can be conserved. However, there may be transport or other costs that have to be incurred which sometimes serve as a disincentive for using fly ash in brick making. Thus, if valuation of the topsoil is done, the benefits (including the opportunity cost of disposal) can be compared with the costs of transport and utilization. The possibility of subsidizing the transport cost or other policies could then be considered by the relevant Ministry to promote the beneficial use of fly ash.

Following the Ministry's suggestion, a study was taken-up by the Centre on economic analysis of environmental impact assessment in India. The study proposed extending the

existing practice of comparing the pollution load generated by the project with the existing ambient standards and argued for focus on costing of the mitigation plans proposed under the environmental management plans of the projects and valuing the damages to health, material and eco-systems.

An extension of cost benefit analysis is environmental risk assessment. Risks are inherent in the production of many goods, and particularly those that use hazardous substances or generate hazardous wastes. Risk assessment is the method used to define and estimate the likelihood of adverse consequences, from exposure to environmental hazards. Valuation of life and health are integral to these studies. Risk management on the other hand requires regulators to make assessments and integrate these with other factors including perception of risks. Many agencies particularly industry and infrastructure agencies have to factor in environmental risk along with other business risks and develop strategies to minimize the risks. The COE could take up such studies of environmental risk assessment / management in the future apart from traditional benefit-cost analysis.

Thus, there are a large number of applications, both at the project and policy level where extended cost benefit analysis and related techniques can be used. These research studies can be agreed upon in consultation with the Ministry.

### **3. International Issues – Trade and Environment**

In a liberalized environment, trade flows and foreign direct investment is likely to increase. It is important that domestic environmental policies are sufficiently stringent to ensure that trade does not result in higher levels of pollution or resource degradation. For example, the leather and textile industries have increased their export volume significantly in the last decade. But this expansion has caused local pollution problems. Effluents have affected downstream agriculture, drinking water, etc. Importing countries are also now imposing stringent environmental product requirement that these firms have to meet. Some view these requirements as a non-tariff barrier to trade. Hence, there are many interlinkages of trade and environment that could be studied.

Both theoretical and empirical studies seem to indicate that there is no reason to restrict trade on environmental grounds. It is more important that domestic environmental policies in India are kept sufficiently stringent to ensure that welfare is not reduced by increasing pollution due to greater output. It is necessary, therefore, to study these particular sectors to ascertain if domestic policies in India are sufficient to protect the quality of the environment. In most cases, it is not the policies themselves, but the implementation of the policies through enforcement that needs attention.

MSE carried out a comprehensive study of the trade-environment linkages in the leather industry. This study included a review of the action taken by leather importing countries to restrict or ban or reduce access to exports of leather; estimation of the normative or actual costs of compliance with the standards of the importing countries; and policies to meet these compliance requirements. The perceptions of the leather exporters were also

analyzed with regard to the environmental restrictions placed by the importing countries.

Textile sector, like leather, has high trade potential and also results in significant local pollution during processing. The fragmented nature of the production process is another feature that these two sectors share. However there are important differences too between the two sectors. In an effort to extend the knowledge learned through the study on the leather sector and assess the crucial differences in the learning experiences of the two sectors with regard to the environmental compliance, the Centre has recently started a new project with focus on textile sector.

With external funding, the Centre has carried out several research projects on climate change related issues. With focus on climate change impacts on agriculture, the research by the Centre's faculty has provided crucial inputs for global negotiations and also for the local adaptation strategies. Similarly, the link between environment and development has been studied extensively through Environmental Kuznets Curve Hypothesis in an effort to inform the policy on the developmental trade-offs.

Another issue of significant policy interest is the conflict between specific trade obligations in multilateral environmental agreements and WTO rules. Through an inter-ministerial committee chaired by Prof. Sankar these issues have been critically examined to advise the Ministry of Environment and Forests and the Ministry of Commerce. As a follow-up of this, the Ministry of Environment and Forests has sanctioned a special program on Trade and Environment at Madras School of Economics. This program is coordinated by Prof. Sankar. Through this program and other efforts, the implications for India of environmental standards being incorporated in the WTO requirements is an important area for research, since such standards could have important repercussions for domestic industry.

### **III. ENVIRONMENTAL ECONOMICS WEBSITE**

One of the major activities envisaged for COE was the creation and operation of an Indian environmental economics website. The purpose is to create an online community of policy experts, researchers, NGOs and citizens interested in the area of environmental economics. The website will have the following objectives:

- To provide data, research findings, and references relating to research (primarily in India) in this field
- To disseminate teaching and training material for university and college teachers
- To promote collaboration between researchers, scholars, policy makers and others interested in policies relating to the environment
- To offer reliable and credible information on news and issues related to the environment
- To provide information on conferences, training workshops, and fellowships in the area of environmental economics
- To create a forum for public discourse on environmental issues
- To post details on environmental legislation and court judgments.

- To be a clearinghouse on environmental manpower.

The initial hardware and software requirements for this purpose have been met through funding from the Ministry. The website has since been revamped and a completely new look site with many user-friendly features has recently been uploaded. Salient features of the website include a detailed database of studies concerning various issues in the field of Environmental Economics, a database of Indian studies, one-stop information source on various legislative matters, conceptual issues concerning environmental economics and list of experts working on environmental economics issues in India. The website also maintains sections on green business practices and kids corner.

The main database is regularly updated. More than 4500 abstracts of indexed articles from national and international journals are available on environmental economics and resource economics. This database is searchable by subject and title of the paper. Over 500 abstracts of journal articles addressing numerous environmental issues in India, sorted under broad categories and searchable on key-words, are also available on the website.

The website needs to develop dynamic features such as ‘ask an expert’ – wherein real-time responses to queries on environmental economics would be provided. Further, the linkages with the industry also need to be strengthened through incorporation of environmental information that is industry specific.

#### **IV. CAPACITY BUILDING PROGRAMMES**

The World Bank capacity building project in environmental economics (EMCaB) was coordinated by Madras School of Economics over a period of five years prior to 2002. The components of the project included curriculum development, training, research, and overseas fellowships. While it is not possible to continue all these programmes at the same level as the World Bank project, it was envisaged that some of the activities can be executed by the COE at a more modest level.

- Preparation of dissemination papers:*** There is a great deal of demand from the government, corporate sector and NGOs to demystify environmental economics and present the concepts in simple terms for the laypersons who are not trained in economics. Thus brief concept papers with examples can be brought out on selected themes. About nine such papers have been brought so far by the Centre and several others will be added in future.
- Curriculum Development:*** Environmental economics is a rapidly growing field and those teaching the subject should be kept aware of recent developments. This could be done through short-run refresher programmes as well as through a newsletter. A three-week faculty upgradation program was coordinated by the Centre at Institute of Economic Growth in 2005 and similar programs will be conducted in future too.

- c) **Training Programmes:** One of the successful elements of the earlier project was the large number of people who were given exposure to concepts of environmental economics. It may be possible in partnership with CII and others to offer special courses for individuals in the corporate sector working in the area of environmental management. Government representatives at MoEF, Central and State Pollution Control Boards, Departments of Environment would also require such training if these concepts are to be used in policy making. Programs with specific focus on tools like Cost-Benefit Analysis and Economic Instruments were conducted by the Centre in the past. Such programs with focus on Environmental Accounting will be conducted for several stakeholders in future.
- d) **Visiting Researchers Fellowship:** In order to enhance the output from the Centre and also for better networking with other leading economic institutes in India, it is proposed that the Centre may start a Visiting Researcher Programme. It is envisaged that the Centre could benefit through the participation of the Visiting Researchers in an on-going research work at the Centre, and/or a stand-alone research work conducted by the visiting researchers. The objective of the programme is to attract best practitioners and faculty in the field of environmental economics from other leading institutions/universities in India to CoE for wider networking.
- e) **News Letter:** The Centre's work on various issues is disseminated through a News Letter that also features some articles on focus areas by the in-house faculty. The News letter titled as **GREEN THOUGHTS** is recently started and is envisaged as a bi-annual publication from the Centre.
- f) **Collaboration with Other Institutions:** Over the past several years MSE has developed strong links with several leading institutes in India to collaborate on environmental economics related work. In some of the projects external technical expertise has also been availed.

Environmental economics is still a relatively young discipline, and it will therefore be necessary to continue these efforts to develop a corps of professionals not only in academic institutions, but in government, the corporate sector and in civil society.

## **MSE EXPERTISE**

MSE now has around 9 faculty members who have expertise in various areas of environmental economics indicated in the following table.

### **MSE FACULTY EXPERTISE IN ENVIRONMENTAL ECONOMICS**

<b>No.</b>	<b>Faculty Members</b>	<b>Designation</b>	<b>Areas of Environmental Economics</b>
1.	Dr. U. Sankar	Honorary Professor and Member Secretary, COE	Economic Instruments, Industrial Pollution Control, Energy, Environmental Policy
2	Dr. D.K. Srivastava	Director, MSE	Public Finance, Environmental Management
3.	Dr. K.S. Kavi Kumar	Professor (Member Secretary, COE)	Energy, Climate Change, Adaptation Strategies
4.	Dr. Soumyananda Dinda	Associate Professor (In charge of the web-site)	Environment and Development, Climate change and human security, Globalization and environment
5.	Dr. Brinda Viswanathan	Associate Professor	Indoor air pollution, Applied Econometrics
6.	Dr. R. Hema	Associate Professor	Energy and environment, Renewable sources of energy
7.	Dr. C. B. Rao	Associate Professor	Public Finance, Environmental Management
8.	Dr. Zareena Begum	Assistant Professor (in charge for ENVIS)	Water, Solid Waste Management, Environmental Health
9.	Dr. Sukanya Das	Lecturer	Environmental valuation, Solid Waste management
10.	Dr. Elumalai Kannan	Assistant Professor	International Trade
11.	Dr. S. Subash	Assistant Professor	International Trade

Note: 1, 3, 4, 8, and 9 – Core faculty of CoE ; 2, 5, 6, 7, 10, and 11 – Associated faculty

To supplement the expertise at MSE, it may be necessary to collaborate with technical institutions like the I.I.T.s or legal institutions like the National Law School, apart from sister institutions working in the area of environmental economics like IGIDR, Mumbai, IEG, New Delhi, NIPFP, New Delhi or ISEC, Bangalore. National level studies on specific issues may require such collaboration. There are also many other institutions that have built up capacity in environmental economics through the World Bank project, which can be partner agencies. Collaborative work can also be taken up with the

corporate sector or with institutions like CII, FICCI, ASSOCHAM or other industry associations.

### **GOALS FOR THE FUTURE**

The goals for future – to be achieved during the period 2007-2012 – include:

- Continue to provide policy assistance to MoEF.
- Completion of at least **five** research projects in the **three** thematic areas by 2012. Till now four projects have been completed with two more in progress. During the next 3-4 years additional 3-4 projects would be taken-up for research.
- Continue to maintain state-of-the-art information on the environmental economics website and develop dynamic features to attract more visitors to the site.
- Continue dissemination of information through the Dissemination Paper series and the News Letter (GREEN THOUGHTS). At least **three** dissemination papers would be prepared per year and **two** issues of the News Letter will be published per year.
- Attract researchers through the Visiting Researcher Fellowship. At least **one** researcher would be invited per year to spend a couple of months time at the Centre to work on the theme areas.
- Conduct at least **one** training program per year – either through funding from the Ministry or other sources – on issues related to environmental economics. Conduct at least **two** faculty upgradation programs by 2012 to strengthen the teaching of the subject across universities/colleges in India.