



South Asian Network for Development
and Environmental Economics

Newsletter

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Dear Friends and Colleagues:

We have had three excellent workshops since we last wrote in this newsletter. About 60 colleagues met in Bangkok in February and March, first for an advanced workshop on CGE modeling, and then to discuss SANDEE research proposals. It is an unfortunate reflection of our times and the prevailing turmoil between and within our countries that we had to meet in a location outside South Asia. The Thai were welcoming and the AIT center was a wonderful venue -- we took a degree of comfort in its truly international ambiance.

In SANDEE, we try to sell the idea of 'rigorous learning with good fun'. This seems to be an appropriate description of our first regional course in Resource and Environmental Economics, which was held in Dhaka last month. The three week course was a joint venture between SANDEE, the Bangladesh Economics, Environment and Poverty Program and the World Bank Institute. Twenty six university teachers and researchers from around South Asia received approximately a semester's worth of training in natural resource and environmental economics. The course was designed to strengthen the participants' theoretical and empirical understanding of issues such as green income accounts, optimal use of natural resources, environmental externalities, valuation of non-market goods, and policy instruments for correcting environmental problems. We hope to continue to provide this course on an annual basis.

A few words on our researchers -- three SANDEE researchers were offered grants to attend the World Congress in Environment and Resource Economics in Monterey, California -- Bhim Adhikari of Nepal,

Himayatullah Khan from Pakistan, and S. Madheshwaran from India. The Congress itself was a huge success. Also, as you will read in the pages that follow, we have a new group of SANDEE grant recipients. Kudos to all of you.

Finally, we are incredibly pleased and proud that two of our advisers -- Profs. Karl-Goran Maler and Partha Dasgupta are recipients of this year's Volvo Environment Prize. Sir Partha was also knighted by the Queen of England, adding to his honors. Congratulations.

Be well and take care,
All of us at the SANDEE secretariat.

RESEARCH NEWS

SANDEE recently made several new grants to researchers from South Asia. A brief description of some of these grants is presented below. These may be particularly useful to new applicants seeking to obtain SANDEE research funding.

“A Framework for the Economic Analysis of the Protection and Sustainable Use of Traditional Knowledge: Effectiveness of Incentive Mechanisms”. Aparna Bhagirathy, India

Aparna seeks to develop a framework for analyzing the role of traditional knowledge in property rights regimes, including intellectual and common property rights. Building on recent developments in bio-technology and global trade with IPR, this study focuses on incentive mechanisms needed for the conservation and sustainable use of traditional knowledge rather than merely valuing traditional knowledge. The study will identify measures to determine the efficiency of different incentive mechanisms including benefit sharing, IPR and non-monetary incentives.

“Income Inequality and the Demand for Environmental Goods: Analyzing the Distributional Effects of an Irrigation Project on Three Tribal Economies”. Arabinda Mishra, India

Arabinda seeks to study the impact of development interventions on forest resource use. Often, state-led development interventions result in changing the traditional homogeneity of tribal communities. The resulting change in income distribution within a tribal community subsequently affects the pattern of demand for forest goods. Economic theory provides the concept of the ‘distributional characteristic of a good’ that is based on a postulated relationship between the degree of income inequality and the demand pattern for that good. The proposed research seeks an empirical verification of this relationship for forest goods. The specific setting of the proposal involves an irrigation project and

three categories of tribal communities – project- unaffected, project-displaced and project-benefited.

“Income and Information Elasticities of Demand for Environmental Quality” E. Somanathan, India

This study aims to investigate household willingness-to-pay for an environmental good, specifically clean drinking water. The study will examine the role of information (about positive health effects of water purification) and household income as determinants of willingness-to-pay. The study will also attempt to obtain information from Delhi and surrounding areas about coping actions that households take to obtain clean water and expenditure incurred in doing so.

“Valuation of Environmental Resources: A case study of Margalla Hills National Park in Northern Pakistan.” Himayatullah Khan, Pakistan

Himmy seeks to undertake a valuation study of the Margalla Hills National Park. He will investigate individual visitors’ (Pakistani and foreigners) willingness-to-pay for recreational benefits by using the travel cost method. The objective of the study is to help policy makers and planners establish park entrance fees and develop management plans for national parks in Pakistan.

“Trade-off between Carbon Emissions, Economic Growth and Poverty Reduction in India”. Vijay Prakash Ojha, India

The overall goal of Vijay’s study is to identify policy instruments that would reduce carbon emissions and to evaluate their impact on the economy in general and on GDP and poverty reduction in particular. Vijay will be looking at two key policy instruments: carbon taxes and tradable permits for this purpose. He will be using a computable general equilibrium model for his analysis.

“Shrimp Culture, Environmental Consequences and Poverty in Coastal Bangladesh: A Benefit-Cost Analysis.” Zulfiqar Ali, Bangladesh

Whether shrimp culture should be stopped or continued has become part of an intense debate in Bangladesh. Zulfiqar will estimate the benefits and costs of shrimp culture vis-à-vis paddy cultivation practiced in the same area. The study will examine the environmental externalities associated with shrimp farming for different land use options. The study will also analyze the redistribution of benefits among different economic and social groups.

“Social Benefit-Cost Analysis of Shrimp Farming in the Coastal Tracts of Tamil Nadu and Pondicherry.” L. Umamaheshwari, India (study grant)

Indiscriminate land use brings with it adverse social and environmental impacts. Moreover, land is becoming a scarce commodity due to population pressure, increasing non-agricultural use and diversion to commercial activities such as shrimp farming. Intensive shrimp farming in cultivable land may cause adverse environmental effects due to salinisation of land and groundwater. Uma’s study is similar to Zulfiqar’s and will examine various externalities associated with shrimp farming.

Profile: Department of Economics, North South University, Dhaka, Bangladesh

In each newsletter we will inform you about a center of learning in the region that is teaching or undertaking research in environmental economics. Here is a brief description of a program in Bangladesh.

In 1992, a group of philanthropists, industrialists, bureaucrats and academics came together to establish North South University, the first private university in Bangladesh. The Department of Economics is a core academic department in the university. The Department offers masters degrees in Economics and Development Studies with a focus on Environmental and Natural Resource Economics.

Within a very short period of time, the Department of Economics has established itself as one of the best Economics Departments in the country. Courses in the MS and MDS program are taught by faculty with Ph. Ds in Economics from reputed North American, European and Australian universities. Students are now competing strongly with graduates from other public and private universities. On average, 4-6 students from this department receive scholarships annually from York University in Canada to continue their studies there. The student community includes mostly Bangladeshi students and students from India, Korea, China, Sri Lanka, and Uganda.

The MS program in Economics is a 30 credit hour program. It has three broad specializations: International Economics, Development Economics, and Environmental & Natural Resource Economics. Courses included under Environment and Natural Resource Economics are Introductory and Advanced level Natural Resource and Environmental Economics, Energy Economics, Environmental Impact Assessment, Economics of Exhaustible Resources, Environmental Policy, and Environmental Accounting. The Masters in Development Studies (MDS) program is a 33 credit hour program with a strong focus on administration and management of development programs for government and non-government organizations.

The Department is also very strong in research. The Institute of Development, Environment and Strategic Studies (IDESS) is the research institute of the University with a very strong focus on the Environment. IDESS is a member of South Asian Network for Development and Environmental Economics. IDESS has also received grants from the South Asian Network of Economic Institutes, UNDP, CIDA, the World Bank, and the Government of Bangladesh.

Interested students can apply to the Department of Economics and obtain an application form for Tk 350. Foreign students can email the Registrar at econ@northsouth.edu to find out more about the application procedure. The Department offers a limited number of teaching assistantship to qualified candidates, which covers most tuition costs. Research assistantships are also available.

Focus.... The Economics of Nature

Partha Dasgupta

Frank Ramsey Professor of Economics,
University of Cambridge

It is today a commonplace that our use of the natural environment ought to enter economic accounts. How it should enter isn't a commonplace, though; it isn't even well understood. This may explain why accounting for Nature continues to be a rarity in practical economic reasoning. More generally, it may explain why the Economics of Nature continues to be a neglected subject in mainstream economic thinking.

For some time now, several economists have tried to develop the Economics of Nature in such a way that it can enter economic reasoning seamlessly. Members of SANDEE are, of course, familiar with much of it. They have even encouraged me to write a book on the subject. This I have now done in a book that I recently published with Oxford University Press, with the title, *Human Well-Being and the Natural Environment*. Recently, Manik Duggar asked me to prepare an account of the book for members of SANDEE.

My book actually addresses a larger theme: measuring the quality of life. For this reason, Nature is viewed in the book as a source of human well-being, meaning that I am mostly concerned with natural resources. I regard Nature as an array of capital assets: minerals and fossil fuels, soils, fisheries, sources of water, forests and woodlands, watersheds, the oceans, places of beauty and tranquility, and the atmosphere (as both a source of well-being and a sink for the residuals of human activity). Natural resources are but one kind of capital assets. Other types of assets include manufactured capital (buildings and machinery), human capital (skills), and knowledge (ideas). The quality of life in an economy is determined by the way the portfolio of its assets are managed. How they are managed is determined in great measure by a society's institutions (e.g. property rights to various assets). The idea is to value states of affairs in terms of the quality of life they sustain. One reason for the valuation exercise is that we could then evaluate policies, in order to

choose better. As Nature is a stock, any deep study of its role in our lives must include an analysis the way services are drawn from it over time in various institutional settings.

The chain of reasoning just sketched is developed in my book in five parts. Part I advances a pluralist conception of personal well-being, which is then used to develop the concept of social well-being. This notion is inclusive of human rights. A distinction is drawn between the constituents and determinants of well-being and is put to work in describing quality-of-life indices used by international agencies. A pre-requisite for measuring the quality of life over time is a measure of well-being at a point in time. Part II develops an empirically comprehensive measure of social well-being at a point in time and offers quantitative estimates in poor countries. The measure includes not only health, education, and material well-being, but also indices of political and civil liberties. Evidence from the 1970s shows that countries in which citizens enjoyed greater civil and political liberties performed better in the socio-economic sphere. The oft-repeated fear among rulers in poor countries - that there is a trade off between economic performance and political and civil rights - is belied by what evidence we have.

The fact remains though that within democratic countries there are enormous differences among people in the prospects they face. Political scientists have shown that democracy is neither necessary nor sufficient for civic cooperation and the benefits that come with it. Moreover, democracies in poor regions harbour significant proportions of malnourished people. In order to explain the findings, we are led to study institutions and the geography of poverty traps.

Time and generations are introduced in Part III, so it isn't until then that nature enters the picture. I am concerned here with valuing states of affair. Accounting prices are introduced – these prices measure the social worth of goods and services and depend on substitution possibilities among resources and among resources, labour,

and manufactured capital. The role of biodiversity in creating and preserving substitution possibilities in economic activities is identified. Accounting prices also depend on the structure of property rights and the institutional rules that guide resource allocation. Illustrations are provided from poor countries of resources that are neither private property nor State-managed, but owned communally. A rationale for the co-existence of various property-rights regimes is offered. I also try to identify why some common-property resources are managed communally, while others remain unmanaged and result in the "tragedy of the commons". Where institutions function badly, accounting prices differ substantially from market prices. Practical methods for estimating these prices are discussed.

The concept of "sustainable development" is formulated and the sense in which it is related to the protection and promotion of human well-being is identified. Wealth, estimated in terms of accounting prices, serves admirably as an index of well-being over time and across generations. A country's wealth measures the social worth of its capital assets. The notion of wealth developed in the book is a comprehensive one, including in it the social worth of manufactured and human capital, public knowledge, and natural capital. It is argued that, adjusting for demographic differences and differences in the structure of accounting prices arising from differences in their institutional structures, wealth can be used to compare social well-being among communities and nations. It is argued too that, correcting for demographic differences, for changes in institutional structure, and for the knowledge that is acquired freely from elsewhere, changes in wealth over time reflect changes in social well-being over time. Sustainable development is interpreted as the maintenance of wealth.

Given that movements in wealth over time measure movements in social well-being, the object of study is then shown to be "genuine investment", which measures changes in wealth. Genuine investment is the social worth of net changes in an economy's capital assets. Like the notion of

wealth, genuine investment is a comprehensive notion. Thus, ensuring that social well-being is sustainable involves taking care that the economy's assets are managed well. Under current accounting practices, however, recorded investment could be positive, even large, while genuine investment is negative. This can happen because environmental resources are typically under-priced. Moreover, because the depletion of natural capital doesn't count for much in economic calculations, investment projects judged to be productive can in fact be unproductive owing to their rapacious use of natural resources. The direction of technological change can also be biased against nature. This is why industrial technology is often environmentally unfriendly.

The theory is put to work on contemporary data from the poorest countries in the world. The picture that emerges about recent development experiences and the problems poor countries now face is substantially different from the one portrayed in the contemporary literature on economic development. Countries that would be regarded as having performed well if judged on the basis of such indices as GNP per head or the Human Development Index are found to have grown poorer, a few alarmingly so. The estimates I offer are rough and ready, but they suggest that the poorest countries of the world have "developed" by depleting natural capital relative to their high population growth rates. This finding is at variance with current thinking among development economists that in poor countries high population growth has not been a hindrance in the recent past. The theory I advance here identifies circumstances where high fertility, poverty and malnutrition, illiteracy, and degradation of local resource-bases feed on one another, cumulatively, over extended periods of time. However, none is seen in the theory to be the prior cause of the others: over time each influences, and is in turn influenced by, the others. Thus, it makes no less sense to say that high birth-rates cause poverty and illiteracy than to say that poverty and illiteracy cause birth rates to be high. The findings suggest that there is now a need to review our collective thoughts

on the processes of development and on the institutions that ought to govern the allocation of natural capital. Since development economics is many decades old, this is a sad conclusion.

In the background of Parts III and IV is a puzzle created by the conflicting intuitions that have been derived from two different empirical perspectives concerning the question of whether the character of contemporary economic development is sustainable. On the one hand, if we look at specific resources and services (e.g. fresh water, ecosystem services, and the atmosphere as a carbon sink), there is convincing evidence that the current rates of utilization are unsustainable. On the other hand, if we look at historical trends in the prices of marketed resources or the recorded growth in GNP per capita in countries that are currently rich, resource scarcities would not appear yet to have bitten. The focus on genuine investment helps to resolve the conflict.

Part IV begins with a theory of policy evaluation based on accounting prices. This is followed by an analysis of a class of accounting prices that has been regularly controversial: social discount rates. The topic is over forty years old, and yet the controversy is about matters that have long been settled, involving as they do technical economics. The framework developed in Parts III and IV is then used to clarify contemporary debates on structural adjustment programmes, freer trade, and global warming. Investment projects are the simplest examples of policy change. They perturb an economy. In Part IV it is shown that the way to evaluate investment projects is to compare reductions in consumption arising from the investments with the increase in wealth the investments help to create. To put it in slightly different words, projects should be accepted if they add to wealth, but not otherwise. Rules of social cost-benefit analysis, developed several decades ago, are implied by this finding.

The chain of results in Parts III and IV unify procedures for valuing states of affairs and evaluating policies: they both involve wealth comparisons. Given that Adam Smith's

inquiry into the wealth of nations is over two hundred years old, the conclusions could appear banal, but for the fact that in recent years the progress of nations has almost invariably been measured with every yardstick but wealth. Most common among them have been gross national product (GNP) and such ad-hoc measures of well-being as the United Nations Development Programmes' Human Development Index, neither of which is related to wealth.

In Part V, I extend the framework of Parts III and IV to offer an outline of a theory which enables us to value states of affairs and evaluate policies when future population numbers are influenced by policy (thus far I assumed, as demographers do when they make population forecasts, that the size of future generations is not influenced by policy). Classical-Utilitarian thinking on the subject has been known to recommend what would otherwise be regarded as overly large populations. I offer an outline of a theory that is based on an especially strong conception of personhood. In comparison with Classical Utilitarianism it appears to perform well when put to work in a world facing environmental limits.

I have been told that the book is not an easy read. It wasn't meant to be. The subject of my book is not easy and I could not find a way to present the material more simply without the risk of making the analysis superficial. I wrote the book for someone who is willing to work hard with me, and I hope very much that members of SANDEE will find the effort worthwhile.

Are you interested in contributing to SANDEE's newsletter?

In this newsletter we try to publish environmental economics 'news' that is relevant to South Asia. If you would like to discuss an important emerging policy issue or some policy relevant research, please write to us and let us know. We are looking for short, interesting analytical stories.

Further, if you or your institution are seeking to advertise positions in environmental economics or conferences that may be relevant, please let us know and we will present this information. Our newsletter now reaches over 700 individuals and institutions in S. Asia and beyond.

ECO-NEWS

In this section, we present regional and international policy-relevant news, anecdotes and analyses.

Payments to Farmers for Watershed Protection in Sri Lanka – Another Case of Polluter Pays.

Hemashri Kotagama

Do you have any examples of watershed protection leading to improved environmental quality in South Asia? This question was posed by SANDEE (Newsletter, No. 4, February 2002) following a description of the case of New York City dwellers, who paid people living in the Catskill region to protect the Catskill watershed and to sustain water supplies to the city. The finances for this transaction were raised by floating an environmental bond. This is a case among many that proves the ability of markets to protect nature. The case questions, as SANDEE has, the validity of the popular slogan that “the polluter should pay”. In this case it is the affected party, New York City dwellers, paying the polluters - the Catskill watershed dwellers. Such examples are replete in South Asia too. Although the raising of finances and payment is not through the market, state sponsored watershed management projects have been paying watershed dwellers to adopt land-use conservation practices.

The Sri Lankan economy is said to be a hydraulic economy since time immemorial. It depends on water for paddy production (staple crop in agriculture) and to produce hydroelectricity (main energy source for industry). The on-site cost due to loss of nutrients and off-site costs of loss of hydropower generation due to degradation of Sri Lanka's major watershed, the Mahaweli, have been estimated as Rs.953 million (10 million US\$) and Rs.15 million (0.15 million US\$) per year, respectively. Watershed protection is recognized as critically important to sustain Sri Lanka's development. Currently there are two major watershed protection investments, financed through loans from the World Bank (Environmental Action 1 Project) and the Asian Development Bank (Upper Watershed Management Project).

These projects directly pay farmers to adopt soil conservation and other conservation farming practices. Some payments are financial (for adopting soil conservation) and some are in kind

and as services (such as provision of planting material, cattle, material to establish cattle sheds, extension advice etc.). Based on financial payments made to farmers by the EA1P during 1998 to 2001, it is estimated that payments to the extent of Rs. 3291 per acre and Rs. 2948 per farmer were made for watershed protection. As would be expected, the level of payment is low in Sri Lanka (35 US\$/acre) relative to New York (100-150 US\$/acre). However, the payment to Sri Lankan watershed dwellers reported here refers to direct cash payments and does not account for payments in kind, provision of services, and other overhead and organizational costs. Given disparities in per capita income between the US and Sri Lanka, these payments may actually be quite comparable. The clear difference between the case in New York and Sri Lanka, is the mechanism used for raising finances. In New York the market was used to raise finances (through environmental bonds), and in Sri Lanka the government uses international loans to raise money (to be paid back through future public financing). Which mechanism is better depends largely on the transaction costs of raising finances.

In New York as well as in Sri Lanka the polluters (watershed dwellers) are being paid by the affected party despite the popular expectation that the “polluters should pay.” In Sri Lanka, where payment for watershed protection is financed through loans both the present and future generations contribute to the financial payment for watershed protection. Who should pay depends on the property rights to pollute. The conditions of property rights in New York are not known. In Sri Lanka the right of having protected watersheds is vested in the public. The Soil Conservation Act of Sri Lanka (at least 50 years old) specifies and legally compels watershed dwellers to adopt technically optimal watershed conservation practices on their lands. Penalties for defection are specified, which range from financial penalties to confiscation of land. Hence in Sri Lanka from a legal or property rights point of view, it is clearly an irony that the watershed dwellers, instead of being fined for not protecting the watershed, are being paid to adopt watershed protection practices. Such perverseness (with respect to property rights) in payments, is not confined to watersheds. Land dwellers who do not have legal rights to land are often expected to be paid compensation or alternative land found in implementing

investment projects in developing countries. In Sri Lanka, paying watershed dwellers, who are mostly farmers, could be justified on aspirations to achieve equity since farmers are poor and those benefiting from watershed protection such as the electricity consumers are richer.

Who should pay for pollution often depends on the transaction costs associated with raising and paying finances to internalize externalities and on issues of equity. In New York, paying polluters has apparently helped save the Catskills watershed. In Sri Lanka there is now anecdotal evidence that the implementation of

the Upper Watershed Management Project has resulted in silt free clearer streams in some parts of the watershed, and dead springs have come alive. As SANDEE mentions, following the well-known principle put forth by Coase: "It isn't always necessary that the polluter pays."

This is a nice Sri Lankan example of payments to farmers for watershed protection. SANDEE would like to continue to print such examples. If you have other examples, especially with empirical evidence that payments have resulted in a decline in degradation, please do write to us.

Is there light at the end of the tunnel?

Arjun Dhakal and Manik Duggar

Numerous studies point to the tremendous hydropower potential of Nepal, which is considered the second largest in the world after Brazil. Estimates suggest that there exists about 83,000 MW of capacity, of which 45,000 MW is considered technically viable and 90% of this estimate is supposed to be economically viable. Given this background, it is rather disappointing that currently less than one percent of the potential capacity is being produced (NEA, Annual Report, 2001). The situation is even more dismal when distribution of power is considered. Nearly 85% of the 23.1 million (National Census, 2001) people of Nepal still live in total darkness. The "power-grab" is mostly urban and less than 3% of rural folk are lucky enough to have power connection.

Given this abundance in potential magnitude for hydro-power, Nepal continues to rely on kerosene and fuel wood for lighting. Over 60% of the energy required for the domestic sector use in rural areas is met by firewood alone. Further, fuelwood gathering is considered to be one of the major causes of deforestation and soil erosion in the country. This scenario gets worse when analyzed in economic terms--- it is estimated that approximately Rs. 25 billion (almost one quarter of the total national budget) is spent on fossil fuel imports.

The question to ask is why then is the situation so dismal? This is clearly a question of policy failure in Nepal. The current policy debate in Nepal over hydro-power is stuck in an unproductive debate about scale and sector. The bureaucracy, experts and political regime

endlessly discuss "big" versus "small" and "private" versus "public" sector projects. Further, the thinly spread population in the hills and its difficult terrain make the cost of distribution much higher in Nepal relative to other countries. All this has resulted in the price of electricity in Nepal, which is equivalent to US 9 cents per unit, being one of the highest in the world. Nepalese, thus, are among the lowest per capita electricity users in the world. For a nation that boasts the second largest potential for hydropower in the world, this is a rather dark scenario.

There are three major issues that need to be addressed for the power sector to grow :

1. High Investment Costs: Inefficiency, corruption and mis-utilization of foreign aid have resulted in very high investment costs ranging from US\$3000 to \$4000 per Kilowatt, which has made projects in Nepal about four times as expensive as similar projects in China, India or Bhutan (Pandey, B. SDAN/NPC, 2002). On the other hand, as against NEA's production cost (which is a monopoly in production, distribution and transmission of power in Nepal), smaller scale private sector hydropower project (of less than 50 MW) cost between US\$1500-2500 per Kilowatt. Smaller privately promoted projects seem to produce cheaper power because they use local resources and expertise.
2. High price of electricity: NEA charges commercial rates for power based on the cost-plus model. Most power projects are

built with the help of foreign-aid or foreign-loans, where construction and management is controlled through various contractual conditions about specific technology, equipment, contractors and consultants. Further, private foreign investors sell power to NEA as per Power Purchasing Agreements (PPA). Currently, PPAs are dollar denominated, hence prices increase as the Nepali rupee continues to devalue against the dollar.

3. Lack of cogent power export agreements (especially with India): Understandably, India is not willing to pay such high commercial rates for power purchased from Nepal even though it is an energy hungry nation. Perhaps if India was able to value the positive externalities or downstream benefits of hydro projects in Nepal such as increased irrigation, flood control, and river transportation, the price of Nepalese power would not seem as high. In any case, large-scale hydropower generation in Nepal will not go anywhere without a long-term power - purchasing agreement with India.

It is clear that current policies are not working well. The following issues need immediate consideration:

- Cost of construction needs to come down to Indian/Chinese levels. This may be achieved by involving local contractors and private sector operatives. Bhote Koshi, Modi and Chilime projects are good examples in this regard where

Ban on Polythene Bags in Bangladesh

Enamul Haque

On the first day of 2002, the newly elected Government of Bangladesh banned the use of polythene shopping bags in Dhaka. On March 1, 2002 the Government extended the ban to other major cities of the country. Thus, polythene shopping bags, which were introduced in Bangladesh in 1982, may soon be a thing of the past. In 2001, nearly 800 factories in Dhaka and other major cities in Bangladesh were in the business of producing polythene shopping bags.

Over the past two decades, polybags have been blamed for a number of environmental hazards

the costs are almost half of prevailing NEA costs (Pandey, B. SDAN/NPC 2002).

- As against the licensing system of power generation, a truly competitive environment for private sector investment is needed to bring down prices. The current system of cost-plus contracts does not provide incentives to reduce cost and therefore prices.

- Small-scale hydropower projects including micro-hydro should be encouraged. Such projects do not require complex civil works and can be built using local labour and to some extent local capital. Local communities can even manage micro-hydro projects through co-operatives as shown by the Alternative Energy Promotion Center's projects.

- Foreign loan/investment project agreements should be based on rupee terms rather than dollar terms.

Should the public of Nepal remain in darkness while this debate goes on endlessly? If the current policy debate on power sector, which is riddled with confusion and corruption continues, there will be little progress. However, a rational approach based on realistic pricing , cost-effectiveness, and perhaps the principles of BOOT (Build, Own, Operate and Transfer) may provide the required "light" at the end of the tunnel.

Please send your comments and questions to Arjun Dhakal at arjundhakal@yahoo.com or Manik Duggar at manikd@sandeeonline.org

including drainage blocking. Prior to plastic bags, Bangladeshis used biodegradable jute bags, which were replaced by the more convenient polybags. Reduction of demand for jute bags was a blow to millions of jute producers, who over time substituted jute with rice and other agricultural products. Environmental problems related to use of polythene bags are mainly caused by improper disposal of bags by city dwellers.

A Ministry of Environment survey report shows that about ten million polythene bags are used and nine million dumped everyday in Dhaka city. On average, a family in Dhaka throws out four polybags everyday. Of these only 10 percent are dumped in the right place. Most of the bags are typically thrown in the street or into drainage

facilities. Since the bags do not degrade as paper bags do, they very frequently end up clogging drains and sewerage system, which in turn creates significant negative health effects, water logging etc. There are some industries which are engaged in recycling bags but the polythene bags when recycled create a harmful hydrogen cyanide gas, which contributes to respiratory problems. Water-logging is also believed to be the main cause of several outbreaks of dengue fever in Dhaka in the last few years.

Two previous governments, including the government led by the present Prime Minister (in 1991) tried to ban use of polybags but failed to do so due to lobbying by bag producers. However, after the 1998 floods in Dhaka, and as a result of a strong campaign by NGOs, people became aware of the negative environmental impacts of plastic bags and this time, the

government successfully put this to an end. Demand for jute is now expected to increase and it is expected that it would increase income and employment in rural Bangladesh.

This is a report by Enamul Haque on a new environmental policy in Bangladesh, where the government has decided that the environmental harm caused by plastic bags is far greater than the everyday conveniences provided by these bags. Several questions of course remain: Are the benefits of an outright ban greater than the costs? Can we put a number on the benefits of such a ban? Will the ban be successful? It is hard to imagine a world without the omnipresent plastic bag – what are the regulatory costs of seriously implementing a full ban? We will continue to look for answers to these economics questions in future newsletters. Please write to Enamul Haque at ehaque@northsouth.edu with comments.

Vehicular pollution control in Delhi – A plea for a more integrated approach

Vinish Kathuria

Delhi, which was once one of the greenest capital cities in the world, has attained the dubious distinction of being among the 10 most polluted cities of the world. In the last 10-15 years, pollution has gone from bad to worse. The average level of solid particles in the air or SPM, which was 375 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) during 1991-1994 (approximately 5 times the annual average standard set by the World Health Organization (WHO)), increased by more than 20% to 460 $\mu\text{g}/\text{m}^3$ during the period 1999-2001 (over 6 times the WHO standard). A study by Brandon and Hommann in the early nineties estimated that 7,490 deaths/year could be avoided in Delhi if WHO norms for fine particles in the air (PM_{10}) could be attained.

The transportation network in Delhi is road-based, which results in vehicles contributing significantly to total air pollution. Data shows that of the 3,000 metric tonnes of pollutants released every day in the city, 66% is from vehicles. This contribution of vehicles to total pollution load has increased tremendously in the

last two decades. The contribution of vehicular pollution to total air pollution was at 23% in 1971, rose to 43% in 1981, and was 63% in 1991.

For us economists, vehicular pollution is a negative externality where users of polluting transportation fail to take into account the environmental costs they impose on others. If vehicle users are forced to internalize this cost by, for example, paying an amount equivalent to the cost of externality, it would result in cleaner vehicles, less traffic and reduced air pollution. Governments often use a variety of policy instruments to limit this negative externality. Generally, environmental policy instruments are classified according to whether they are Command and Control (CAC) or Market Based Instruments (MBI) and according to whether the regulator uses direct regulation through emission standards, fees, permits etc. or indirect instruments, i.e. taxes, technology standards etc. to control pollution. In general, there are three stages at which vehicular emissions can be controlled. Stage I or the pre-combustion stage, where fuel quality can be upgraded. Stage II or the combustion stage

where engine modifications are required, and, stage III or post-combustion stage where exhaust treatment devices like catalytic converters are required. Thus, policy instruments can be oriented at any of these three stages and can be directed towards either producers (fuel or vehicle) or dealers (petrol-pump owners or vehicle dealers). There are also non-technical instruments that can be aimed at consumers, requiring behavioural adaptations either in the mode of transport (stage 0) or necessitating periodic maintenance checks to minimise pollution levels (stage IV).

To combat the menace of air pollution in Delhi, a number of policy instruments have been implemented in the last 3-4 years at all levels – customer, dealer and producer -- and at all stages – stage 0 to stage IV. The most important among these are complete removal of leaded gasoline (CAC, I), phasing out of commercial vehicles older than 15 years (CAC, 0), installation of pre-mixed 2T oil (CAC, 0), mandating passenger cars to meet EURO II norms (CAC, II), replacement of all pre-1990 autos and taxis with new (subsidized) vehicles using clean fuel (CAC, MBI, II) etc. The last measure mandating all buses to turn to CNG is still under implementation. The impact of this instrument can be expected only after the complete fleet is converted by the end of the year.

An analysis of daily ambient air pollution data by the author (Kathuria, 2002) for the period June 1999 to June 2001 at one of the busiest intersections in Delhi i.e., the Bahadur Shah Zafar Marg, unfortunately suggests that the instruments implemented so far have not decreased pollution. In fact, SPM quality has deteriorated over the period. In 1999 the average SPM level was 423 $\mu\text{g}/\text{m}^3$ and this increased to 515 in 2001. Carbon monoxide (CO) violations for each 8 hour category also increased in 2000; but in 2001 CO showed significant improvement (though this was still

nowhere near the set standard). In fact, SPM, PM_{10} and CO, violations, which should not have exceeded 2% throughout the year, had an adherence rate of 3%, 20% and 18%. Only sulphur dioxide (SO_2), which was within standards even before enacting these policy instruments, is showing significant decline.

One of the reasons we are not seeing an overall improvement in ambient air quality is because regulatory instruments rely on improving new vehicles, with little emphasis on in-service vehicles. The contribution of in-service vehicles could be very high as data indicates that in India 20% of 'bad' in-service vehicles contribute as much as 60% of total vehicular emissions. Even with new vehicles, the focus is on emission limits not on limits on ambient air quality. In fact, in Delhi every day 370 to 600 new vehicles are registered, which makes any expectation of improvement in air quality simply far-fetched. Another important explanation for instruments not showing the desired results is excessive emphasis on CAC instruments and that too directed towards air quality. Recently, many countries like Chile and Singapore have shifted from fuel efficiency and atmospheric regulation to pure transport policies like road-pricing, parking and collective transport. The shift has multi-faceted benefits as it addresses pure transport related externalities like congestion, traffic accidents etc., besides having a beneficial impact on air pollution. In fact, the containment of vehicular pollution would require an integrated approach, with equal reliance on pure transport policies, instruments towards fuel and air pollution, and emphasis on in-service vehicles. Clearly, this is the direction that Indian regulators have to head to seriously combat pollution problems in Delhi.

Please write to Vinish Kathuria at vinish67@yahoo.com for references and any further questions you may have.

Socio-Economic Heterogeneity and Distributional Implications of Common Property Resource Management in Nepal

Bhim Adhikari

Despite long debate and skepticism about common-pool resource (CPR) management under community ownership in poor regions, there is now a growing consensus that local institutional arrangements, including customs and social conventions, can overcome the collective action problem and help achieve equity and efficiency in the use of such resources. This recognition has led to the devolution of natural resources from centralized government management to local user groups in Nepal and other South Asian countries. In Nepal, as discussed in SANDEE's Newsletter No. 3, devolution of forests has been underway since 1990. National forests have been handed over to forest user groups (FUG) under a community-based property rights regime. FUGs are granted usufruct rights to forests through legal enactment and are being encouraged to become independent and self-governing organizations. To date, more than 9000 FUGs manage about 660,000 hectares of community forest through out the country (CPFD Database, 2000).

Although local control over natural resources is regarded as a win-win solution for environment and local development, the empirical evidence regarding the economic impact of CF management is rather mixed. Scholars on commons argue that recent world wide policy shifts towards community-based forest management have not had the desired impact on the livelihood of the poorest section of the community (for whom the programmes were designed). They further posit that community-based forestry programs are well suited to the promotion of sustainable regeneration, but that such regeneration is currently being achieved at the expense of the poor (Kumar, 2002). Further, management regimes of community forests are disproportionately biased towards the production of intermediate forest products that are inputs into the farming system rather than non-timber forest products, which can contribute significantly to the livelihood of poorer households (Richards *et al.*, 1999). Scholars have also argued that natural resource managers have failed to consider that resources often have multiple uses and that there tend to be sub-groups of users who may not benefit

from changes in property rights (Meinzen-Ruth and Sallow, 1997). This empirical evidence on the impact of community forests on the poorest segments within communities and the disparities inherent in the social and economic structure of most Nepalese villages automatically raise concerns as to whether the cost-benefit sharing arrangement in community forestry in Nepal is egalitarian.

It has been argued that socio-economic differences among the members of a resource-using group might be associated with differing degree of control to and access over the local commons. In light of this inequitable access to CPR, scholars on commons have pointed to the problem of collective action in an economy with highly heterogeneous agents (Baland and Plateau, 1996; Bardhan and Dayton-Jonshon, 2000; Karaivanov, 2001). The presumption is that socio-economic differentiation and group heterogeneity may have negative effects on the likelihood of collective action. Divergence of interest among heterogeneous agents is likely to emerge when socio-economically heterogeneous groups are sharing common resources since their interests in resource management may significantly differ from one another. Nevertheless, the hypothesis that inequality, especially socio-economic differences among community members might be an important part of the answer has recently received scholarly attention. Although the relationship between socio-economic heterogeneity and commons performance has been discussed in great depth, issues such as equity and distributional implications of CPR institutions remain less understood.

In an attempt to identify the relationship between socio-economic differences and equity of resource distribution of a resource held under community ownership, I undertook an empirical study of CF management among 330 households from the mid-hills of Nepal. The analysis of household level benefits from CF suggests that poorer households are currently benefiting less from CF than relatively better off households. Moreover, an econometric analysis indicates that household labor allocation decisions and access to and control over CF are dictated by various socio-economic and demographic variables. In general, it appears that household land and livestock holdings, gender, ethnicity and education of family members exert significant influence on household labor allocation decisions and thereby

on household income from CPR. The results also show that transaction costs of CF management can be a significant part of resource management costs, a factor that is generally ignored in economic analysis of participatory forest management. At a glance, the impact of CF on sustainable forest management seems to be somewhat ambiguous. While CF seems to be good for forest resources, fundamental questions remain about its equity, distribution and livelihood implications. It is evident that during the CF process rights of certain interest groups gradually get curtailed -- partly as a result of the restrictive management regime and partly because of the lack of attention placed on products most useful to them in designing the new property rights structure. Thus, in the face of persistent socio-economic inequality within communities, restricting the access of poor people through changes in property rights may increase poverty.

The results obtained from this study have important policy implications for community-based resource management. One important implication is that interventions seeking to

reduce poverty need to improve both productivity of forests and distribution systems. Since poor people do not get substantial benefits from agricultural related forest products, forest management regimes need to be directed at increasing alternative forest products, mainly non-timber forest products that play a significant role in rural livelihoods. Further, policy-makers need to consider household and community characteristics in order to incorporate interests of different income groups into operational plans when handing over forests from government control to community ownership. In other words, an important area for policy consideration is the need to ensure that the interests of poorer forest-dependent communities are adequately represented in forest planning and management decisions. If the poor within forest dependent communities do not feel empowered to make decisions, they are unlikely to benefit from regime changes.

Bhim Adhikari is a SANDEE research grant recipient. His work on forest communities will soon be completed and appear as a SANDEE working paper.

Happenings....

We are very pleased to announce that Professor Partha Dasgupta and Professor Karl-Goran Maler, co-founders of SANDEE, have been jointly awarded the Volvo Environment Prize for 2002. This prestigious award is given by an independent foundation, which was instituted in 1988. Laureates represent all fields of environmental and sustainability studies and initiatives. Further, the Queen of England recently knighted Prof. Dasgupta in Her Majesty's Golden Jubilee Honors List.

Congratulations Sir Partha and Dr. Karl-Goran!

Dr. Gopal Kadekodi, who has been a friend and advisor to SANDEE, has been elected President of the Indian Society for Ecological Economics. Dr. Kadekodi is the Director of the Center for Multi-Disciplinary Development Research in Dharwad, Karnataka, a research center that works on environmental economics issues. He will take over from Dr. C. H. Hanumantha Rao.

Congratulations to Dr. Gopal Kadekodi !

SANDEE welcomes Dr. Herath Gunathilake from the University of Peradeniya. Dr. Gunathilake has agreed to join SANDEE's advisory committee. He will bring to us his strong research skills, especially in the area of environmental valuation, his considerable teaching experience, and his links to the environmental economics community in Sri Lanka.

SANDEE Training Activities

SANDEE organized two training courses earlier this year in partnership with a number of institutions. Please read on to find out more about these courses. We foresee repeating the Environmental Economics course next summer and the CGE course within the next two years.

Advanced Course in CGE Modeling and the Environment – A Reflection

Manik Duggar & Sugandha D Tuladhar

The “Advanced Course on Computable General Equilibrium (CGE) Modeling and the Environment” was finally held from February 23 to March 6, 2002 after several rounds of rescheduling. Twenty-four individuals representing the Indian subcontinent and the continents of Africa and South America participated in the course. The Abdus Salam Centre for Theoretical Physics in Trieste, Italy was the main sponsor of the workshop, which was jointly organized by the Beijer Institute of Ecological Economics and SANDEE.

The objective of the course was to give participants an improved understanding of applied general equilibrium analysis and some basic skills in CGE modeling based on GAMS, a software widely used by economists. The course was developed with the aim that, by the end of the course, each participant would be able to design, implement, solve and interpret the results of a small static CGE model.

Our personal account and evaluation of the course in general from the perspectives of a course faculty (Sugandha) and organizer (Manik) is recollected in this article. This is our candid reading of the participants response through informal discussions and interactions about the expectations, challenges, and benefits the course had to offer, and its contribution at an intellectual and personal level.

We are all aware how time consuming it can be to build a real world CGE model. This is especially true in developing countries where the paucity of data makes collection and reconciliation of data painful. These reasons have detracted a lot of researchers from pursuing CGE modeling. The perceived complexity of CGE models is another reason why it is not widely adopted. One participant put this succinctly as “I had CGE-phobia, I used to

skip any literature or paper that talked about CGE, let alone read all the complex equations that are enumerated in a CGE modeling exercise.”

The slow pace of the course and the “learning by doing” approach, we believe, mitigated this phobia for most participants. Although dubbed as an “advanced” course, the teaching approach was simple and elementary so that each participant understood the theory and programming aspect of the course. The participants’ desire to move as a unit in terms of learning and experience “one command at a time” and analyze the effect of “one semi-colon at a time” made it all the more easier for us to translate the simplicity behind this perceived complexity and allow the participants to appreciate the learning process. Our “phobia-laden” participant, at the end of course, had this to say: “I see now what CGE is all about, how different parts are connected, how the equations are derived and linked, and finally solved.” This in essence was the key objective of the course and gives us a great deal of satisfaction to see it successfully delivered.

The professionalism of the participants and demonstration of their willingness to learn new programming technique made the course fun to teach and organize. The late nights in the computer lab on a thermos of tea and coffee with occasional background music has strengthened our friendship and built a better understanding of our mutual research interests and potential application of this course. As resource person and organizer, we learnt a lot from the vast range of experiences participants brought to the course. It was also fun to see how, even at shopping malls, individual actions were being “modeled” in CGE framework!

It also brings vicarious accomplishment to see each and every participant work on a project and complete it, despite the availability of only a short time to “master” a new programming language and to apply CGE modeling to a real world problem. This, in itself, is a manifestation that the course was able to build confidence in participants to analyze different issues faced in their country. It is remarkable how the participants were able to analyze a wide range of policy questions building on the same model, a simple economy model, illustrated by Prof. Lars Bergman. Project topics included analyzing pollution taxes on sectoral distribution of water, impact of September 11, on a small open

economy, CO₂ emissions reduction strategy, tax reforms in Sri Lanka, water policy impacts on water allocation in South Africa, policy alternatives to reduce deforestation in an open economy, and economic reform in Nepal and the Nepalese agriculture. Prof. Karl-Goran Maler

summed it up best in his closing statement when he said the participant response was "just remarkable." Kudos to all of you who joined us for the course and worked well past midnight on most days.

On the funnier side: By popular request...!!!!

Q: How many conservative economists does it take to change a light bulb?

A1: None. The darkness will cause the light bulb to change by itself.

A2: None. If it really needed changing, market forces would have caused it to happen.

A3: None. If the government would just leave it alone, it would screw itself in.

A4: None. "There is no need to change the light bulb. All the conditions for illumination are in place.

A5: None, because, look! It's getting brighter! It's definitely getting brighter !!!

Q: How many Keynesian economists does it takes to change a light bulb?

A: All. Because then you will generate employment, more consumption, dislocating the AD (aggregate demand) to the right,...

Q: How many Marxists does it take to screw in a light bulb?

A: None - the bulb contains within it the seeds of its own revolution.

Q: How many environmental economists does it take to change a light bulb?

A: Eight - one to turn the light bulb and seven to do the environmental impact study.

Q; How many central bank economists does it take to screw in a light bulb?

A: Just one -- he holds the light bulb and the whole earth revolves around him.

Q: How many doctoral students does it take to change a light bulb?

A: I'm writing my dissertation on that topic. I should have an answer for you in about 5 years.

From <http://netec.wustl.edu/JokEc.html>

Regional Course on Environmental and Resource Economics , Rajendrapur, Bangladesh

M. Hifzur Rahman, Bangladesh, Sajid Kazmi, Pakistan, Shamen Vidanage, Sri Lanka

The Dhaka Training Program is a good example of SANDEE's operational motto: "learning with fun". This was declared by Priya Shyamsundar, Program Director of SANDEE at the very outset. SANDEE's first attempt at a Regional course on Environmental Economics was just that: lots of serious study and great fun!

The EE Course was jointly organized by World Bank Institute (WBI), SANDEE and the Bangladesh Economics, Environment and Poverty Program (BEEPP) and was held at BRAC's beautiful and lush-green BCDM Centre at Rajendrapur from 29th April to 16th May, 2002. The course was designed for developing the capacity of young economists. The participants were drawn mainly from academia, but also included colleagues from NGOs and research organizations. All the SAARC countries were represented except for the Maldives.

The three-week course was organized systematically with different themes: the first week dealt with introductory concepts in EE with respect to developing countries and discussed at length topical issues with regard to renewable and non-renewable resources including energy, mining, biological resources and fisheries. The second week introduced concepts in valuation techniques and also introduced concepts of property rights. While part of the third week was designed to put into practice what was learnt previously, we were also exposed to policy issues with real life examples, which were drawn from the first two weeks extensive theoretical course work. Use of economic instruments specially related to water resources, industrial pollution, and waste management were discussed in week 3. Of the total 56 sessions, 18 sessions were devoted to exercises, case studies, group discussions and presentation. The lectures were followed by lively discussion where we shared a variety of experience that was brought from different countries of the region. The reading materials was extensive and contained real life examples that facilitated an understanding of EE issues.

One of the important events of the program was a mock exercise to write short research proposals. The participants grouped even with participants from another country and tried to address a few issues of importance from their own county perspective. Resource persons helped the participants to build good research proposals and provided insights on the proposals presented. While preparing the proposals, we were given an opportunity to visit the library at North South University in Dhaka, which proved to be a great source of reference material. The resource persons encouraged us to revise our proposals and submit them for the forthcoming cycle of SANDEE research grants.

Resource persons for the course were drawn from the World Bank Institute, and other South Asian academic/research institutes including the Institute of Economic Growth (India), University of Peradeniya (Sri Lanka), and North South University (Bangladesh). Faculty included Dr. A K Enamul Haque and Dr. Iftekhar Hossain from Bangladesh, Professor Anil Markandya, Dr. John Dixon, Dr. Maureen Cropper from the WBI, Dr. Herath Gunatilake from Sri Lanka, Dr. M. N. Murty from India and Dr. Priya Shyamsundar from SANDEE. Dr. Aminur Rahman from Bangladesh briefly addressed some issues on waste management on the last day of the course.

Along with the serious learning, we had great fun as well. Apart from developing wonderful friendships in such a short time, we found out that we can be a great resource to each other. An overnight weekend boat cruise to some historic places brought us closer together. In the midst of this weekend tour, Sajid Manzoor, a participant from Pakistan, even gave a lecture on basic Econometrics. The classroom where this lecture was given is worth a mention. It took place in the 100-year old home of a Jamindaar (landlord), which has now been converted into a junior college. The setting was perfect: an old and dilapidated building, an open veranda converted into a class room with an over-used blackboard, and two almost completely used chalk-sticks that we were fortunate to have found on the class floor. While we sat on the old desks and benches in sultry conditions, Sajid's lecture was its best. On the boat trip, we discussed our projects with Priya, who also took this opportunity to group us together on the front deck to describe the research guidelines in detail. Thus, in a relaxed holiday atmosphere and the soothing breeze of the Satalakkha river, some serious work was done.

Job Opportunities.....

Ashoka Trust for Research in Ecology and the Environment (ATREE), Bangalore, India
Positions for Social Scientists, Deadline: September 1, 2002.

ATREE invites applications from social scientists trained in economics or other social science disciplines for the following positions. Please look at www.atree.org for details about these positions or email director@atree.org or info@atree.org

- 1. Social Scientist:** The applicant would have a PhD or equivalent publications in sociology, anthropology, political science or related discipline, with demonstrable research experience in applying an interdisciplinary social science approach to ecological and environmental issues.
- 2. Environmental Economist:** The applicant would have a PhD or equivalent publications in economics, with a focus on environmental and/or resource economics.

WEBNEWS...

SANDEE...

The South Asian Network for Development and Environmental Economics (SANDEE) is a regional network that seeks to bring together analysts from the different countries in South Asia to address environment-development problems. SANDEE's mission is to strengthen the capacity of individuals and institutions in South Asia to undertake research on the inter-linkages among economic development, poverty, and environmental change and to disseminate practical information that can be applied to development policies.

The Global Development Network (GDN) (www.gdnet.org):

The GDN has now launched a "Funding Opportunities" Newsletter. The newsletter is published every two weeks and brings news of funding available to social science researchers in developing countries. An example is the SANEI Fellowship for Research on South Asian Issues. The fellowship is awarded for Empirical Research on South Asian Economies to researchers working on a Ph. D. thesis in a University outside South Asia. In order to avail of this service, you need to create a researcher profile within the GDN website. To create a Researcher Profile on the GDN People database, please visit <http://www.gdnet.org/community/join.html>.

East West Center Fellowships (deadline August 15, 2002):

An announcement of the East-West Center's 2002-2003 visiting fellowships is available on its website at <http://www.EastWestCenter.org/res-vf.asp>. Researchers interested in sustainability issues -- What are the political, economic, social (especially demographic), and environmental obstacles to the pursuit of "sustainable" development? Does sustainability in one area undermine sustainability in another? -- may apply. Successful applicants would be expected to stay in residence in Hawaii for a period of 2-4 months.

Digital South Asia Library (<http://dsal.uchicago.edu/>)

A project of the Center for Research Libraries, this gateway site is a collaborative effort of leading US universities, the South Asia Microform Project, the Committee on South Asian Libraries and Documentation, the Association for Asian Studies, the Library of Congress, the Asia Society, the British Library, the Universities of Oxford and Cambridge, MOZHI in India, the Sundarayya Vignana Kendram in India, Madan Puraskar Pustakalaya in Nepal, and other institutions in South Asia. It provides a wide array of resources on South Asia, including dictionaries and other reference works, databases of photographs, maps, and manuscripts; statistical information from the colonial period to the present, electronic catalogues and finding aids, periodical indexes, electronic books and journals, and more.



South Asian Network for Development
and Environmental Economics

Information about SANDEE and our activities can be obtained online at www.sandeeonline.org. Our mailing address is IUCN Nepal, PO Box 8975 EPC-1056, Kathmandu, Nepal. Telephone: 977-1-528761; Fax 977-1-536 786. If you have any questions about our programs, please write to Priya Shyamsundar at priyas@sandeeonline.org or Manik Duggar at manikd@sandeeonline.org

SANDEE

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Notes:

1. This form is for institutional members only. The institutional membership fee is US\$25 per year for South Asian institutions and US\$250 per year for non-South Asian institutions.
2. Payments must be made in US dollars payable to **IUCN Nepal** and must accompany the Membership Form. **Please do not send any cash.**