Dear Friends and Colleagues

Early 2014 has been eventful for our SANDEE family. Our co-Founder Sir Partha Dasgupta led a workshop on sustainable humanity and nature at the Vatican, which brought together leading thinkers from around the world and was attended by the Pope and several SANDEEites. SANDEE Board Chair Madhu Khanna briefed policymakers on advanced biofuel production on Capitol Hill in Washington, D.C. Our Executive Director Priya Shyamsundar and Advisor Jeff Vincent were expert moderators of a panel on Ecosystem Accounts at the World Bank’s Fourth WAVES workshop in Washington, D.C. SANDEE and ATREE jointly organised a brainstorming workshop in Bangalore, India to identify priorities for research on the economics of ecosystems services. A number of SANDEEites presented their findings at conferences across South Asia, and ten new research studies were launched on important questions related to environment and development.

In ‘Focus’, Arun Shrestha discusses the challenges of flash floods in South Asia and identifies ways forward for risk management. SANDEE will build on this work as it starts new international research in South Asia’s ‘hot spot’ areas where populations are particularly vulnerable to long-term climate change. This research and the continuing efforts of SANDEE and others, we hope, will contribute to ongoing dialogue on successful adaptation to climate change in South Asia.

With best wishes,
SANDEE Secretariat
Kathmandu, Nepal
SANDEE’s research is thematically focused on three areas: economics of climate change, ecosystems management, and policies and programmes for greener development. Grants for research are thus awarded mostly under these themes, and so it was with grants given in the winter 2013 cycle. SANDEE received a total of 94 research concept notes and approved six research grants and four micro-grants based on the Research and Training workshop held in December 2013.

### Research Grants

**Economics of Climate Change**

- **Kumar, Surender**, India
  Embodied Carbon Trade and Trade Resistances: Evidence from South Asian Countries

- **Budhathoki, Nanda Kaji**, Nepal
  Determinants of Nepalese Farmers’ Adaptation Strategies to Climate Change

**Ecosystems Management**

- **Rodrigo, Chatura**, Sri Lanka
  Organic Rice Production in Sri Lanka: Opportunity Cost of Supply vs. Willingness to Pay

- **Chand, Narendra**, Nepal
  Provision of Ecosystem Services and their Tradeoffs in the Terai Landscape of Nepal

- **Dorji, Phurpa**, Bhutan
  Have Mitigation Strategies Balanced the Needs of Human and Wildlife in Langchenphu Gewog? (Micro Grant)

- **Choda, Jamyang**, Bhutan
  Evaluation of Mitigation Measures Used for Wildlife Protection: A Case Study in Bartsham Gewog, Trashigang, Bhutan (Micro Grant)

- **Rinzing, Sangay**, Bhutan
  Human-Wild-life Conflict: A Case Study of Wild Pigs in Kangling Gewog Bhutan (Micro Grant)

- **Giri, Nandu**, Bhutan
  Examining Human-Elephant Conflicts in Sipsu Gewog, Samtse, Bhutan (Micro Grant)

**Policies and Programmes for Greener Development**

- **Kabir, Mahfuz**, Bangladesh
  Valuation and Emission Accounting of Subsoil Minerals: The Case of Natural Gas and Coal in Bangladesh

- **Padda, Ihtasham**, Pakistan
  Compliance with Cleaner Production: An Appraisal of the Tanning Industry in Sialkot, Pakistan

### Working Papers

#### Monetary Incentives to Reduce Open-Field Rice-Straw Burning in the Plains of Nepal

Krishna Prasad Pant, WP 81-13

Rice-straw burning in the open fields of southern Nepal is common practice. This is problematic because biomass burning contributes to smoke, black carbon and greenhouse gases. Few studies have tried to identify incentives that might stop farmers from burning. This study used a uniform price unit-supply reverse auction, followed by an actual payment, to measure the amount of incentive required to stop smallholder farmers from burning rice-straw. About 86 percent of participating farmers fully complied with an agreement to avoid burning for a median payment of $78/ha. The study indicates a linear relationship between payments and burning prevention.
To Cultivate or Not? Examining Factors that Influence Jatropha Agriculture in Northeast India
Kishore Goswami, WP 82-14

In the Indian states of Assam and Arunachal Pradesh, a variety of factors influence the cultivation of Jatropha. The findings from this study suggest that risk aversion, land surplus, and product knowledge all play a role in a farmer’s decision to grow Jatropha. Institutional factors such as credit availability, travel time and distance, and labor and product markets are also important considerations. The study shows that, although there are serious bottlenecks to increasing Jatropha production, these problems can be remedied with institutional interventions.

Weather Variability, Agriculture and Rural Migration: Evidence from State-Level and District-Level Migration in India
Brinda Viswanathan, WP 83-14

This study explores the three-way linkage among weather variability, agricultural performance and internal migration in India. A two-equation model examines variations in weather that influence crop yield and identifies the resulting effect on the rate of migration. The analysis uses two variants of migration data as reported in the Indian Census: inter-state, out-migration data and intra-state, district-level, in-migration data. The results suggest that the impact of crop yields on migration depends both on the type of crop and the interplay between inter- and intra-district migration rates. Migration is a potential adaptation strategy for people adversely affected by weather and climate change, but these inter-linked effects in India appear thus far to have been relatively small.

Examining the Impact of Climate Change on Migration through the Agricultural Channel: Evidence from District-Level Panel Data from Bangladesh
Kazi Iqbal, WP 84-14

In Bangladesh, climatic changes of temperature and rainfall which impact agriculture also impact migration. This study uses historical district-level data from 64 districts over three periods (1974-1980, 1981-1990 and 1991-2000) to analyse migration-related outcomes. Revenues from agriculture indicate that fluctuations in temperature and rainfall contributed to a decline in agricultural productivity. Fixed Effect and Instrumental Variable estimations show that about one standard deviation decrease in real per capita agricultural revenue increases the net out-migration rate by 1.4 to 2.4 percent, controlling for unobserved effects for districts and years. The net out-migration rate is predicted to be some 22 percent higher in 2030 than in 1990, assuming the variability in temperature stays stable and the behavioural responses of farmers do not change.

The Impact of Climate Change on Rice Production in Nepal, Prakash K. Karn, WP 85-14

This paper examines the sensitivity of rice yield in Nepal to changes in climate variables and the magnitude of potential impacts on rice productivity. The findings draw attention to the differential impacts on rice yield depending on the stage of rice development. E.g., a 1°C rise in day-time maximum temperature during the ripening phase of rice increases harvest, but productivity also declines when day-time maximum temperature goes beyond 29.9°C. Since the average maximum temperature is already higher than this threshold, rice yield will likely diminish with any further increases in maximum temperature. Rainfall appears to have a strong negative effect on yield if it occurs when rice plants are in the nursery stage. Overall, under a double CO₂ scenario predicted for 2100, rice yield in Nepal is expected to drop by about 4.2 percent relative to current production levels.
Floods are the most frequent water-related hazard in the world. The mortality rate for flash floods is much higher than for flooded rivers and other water-related hazards. Statistics show that the number of people killed and affected per flood event is significantly higher in Asia than elsewhere (Figure 1).

While the water flowing from the Hindu Kush-Himalayas (HKH) sustains the lives and livelihoods of the millions of people residing in the region, it is also a source of considerable hazard. Flash floods are particularly devastating. Poverty and high population density contribute to significant vulnerability of South Asian countries to flash floods.

Causes and Impacts

The most common cause of flash floods in South Asia is high intensity rainfall. Extreme rainfall exceeding 100 millimeters occurred June 16-17, 2013 in Uttarakhand, India and western Nepal, an event that affected some 900,000 people. Intense rainfall into the headwaters of a river often causes not only flash floods in upstream areas, but also large floods downstream. The mega flood of 2010 in Pakistan caused damage estimated at US $9.7 billion, or double the damage caused by the 2005 earthquake.

Another cause of flash floods in South Asia is glacial lake outbursts. The glaciers in the HKH, particularly in the eastern Himalayas, are in a general state of retreat. Retreating glaciers often leave behind voids filled by melted water called glacial lakes. When the naturally occurring dams that hold these lakes fail due to water pressure, erosion, avalanche, etc., the outburst can be catastrophic. There have been 56 recorded events of glacial lake outburst flood (GLOF) events in this region and it is likely that the frequency of GLOF events could increase due to climate change.

Landslides are common phenomena in South Asia. Landslides and debris flows, released by torrential rain or seismic activity, may cause temporary dams across river courses impounding immense volumes of water. Subsequent overtopping or breaking through of the earth dam can result in a landslide dam outburst flood (LDOF), which, similar to a GLOF, is difficult to predict and may cause serious loss of life and damage to property. One of the most striking examples of a LDOF is that of the Yigong River in eastern Tibet in 2000, which caused large infrastructural damage in China but no human casualties. However, downstream in India, more than 50,000 people in five districts of Arunachal Pradesh were rendered homeless and some 20 large bridges were washed away. As there was no mechanism to warn the people living downstream.

Flash floods can also be caused by rapid snow melt or failure of infrastructure. In the western Himalayas, the rapid melting of accumulated snow has led to flash floods, while the 2008 Koshi flood and Jiadal flood in Assam, India were due to poor design or lack of maintenance of infrastructure.
Flash Flood Management in South Asia

Despite the prevalence of flash floods and their high risks, the countries of South Asia have few policies, plans or governance mechanisms in place to address them. An integrated approach encompassing flood plain zoning and flood plain management is gaining ground. There is a regional disparity in early warning systems, but a general acknowledgment that early warnings and management of flash floods are best handled by local communities.

Afghanistan and Bhutan have no operational flood forecasting system. Nepal is currently conducting a test of flood forecasting models and intends to provide flood forecasting in the near future. India and Bangladesh have an extensive flood-forecasting network, but mostly for riverine floods, not flash floods. Pakistan has a network of weather radars used for flood forecasting and has been successful in forecasting and minimising human casualties in recent years.

The Way Forward: Enhance Flash Flood Preparedness

- Institutional focus on flash floods as a separate category of disasters.
- Strengthening of national hydrological and meteorological networks and weather radars; and use of satellite real time data to forecast and provide warnings.
- Flash flood modeling and hazard mapping to assess risk, identify hazard-prone areas, and develop land use guidelines and building codes.
- Transboundary collaboration, both international and national, including information exchange, joint implementation of mitigation projects, and establishment of early warning systems.
- Effective early warning systems with the involvement of upstream and downstream communities.
- Empowerment of communities and the use of local knowledge to minimise the risk and promote community-based disaster management.

- Arun B. Shrestha, Senior Climate Change Specialist and Regional Programme Manager with ICIMOD in Kathmandu, Nepal
Collaborative Adaptation Research Initiative in Africa and Asia (CARIAA)
The International Development Research Centre of Canada (IDRC) and the Department for International Development (DFID) of the United Kingdom formed the CARIAA partnership to support some of the world's most vulnerable population “hot spots,” those areas where climate change puts health, welfare and livelihood at immediate risk. CARIAA funds research to inform policy in semi-arid regions, deltas and river basins throughout Asia and Africa.

In South Asia, climatic changes in the water flows and the monsoon cycle have the ability to affect 1.5 billion people in the Hindu Kush Himalayan region through impacts in the Ganges, Indus, and Brahmaputra floodplains. Thus, as part of CARIAA, ICIMOD and a consortium of four other partners will examine climate trends and adaptation strategies in the glacier and snowpack-dependent river basins of the Hindu Kush–Himalayas. SANDEE will contribute to this effort, termed Himalayan Adaptation, Water and Resilience (HI-AWARE), by organising a set of large research studies focusing on the economics of adaptation to climate change in key deltas across Bangladesh, Bhutan, India and Nepal.

Publications and Dissemination

Publications


Dissemination


Launched in 2010, WAVES is a global partnership of governments, UN agencies, international institutes, non-governmental organisations and academics that supports sustainable development by encouraging countries and corporations to practice natural capital accounting (NCA), the inclusion of natural resources into economic accounts and development planning. Several SANDEEites attended the D.C. meeting, which focused on water and ecosystem accounts, as well as how NCA supports wider development goals. Priya Shyamsundar and Jeff Vincent moderated an expert panel on Ecosystem Accounts.

For more about WAVES, their goals and partners, see www.wavespartnership.org.
Workshop on Sustainable Humanity, Sustainable Nature: Our Responsibility
Vatican City, May 2-6, 2014. Organised by the Pontifical Academy of Sciences and Social Sciences.

If you think you’re too small to make a difference, you haven’t spent a night with a mosquito. - African proverb

This piece of wisdom resonated with the 100 odd participants of the four-day workshop in the city-state that is the time-honored home of the papacy. As identified in the opening note by the joint organisers, P.S. Dasgupta, V. Ramanathan and R. Minnerath, the workshop was about the big issues we face today: Are Humanity’s dealings with Nature sustainable? What is the status of the Human Person in a world where science predominates? Should one expect the global economic growth that has been experienced over the past six decades to continue for the foreseeable future? Should we be confident that knowledge and skills will increase in such ways as to lessen Humanity’s reliance on Nature despite our increasing economic activity and growing numbers? Is the growing gap between the world’s rich and poor in their reliance on natural resources a consequence of those growths?

This was a unique workshop in many ways. First, it brought together some of the best minds in multiple disciplines to discuss the future of the earth. In hand were four Nobel laureates representing different disciplines. Second, it was organised at the Vatican, possibly to assist as the Pope gets ready to write a major piece on the environment (an Encyclical, the highest form of papal writing). Third, if there was one strand that ran through this really smart, mostly scholarly collective, it was a sense of moral urgency about the future of humanity. While there were some academic quarrels over facts, the main discourse was about the obligation we have to put the earth and its humans on a sustainable path. Honduran Cardinal Oscar Rodriguez Maradiaga reflected the mood at the workshop beautifully when he said, “Nowadays man finds himself to be a technical giant and an ethical child.”

SANDEEites would be interested to note that the two academic co-organisers of the workshop were both from South Asia – SANDEE’s Founder Sir Partha Dasgupta and V. Ramanathan, an atmospheric scientist from UCSD. The discussions, not surprisingly, ranged from the theoretical to the empirical. Sir Dasgupta probed into the nature of social externalities and how appropriate technology is unlikely to emerge to solve many critical problems because markets will not correct for these externalities. Prof. Ramanathan, on the other hand, focused on the need for technological solutions and argued for better cook stoves – building not only his years of experience as an academician but more recent sojourns into villages in several parts of India.

The economics of environmental changes emerged strongly in many discussions at the Vatican. SANDEE Advisor Jeff Vincent surveyed the literature on tropical forests and discussed the implications of deforestation and degradation on poverty. Karl-Goran Maler made a case for better measures to account for ecosystem services, while Achim Steiner, the head of UNEP, argued that environmental valuation is no perfect solution, but gets us out of the problem of attributing a zero value to many goods and services. Prof. Jeffrey Sachs emphasised the need for Sustainable Development Goals. Most compelling was Nobel Laureate Joseph Stiglitz’s discussion on inequality.

For example, the Walmart family in the United States owns about 35% of the wealth of the entire country. But policies are responsible for the inequality that exists in income, and more so in wealth. These polices can be changed. This push to change policies was reinforced by Sir Dasgupta’s call to separate the discussion on aggregate growth from poverty reduction as poverty reduction requires employment generation more than it requires increases in the growth rate. Time again the conversation moved to the dual problems of decreasing current inequality and enabling the future generation to share in earth’s wealth.

Several years ago, I listened to presentations by a group of scientists at Dharmasala on planetary boundaries. The Dalai Lama, in his usual optimistic fashion, said humans will find a way out. The discourse in the Vatican was possibly a bit more dark and urgent. There was certainly a sense that humanity had very little time left to change course, and as discussed by Prof. Schellenhuber of the Potsdam Institute for Climate Impact Research, if we do not heed the warning signs, we may really be knocked off the threshold.

Let us fix the incentives with our research on economics, but perhaps it is also time for us to take our environmental woes to those who inspire the masses and their bully pulpit may offer new ways forward.

Please visit http://www.casinapioiv.va/content/accademia/en/events/2014/sustainable.html to obtain more information and to see YouTube videos of the presentations at the Vatican.

- Priya Shyamsundar, Executive Director of SANDEE
**Training**

**Experimental Methods in Ecological Economics**  
Tejpur, India, December 4, 2013

A pre-conference workshop to the Seventh Biennial Conference on Global Change organised by the Indian Society of Ecological Economics (INSEE). The workshop, co-sponsored by SANDEE, INSEE and the Indian Council of Social Science Research, had five sessions, two each by Gautam Gupta and Neeraj Hatekar and one by Krishna Pant. The secretary of INSEE, Pranab Mukhopadhyay opened the workshop.

**Cost-Benefit Analysis**  
Kathmandu, Nepal, December 6-8, 2013

Dr. Madhu Khanna, Chair of SANDEE’s governing board, taught this three-day course for researchers who wanted to strengthen their skills in conducting cost-benefit analysis to examine environmental issues. Attendees gained hands-on experience in conducting cost-benefit analyses on spreadsheets and evaluated the trade-offs between environmental protection and economic development.

**Research and Writing Workshop in Environmental and Natural Resource Economics**  
Thrissur, India, January 18-22, 2014

SANDEE and the Centre for Excellence in Environmental Economics, College of Horticulture, Kerala Agricultural University, organised this workshop. Research and writing workshops develop proposal-writing skills among researchers to prepare them for applying to SANDEE’s grant programme. SANDEE also introduces researchers to the current policy concerns and research themes of environment and development across South Asia. The 15 participants included three from Sri Lanka, one from the Maldives and eleven from India.

**Winter School in Resource and Environmental Economics**  
Kathmandu, Nepal, March 4-13, 2014

This course is an annual event for SANDEE. Researchers who have already received a SANDEE research grant attain the skills necessary to progress in their ongoing project. The two-week Winter School covers a variety of topics like designing a sample, developing a survey instrument, and training enumerators. It covers survey data collection methods and challenges, data management tools, the basics of analysis, literature review, presentation skills, manuscript development and econometrics. Twenty-seven researchers from Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka participated in the Winter School.
Other Developments

Kudos

- Indrila Guha was part of a segment on TARA NEWZ out of Kolkata that aired in India and Bangladesh and featured Indian Sunderbans Minister Sri Manturam Pakhira. Participants on the programme discussed the effect of tourism on the Sundarbans.

- The international non-profit Blacksmith Institute invited Yamini Gupt to extend her work on lead battery recycling, and work together with the Indian Ministry of Environment and Forests, the institute, and other stakeholders on policy initiatives to help solve lead pollution issues in India.

- SANDEE research associate Tehmina Mustafa completed her Ph.D. from Sindh Agriculture University Tandojam in Pakistan. Her thesis was on "Economic Valuation of Wetland: A Case Study of Keenjhar Lake in Sindh Province of Pakistan".

- Hippu Salk Kristle Nathan was promoted to Assistant Professor at the National Institute of Advanced Studies in Bangalore, India.

- The University Grants Commission in New Delhi has awarded INR 5,700,000 to the Department of Economics, Ravenshaw University, Odisha, India for the continuing research projects of Sudhakar Patra and Mamata Swain.

- Mohammad Rafiq was interviewed by Islamabad-based Pushto TV about pollution, waste management and the biodegradability of shopping bags and other plastics. Rafiq and students of the university in Peshawar have formed the Green Environmental Protection Society to promote awareness of environmental problems.

- Kanchana Wickramasinghe received the best presentation award for "Environmental Orientation in the Hotel Sector in Sri Lanka" at the International Conference on Hospitality & Tourism Management in Colombo, Sri Lanka.

Influencing Curriculum Change

- The University of Hyderabad, India introduced a new graduate course on Natural Resource Economics. SANDEE researcher Prajna Mishra is using SANDEE materials to teach the course.
Congressional Briefing

SANDEE Chair Madhu Khanna was recently invited to give a briefing in the Senate and the House of Representatives on Capitol Hill in Washington, D.C. Briefings to Congressional staff and committee members provide an opportunity to communicate science-based policy analysis directly to those men and women who enact legislation in the United States.

“Much of the research we do is very useful for policy because it analyses the cost effectiveness of different policies and designs policies to use government expenditures for maximised social benefits,” says Madhu. “It is different from advocacy or lobbying.”

Congressional briefings can make recommendations, draw attention to policy needs and gaps, or point out unintended consequences. Unlike congressional testimony, which is likely to be focused on an issue that Congress must immediately decide, briefings can concentrate on near-term or slightly longer-term issues.

Madhu presented information in support of policies for effective production of low-cost, advanced biofuels. Her briefing:
-Outlined the environmental, energy security benefits of biofuels.
- Discussed the implications for bioenergy in the recent Farm Bill passed by Congress.
- Clarified how the Farm Bill was inadequate to achieve national goals set for renewable fuels.
- Explained how risk aversion and high implicit discount rates could create hidden barriers.
- Described how hidden barriers would limit the effectiveness of existing policies.
- Recommended Congress supplement existing policies with crop insurance and low cost loans for investment in crop production.

Setting a Research Agenda on Ecosystem Services

SANDEE and ATREE jointly organized a brainstorming session in Bangalore, India in April to determine research priorities for the rapidly deteriorating ecosystem services of South Asia. Four primary issues were identified.
- Contributions of ecosystem services to livelihoods, especially of vulnerable groups.
- Strategies for conservation of services, e.g. biodiversity, that are highly threatened.
- Investigation of resources that are prone to conflict, assessing contributions of services to different stakeholders at multiple scales.
- Identification and examination of policy levers most amenable to conserving ecosystem services.

Research that addresses these topics will enable development programs to better respond to the trade-offs between conservation and development.