

Annual Report 2005/2006

The Beijer International Institute of Ecological Economics



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International Institute
of Ecological Economics

Editorial

This year's Beijer annual report looks a little bit different than the years before. But like the years before this report could not have been made without the help from the contributors. Thank you all for your participation.

This report is structured as follows. The Director contributes by giving his views on the activities at Beijer this past year.

The Articles section gives insight into a number of issues related to the Institute's activities.

Finally, you can read more about the Institute's staff, activities, publications, workshops, seminars, and more in the Appendix.

Anna Sjöström

EDITOR

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Contents

The Director's Column	5
Karl-Göran Mäler	
The MISTRA initiative	8
Johan Rockström, Carl Folke and Karl-Göran Mäler	
New Centre of Excellence for resilience research	12
Carl Folke, Karl-Göran Mäler and Johan Rockström	
Business and global change	14
Karl-Göran Mäler	
Inclusive Wealth and Accounting Prices (IWAP)	15
Åsa Jansson	
A program on marine biodiversity (MARBIPP)	16
Max Troell	
HIV/AIDS – the true tragedy of the commons?	17
Ingela Ternström	
“Trash fish” – trash for whom?	19
Max Troell	
Ten years in the greenhouse	22
Tore Söderqvist	
Spatial/dynamic models of economic and ecosystem interaction	24
James E. Wilen	
The Shallow Lake	26
Aart de Zeuw	
A case for green growth accounting	27
Anastasios Xepapadeas	
Coastal communities, vulnerability and adaptation	28
Priya Shyamsundar and Paul Appasamy	
Resource Accounting Network for Eastern and Southern Africa (RANESA)	31
Rashid Hassan	
Latin American and Caribbean Environmental Economics Program (LACEEP)	33
Francisco Alpizar	
Middle East and North Africa Network of Environmental Economists (MENANEE)	35
Mohamed Abdrabo	
Environment and Development Economics	37
Anastasios Xepapadeas	
The EEE Programme	42
Monica Eberle and Roberto Roson	
Capacity building in environmental economics in developing countries	44
Thomas Sterner	
Appendix	49
Board of directors	49
Staff members	50
Visiting scientists	50
Administration	50
Funding	51
A summary of Beijer activities	51
Teaching and training	53
Staff members' publications and activities	54
Publications	65
A chronology of Beijer and associated networks events	65

The Director's Column

by Karl-Göran Mäler, Director, the Beijer Institute

THIS WILL BE THE LAST "Director's Column" I will be writing as I am scheduled to retire from my current position in the end of this year. As of now, I do not know who will replace me, but I am sure that the Royal Swedish Academy of Sciences will find a

Karl-Göran at the business and global change seminar.



PHOTO: DAVID BITCHO. COURTESY BY IFL, STOCKHOLM SCHOOL OF ECONOMICS.

very good new director who probably will try new ideas and new routes for the future.

I have been the Director for more than fifteen years and these years have been my best years. I have to admit that I was worried before I decided to take on the responsibility of the Beijer Institute. Everyone who knows me (including myself), know that I am a lousy administrator. In fact, I was very hesitant before I accepted the job. It took one year for the then Secretary General of the Academy to convince me to accept the offer. However, I was very lucky being surrounded by colleagues who really cushioned me. Without Christina Leijonhufvud, Astrid Auraldsson, and Anna Sjöström, I would never have been able to function as a head of the Institute.

But besides my problems with my own shortcomings with administration, it has been a marvellous journey and I have enjoyed and more important learned from almost everything that we have been undertaking at the Institute.

Among the stated objectives of the Institute is to find ways by which ecologists and economists can productively cooperate on issues relevant to the human environment. Before 1990, there was open hostility between groups of ecologists and groups of economists. This was even true for the people that later on became engaged in various Beijer activities. But, least for this group, the attitudes have changed. We are now willing to listen to each other, to understand each other, and to work with each other. That, I believe, is the greatest achievement we have made during these fifteen years.

I do not think that this is the time to evaluate our past activities. This was done by an independent evaluation committee last year and I don't think I

am able to improve on its report. Instead, I would like to make some comments on three items I have personally been very involved in and which I have found of extreme intellectual interest and importance. These are

- ❖ capacity building in developing countries
- ❖ resilience in ecological, economic, and social systems
- ❖ indicators of sustainable development

Already before I was appointed director of the Beijer Institute, Professor Sir Partha Dasgupta and I had started a program on capacity building in developing countries. The idea was to teach university teachers in economics the role of ecological systems and how one could apply economic tools to analyse them. From the beginning, we had the program based at World Institute of Development Economics Research, WIDER, of the United Nations University. A year after I was appointed director, we moved the program to the Beijer Institute. We were able to get substantial funding from the MacArthur Foundation and the Swedish International Cooperation Development Agency and as a result we were also able to build regional networks – SANDEE, RANESA, LACEEP and MENANEE – (they are described elsewhere in this report). These regional networks play a very important role in building capacity in ecological economics their regions. It has been very fascinating and rewarding to have been involved in these activities. As a result for me personally, I seem to have very good friends wherever I go in the developing world.

In mid 90's, Professor Buzz Holling and I were able to get substantial funding from the MacArthur Foundation for a program on resilience in ecological systems. The program was carried out in cooperation between the Beijer Institute and the University of Florida. Buzz was the intellectual leader and Lance Gunderson the director of the program. During the years this program run, I learned quite a lot. The program was about thresholds, about hysteresis and about irreversibility. Resilience is defined as the maximum perturbation we can allow before the system would hit a threshold, where it would flip a different basin of stability. I, and most environmental economists, found the existence of thresholds rather arbitrary and I was doubtful to some extent. But eventually, I understood that it all had to do with the dynamics of the systems and with positive feedbacks, the system would be char-

acterized by non-convex dynamics, and as a result thresholds (or bifurcations) would be the natural outcome. Now, positive feedbacks are something that seem very likely in most systems (any persons in doubt should consult Will Steffen's excellent book *Global Change and the Earth System*) and suddenly I understood that thresholds would be generic in natural systems. This, however, would change the economics of these system very much, both with regard to how to manage them to valuation of them. These insights led Professor Partha Dasgupta and I to edit a special issue of *Environmental and Resource Economics* on non-convex dynamics.¹

I have been interested in indices of economic performance since I wrote a book in the early 70's on theoretical environmental economics. However, it was not before 1990 I became seriously interested in the subject and published a number of articles. These articles built on optimal growth models and showed that NNP could be used as a cost-benefit measure for judging marginal changes in the economy. I also tried to show that NNP could be used as measure of the sustainability of the economy, à la Marty Weitzman. But I failed. Furthermore, I was very unhappy for the assumption of optimal growth. If we are on an optimal growth path, there is no need for a measure of sustainable development and, of course, we are never on an optimal growth path. Later on, in 1998, I was returning to this problem during a research seminar we organized in Costa Rica, and I suddenly understood that I could solve both these issues by replacing the assumption of optimality with an assumption of predictability. If we can predict the future economic performance, given today's situation, I could show that there are accounting prices such that the value of the changes in all assets today is the appropriate indicator of sustainable development. Later, Partha, Professor Kenneth Arrow, and I developed these ideas further and as result, we now have an operational theory that already is being applied. I am very proud to have been involved in the development of these ideas.

It is interesting and important to point out that the idea of ecological resilience fits into this framework very nicely. I, Gia Destouni, and Chuan-Zhong Li²

¹ *The Economics of Non-Convex Ecosystems*. Eds. Karl-Göran Mäler and Partha Dasgupta, Kluwer Academic Press, (ISBN 1-4020-1945-9) or (ISBN 1-4020-1864-9)

² Li is the author that should be credited for the intellectual content of the paper.

have recently circulated a paper in which we derive an accounting price for resilience in a simple hydrological system. We are now working hard on generalizing this methodology.

It may seem to be rather small step to expand the value of capital to include resilience but I believe it may be a major step. The reason is that we will not see any direct consequences from the erosion of resilience for a very long time. But in the long term, the present erosion of resilience will increase the likelihood of hitting a “bad” threshold, which may have serious consequences for human well-being. By not including this erosion of resilience in our wealth estimation, we may seriously be overestimating the performance of the economy. However, it will be very difficult to make precise estimates of both the change in resilience and the accounting price of resilience. We need much more research on these issues.

It is interesting to report that RANESA is presently implementing some of these ideas in constructing indicators of sustainable development on a large scale (Eastern and Southern Africa).

I know that I have been very selective in choosing my examples, but that is what I intended to do. At least in the fields covered by the examples, the Beijer Institute has made a mark!

At the end, I should also make one remark on the future of the Institute. Of course, it will and it should change when a new Director is on place. He/she will have his/her own priorities and he/she will together with the Board of the Institute implement these. That is good. However, there is another change that will take place, and that has to do with the decision by MISTRA to award Stockholm University, the Beijer Institute, the Centre for Transdisciplinary Environmental Research (CTM) and the Stockholm Environment Institute a contract of building a new institute – the Mistra Centre. This new Centre will focus on biodiversity, ecosystem dynamics and ecosystem services. These issues fit very well with what the Beijer Institute has been doing for the last fifteen years. It will give us more resources (and in particular resources for extending our international contacts) to carry on the present program (if the new Director and the Board so wish).

Sustainable governance and management of linked ecological and social systems

The MISTRA initiative

by Johan Rockström, Director, SEI, and new Director for the new Institute;
Carl Folke, Director, CTM and Science Director of the new Institute;
and Karl-Göran Mäler, Director the Beijer Institute

LAST YEAR AT THE BEIJER BOARD OF DIRECTORS

meeting a new major initiative announced by the Foundation for Strategic Environmental Research - Mistra - was presented and discussed. At that time we had submitted a letter of interest to Mistra as a joint effort for developing and strengthening the close collaboration between the Beijer Institute, the Centre for Transdisciplinary Environmental Research (CTM) at Stockholm University, and the Stockholm Environment Institute. The Beijer Board endorsed the effort.

The focus of the initiative, *"Sustainable governance and management of linked ecological and social systems"* is influenced by the findings of the Millennium Ecosystem Assessment, the urgent situation facing humanity and emerging research on social-ecological systems. Quoting the announcement

"The rationale for the initiative could be stated in one sentence: The institutional capacities to manage the earth's ecosystems are evolving more slowly than man's overuse of the same systems. This follows from the message coming out of the Millennium Ecosystem Assessment: the scale of present human activities is so extensive that the capacity of the planet's ecosystems to sustain also future generations can no longer be taken for granted. ... The effects of climate change will further add to the precarious situation. Reversing present trends and protecting the potential well-being of future generations will require wiser and less destructive use of the earth's natural systems. This, in turn, will require major changes of today's governance of natural systems."

The large size of the initiative, well over 200 million SEK over ten years and matched by similar

amounts, required the application to be signed by the Vice Chancellor of a major Swedish University. Most Swedish Universities applied and three were selected for the second round - Gothenburg, Stockholm and Umeå - and invited to write a full application and participate in the process. There were scientific and organizational evaluations, interviews and presentations. The Mistra Board made the decision by the end of June this year. The Stockholm team was granted the new centre!

The vision of Mistra is to make a difference for sustainable development by building a world leading research centre that will take the interdisciplinary research on linked ecological and social systems significant steps forward. Ultimate deliverables are new and elaborated insights and means for the development of management and governance practices in order to secure ecosystem services.

The centre will be placed directly under the Stockholm University management as required by Mistra and have its own budget. The strategic placement above the disciplinary mandates of the four faculties at Stockholm University marks the interdisciplinary nature of the new centre and the high priority the leadership of Stockholm University gives to the new Institute. The initiative is also endorsed by the SEI Board, the Royal Swedish Academy of Sciences through the Secretary General, and the Rector of the Royal School of Technology and supported by numerous researchers and groups worldwide. It will be governed by an international board, which will be responsible for the strategic direction of the Institute, the scientific and outreach achievements, the organizational structure and development, and the financial performance of the Institute. An inter-



Johan Rockström, Director of the new Institute

nationally appointed Panel of Science Advisors will guide the research agenda.

The new centre will have Dr. Johan Rockström as the Director, currently Director of SEI and a Science Director, Prof Carl Folke, currently Director of CTM, supported by a steering committee consisting of Prof. Katarina Eckerberg, Prof. Karl-Göran Mäler, and Prof. Sverker Sörlin. The Institute will be located at the Stockholm University campus, in a joint building shared by CTM, SEI and staff from the BI. The core partners, Stockholm University, Beijer Institute and SEI, will in addition to the funds from Mistra, contribute with substantial numbers of staff and resources. Over the five year build-up phase (2007-2011) we foresee the number of staff increasing from 18 - 24 in the initial year, to 50 - 60 staff at a fully operational Institute. We intend to bring a substantial group of young scholars together with the possibility of shared positions with leading research groups and institutes worldwide and secured career paths with university departments. In total we foresee building an Institute with in the order of 100 researchers attached to it, including Institute staff and affiliated Swedish and international research staff, directly involved in research carried out by the Mistra Institute.

We do not intend to fully merge the three collaborating partners. They will all remain, but the activities of the three partners that fit within the Mistra initiative will be joined together under the same



Carl Folke, Science Director of the new Institute

roof. The interest from the international research community is already strong. It is truly exciting and an important step in the history of the Beijer Institute and its collaborators!

The Stockholm application of about 100 pages as well as the announcement from Mistra and the evaluations are available from the Beijer webpage. Below the research agenda is briefly presented.

The research challenge

Our research agenda states that because of cross-scale interactions, positive feedbacks causing non-linear (non-convex) dynamics and possible regime shifts in interdependent social-ecological systems, new approaches to governance will be necessary for guiding management and policy of ecosystem services towards sustainability.

Three fundamental hypotheses form this research agenda:

- 1 society and nature represent *interdependent social-ecological systems*
- 2 social-ecological systems are *complex adaptive systems* and
- 3 *cross scale and dynamic interactions* represent new challenges for governance and management in relation to interdependent social-ecological systems and ecosystem services.

The research focus

Our work over the past decades, and in particular the iteration between theory, comparative work and case studies, has provided a new direction, under continuous development, for governance and management of social-ecological systems in the face of uncertainty and change. It differs from current approaches that tend to take the self-repair capacity of ecosystems for granted and stresses that it will not be sufficient to reduce pressures on ecosystem (e.g. pollution, fishing pressure) to sustain and develop the environmental resources base for societal development. The variables and processes that structure ecosystem dynamics and the sources of social and ecological resilience, vulnerability and adaptability have to be understood and actively managed to deal with the consequences of the interplay of gradual and abrupt change. It implies expanding analysis into broader spatial and temporal scales. A major challenge in this context is to build knowledge, incentives, and learning capabilities into institutions and organizations for governance of local, regional and global ecosystems and to incorporate actors in new and imaginative roles.

We will expand our efforts in developing theory, operational concepts, measures, and policy relevant tools and new insights for social-ecological systems. Clusters of research issues that we intend to address include:

- ❖ What are the processes and functions that generate ecosystem services and how can they be managed?
- ❖ To what extent is there a need to revise current approaches to economic policy, valuation, and indicators of progress and wealth in the light of non-linear (non-convex) dynamics, cross-scale interactions, changes in resilience, and pervasive uncertainty?
- ❖ How do dramatic events in social systems, such as drastic changes on global markets or shifts in political systems interact with and change ecosystems and ecosystem services?
- ❖ What are the basic institutional foundations in social-ecological systems that strengthen or weaken adaptive capacity and how do institutional interactions across temporal and spatial scales affect adaptive capacity?
- ❖ How can governance systems that support sustainable management of ecosystem services be

shaped and stimulated to emerge across spatial and temporal scales in order to cope with uncertainty, surprise and vulnerability in an increasingly globalized society? What are the lessons from past experience and history and what are the prospects for the future?

The research agenda

The research will be structured into three major parts:

- ❖ Advancing insights on complex social-ecological systems
- ❖ Cross-cutting themes for learning and application
- ❖ Emerging themes on social-ecological systems

Advancing insights on complex social-ecological systems

The integrated research on complex social-ecological systems will focus on six clusters that interact, elaborated on in the application.

- 1 understanding ecosystem dynamics (e.g. resilience, regime shifts, diversity) for the generation of ecosystem services;
- 2 incorporating the implications of the dynamics for welfare economics, economic valuation and economic policy;
- 3 understanding socio-political complexity and the role of institutions, governance, and social structures in ecosystem management;
- 4 developing knowledge systems, participatory approaches and management practices that interpret and respond to ecosystem feedback;
- 5 exploring actors, networks and multilevel dynamics of social-ecological systems;
- 6 building adaptive capacity to deal with uncertainty and change.

Cross-cutting themes

We will develop four themes that focus on how to secure ecosystem services and that cut across the above clusters:

- 1 Urban social-ecological systems and globalization,
- 2 Governing freshwater management for food and ecosystem services,

- 3 Governance and ecosystem management of coastal and marine systems,
- 4 Adaptive governance of dynamic landscapes.

These clusters and themes will “kick-start” through the platforms of collaboration among our research groups and take on the challenge of truly integrating natural science with social science and the humanities for new innovative insights, applications and policy developments.

Emerging themes

We will also develop four emerging themes that focus on cross-scale interactions of social-ecological systems, with new and unforeseeable aspects to our thinking on natural resource management:

- 1 international relations and social-ecological systems;
- 2 power, welfare states and social-ecological systems;
- 3 security and global change;
- 4 new history of crisis and resilience.

New and innovative solutions for governance and management are envisioned to emerge. International research collaboration will be substantial with joint projects, joint positions, workshops etc. with internationally renowned research groups, centers and alliances worldwide and feed into the Swedish University system.

An important part of the Institute is outreach, which we define in a broad sense, i.e. the whole process of bridging science to society. It is our vision of building the new centre in joint collaboration to also become an important actor on the global policy arena.

The planning process has been initiated and we expect to start working and build up the new effort already in January 2007. We envision lots of mutual benefits and synergies between the three partners involved in the process. It will be an amazing journey!

New Centre of Excellence for resilience research

by Carl Folke, Director, CTM; Karl-Göran Mäler, Director, the Beijer Institute;
and Johan Rockström, Director, SEI

THE BEIJER INSTITUTE JOINED forces with the Centre for Transdisciplinary Environmental Research (CTM) at Stockholm University and the Stockholm Environment Institute (SEI) to compete for a Swedish Centre of Excellence granted by FORMAS – the Swedish Research Council for the Environment, Agricultural Sciences and Spatial Planning. Well over 100 research teams, covering a wide set of topics, participated, about 20 were selected for the full competition and only five of those were successful.

Our proposal – *Resilience and Sustainability: Integrated Research on Social-Ecological Systems* – was one of those and the only one with an interdisciplinary focus. Beginning January 2006, the five year research program with new funds (25 million SEK in total) has started and we are very excited about the collaboration and the program!

In the program, there is a strong focus on complex systems, regime shifts and resilience. We argue that because of positive feedbacks causing non-linear dynamics and regime shifts in social-ecological systems a resilience approach will be required for guiding management and policy towards sustainability. Conventional models, based on linear dynamics, are not very useful for this purpose. The perspective implies that achieving desirable states and outcomes for humanity, such as those of the UN Millennium Development Goals on poverty, food security, and environmental sustainability will require new integrated and adaptive approaches to social and economic development, where the complex interconnectedness between humans and nature, at all scales, is considered and the existence of uncertainty accepted as the rule.

We will expand our efforts of developing theory, operational concepts, measures, and policy-relevant tools for evaluating the role of resilience and its governance in social and economic development. The clusters of research issues that we intend to address are;

- ✦ What are the basic processes and sources of resilience in social-ecological systems and the features behind loss of resilience and how do they interact across temporal and spatial scales?
- ✦ How can governance systems be shaped and stimulated to emerge across spatial and temporal scales in order to cope with uncertainty, surprise and vulnerability in social-ecological systems? What are the lessons from past experience and history?
- ✦ To what extent is there a need to revise current approaches to economic policy, indicators of wealth, and governance in the light of complex systems and cross-scale interactions? In particular, is it possible to assess the value of resilience so as to include it in an accounting framework?

The program is structured in two major parts that will interact and feed into each other. They are:

- ✦ Advancing theories on social-ecological systems
- ✦ Place-based regional case studies for learning and application

Advancing theories on social-ecological systems

The existence of regime shifts in ecosystems has been well documented. But what are the implications for social-ecological systems? We hypothesize that

- ❖ An ecological regime shift or collapse does not necessarily result in a regime-shift or collapse of the social-ecological system
- ❖ Good governance of the social domain does not necessarily imply maintaining a resilient social-ecological system

We will continue to analyze the theoretical basis and implications of regime shifts in ecosystems for economics and economic policy in relation to resource and environmental management. There will be analyses of shifts in knowledge regimes in the context of the history of ideas and its implications for the trajectories of governance of social-ecological systems. Furthermore, there will be analyses of regime shifts of governance systems with modeling of shadow networks, leadership, institutions and other social capital factors affecting such shifts drawing on findings of the place-based regional case studies. These efforts will not only focus on the threshold between states (or possible multiple states), but will also work towards unraveling variables, processes and sources of resilience and vulnerability to regime shifts in social-ecological systems. The implications of spatial dynamics will be analyzed and tools developed to include spatial dynamics, regime shifts and multi states in resource management models and policy instruments. We will also address social sources of resilience, how they interact across scales and their role in management of social-ecological systems subject to change, including systems of adaptive governance.

Place-based regional case studies for learning and adaptation

Four areas will be in focus, areas in which we are actively working with collaborators internationally and in Sweden.

- ❖ Social-ecological resilience of coastal and marine systems
- ❖ Resilience and reserves in dynamic landscapes
- ❖ Freshwater, food, ecosystem services in productive landscapes
- ❖ Urban social-ecological systems

The collaboration with different groups of the Resilience Alliance will be especially valuable in this context. Carl Folke is project leader, in close collaboration with Karl-Göran Mäler and Johan Rockström. There is close collaboration with the IGBP and a strong team of natural and social scientists participates. The funds will predominantly support several young scholars from different disciplines.

The new resilience program will become a corner stone in the new exciting phase of major joint collaboration between the three institutes under the new MISTRA centre to be created. The new MISTRA centre is presented previously in the Annual Report. For a full resilience program description please see the Beijer webpage.

Business and global change

The road to sustainable development

by *Karl-Göran Mäler*, Director, the Beijer Institute

THE BEIJER INSTITUTE PROPOSED to the Stockholm School of Economics that we should organize a series of seminars together aimed at business leaders on the consequences of global changes and consequential changes in policies for the choice of strategies. The basic issues raised in the series of seminars were:

- ❖ How will the predicted physical and ecological global changes affect the business climate?
- ❖ What will be the probable legal changes in the business environment as a consequence of the physical and ecological changes?
- ❖ How can company managers prepare themselves for the forthcoming changes in economic, social, and physical environment?

The series got an excellent start, thanks to a brilliant lecture by Will Steffen, former Director of

the International Geosphere-Biosphere Program (IGBP). Later in the series of presentations, there was one former Beijer Board chairman, Professor Sir Partha Dasgupta (who discussed the meaning of sustainable development), a present Board member, Professor Jeffrey Vincent, (who discussed corporate environmental strategies), a senior researcher at the Beijer Institute, associate Professor Tore Söderqvist, (who discussed economic valuation of changes in the environment), and myself who discussed the theoretical basis behind the use of economic instruments in environmental policy. I should also add that His Majesty the King participated in one seminar.

The Stockholm School of Economics regarded this, the first attempt of such a course, as so successful that it has been decided to continue with a second such series of seminars. More information on www.ifl.se

His Majesty the King
at the business and
global change
seminar.



PHOTO: DAVID BICHO. COURTESY BY IFL, STOCKHOLM SCHOOL OF ECONOMICS.

Inclusive Wealth and Accounting Prices (IWAP)

by Åsa Jansson, PhD, Researcher, the Beijer Institute

THE IWAP PROJECT CONSTITUTES an attempt to test whether it would be possible to estimate accounting prices for ecological systems. The method, developed in an ecosystem services context, is to be applied to large scale systems, in order to assess the sustainability of the joint economic – natural system.

Based on the work of David Pearce and colleagues (G. Atkinson and K. Hamilton), Dasgupta and Mäler (2000) and Dasgupta and Mäler (2003) sustainable development can be defined as a development that sustains human well-being and the value of changes in all capital assets is the appropriate indicator. The adjective inclusive implies that all capital assets – real capital, natural capital and human capital have been included in the wealth concept. The IWAP project is in the process of applying these insights to the Stockholm County.

So far we have collected information in the formation of real man made capital valued with market prices, taking into account imperfections such as capital taxes, environmental externalities etc. We have also collected data to assess the development of human capital in the county. Also, an inventory of most important ecological assets has been made, including ecosystem services such as nitrogen retention, carbon assimilation, pollination of crops, wood production, crop production and the generation of mushrooms and berries. Quantifications of the majority of the identified ecosystem services have been completed. For ecosystem services

such as nitrogen retention, pollination of cash crops and wood and crop production accounting prices have been estimated. Our preliminary results of the quantification and valuation of natural capital indicate that good ecological knowledge, including e.g. scale issues, resilience and spatial heterogeneity is essential for conducting good valuation of ecosystem services. Furthermore we are currently developing stochastic model for systems with non-convex dynamics where resilience becomes critical and such a stochastic model has already been applied to the Australian case study area. Further use of such stochastic models is to be assessed for the potential use on phosphorous saturated freshwater lakes in the Stockholm County

The Beijer Institute has together with ICTP taken the initiative to create an international network for researchers working with inclusive wealth – the IWAP network. This network includes a team at CSIRO working on the Golburn-Broken catchments in South Western Australia, teams working on estimating inclusive wealth in Namibia, Botswana, South Africa, Tanzania, and Ethiopia. In the spring of 2005 the 2nd workshop on “Inclusive Wealth and Accounting Prices” was held in Trieste, Italy, where members of the Swedish team, Professor Karl-Göran Mäler, Professor Sara Aniyar and Dr Åsa Jansson, presented their work. In August of 2006 another workshop will be organized in Pretoria, South Africa.

A program on marine biodiversity (MARBIPP)

by Max Troell, PhD, Researcher, the Beijer Institute and Associated Professor, Systems Ecology, Stockholm University



PHOTO: MAX TROELL

Seagrass (*Zostera marina*) from the Swedish West coast, a threatened coastal habitat that is very important for fish production and biodiversity.

THE SCIENTIFIC PROGRAM on marine biodiversity (MARBIPP) is coming to an end this year. The general objective has been to provide increased knowledge and end-user directed guidelines for the management of coastal marine biodiversity in Swedish waters. The program has involved many scientists and has resulted in many scientific publications. A web tool has also been developed that allow end-users and the public to access information for marine environmental management, protection and education. An overview of the program, and access to the web tool when it becomes finalised (end 2006) is available from <http://www.marbipp.tmbl.gu.se/>.

The core work by the Beijer Group has concentrated on defining and structuring various ecosystem goods and services, generated from MARBIPP's key coastal habitats. Further, by estimating the economic value of some goods and services, the economic significance of the marine biotopes (and when possible the relation to their biodiversity) have been assessed. These studies involved identifying and analysing larger ecosystem "shifts", and

predict the economic implications associated with changes in ecosystem goods and services.

Collaborating partners in this work are Prof. Nils Kautsky, Department of Systems Ecology, Stockholm University; and Prof. Leif Pihl and Dr. Håkan Wennberg, Marine Ecology, Kristineberg Marine Research Station, Gothenburg University. Involved from The Beijer Institute are Dr. Max Troell, Dr. Tore Söderqvist, Dr. Patrik Rönnbäck and PhD student Sandra Lerda.

PUBLICATIONS:

- 1 Rönnbäck, P., Kautsky, N., Pihl, L., Troell, M., Söderqvist, T. & Wennhage, H. (2006) Ecosystem goods and services from a temperate marine coastal system – identification, valuation and implications of ecosystem shifts (submitted to *Ambio*)
- 2 Pihl, L., Baden, S., Kautsky, N., Rönnbäck, P., Söderqvist, T., Troell, M. & Wennhage, H. (2006) Shift in fish assemblage structure due to loss of seagrass *Zostera marina* habitats in Sweden. *Estuarine, Coastal and Shelf Science* 67: 123-132.
- 3 Troell, M., Pihl, L., Rönnbäck, P., Wennhage, H., Söderqvist, T., Kautsky, N., 2005. Regime shifts and ecosystem service generation in Swedish coastal soft bottom habitats: when resilience is undesirable. *Ecology and Society* 10(1), 30 [online] URL: <http://www.ecologyandsociety.org/vol10/iss1/art30>
- 4 Lerda, S. 2006. Economic valuation of coastal habitats sustaining plaice fisheries (manuscript)

HIV/AIDS – the true tragedy of the commons?

The effects of HIV/AIDS on management and use of local natural resources

by Ingela Ternström, PhD, Researcher, the Beijer Institute

IN DECEMBER 2005 SIDA DECIDED to give a three year research grant to Ingela Ternström to implement the following project.

The AIDS epidemic started in the mid 80's in Africa – it has since then developed into a global crisis. According to UNAIDS/WHO (UNAIDS/WHO, 2004, AIDS epidemic update, Geneva), 38 million people were living with HIV in 2004 and 20 million had died. Of those infected, the largest proportion lives in sub-Saharan Africa. There, the proportion of the adult population that is infected ranges from 10 to 40 percent. HIV/AIDS is different from other diseases and causes of death in that it targets mainly the productive part of the population, leaving the young and the old to care and mourn and to take on the tasks of providing food and governing resources.

Initially HIV/AIDS was regarded as a health problem. However, the pandemic is increasingly recognized to have much wider implications, on all levels of society. Dramatic decreases in the size of the labour force are documented in e.g. Southern Africa as productive capacity is lost, not only to death and illness but also to caring and mourning. Rural households suffer doubly as infected urban relatives move back to the villages: income from remittances is lost and the burden of care increases. Meanwhile, medical bills and funeral costs increase. The economic consequences are dramatic. For the rural population, the solutions so far include a shift to less labour intensive, but also less nutritious crops, which further decreases productivity; an increased dependence on gifts and loans, which places the social fabric of affected communities under severe stress; and an increased use of alternative sources of

food and income – which increases the pressure on local natural resources.

These are the primarily short-run effects of the HIV/AIDS pandemic. What will happen in the long run? How will the social fabric of norms, rules, traditions and customs be affected by the pandemic? What happens when village leaders die and the transfer of local traditional knowledge is lost? When children are forced to take on their parents' tasks? When agricultural production decreases due to a reduced ability to supply labour and purchase fertilizers? When the pressure on local natural resources, such as wild foods, medicinal plants and firewood, increases further? Such resources are often used in common by many people, with intricate webs of rules, norms and traditions governing their use and ensuring long-term sustainability. Will these intricate webs survive the challenges, or will there be extensive resource deterioration? Will HIV/AIDS become the True Tragedy of the Commons?

The purpose of the project is to make a first exploration into the effects of HIV/AIDS on the management and use of local non-agricultural natural resources, such as forests and grazing land. The focus will be on how the HIV/AIDS pandemic affects the institutions (rules, norms, traditions) that govern their use. A further purpose is to put this topic on the agenda of researchers, policymakers and aid organisations.

The main hypothesis is hence that HIV/AIDS affects the use and management of local natural resources not only via an increased demand for food and income from them, but also via a disruption of the social control mechanisms that govern their

use. This hypothesis will be tested by trying to find answers to the following questions:

- 1** Does the reduced labor force, via reduced agricultural productivity and production and via reduced income from skilled labor (e.g. wages and remittances) affect the demand for local natural resources as an alternative source of food and income?
- 2** Does the reduced labor force, via reduced incomes (as above) and increased dependence and pressure on social networks for loans and gifts affect social capital and hence the basis for social institutions used for managing local natural resources?
- 3** Does the decreased life expectancy and increased urgency of people living with HIV/AIDS affect their interest in preserving local natural resources for future?
- 4** Does the loss of key persons in affected communities change, destroy or hinder the adaptation of social networks and institutions, and does this affect the governance of local natural resources?
- 5** Does the loss of traditional knowledge affect local natural resource use and management?
- 6** Do changes in customs related to how HIV/AIDS affected individuals are treated (e.g. widow inheritance, land-grabbing and stigmatisation) have repercussions on other traditions, and via these on institutions related to local natural resource use and management?

- 7** Do changes in age, gender and status of those in charge of harvesting and managing local natural resources affect how they are used, and do the institutions for governing the resources adapt in a way that ensures continued sustainability?

The first of these questions is already being addressed by other researchers, but the other questions are still mainly not even asked. Answering them requires detailed mapping of social networks and institutions and of how these have changed over time in response to the HIV/AIDS pandemic.

As no data exists, primary data will have to be collected. To minimise duplication, time, cost and disturbance to the affected communities the data collection will be carried out where baseline data already exists and in collaboration with local research institutes. Hence the project includes development of questionnaires, data collection, data analysis as well as literature studies and development of theoretical models for capturing the interlinkages between HIV/AIDS, use and management of local natural resources, biodiversity and ecosystem resilience. Data will be collected in discussions with key persons and in focus group discussions with women, men, leaders, elder, orphans and groups of users of local natural resources. Recollection techniques will have to be used to get time series data on changes over time of e.g. seasonal calendars, local natural resources, local institutions and networks.

“Trash fish” – trash for whom?

by Max Troell, PhD, Researcher, the Beijer Institute and Associated Professor, Systems Ecology, Stockholm University

SINCE JANUARY 2006 a new project started at Beijer: *“Consumption of fish resources in aquaculture production: implications for supplies of low cost nutritious food for poor consumer groups and its overall socio-economic impact”* (financed by Sida/Sarec)

Participants from all over the Asia Pacific region met recently at a FAO workshop in Hanoi, Vietnam, to discuss the problem of wasteful utilisation of low valued fish resources- so called “trash fish”. Interesting to note from the meeting was that a lot of time was initially spent on how to define “trash fish”. Very simple “trash fish” can be defined as a fish resource having low market value. However, this definition does not say anything about the quality of the resource i.e. about its palatability. The fish resource may be of low value due to low demand for that particular species/size, to costly to handle and process compared to market value or the fish resource has been spoiled during transportation or

handling. This is important when addressing food security issues, as there is an increased demand for affordable low cost fish for direct consumption by many rural poor people. We in the West may regard many e.g. pelagic fish species as “trash fish”, but these are often the main affordable fish sold fresh or dried on local markets in developing countries.

As the world fishing areas have reached maximal potential for capture fisheries, aquaculture production has become increasingly important as a mean for meeting current and future demand of seafood. Aquaculture has a great potential for production of protein rich food and for alleviation of poverty by providing poor income groups with alternative livelihoods. It can also contribute sustainably to food security within developing countries as a provider of an affordable and much needed source of high-quality animal protein source. However, the culture of mainly high value carnivorous finfish/crustacean species has resulted in increased demand and prices for “trash fish” by farmers. Prices for this fish resource have within some countries increased, which in turn result in decreased availability at local rural markets.

Social and economic consequences from aquaculture activities have been addressed extensively in the literature. Its positive effect on employment and introduction of alternative livelihood has been incentives for various donor and aid agencies to fund aquaculture projects, especially in developing countries. Studies investigating negative externalities from aquaculture operations have mainly focused on waste emissions and habitat conversion. However, the potential problem with competition between lower income groups and industrial aquaculture for feed resources has not been addressed

Fish bought from landing sites arriving to feed factory to be transformed into pellets for mainly shrimp aquaculture.



PHOTO: MAX TROELL

Sale of local catches at a small local market. Notice the small sized fish in the basket- no size being too small for consumption.



PHOTO: MAX TROELL

to any large extent. It has been shown that fish bycatch used for human consumption in e.g. India and Malaysia is now instead diverted to shrimp farming. However, the overall socio-economic consequences for lower income groups from this have not been evaluated. The problem is not so much the industrial feed fishery targeting smaller pelagic species being converted to fishmeal (e.g. like the anchoveta fisheries outside Peru and Chile). It is true that this kind of fisheries has been accused for inefficient resource use, but as few direct local users of this resource presently exist (usually in developed countries), conversion to fishmeal could be the most efficient use for this resource (at least today, research is ongoing trying to find alternative uses from value-adding techniques). The situation is different in many developing countries, where many poor people are relying on the availability of cheap fish (dry or fresh) on the market. Significant amount of catches of low-grade fish are increasingly either being sold to fishmeal production or used directly as trash fish feed inputs to aquaculture operations. This of course generates a higher profit for the fishermen but the question is how it affects the people being dependent on the availability of cheap fish protein resources. This will not only depend on the amount of people buying these lower grade fish from the market but also how the

community structure is organised. It may be that the extra income from sales to the aquaculture or fishmeal industry also benefits the lower income groups of the society. This may differ between countries and even between communities within the same country. The demand for low-grade fish species may also imply that the fisheries target other species than commonly fished for, and that fishing efforts and techniques change. This can, thus, affect sustainability in the long term. In its extreme, there is a great risk that the reduced availability of fish for fish meal and increasing world market prices, may lead e.g. shrimp farmers to use small locally caught fish and thus deprive local consumers of their food, use it as feed for shrimps which are then exported. It is important that we acknowledge that aquaculture is not just purely an economic activity, but also a way to produce much needed high quality food.

The initiated project “*Consumption of fish resources in aquaculture production: implications for supplies of low cost nutritious food for poor consumer groups and its overall socio-economic impact*” will investigate how the allocation of fish resources by the aquaculture industry affects people living in areas where such resources are available and also being appropriated. The resources involve both fish for fishmeal and fish used directly as “trash fish”

feed. The general objective is to investigate how the aquaculture sectors need for fish resources affects fish protein availability for poor people. The following specific questions will be addressed:

- 1** are local subsistence or commercial fish catches to a lesser extent reaching local markets as food fish;
- 2** do poor people have more difficulties in getting hold of cheap fish due to decreased availability;
- 3** are more of the catches being sold to fishmeal producers;
- 4** if so, how does this affect the fishermen's income and are any extra profits benefiting other community members;
- 5** has the fishmeal market changed the fishing behaviour (lower valued fish being targeted, new species being targeted);
- 6** has the demand for fishmeal resulted in unsustainable fishing practices;
- 7** is the fishmeal produced used locally or internationally.

Fish are dried directly under the sun, either on larger drying places, near landing sites or just along the road.

A few case study sites will be selected and they are chosen to represent areas where interaction between aquaculture activities, fisheries, local markets and subsistence consumption exist. More explicitly these areas are characterised by

- a) dependence on fish among lower socio-economic groups,
- b) growth of aquaculture,
- c) relatively high importance of shrimp and marine finfish culture,
- d) export of finished aquaculture products,
- e) existing fishmeal production.

Initially only one case study site i.e. India, has been determined in detail. One, or possibly, two more sites will be included in the investigation but determination of this is included as a task during the initial phase of the project. Potentially, Cambodia or the Philippines will be other case study sites. Many marine and freshwater fish cages and pens using raw fish exist in these countries.



PHOTO: MAX TROELL

Ten years in the greenhouse

by *Tore Söderqvist*, Associate Professor of Economics

PEOPLE WHO KNOW ME A BIT more than other people know that I am quite interested in plants. For them, it would not come as a surprise that I wish to have a greenhouse in the garden we have at our home (preferably together with enough time to take care of it). This has not yet been realized, but a comforting fact is that I have spent more than ten years in a very special greenhouse, i.e. the Beijer Institute.

Tore, a wise gardener.



PHOTO COURTESY: TORE SÖDERQVIST

Someone who have visited Beijer a hot summer day and interpreted this as a real greenhouse experience because of the poor ventilation system might suggest that this is a fact in a literal sense. But no, I am thinking of it as a suitable metaphor for Beijer as a workplace.

A greenhouse should be a place which gives good conditions for seeds and seedlings to grow and flourish. Eventually the plants might become strong enough to be moved outside the greenhouse. I feel that I have enjoyed a greenhouse effect at Beijer, and this is something I am very grateful for. I arrived to Beijer as a guest student a short time before I took my PhD in 1995, and very much thanks to Beijer's people and networks I could carry out research that enabled me to obtain an associate professorship, which was one of my objectives. This research was facilitated by a largely liberal and kind atmosphere creating freedom of action and being fruitfully challenging because of its interdisciplinary character. I am quite sure that the atmosphere at an ordinary University department would have been considerably less rewarding and suitable to me.

During my first year at Beijer, I can't say that I managed to get an overview of everything that was going on at Beijer. Beijer might look like a small place for a visitor, but much research and other activities were carried out elsewhere and in a network fashion. However, a common denominator for all activities organized by Beijer is that they grow in soil that has to be fertilized by money. So the fact that I for several years also was the financial controller at Beijer gave me some insights in most things that were going on. While everyone might not have envied me this position, it gave me a valuable overview of the whole greenhouse.

Ten years are a long time, and gradually it felt natural to try something new. My colleague Åsa Soutukorva and I could coordinate our ideas and start the consultancy Enveco (www.enveco.se), carrying out applied environmental economics work. You find us there now, and hopefully there will be opportunities for further cooperation with those of you who are reading this.

Now, in general, what plants should one have in a greenhouse? Well, there is no greenhouse without a gardener. A wise gardener avoids monoculture, because this might result in a too high sensitivity for some pest destroying the whole culture. A wise gardener instead favours resilience and creates diversity. This is very demanding though, because it is necessary to pay attention to the different plants in a suitable amount¹ and to know what they need in terms of soil composition, temperature, water, etc. But attention, knowledge and good payoff walk hand in hand like a happy family, and a greenhouse full of different flourishing plants is what makes the gardener really proud.

Based on my viewpoint and my years at Beijer, I take the liberty of giving a few suggestions that might be of help for making a good greenhouse even better. Most of these suggestions are neither new nor referring to non-existent Beijer features, but they might still deserve to be repeated:

- ❖ Try to increase the staff to a level that definitely constitutes a critical mass, and think explicitly about having employees giving diversity in

¹ Absolutely not too little. But neither too much – you might also have experienced that your potted plants prefer to start flowering while you are away from home for a few days?

research interests and personalities and being in different career phases. Conformity doesn't support creativity. While I am not a fan of Mao, the saying "let thousand flowers bloom" feels appropriate in this case. (While my own recruitments of new people to Beijer might not have contributed to an even gender distribution, I still hope that they contributed to diversity in other ways.)

- ❖ Make sure to inform the whole staff about what is going on at Beijer and find ways to involve them in core activities.
- ❖ Try to develop the student resource base in Sweden for ensuring a continuous inflow of new research assistants and researchers. While the Institute is international and should be so, it is still likely to be favoured by being firmly rooted in the Swedish research and education community. A trainee programme perhaps?
- ❖ While there can only be one gardener, he/she cannot be expected to be an expert in everything. Gardener assistants are a blessing if they are given responsibility – and if they are able to take it.
- ❖ Transform the noisy Beijer terrace to an indoor space. Why not have walls and roof made of glass? If so, a part of it could be used as a real greenhouse!

Finally, I would like to take this opportunity to thank all Beijer people who made my ten years at Beijer to great years. I don't include a list of names here but I know who you are!

Spatial/dynamic models of economic and ecosystem interaction

by *James E. Wilen*, Professor, Department of Agricultural and Resource Economics, University of California, Davis

THE BEIJER INSTITUTE HAS BEEN sponsoring a collaborative research program with FEEM (Fondazione Eni Enrico Mattei) and the Environmental and Ecological Economics (EEE) program at Abdus Salam International Centre for Theoretical Physics (ICTP). The program is focused on understanding spatial/dynamic processes that link ecological and economic systems, including problems such as invasive species spread, animal disease transmission, subsurface contamination of aquifers, forest pests, disease epidemics, and management of marine and terrestrial species governed by dispersal. Each of these examples depend upon spatial/dynamic biophysical mechanisms that can be modeled as dispersal processes. The modeling challenge presented by these problems stems from the complexity of the mathematics of optimal control of spatial/dynamic systems. Tackling the modeling challenges for these kinds of problems opens up opportunities for addressing the policy challenges posed by these examples, namely understanding where, when and how much regulatory effort ought to be utilized to mitigate the problem.

Part of the complexity of modeling spatial/dynamic problems, the intertemporal part, is familiar to economists. Natural resource economics has, as its foundation, a sophisticated body of analytical concepts and tools that has helped economists understand the intertemporal dimensions of resource and environmental problems. In contrast, the focus on space and dispersal processes is a new area of inquiry. The first emphasis in the research program has thus been to bring resource and environmental economists familiar with dynamic optimization together with ecologists, physicists, systems theorists, and applied mathematicians in order to dis-

cuss how various disciplines depict spatial dynamic processes. This first step was accomplished with three workshops held between 2003 and 2005.

The first workshop on spatial dynamic models of economic and ecosystem interaction was held in June 2003 at the Royal Swedish Academy of Sciences in Stockholm. At that meeting, an outline for a research program was laid out by Partha Dasgupta, Simon Levin, Karl Goran Maler and Jim Wilen. This was followed by a two and a half day workshop held in Trieste, Italy in April 2004 at the Abdus Salam International Centre for Theoretical Physics (ICTP). This 2nd Workshop brought a diverse group together to talk about the mathematics of diffusion and of integrated modeling approaches that marry spatial/dynamic processes with economic optimization frameworks. Several conclusions emerged from the 2nd Workshop. One was that while there had been much descriptive work done with models of spatial processes in physical and ecological systems, there had been very little work embedding spatial processes in general optimization frameworks in order to answer questions about when and where actions should be taken from a management perspective. Another conclusion was that there was a broad opportunity for economists to illuminate how incentives and institutions influence environmental and resource misuse over space and time, and how, as a corollary, human behavior might be modified to influence spatial/dynamic systems in positive ways.

The 3rd Workshop on Spatial Dynamic Models of Economic and Ecosystem Interaction was held in April 2005, also at the Abdus Salam Centre in Trieste. The 3rd Workshop focused attention on some newly-developed economic models that embedded

explicit spatial/dynamic diffusion processes within integrated modeling frameworks. Several papers were given that focused on renewable resource systems in which populations diffuse according to either density dependent or density independent mechanisms. Other papers focused on bioinvasions in a spatial setting and there were papers presented on general methodological issues associated with optimized spatial/dynamic systems. Some important and interesting questions were raised during presentations and discussions at the 3rd Workshop. Many of these were associated with technical modeling issues, including the stability properties of optimized spatial/dynamic systems, differences between deterministic and stochastic models, and how to incorporate various boundary conditions associated with spatial/dynamic systems.

Over the intervening period since the 3rd Trieste workshop, participants at the meetings have initiated and continued a number of new research efforts on the general topic of spatial/dynamic systems. One area that has received the attention of several different participants is the question of equilibrium properties of optimized spatial/dynamic systems. A series of papers has focused on the question of Turing instability, or whether spatial dynamic systems are destabilized in the neighborhood of equilibrium by optimal controls. This is a provocative

new investigation with numerous implications. One implication is that systems that are essentially homogeneous over space can nevertheless lead to optimized equilibria that exhibit spatial patterns. A related line of inquiry has derived general properties of an optimized and spatial/dynamic system, including end point or transversality conditions for several different possible boundary conditions associated with the spatial diffusion process. Another line of investigation has been to address circumstances that give rise to corner solution controls as part of optimal spatial dynamic strategies. This topic is of practical importance because it relates to various policy efforts that are ongoing that aim to create reserves, or refugia, or otherwise protected zones within complex marine and terrestrial spatial/dynamic systems. Another broad area that is receiving attention of some of the Beijer workshop participants is the question of what kinds of spatial externalities are generated by spatial diffusion systems, and what kinds of policy instruments are best suited to mitigating spatial dynamic problems. These and other similar issues are being addressed by a range of individuals from various disciplines brought together by the Beijer-sponsored workshops on spatial/dynamic modeling. Future plans for additional workshops and research collaborations are in progress.

The Shallow Lake

A metaphor for non-linear differential games in pollution control

by Aart de Zeeuw, Professor of Environmental Economics, Tilburg University

THE SHALLOW LAKE HAS BEEN part of the research agenda of the Beijer Institute for some time now. Eutrophication of lakes is of course a very important issue, especially shallow lakes have been intensively studied by ecologists, and economists have realized that their standard convexity assumptions in pollution control models are not adequate. The first results in this research program have been published in a special issue of *Environmental & Resource Economics* (December 2003).

This research program also has a methodological component. Lakes are usually common property so that it is to be expected that the non-cooperative equilibrium is not efficient and that some coordination is needed for optimal management of the lake. This position is challenged from a game-theory perspective because in repeated games Nash equilib-

ria exist that support the cooperative outcome. Furthermore, in linear-quadratic differential games, non-linear Nash equilibria exist with steady states that are close to the optimal management steady state. In order to be able to evaluate these issues for pollution control problems like the shallow lake, it is important to be able to derive (non-linear) feedback Nash equilibria for non-linear differential games.

A recent paper in this research program develops a solution, partly analytical, partly by a numerical procedure. It is shown that the steady states of the feedback Nash equilibria are not necessarily close to the optimal management steady state and that welfare in the Nash equilibria is substantially lower than for optimal management. Coordination still seems to be needed.

Total factor productivity growth and the use of the environment:

A case for green growth accounting

by *Anastasios Xepapadeas*, Professor, University of Crete, Greece

GROWTH ACCOUNTING IS THE EMPIRICAL methodology that allows for the breakdown of output growth into its components and estimates the contribution of each component into the final output growth. The large literature on Growth and the Environment provides a basis for capturing the use of the environment in output production, by introducing emissions, which may be used without direct costs due to the absence of appropriate environmental policy, as an input in an aggregate production function. Thus, emissions can determine, along with other inputs and technological progress output growth in a growth accounting framework. Therefore, our research can be regarded as an attempt to explore systematically whether the use of the environment contributes to output growth, and how this contribution can be measured.

A growth accounting framework for measuring total factor productivity growth (TFPG), is developed, by approximating the use of the environment by carbon dioxide (CO₂) emissions. We argue that environment such as the atmosphere can be regarded as a component of social overhead capital and that CO₂ emissions can be thought of as a reduction of this social capital -a form of disinvestment. Thus, we use CO₂ emissions as a proxy for the use of this component of social capital in the production process. Our purpose is to examine the contribution of CO₂ emissions' growth, as a proxy for the use of environment, on economic growth, and to show that since external environmental damages which are created during the production pro-

cess are not taken into account in the measurement of total factor productivity growth, the current measurements of TFPG or the Solow "residual", could provide biased results. Our basic hypothesis, which has been tested empirically is that the use of the environment, in the form of CO₂ emissions, is an *unpaid* source of output growth and it might explain part of output growth. Furthermore, if emissions saving technical change is present this could be another source of growth in addition to the conventional labor augmented technical change. This hypothesis is assessed and tested empirically in a first paper by using data from a panel of 23 OECD countries.

Preliminary results suggest that CO₂ emissions is a statistically significant input in the aggregate production function and that emission augmenting technical change coexist with labour augmenting technical change. This implies that the use of the environment, approximated by the unpaid factor "CO₂ emissions", contributes to the growth of output along with physical capital, human capital, and labour, and its contribution should be accounted in the context of a "green TFPG". Results also depend on the true cost of the CO₂ emissions. High costs might produce a negative Solow residual. This could be an indication that the total use of resources, including the "unpaid" one, properly valued, exceeds the output growth generated by these resources. In this case development that uses "unpaid" factors will not be sustainable.

Coastal communities, vulnerability and adaptation

A new focus for the South Asian Network for Development and Environmental Economics (SANDEE)

by Priya Shyamsundar, Program Director, SANDEE and Paul Appasamy, Madras School of Economics, India

BOTH THE ASIAN TSUNAMI and Hurricane Katrina highlighted the extreme vulnerability of poor coastal communities to natural disasters. Coastal areas have historically supported vast populations and are often drivers of growth. Yet, as the evidence from Asia and America shows the coastal poor remain particularly defenseless to both sudden natural changes and to gradual erosion of resources and resource-dependent livelihoods. But, how do we prioritize amongst the different ecological and economic problems faced in coastal areas? And, what kind of research can help meet the challenges of coastal zone management? This note seeks to examine these questions and discuss a new set of research priorities for the South Asian Network for Development and Environmental Economics.

In March 2005, the SANDEE and Madras School of Economics (MSE) brought together thirteen experts from around South Asia to consider how coastal communities respond to risk and uncertainty associated with natural disasters and what public policies can help decrease the costs of coastal degradation.¹ This note summarizes the discussions held during the workshop.

¹ The participants of the workshop on “*Coastal Communities and Natural Disasters*” included: B. M. S. Batagoda, Director, Environmental Economics & Global Affairs, Ministry of Environment and Natural Resources, Sri Lanka; J. Samarakoon, Marine Ecologist, Sri Lanka; Prof. A. K. E. Haque, Department of Economics, East West University, Bangladesh; N. Abdullah, Director, Marine Research Centre, Ministry of Fisheries, Agriculture and Marine Resources, Maldives; M. Baba, Director, Centre for Earth Science Studies, India; S. Ramaswamy, Director, U. Sankar, Professor Emeritus, and P. Appasamy, Member Secretary (Center of Excellence in Environmental Economics), MSE, India; R. Ramasubramanian, Senior Scientist, M. S. Swaminathan Research Foundation, India; R. N. Roy, Fisheries Consultant, India; Y.S. Yadava, Director, the Bay of Bengal Programme; M. Duggar, Program Manager, and P. Shyamsundar, Program Director, SANDEE.

Four important challenges in managing coastal areas in South Asia are discussed below.

Coastal policies and regulations – the challenge of implementation

In Sri Lanka and India, existing coastal regulations appear to do little to protect coastal communities. First, there are informational difficulties, with regulations being mostly un-known. Lack of clarity over responsibilities shared among different levels of government is another problem. Most important, however, is lack of implementation. Often, regulations are seemingly implemented only when they involve economically weak actors such as fisher-folk. In India, the M.S. Swaminathan commission recently reviewed existing coastal regulations. Sri Lanka also just completed an impact assessment of the Tsunami. Some prevailing concerns are being addressed through these efforts; however, the implementation problem looms large.

A recent policy issue that has received considerable scrutiny is vulnerability zoning or “the 100 meter rule.” Many experts question whether a standard rule that applies to all coastal communities will be effective. A better option may be a “coastal vulnerability index” that takes into account variability coastal geo-morphology as well as the size and density of human settlements. The main challenge again is to ensure compliance. Here there is a clear need for economic instruments that can promote compliance.

Another policy consideration is whether implementation of coastal regulations can be devolved to local governments. Decentralization in resource management is an important trend worldwide, but

there are concerns about whether local authorities can manage coastal ecosystems of national or global importance. Here the Maldives presents a successful example. In the Maldives, the government requires private companies to develop environmental management plans for islands used for tourism. Compliance is partly assured because of a well-developed market for tourism. An interesting question is whether coastal areas in other South Asian countries are being managed better where tourism prevails, and, if not, why not.

How do communities adapt to natural changes?

Communities adapt to slow and rapid natural changes in various ways. This is particularly obvious in the case of Bangladesh, where some well-known adaptation and mitigation strategies are: a) loss-sharing amongst affected households; b) post-disaster changes in occupations and living areas; c) physical restoration of disaster zones; d) cyclone shelters and relief centers to reduce loss of life and help recovery; and e) mangrove protection to strengthen natural barriers.

In general, policies related to natural disasters need to move away from current recovery strategies that are replete with incentive problems and build a “dependency syndrome” amongst coastal communities who are subject to periodic natural disasters. Increasingly the focus needs to be on risk-management, rather than just environment or disaster management. Adaptation policies should also take care to not worsen ecological problems. This may require support for households to switch occupations or to migrate to less risky areas – an issue being currently debated is whether poor fishermen, who are dependent on a dwindling resource base, should be relocated to less risky areas or trained for new occupations. A final point is the value of preserving traditional knowledge. Anecdotal evidence suggests that tribal communities in the Andamans perceived the 2004 Tsunami and quickly moved to safer ground. Policies that build on local knowledge are likely to be accepted and successfully implemented.

Insurance markets as a partial solution

Poor households frequently spread risks within their communities and extended families. An important question is whether there is a role for

insurance markets to reduce natural hazard related risks? In most South Asian countries, credit and insurance markets that can mitigate the effects of natural disasters either do not exist or are imperfect because of information asymmetries, low affordability, and poor knowledge about implementation of hazard insurance schemes.

There is a need for area-based catastrophic risk indices that can be used to devise insurance premiums proportional to objectively determined risk measures. Other public-private interventions that are required include: a) incorporation of hazard insurance into regular property insurance schemes and maintenance charges for buildings and apartments; b) piloting of programs where an insurance element is integrated into micro finance schemes; c) tax credits for property and other asset insurance schemes; d) subsidized insurance premiums for the poor; and e) government and international re-insurers for catastrophic risks.

Policy changes are needed to open up the insurance market, to facilitate pooling and spreading of risks, and to avail of the world-wide experience in calculating risk from natural hazards. Recent developments in international instruments to share risks, such as ‘catastrophe bonds,’ need to be more carefully explored.

Natural barriers – another solution?

Recent natural disasters have highlighted the role of natural vegetation in mitigating damages. Natural barriers in South Asia include beaches, estuaries, lagoons and vegetation. Estuaries and lagoons serve as natural barriers by transforming a wave front to a less damaging flood, and plantations and coral reefs can act as bio-shields. Interestingly, atolls in the Maldives were not badly affected by the recent Tsunami and the artificial seawall structure of rocks around Male helped to save lives.

Mangroves are considered an important natural barrier that can mitigate wave energy. Anecdotal evidence suggests that villages adjacent to mangroves on the Andhra coast frequently suffer fewer losses from cyclones. Mangrove protection can also provide livelihood opportunities through fisheries, fuelwood collection, eco-tourism etc., as evidenced by projects in Sri Lanka and elsewhere.

Some research priorities

The challenges faced by coastal communities are immense. While some of these challenges can be addressed through current policies, several others require inter-disciplinary research. Thus, some key issues being considered for future SANDEE research include:

- 1 Coastal Policies and economic incentives:** What are appropriate criteria for set-back zones or vulnerability zones? Can economic criteria be used to determine zones? What are the economic costs of decreased development in high risk zones? Who bears the costs of actions taken to reduce vulnerability to disasters? What are costs of non-compliance in terms of impacts of natural disasters?
- 2 Decentralization and Coastal management:** Can responsibility for coastal management be devolved to lower levels of governments? What functions can be undertaken at the village, municipal, district and state levels? What incentives do decentralized agencies have to implement current laws regarding coastal management? What are some economic instruments (fees, permits, subsidies) that can be used to regulate coastal development?
- 3 Community Adaptation:** What incentives and dis-incentives lead to in-efficient use of coastal resources, particularly fisheries? How and to what extent do disaster relief and re-construction efforts exacerbate inefficient resource extraction? What conditions lead to successful community responses to coastal degradation? What is the role of collective action and social capital in preparing for and mitigating the effects of coastal and riverine disasters?
- 4 Market Strategies:** What is the role of insurance markets in responding to natural disasters? What policy and regulatory changes are required to strengthen insurance markets to enable them to respond to natural disasters? What kind of data is required for the emergence of insurance markets? What are other market strategies that can help communities to pool risks?
- 5 Natural and Infrastructural barriers:** What is the role of natural barriers and the services they provide in mitigating slow and rapid-onset disasters? How can we value these services? What are some un-expected costs of man-made barriers? What incentives do communities have to develop and maintain infrastructural and natural barriers?

Resource Accounting Network for Eastern and Southern Africa (RANESA)

by *Rashid Hassan*, Program Director, RANESA

DURING THE SECOND YEAR (2005) of its third phase of operations, RANESA has continued to support work on environmental accounting in the eastern and southern Africa (E&SA) region using funding from Sida Sweden. Four new activities have been initiated in Tanzania covering construction and use of NRA for fisheries, forests, minerals and water sectors. Uganda also received support to construct and use NRA for their forest and fisheries sectors. Environmental accounting work has also been initiated in Mozambique on fisheries and water and Ethiopia received support to construct land and forest resource accounts. The Work initiated under the said initiatives is planned to complete with-

in the next year. Progress of work on these initiatives has been reviewed during RANESA's second research and training workshop held in Pretoria SA late July 2006 in which many international and regional resource persons and institutions participated including Professor Karl Maler from the Beijer Institute among others. This was followed by a planning meeting coordinated jointly by CEEPA and the Beijer Institute on valuing ecosystems and their services held at Entebene, SA, August 2006, to which a core team of international experts in the ecological economics field were invited. A background document and workplan for designing and implementing a research program on this theme

Lecture by Sir Partha Dasgupta at the second Ranesa workshop, 2006.



PHOTO: SARA ANIYAR

Participants at the second Ranesa workshop, 2006.



PHOTO: SARA ANIYAR

will be produced based on these meetings' deliberations. RANESA also continued to support environmental accounting activities in South Africa, Namibia and Botswana, with special focus on consolidating the institutionalisation of NRA within government structures and its use for improved policy design and prudent management of natural resources.

RANESA continued its operations under the auspices of the Centre of Environmental Economics and Policy in Africa (CEEPA) at the University of Pretoria, South Africa, which coordinates and supports various other complementary research and training activities. Most important of which is the new program, launched last year for supporting regional capacity in environmental economics funded by SAREC/Sida. Under this project and in collaboration with the EEE program of ICTP/Beijer CEEPA conducted the second advanced training course on the use of computable general equilibrium modelling for environmental management at

the ICTP headquarters in Italy, December 2005. Twenty five participants, most from Africa benefited from this training. The Sida-CEEPA capacity support program also offers research grants in a package that includes theoretical and hands-on training and close mentorship and supervision by international experts in the field through at its Biannual research workshops. CEEPA's first Biannual workshop under this program was held in Cape Town, May 2006 in which 15 participants from Africa received specialised hands-on training on Stata and received lectures from invited plenary speakers and and one-on-one technical review and mentorship on funded research projects. This program also offers PhD scholarships, which supported so far four students from the region enrolled for their PhD degrees in environmental economics at CEEPA. The program also provides support to post-doctoral and visiting African and International fellowships (see details on CEEPA's website at www.ceepa.co.za).

Latin American and Caribbean Environmental Economics Program (LACEEP)

by *Francisco Alpizar*, Program Director, LACEEP

LACEEP IS A CAPACITY BUILDING effort that provides research grants in environmental and resource economics to Latin American and Caribbean (LAC) researchers. It is supported by the Canadian International Development Research Center (IDRC) and the Swedish International Development Agency (SIDA). It provides not only financial support but also meetings, close advice and supervision by specifically appointed scientists, access to literature, publication outlets, and opportunities for comparative research. LACEEP's research program focuses in general on applied, policy relevant research.

The program is aimed at junior researchers who are citizens of any country in LAC, although particular emphasis is paid to Central America and countries in the Andean region. Applicants should have prior training in economics, preferably at the master level or higher, and should preferably be attached to an institution in the LAC region.

The secretariat is hosted by the Tropical Agricultural Research and Higher Education Center (CATIE) in Costa Rica. It consists of a Program Director and an administrative officer. CATIE is responsible for accounting and auditing the available funds.

Grants for research

The first call-for-proposals started in March 2005. A total of 30 preliminary proposals were received. At the end, a total of 18 full proposals were received and sent for external evaluation. A total of 14 applicants were invited to the workshop and a prerequisite for their participation was a final proposal incorporating the suggestions from the external reviewer.

Four grants were assigned to applicants from Brazil, Chile (2) and Mexico. In addition, two grants were conditionally approved (Guatemala and Peru). This means that funds are earmarked for their research proposals but disbursements depend on a thorough revision of the proposal. In the case of Carlos Orihuela, from Peru, he was invited to spend one month at the Beijer Institute of Ecological Economics to work closely with his appointed tutor, Prof. Karl-Göran Mäler.

The second call-for-proposals initiated in February, 2006. The deadline for submitting preliminary proposals was May 15th, 2006. A total of 22 preliminary proposals were received and of those, 17 were invited to submit full proposals.

Biannual workshops

A key component of LACEEP's activities is the series of biannual workshops in which invited applicants are able to present their proposals in front of a carefully selected panel of experts. Moreover, these experts are available throughout the workshop for informal discussions and advice.

The first workshop of LACEEP took place in San Jose, Costa Rica from February 20th-23rd. During the first day all applicants had one to one meetings with the Program Director to make sure that they were prepared for the days to come. Days 2 and 3 contained plenary presentations from the resource persons followed by sessions in which applicants presented their research proposals.

The plenary presentations covered a broad number of topics but were aimed in general at showing the complexity of doing quality research and possible ways of dealing with that complexity. Prof. Mäler

proposed an ambitious agenda for research in environmental economics, that included four major areas of research: i) The analysis of ecosystem services, including modelling their role and value in the generation of human well being, ii) The dynamics of ecosystems, including fundamental questions regarding the existence of ecosystem thresholds in relation to their resilience; iii) The spatial analysis of ecosystems, and iv) The search for “correct” welfare indicators.

Prof. Dale Whittington, Dr. Allen Blackman, Dr. Fredrik Carlsson, and Dr. Peter Martinsson also made presentations during the workshop and David Glover of EEPSEA gave a brief presentation of ethics in research.

The last day of the workshop was dedicated to meetings of the Scientific Committee (SC) and the Advisory Committee (AC). In the meeting of the AC only Sara Aniyar and Leiner Vargas were pres-

ent, which prompted the discussion of the need to reinvigorate this Committee with new members, hopefully from the Caribbean and from regional organizations.

The 2nd biannual workshop is planned for October 16th to 19th, 2006, in Antigua, Guatemala.

Training

The third key component of LACEEP is a series of short courses on selected topics of environmental economics. The first biannual short course of LACEEP took place at CATIE’s campus in Turrialba, Costa Rica, from February 23rd-28th, 2006.

The next course will take place in Antigua, Guatemala from the 19th-23rd of October. Preliminarily topic is “public economics and welfare theory: the foundations of environmental economics”.

Middle East and North Africa Network of Environmental Economists (MENANEE)

by *Mohamed Abdrabo*, Program Director, MENANEE

THE NEED FOR ESTABLISHING a regional network of environmental economists for the Middle East and North Africa was considered vital for the success of environmental and sustainability efforts and actions in the region. This was based on the background of inadequate capacity of environmental economics that exist in the region.

This fact was coincidentally enforced by the figure displayed in another article, written by Prof. Anastasios Xepapadeas, editor, *Environment and Development Economics Journal*, in the same annual report. He reported that the submission of papers from the Middle East region, over the 10 years of the journal, totaled 17 papers, representing a mere 0.02% of the total number of submitted papers from different regions. Moreover, he noted that out of these papers only 2 were accepted for publication, with a rejection rate of 81%, which was the highest of all regions.

A regional network of environmental economists (MENANEE), with such background, can play a significant role in strengthening the capacity of individuals and institutions in the region in the field of environmental and resources economics. It also intends to focus on the interrelationships between economic development and environmental changes and assist in integrating the environmental in decision making process.

Thus, it was decided, during the Trieste meeting, held 2-4 May 2005 that such a regional network was urgently needed in the region. Furthermore, it was agreed that the launching of the network should be done in a firm manner that reflects the genuine and beneficial nature of the network, namely a teaching

workshop on environmental economics for those interested in the region.

Thereafter, plans were developed for holding the teaching workshop, with the support of the ICTP in Trieste, in December 2005. The workshop was held for two weeks in Trieste, 5-16 December 2005 with 25 participants from Algeria, Egypt, Iraq, Israel, Jordan, Morocco, Palestine, Sudan, Sultanate of Oman, Syria, Tunisia, and Turkey. The workshop involved teaching session covering various topics of environmental and resource economics. Additionally, participants were asked to present preliminary assessment of the status of environmental economics in their countries. Also, detailed discussion of the various aspects of the network was undertaken.

At that workshop, it was decided that a full proposal of MENANEE would be developed and submitted to potential donors in order to raise funds for the activities of the network. It was also agreed that a more detailed and well-documented assessment of the status of environmental economics in MENA countries were to be prepared by workshop participants for their respective countries.

Since then, a full proposal for the network was developed including details about its mission, activities as well as estimates of its budget for the upcoming four years. Funding possibilities with a number of regional and international organizations with interest in the environment in general and environmental economics are being explored. A provisional webpage was also developed to provide basic information about the network and links to other sites in the environmental and resource economics field. An article was also written for promoting the cause of the network for European

Association of Environmental and Resource Economists (ERARE).

Concerning the hosting of MENANEE secretariat, contacts were made with Dr. Ismail Serageldine, the Director of the Library of Alexandria for the library to be such a host. Dr. Serageldine welcomed such a move as it would emphasize the message of the library as a leading center for learning, tolerance, dialogue and understanding.

The legal status of the network has been one of the main, if not the utmost, issue of concern at this stage as it may influence not only its capabilities and flexibility to work at present and future but also its sustainability. On one hand, it seemed neces-

sary to keep it away from dealing with national laws and regulations that may adversely affect its flexibility. Ensuring that the network legal status reflects its regional status as well as being credible body with a proper administrative and financial work code. Accordingly, it was decided that an agreement could be signed between Beijer Institute and the Library of Alexandria that would create the network and outline its mission. The Library of Alexandria would, according to this agreement, host the network secretariat at its premises and open a bank account for the network. The network would thereafter adopt the administrative and financial work code of the Library of Alexandria.

Environment and Development Economics

by *Anastasios Xepapadeas*, Editor, EDE, and Professor,
University of Crete, Greece

General

In July 2005 the transfer of the Editorial Office from the University of York to the University of Crete was completed, and all editorial matters have been handled by the Crete office since then. A record number of new manuscripts were submitted to the journal and processed; at the same time a large number of pending manuscripts completed the review process and were given a final decision. Detailed statistics are provided in the "Submissions" section. The transition to an online system of submissions and review was completed midyear, leading to a number of new features for the journal which are discussed in the "Online System" section below.

During the World Congress of Environmental and Resource Economists which took place in Kyoto in early July 2006, EDE held an Editorial Board meeting. Although the group was small, those attending included three Associate Editors, mem-

bers from both the Editorial and Policy Boards, Patrick McCartan representing Cambridge University Press (CUP), and the Editor and Assistant Editor. Because of the very wide geographical distribution of the Associate Editors (see Figure 1) and the Board members, the meeting provided an excellent opportunity for face-to-face group discussions about operational and policy issues related to the journal, and at the same time helped to strengthen the links between those working with the journal. There was also a separate meeting among the Editor, the Assistant Editor and Patrick McCartan, where relations with CUP and operational issues were discussed. A number of positive points emerged from this meeting.

Both of these meetings were very productive; every effort will be made to hold regular Editorial Board meetings from now on during the annual conference of the European Association of Environmental and Resource Economists.

Figure 1: Geographical location of Associate Editors

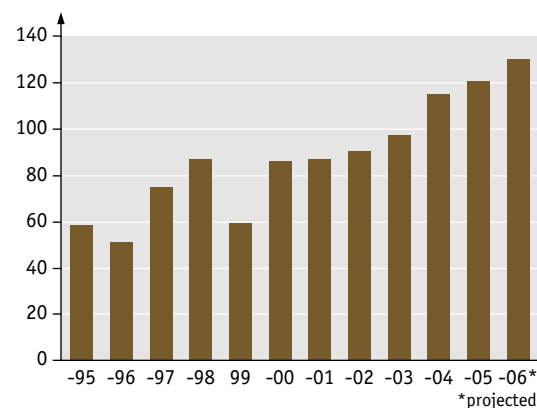


Figure 2: Total submissions, 1995-2006

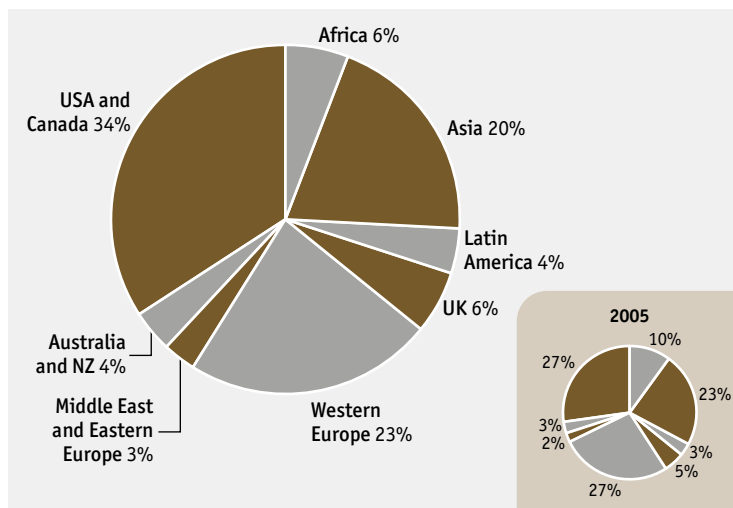


Figure 3: Geographical distribution of submissions, 1995-2006

Submissions

The increasing trend in submissions continued in 2005, and it appears – based on submissions for the first 6 months – that it will continue in 2006 (see Figure 2). New submissions totalled 115 in 2004, 120 in 2005 and are projected to exceed 130 in 2006.

The geographical distribution of submissions presented in Figure 3 and Table 1 shows that the largest number of submissions continues to come from

North America, Western Europe, and Asia. As shown by the inset in Figure 3, there was slight redistribution in 2005, with a small percentage decline in submissions from North America, and the corresponding increase in submissions being evenly distributed in Africa, Asia and Western Europe.

It is important to note, however, that the geographical area to which any given manuscript is assigned (for statistical purposes) is based on the current affiliation of the corresponding author. As such, it is an incomplete reflection of the extent to which a manuscript may be related to developing areas of the world. For example, a paper with more than one author is credited to only one area, even if the co-author(s) come from different geographical areas. Furthermore, students (or professors on sabbatical) from developing countries often submit a manuscript with their temporary affiliation in a developed country, and the topic of the paper itself is frequently related to a developing area of the world, even when the author's affiliation is not. This point is significant in view of the journal's emphasis on capacity building in the developing world and suggests that caution should be used when making assumptions based solely on the geographical breakdown of submissions.

Table 1: Total submissions, 1995 – 2006, by geographical area

Year	Africa	Asia	South America	UK	West Europe	East Europe	Australia & NZ	Middle East	USA & Canada	Total
1995	5	11	8	6	10	0	0	0	18	58
1996	5	5	1	3	11	0	3	1	22	51
1997	3	7	1	4	19	2	4	0	35	75
1998	3	13	3	8	26	0	4	1	29	87
1999	1	7	3	5	9	2	3	1	28	59
2000	9	15	5	7	21	0	4	4	21	86
2001	1	26	4	5	19	0	3	1	28	87
2002	7	13	3	7	21	1	8	1	29	90
2003	8	24	2	4	27	1	2	1	28	97
2004	3	35	7	4	21	3	3	5	34	115
2005	12	27	3	6	33	2	3	0	34	120
2006*	5	16	2	4	14	1	0	0	24	66

*January 1 – June 30, 2006

Table 2: Cumulative rejection rate*, 1995 – 2006, by geographical area

	Africa	Asia	Latin America	UK	West Europe	East Europe	Australia & NZ	Middle East	USA & Canada	Total
Rejection rate	73%	72%	78%	68%	69%	73%	75%	87%	54%	66%

*Includes rejected and withdrawn manuscripts

Rejection rate

The total cumulative rejection rate of the journal since its inception in 1995, along with the geographical breakdown, is presented in Table 2. The overall rejection rate is 66%, while the area rates range from 54% to 87%.

When evaluating the implications of the rejection rate, it should be noted that with the present constraints of approximately 36 published papers per year (6 papers per issue, 6 issues per year), if *EDE* has annual submissions of around 120 manuscripts, this would imply a rejection rate of 70% in order to avoid a backlog. However, until recently *EDE* published only 4 issues per year, and a backlog time of 18-20 months – from acceptance to publication – developed.

Based on this fact, an editorial decision was taken in 2005 making it a high priority target to reduce this period to 12 months. A concerted effort has been made, in which the Associate Editors have played a crucial role, to bring down the acceptance rate while still providing constructive comments for rejected papers, even for those which are “desktop rejections” – that is, manuscripts which are not put through the formal review process, but rather are rejected at the initial stage following a screening by either the Editor or an Associate Editor.

It is therefore of interest to look at the rejection rate for the previous year in comparison to the cumulative rejection rate. Figure 4 shows that the rejection

rate for 2005-2006 is significantly higher (81%) than the cumulative rejection rate (66%). As a result, the acceptance-to-publication time has now dropped to approximately 14 months, and efforts continue to reach the target of 12 months. If this target is reached, the situation will then be re-assessed. It should be noted that production of each issue begins about 6 months prior to publication, so it is not desirable to reduce the time for papers awaiting publication too much below 12 months.

A final point concerns the number of “pending papers” – that is, papers for which a final decision (accept or reject) has not yet been reached. This figure relates to how quickly the review process reaches a conclusion. Table 3 provides summary statistics (as of June 30, 2006) for the 990 manuscripts which have been submitted to *EDE* since its inception. The number of pending manuscripts was 75 on that date.

Figure 5 traces the number of pending papers at the end of each year, beginning in 1996. It shows that, due to the efforts of the editorial team, the number of pending papers dropped significantly over the past year, which would seem to indicate that papers are moving through the review process more quickly.

Figure 4: Overall rejection rate, cumulative vs 2005-2006

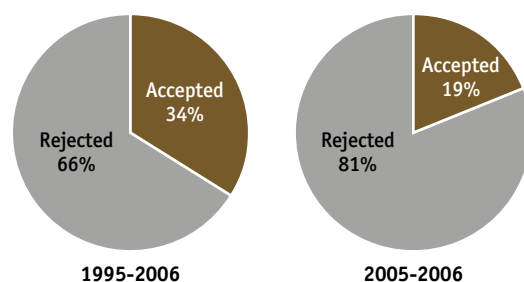


Figure 5: Papers pending decision on June 30, 2006

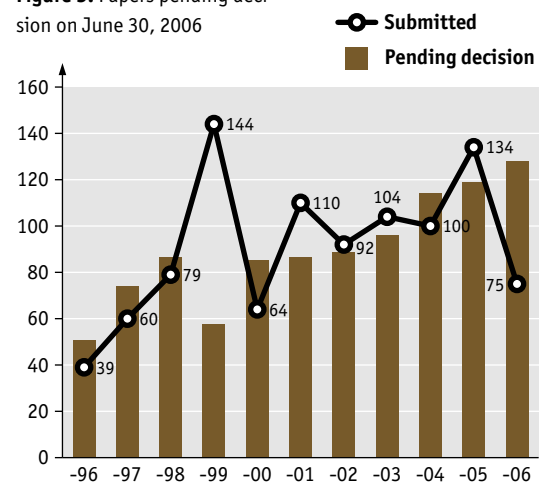


Table 3: Status of manuscripts, 1995 to 2006, by geographical area

	Africa	Asia	Latin America	UK	West Europe	ME & East Europe	Australia & NZ	USA & Canada	Total
Submitted	62	198	42	63	231	27	37	330	990
Accepted	15	52	8	19	68	5	9	137	313
Rejected	33	118	25	32	135	20	24	141	528
Withdrawn	8	17	4	8	13	2	3	20	74
Pending	6	11	5	4	15	1	1	32	75

Editorial Matters

During the past year, two of our Associate Editors stepped down. I would like to express our deep appreciation to Kanchan Chopra and Carl Folke, both of whom moved to the journal's Editorial Board at the end of 2005. Eswaran Somanatham from the Delhi Statistical Institute and Gerald Shively from Purdue University were recruited to replace them. Both of our new Associate Editors bring a high commitment to the job, and we are delighted to have them on the team, along with "veterans" Erwin Bulte, Rashid Hassan, Phoebe Koundouri, Bruce Larson and Bernardo Mueller. Rashid Hassan will be leaving the journal after nearly six years to take on the Editorship of the newly formed *African Journal for Agricultural and Resource Economics*. Rashid's dedication and expertise will certainly be missed, but he is helping us recruit a replacement who will share the goals of the journal, and we expect to continue to work cooperatively with him to promote capacity building in Africa.

Online system

As of January 1, 2006, EDE's new online system of paper submissions and reviews became fully operational. The switchover to the automated system, using the ScholarOne Manuscript Central program, was coordinated by Cambridge University Press and the Assistant Editor. With the new system, both manuscripts and reviews are submitted online. A total of 66 manuscripts were submitted through the system as of June 30, 2006. In order to minimize confusion, the decision was made not to switch papers submitted prior to 2006 over to the online system. As a result, the journal will continue to operate with two systems of review – the old and the new – until all papers submitted before 2006 receive a final editorial decision. As of June 30, there were 41 such papers.

The new system offers a number of attractive new features to the journal. Foremost among these is the ability to create, and constantly update, a database of potential reviewers. The Assistant Editor has entered the names and e-mail addresses of approximately 2000 potential reviewers into the database. The potential reviewers were subsequently invited to enter the system and specify areas of expertise. Approximately 40% (800) have responded so far, creating the ability to search not only by name but also by keywords. Efforts continue to

expand the database, which is expected to assist the Associate Editors in selecting reviewers for manuscripts.

Another important feature of the system is that reminders to reviewers are automatically generated at specified intervals, which may assist in receiving reviews in a shorter time. Closely related to this point, we are very pleased that Cambridge University Press has recently confirmed that the journal will now be able to offer a free one-year online subscription to reviewers who complete their reports in a timely manner. The Assistant Editor is currently coordinating with CUP to initiate this process, which will be retroactive to January 1 of this year. It is hoped that this offer will provide an additional incentive to reviewers to complete their reports on time, and lead to a decrease in the time needed to complete the review process.

The new system also allows Associate Editors to rate the reviews as to timeliness and content, and makes this information available for future selection of reviewers. In addition the system is able to generate a variety of reports, a feature which will become increasingly important as more papers are submitted.

Having noted some of the many positive features of the switchover to the new system, it is important to note that there have been some problems also. These problems have been primarily technical in nature, and can be a source of annoyance – especially to reviewers who are contributing their time to review a paper and do not want to spend additional time wrestling with technical details. It is hoped that these problems will decrease in number as authors and reviewers become more familiar with the system. In the meantime, we have tried to address such problems by offering immediate assistance from the Assistant Editor to solve such problems.

Overall the switchover has been a positive development for the journal which will help us to run the journal more efficiently, facilitate submissions, referee selection and submissions of reviews, and eventually reduce the throughput time. With this new development, EDE is in line with the latest developments in the field.

Circulation

The most recent marketing report from CUP, presented by Patrick McCartan at the Editorial Board

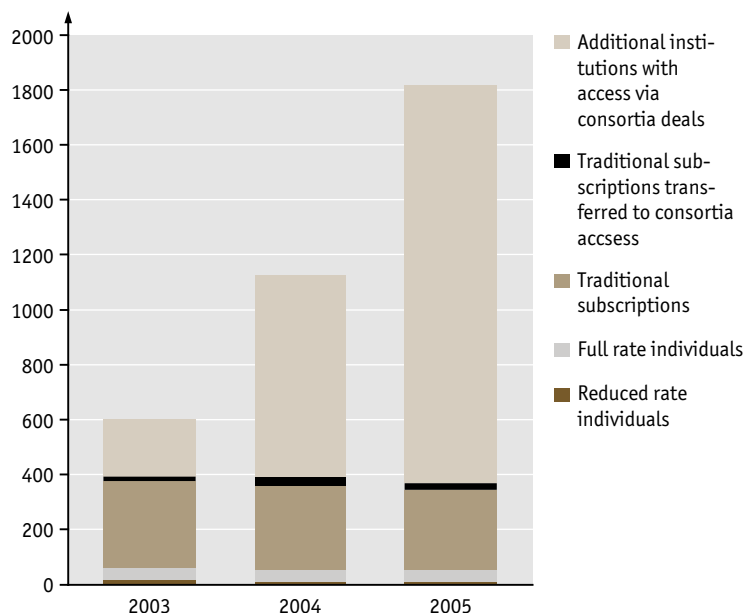


Figure 6: Subscriptions to Environment and Development Economics, by type, 2003-2005

meeting in Kyoto, reflects a slight decrease in traditional subscriptions, but a large increase in subscriptions from institutions with access via consortia deals (see Figure 6). This trend away from traditional subscriptions towards access via consortia deals appears to be typical of what is happening with other comparable journals.

Future Plans

In last year's report I stated that the journal had two parallel goals: to continue the policy of capacity building by providing a good publication outlet for scientists from developing countries and addressing issues pertinent to developing countries; and to continue efforts to secure a respectable and competitive rating for EDE among comparable journals. Since impact factors are the most important of these ratings, and are based on citations of papers published in the journal, we identified a number of concrete steps to achieve these goals.

These strategies included: publishing occasional Special Issues on timely topics, inviting sur-

vey papers on relevant issues, keeping a balance between conceptual papers and empirical papers, reducing the backlog of papers awaiting publication, increasing the rejection rate, and reducing the time needed to complete the review process.

I feel we have been quite successful in pursuing these strategies. A number of proposals have been submitted which could lead to future special issues. The August 2006 issue is a special issue on Resilience and Sustainable Development, guest edited by Charles Perrings. Two additional issues, one on Infectious Diseases (Guest Editors Simon Levin and Tasos Xepapadeas) and one on Payments for Ecosystem Services (Guest Editors Erwin Bulte and David Zilberman) are in progress. Three other possible issues are in the initial stages. The goal is to publish approximately one special issue per year and thus no further proposals are being accepted at the present time. All papers published in special issues follow the regular review process of the journal. Regarding surveys, we discussed the issue at the Editorial Board meeting in Kyoto and are considering suggestions for possible contributors. Additional emphasis is being given to the role of conceptual papers in newly submitted papers to the journal.

Progress regarding reducing the backlog of papers awaiting publication, increasing the rejection rate, and reducing the time needed to complete the review process was discussed earlier in this report.

For the forthcoming year, we will continue to address all of the above areas. In addition, it was decided at the Kyoto Board Meeting that efforts should be made to revive the *Policy Forum* feature of the journal. Jeff Vincent suggested a possible topic which will be further discussed. Finally, we are exploring the possibility of reviving the *Book Review* section of the journal, and we are currently on the lookout for a book review editor.

The EEE Programme

by *Monica Eberle* and *Roberto Roson*, the Abdus Salam Centre for Theoretical Physics, ICTP, Trieste, Italy

FROM MAY 2002 TO JANUARY 2006, the Abdus Salam International Center for Theoretical Physics (ICTP), the Beijer International Institute of Ecological Economics, and Fondazione Eni Enrico Mattei (FEEM) jointly ran the Ecological and Environmental Economics – EEE Programme.

The core aim of the EEE Programme was to organise research and training activities with the final objective of enabling researchers from the developing countries to join the international academic network in the field of ecological and environmental economics.

The activities carried out by the EEE Programme concentrated on two main areas:

- 1** *Dynamic ecological models and Indicators of sustainable development.* Activities focused on the development of a theory for indicators of sustainable development for complex dynamic systems, of indicators of genuine wealth, economics of complex dynamical systems, non-market interactions and informal institutions.
- 2** *Integrated assessment models.* Activities focused on the integration between global climate models, regional models of climate impacts, and economic models to assess the economic consequences of climate impacts in a coherent framework.

In these two research areas a number of activities were organised that significantly contributed to the achievement of the final objectives of the Programme. In particular, the EEE Programme is very proud of its contribution to the creation of the Middle East and North Africa Network of Environmental Economists (MENANEE - <http://www.menanee.org/>).

In its 4 years of activity, 23 researchers from many countries (13 from developing countries) worked within the umbrella of the EEE Programme. The Programme organised 38 seminars and 30 workshops and capacity-building activities (6 in poor countries). The main research results achieved by the EEE Programme were disseminated through the EEE working paper series (22 working papers), through the participation in international conferences (17 paper presentations), through the publication of books (6 books) and papers in renowned scientific journals (15 papers), and through the EEE Programme website (<http://www.ictp.trieste.it/-eee/>).

The EEE Programme has been envisaged as the embryonic form of an international institution on subjects bridging the fields of Ecology, Environmental Sciences, and Economics with special emphasis on the problems of developing countries, with ICTP acting as an ‘incubator’. This objective has been achieved: the success of the EEE Programme both in terms of scientific accomplishments and financial sustainability will lead to the creation of the International Research Centre on Climate Impacts and Policy.

The Centre will be located on the Island of San Giorgio Maggiore, Venice, in the prestigious premises of Fondazione Giorgio Cini, with Fondazione Eni Enrico Mattei playing a leading role. The new Centre will be a spin-off of the EEE Programme and will continue most of its activities, even though the new Centre will be more focused on climate change issues. The research and training activities organised within the EEE Programme will merge into the activities organised by the constituting “International Research Centre on Climate Impacts and Policy”. One of the final objectives of such a centre will be to continue

the mission of the EEE Programme: to enable researchers from developing countries to join the international academic network in the field of ecological and environmental economics.

EEE Research Unit on Integrated Assessment Models (IAMs)

The EEE Research Unit on Integrated Assessment Models was comprised of a modelling team that worked on the quantitative assessment of climate change on the world economy. Economic models addressed the socio-economic dimension of climate change, mitigation and adaptation policies, and focused on the economic (welfare) assessment of climate change impacts. Research strategy was characterised by:

- ❖ focus on economic implications: development and updating of an existing database and modelling structure (GTAP – Global Trade Analysis Project);
- ❖ a flexible, “umbrella” project: incorporation and economic evaluation of different climate change impacts structured as parallel research;
- ❖ co-operation with other research institutes to improve the quality of climatic information and physical impacts of climate change.

To assess the systemic, general equilibrium effects of various impacts (sea-level rise, tourism, human health, water availability, energy consumption, land use, extreme events), the Unit made an unconventional use of a multi-country world CGE model: the GTAP model (Hertel, 1996), in the GTAP-E version modified by Burniaux and Truong (2002), and subsequently extended by ourselves (GTAP-EF).

A CGE model provides a consistent and detailed description of an economic system, highlighting trade linkages between industries, regions and markets. This general equilibrium model of the world economy was used as a common, consistent framework for the assessment of heterogeneous effects. Information coming from micro analyses of various sources was “translated” and interpreted as “shocks” in the model, in terms of: changes in productivity of specific factors or multi-factor aggregates, changes in tastes and consumption patterns, variations in primary resource stocks, international income transfers.

The model was developed in two variants: a conventional comparative static version, and a recursive dynamic one. The comparative static type was used to carry out specific analyses of structural adjustment processes induced by the climate change. The dynamic version is best suited to highlight time paths, and dynamic evolution processes.

Development of the dynamic model implied the study of specific modelling issues, from both a technical and theoretical perspective, like the definition of expectations and the allocation of international investment flows.

Also the static version has been improved in several aspects. Most notably, through the introduction of alternative model closures, based on hypotheses of imperfect competition in some industries. Existing model implementations were tested, and a new version of the model, suited for various IC formulations, was developed within the Unit.

Another impact is related to extreme events. Despite the popularity of arguments linking climate changes to extreme events, like tornados and floods, scientific evidence is lacking. The Unit explored the link, on the one hand, between changes in temperature and ENSO (El Nino Southern Oscillation) and NAO (North Atlantic Oscillation) frequency; on the other hand, between the state of oceanic oscillations and the frequency of a set of extremes in a set of regions. The team analysed the economic implications of increased or decreased likelihood of extreme events in the regional economies, in terms of changes in precautionary savings. The Unit found that structural changes induced by variations in the saving propensity generate effects, which are comparable in magnitude to those associated to direct physical damages.

The IAMs Unit co-operated regularly with other research institutes in order to improve the quality of climate information and physical impacts of climate change. These institutions include the University of Hamburg, Germany; ABARE - Australian Bureau of Agricultural and Resource Economics, Australia; Potsdam Institute of Climate, Germany; CIRED - Centre International de Recherche sur l'Environnement et le Développement, France; and above all the ICTP Physics of Weather and Climate Section, Italy.

Capacity building in environmental economics in developing countries

by Thomas Sterner, Professor, Department of Economics, Göteborg University

PhD Program in Environmental Economics

The Environmental Economics Unit at Göteborg University, in collaboration with the Beijer International Institute of Ecological Economics, should have enrolled 5 new PhD students in fall of 2005.

Due to a decision made centrally by the department of economics, no PhD students were enrolled at all this year. The reason behind this was that there was an asymmetry between the number of PhD students and the number of supervisors at the Department as a whole.¹

During 2005 EEU had 13 PhD students at various stages in the program from a number of developing countries (see list below). The EEU/Beijer PhD program is a five year program. After two years of compulsory coursework at EEU/Beijer in Sweden the PhD students go back to their home countries to conduct field work. The three remaining years are spent conducting research, which includes, beyond writing on their theses, travels to their home countries, visits and workshops overseas, and conference presentations.

All of the PhD students enrolled in 2001 have finished their field work during 2005. The field work has varied in length of time spent in the field and methods applied. Some PhD students' field work was part of a larger national research project and some field work was specifically designed only for the thesis.

¹ This meant that also the recruitment to the Sida program needed to be delayed by one year. The repercussions of this for the program was discussed between EEU and MIL and it was agreed that EEU should instead (i) support four MSc students at EEU from Ethiopia, (ii) intensify supervision of PhD candidates that were delayed, and (iii) support the research of past graduates from the program.

During 2005, three PhD students graduated with PhD degrees:

Eseza Kateregga, Uganda. Thesis title: *Essays on the Infestation of Lake Victoria by the Water Hyacinth*

✦ Minhaj Mahmud, Bangladesh. Thesis title: *Measuring Trust and the Value of Statistical Lives: Evidence from Bangladesh*

✦ Razack Bakari Lokina, Tanzania. Thesis title: *Efficiency, Risk and Regulation Compliance: Applications to Lake Victoria Fisheries in Tanzania.*

In addition to this, Wilfred Nyangena had his high-er and final seminar in 2005. He submitted and defended his thesis in February, 2006.

One PhD student graduated with a licentiate degree:

✦ Nasima Chowdhury, Bangladesh. Thesis title: *The Economic Value of Water in the Ganges-Brahmaputra-Meghna (GBM) River Basin*

The PhD students enrolled in the PhD program during 2005 were as follows:

Name	Country	Home affiliation	Enrol-ment	Status
Wilfred Nyangena	Kenya	University of Nairobi	1999	PhD 06
Razack Bakari Lokina	Tanzania	National Environment Management Council	1999	PhD 05
Minhaj Mahmud	Bangladesh	Jahangirnagar University	1999	PhD 05
Nasima Chowdhury	Bangladesh	University of Dhaka	1999	Lic 05
Rahimaisha Abdula	Philippines	Philippine Institute for Development studies	2001	
Wisdom Akpalu	Ghana	University of Cape Coast	2001	
Mintewab Bezabih	Ethiopia	Alemaya University	2001	
Jorge Garcia	Colombia	Universidad de los Andes	2001	
Martine Visser	South Africa	University of Cape Town	2001	
Precious Zikahli	Zimbabwe	University of Zimbabwe	2003	
Jiegen Wei	China	Chinese Academy of Science	2003	
Ping Qing	China	Chinese Academy of Science	2003	
Innocent Kabenga*	Rwanda	National University of Rwanda	2003	

* Innocent is sponsored by SAREC on separate funding from a bilateral program with Rwanda. His progress is reported elsewhere.

After graduation from the program at EEU the researchers are expected to go back to their home countries and establish (or develop) environmental economics capacity, mainly through launching BA or MA programs in environmental economics, conducting research and providing policy-related advice, with the overall aim of finding effective solutions to the environmental degradation, unsustainable resource use and poverty in their respective countries. In the longer term there is a need to further strengthen the environmental economics capacity, but in new forms suited to the country-specific context but building on the graduates from EEU. These "post-doc" capacity developments will mainly build on (support to) regional networks, collaborative research arrangements and domestic resources. EEU staff discusses these matters with the graduate students, in collaboration with their home affiliations, and develops strategies for their future involvement in teaching, research and policy advice. The EEU works actively to maintain strong contacts with the program graduates in their future work to develop environmental economics capacity in their countries.

There are strong links between the PhD program and a couple of the other activities mentioned in this document, particularly the specialization courses, which are part of the PhD program, and that are also offered independently to outside participants. There are synergies to activities such as the visiting researcher and literature support programs.

PhD students and their thesis work

Rahimaisha Abdula – The Philippines

Rahi Abdula investigates links between bio-energy, food production and climate change.

The rationale for her studies, and her specific focus on land-use, is the predominant role played by agriculture and forestry in developing countries, and the fact that biomass energy from agricultural and forest products potentially may reduce GHG emissions due to substitution possibilities vis-à-vis fossil fuels. The present use of bio-energy in developing countries may, however, undermine this potential since large amounts of GHGs are produced by household which burn biomass in inefficient stoves.

During the year Rahi has worked on papers pertaining to inter-sectoral land-use dynamics and bio-energy development. She analyses the competition between bio-energy and other energy sources, and the competition between different land-use based greenhouse gas (GHG) mitigation options (e.g. afforestation). Policy options of bio-energy as a means to mitigate climate change are analysed in a Computable General Equilibrium (CGE) model, which includes land-based sectors such as agriculture and forestry.

Modelling Bio-energy production and Food - Fuel Competition: In this specific study Rahi analyzes the implications of developing different bio-energy types as carbon offsets on agricultural production and food security. Moreover, she determines

how degrees of substitution (between different land and energy uses) affect the food-fuel competition. The bio-energy considered in the study is *bagasse*, other agricultural residues and fuel-wood. Three major bio-energy-producing sectors are modelled: traditional agriculture, forestry and bio-energy plantation.

Wisdom Akpalu – Ghana

During 2005, Wisdom successfully defended his licentiate thesis in Economics and also made significant progress in his PhD dissertation. His first paper, which analyses gold mining in tropical rain forest, was accepted for publication in the international scientific journal *Environment and Development Economics*. Wisdom also completed his survey on artisanal fishery in Ghana and also conducted a study experiment on voluntary contributions as a policy instrument for sustainable financing and environmental management. Specifically, during 2005 Wisdom has conducted research on the following papers.

Natural Resource Use Conflict: Gold Mining in Tropical Rain Forest in Ghana: Gold is frequently mined in rainforests that can provide either gold or forest benefits, but not both. This paper shows that a value added tax on gross revenue can be used to internalize environmental opportunity costs.

The Role of Local Institutions in the Management of Common Pool Fishery: This study seeks to investigate the effectiveness of *ostracism* (social exclusion) as a punishment mechanism on fishery management in Ghana.

Mesh Size Regulatory Compliance in Ghana: This work analyses incentives and policy implications of fishery crime, which generates flow of returns until the offender is caught and then punished. The empirical analysis is tested on data on the use of fishing nets with illegal (smaller) mesh size in artisanal fishery in Ghana.

The Role of Contribution Norms in Voluntary Contributions Mechanism: In a recent development, researchers have argued that, voluntary contributions to public goods are driven by norms. A contributor feels guilty if his contribution deviates from the norm. Using a public good experiment, we provide an empirical test for this hypothesis.

The Optimum Marine Reserve with Ecosystem Linkages: Despite the wide array of *ecological* benefits of fish resources, impact assessments of Marine

Protected Areas (MPAs) focus on economic benefits that derive exclusively from only some cultural services. The importance of fish as an ecosystem linkage, for example, has hardly been explored in designing MPAs. The goal of this research is to extend a simple bio-economic model of MPAs to capture some other ecological functions and characterize the optimal MPA size.

Mintewab Bezabih – Ethiopia

During 2005, Mintewab was mainly engaged in conducting field work for the second phase of her data collection and developing the PhD thesis chapters. She successfully obtained her licence degree in June 2005.

Biodiversity Conservation Under an Imperfect Seed System: the Role of Community Seed Banking Scheme: This study looks into the role of a community seed banking scheme in simultaneously correcting imperfections in the seed system and enhancing biodiversity.

Tenure insecurity, Transaction Costs in the Land Lease Market and Their Impact on Gendered Productivity Differentials: This paper analyses links between land leasing behaviour and productivity differentials between male and female headed households. The central hypothesis is that because of their position in the society as farmers, female headed households might feel insecure about their land tenure rights and have lower contract enforcement ability which forces them into suboptimal land leasing behaviour.

Environmental Change, Species Coping Ability and Biodiversity Value - An Optimal Control Approach: This paper develops a measure of the value of biodiversity when the underlying environmental factor - which conditions the growth of a biologically diverse ecosystem - changes. The results generally show higher biomass value (positive contribution of biodiversity to overall productivity). Uncertainty associated with environmental change has a considerable effect on biomass values, and loss of biodiversity.

Jorge Garcia – Colombia

Jorge's main research interests are related to the development of policy instruments for environmental protection in developing countries. Jorge spent the first half of 2005 at University of California at Berkeley as a visiting scholar at the Department of Agricultural and Resource Economics.

In his Ph.D. thesis he focuses on the industrial pollution control problem faced by a resource-constrained regulator. Jorge studies, theoretically and empirically, the use of public disclosure of firms' environmental behaviour (measured by specific environmental indicators) as a potentially effective pollution prevention and mitigation tool. The general hypothesis of the thesis is that when information on firms' environmental indicators is made available to the public, a number of forces (such as stock markets, product markets, social sanction etc.) trigger abatement actions among industries. This would avoid direct intervention by the regulatory system.

The first part of the dissertation, which was initiated in 2004, presents a detailed study of Indonesia's public disclosure program (called PROPER). This scheme was an inspiring experiment as it was the first of its kind in the developing world. Using statistical techniques, Jorge analyses issues such as efficiency and cost-effectiveness of PROPER. The results of this research place this type of informal regulation as a promising approach that can reduce emissions at low cost.

In 2005, Jorge have studied Indonesia's disclosure scheme empirically, as well as some of the theoretical underpinnings of this regulatory approach. Using an economic model, one chapter of the dissertation clarifies why perfect knowledge on the identity of polluters by society is a basic requirement for the imposition of social sanctions. The results of this research also stress the importance of the regulator as an agent that can bridge an information asymmetry between the industry and society as a whole.

During 2005, Jorge also initiated research on environmental behaviour of firms in emerging economies. The current title of the first draft paper is *Explaining environmental management in Central and Eastern Europe*. Jorge is expected to defend his thesis in the fall of 2006.

Wilfred Nyangena – Kenya

During 2005, Wilfred was mainly involved in finalizing his PhD thesis chapters.² During the spring Wilfred was at the Environmental Economics Policy Forum in Addis Abeba, under the supervision of Gunnar Köhlin.

² In February 2006 Wilfred successfully defended his Ph.D. thesis entitled '*Essays on Soil Conservation, Social and Technology Adoption*'. Dr. Mary Tiffen, famous for her study of Machakos, was the discussant.

The thesis sought to provide a better understanding on the role of social capital in enhancing collective action on issues pertaining to land management decisions of rural households in Kenya. The FIRST ESSAY discusses methods of aggregating social capital. The analysis tests if there are differences in social capital between Machakos on one hand and Kiambu and Meru on the other. We found significant differences between Machakos and the other two regions. The SECOND ESSAY examined two issues. First, how social capital may affect economic performance and in particular collective action. Second, we examined the extent to which household and village level social capital affected plot level adoption of soil and water conservation. The THIRD ESSAY investigated evidence on the impact of physical soil and water conservation structures on value of yield. Results indicated that soil conservation investments increase returns on degraded land and even increased returns from some traditional inputs.

In addition, during the course of the year, Wilfred also attended and presented a few papers in international conferences. Notably, in January, Wilfred attended and presented a paper at the third workshop on Sustainable Natural Resource Management in Hangzhou, China. In May-June he participated at the third International Conference on the Ethiopian Economy in Addis Abeba.

Martine Visser – South Africa

In May 2005 Martine successfully defended her licentiate degree. Martine's doctoral research focuses on *behavioural economic experiments dealing with co-operation, inequality and the role of social institutions in unequal environments*. During the first stage of her research she has tested these ideas in situations where people rely on communal natural resources for their livelihoods. The work draws from data obtained in 2004 from public goods experiments, including 700 individuals from nine fishing communities, conducted in South Africa.

A novel aspect of the work is that it combines inequality and sanctioning behaviour in the voluntary contribution mechanism. The study incorporated various additional experiments, as well as a detailed survey on household characteristics, quota allocation and attitudes and perceptions about both the community and the individuals themselves.

During 2005 she has taught in an honours level course in Environmental Economics and a masters

level course in Natural Resource Economics at the University of Cape Town, South Africa. Currently she is finalizing her PhD thesis and also collaborating with Peter Martinsson (EEU) and Martin Kocher (CREED, Netherlands) on experiments dealing with social norms.

Precious Zikhali – Zimbabwe

In 2005 Precious took the following courses: Public Economics, Environmental Policy Instruments, Systems Ecology and Environmental Management.

In January, Precious attended the 3rd Workshop on Sustainable Natural Resource Management in Hangzhou, China, hosted and organised by the Centre for Chinese Agricultural Policy (CCAP) at Chinese Academy of Sciences (CAS).

In December she attended the First Training of Trainers Workshop organised by the Centre for Environmental Economic Policy in Africa (CEEPA). This teaching workshop provided an introduction to computable general equilibrium (CGE) models for the analysis of environmental and resource policies. She presented a brief group project using the modelling tools learnt during the course.

The overall theme of Precious' research is 'Forest-based poverty alleviation in rural Zimbabwe'. Her interest is in particular to analyse how non-timber forest products (NTFP) serve as safety nets for the impoverished rural population in developing countries. The last half of the year was spent largely in developing testable research hypotheses as well as on reviewing relevant research literature.

Jiegen Wei – China

Jiegen successfully finished a number of courses during 2005, including *Environmental policy*, *Public economics*, *Econometrics of panel data* and *System ecology*. Triggered by the course-work Jiegen has also initiated two research papers, the first pertaining to regulation of waste water emissions

under information asymmetry, and the second pertaining to the optimum size of marine reserves taking the life cycle of fisheries into consideration.

During the autumn of 2005, Jiegen visited University of California, Berkeley as an exchange research student (on an exchange program between UCLA and Göteborg University). In Berkeley, he completed six PhD courses including e.g. comparative economics, applied econometrics, industrial organization and political economics. While being in the US, Jiegen collaborated with Prof. Bill Hyde on a joint scientific paper on deforestation, published in *Journal of Beijing Forestry University* 2005, vol. 6.

Ping Qin – China

Ping attended the Young Scientists Summer Program in IIASA, Austria, June to August, 2005. She was working on the methane emission and rice production in China. The objective of this report is to describe the technology and practice used in rice cultivation in China, to provide an overview of the major factors influencing methane emissions, and to present the emission factors used for calculating rice field emissions at provincial level of China.

Many studies have found that land rights affect an individual's investment incentives. Various links between land rights and investment incentives have been explicitly identified and formally modelled in the literature. For instance, Jacoby, Li and Rozelle (2000) found a positive relation between the tenure security and investment incentives.

In her studies, Ping uses household survey data from Fujian Province of China, in order to examine the relationship between investment incentives in the forestry sector and three major forest-land property rights, tenure insecurity, right to transfer forest land, and regulations (logging quotas) on forest land rights. In the data collection, Ping measures the trust between the household and the local government, in order to examine the importance of trust households to invest in the forest sector.

Appendix

Board of directors

Board members of the Beijer International Institute of Ecological Economics are appointed by the Royal Swedish Academy of Sciences for a three-year period, and should not be re-elected more than once, according to the standing instruction for Beijer Institute approved by the Royal Swedish Academy of Sciences on June 5, 1991. The first Board of Directors for the new Institute was elected on June 5, 1991. The thirteenth annual board meeting was held at the Institute, September 2nd, 2005.

Board of Directors 2005-2006

CHAIRMAN

Stephen Carpenter*

Professor, Center for Limnology, University of Wisconsin, USA

EX-OFFICIO MEMBERS

Gunnar Öquist*

Professor, Secretary General of the Royal Swedish Academy of Sciences, Sweden

Karl-Göran Mäler*

Director, Beijer Institute, Sweden

* members of the Royal Swedish Academy of Sciences



Beijer Board 2005.
Back row: Karl-Göran Mäler, Anastasios Xepapadeas, Scott Barrett, Michael Hoel. Front row: Kanchan Chopra, Stephen Carpenter, Jeffrey Vincent.

PHOTO: ANNA SJÖSTRÖM

MEMBERS

Barrett, Scott

Professor, John Hopkins University, USA

Chopra, Kanchan

Professor, Environmental Economics Unit,
Institute of Economic Growth, New Delhi, India

Daily, Gretchen

Associate Professor, Department of Biological
Sciences, Stanford University, USA

Folke, Carl*

Professor, Systems Ecology, Stockholms University,
Sweden

Heal, Geoffrey

Professor, Paul Garrett Professor of Public Policy
and Business Responsibility Finance & Economics,
Columbia University, USA

Hoel, Michael

Professor, Department of Economics, University of
Oslo, Norway

Hughes, Terry

Professor, James Cook University, Queensland,
Australia

Rosswall, Thomas *

Professor, Executive Director, International Coun-
cil for Science (ICSU), France

Vincent, Jeffrey

Professor of Natural Resource and Environmental
Economics; Director of Environmental Research at
IGCC, UC San Diego, USA

Xepapadeas, Anastasios

Professor, University of Crete, Greece

Staff members

Folke, Carl, Professor, Research Fellow

Leijonhufvud, Christina, Administrator

Mäler, Karl-Göran, Professor, Director

Sjöström, Anna, Administrator, Information

Söderqvist, Tore, Associate Professor, Research
Associate

Ternström, Ingela, PhD, Research Associate

Troell, Max, Associated Professor, Research
Associate

PROJECT EMPLOYED STAFF

Andersson, Jessica, PhD, Department of Econom-
ics, Göteborg University

Aniyar, Sara, Professor emerita, University of Zulia,
Venezuela

Colding, Johan, PhD, Research Associate

Crepin, Anne-Sophie, PhD, Research Associate

Jansson, Åsa, PhD, Research Associate

Lerda, Sandra, FL, Swedish University of
Agricultural Sciences, Uppsala

Lindahl, Therese, PhD, Research Associate

Rönnbäck, Patrik, PhD, Research Associate

Visiting scientists

Enrique Weir and **Karine Gil-Weir**,
Texas University, USA.

Administration

Office location

The Institute is located in a wing of the early 20th century building of the Royal Swedish Academy of Sciences at Frescati, a science and university area about 2 km north of Stockholm City. The area is situated in one of Stockholm's green belts, Ekoparken, which also include some of the inlets of the Baltic Sea. Ekoparken is declared as a "national city park" by the Swedish parliament. The Institute's visiting address is Lilla Frescativägen 4, Stockholm.

Organization

The Institute's administration is partly carried out by or coordinated with the Royal Swedish Academy of Sciences, for example, accounting and maintenance of premises and computers. Other administrative routines are designed independently by the Institute.

Christina Leijonhufvud

Christina Leijonhufvud is administrator. During 2005/2006 she has been responsible for the administration of the Board and the Askö meetings (at Kristineberg Marine Research Station) in September 2005 and the meeting on "Steady State Economy" at Stanford University in January 2006. She has been organizing the Resilience Alliance meeting at

the Academy in September 2005. She is also dealing administratively with the SANDEE Network, the EDE journal, the handbook of Environmental Economics, and the EEE programme together with the ICTP and FEEM.

Anna Sjöström

Anna Sjöström is administrator and also handles the information about the Institute and its research. During 2005/2006 she has been responsible for the administration of the Board and the Askö meetings (at Kristineberg Marine Research Station) in September 2005 and the Resilience Alliance meeting at the Academy in September 2005. Anna is the webmaster for the Beijer webpage, editor for the Annual Report and responsible for the Beijer Publication Series, Beijer Reprint Series, Beijer Discussion Series, Beijer Occasional Series, and the Beijer library. Furthermore she is also handling administratively with the PhD programme together with Göteborg University.

General budgetary and accounting issues for the Institute are managed by Ingela Ternström.

Simon Fransson have worked part time with administrative matters.

Funding

Core funding of the Institute has been provided by the Kjell and Märta Beijer Foundation. Funding for the Institute's activities between 1 July 2005 – 30 June 2006 has also been provided by:

- ❖ Foundation for Strategic Environmental Research (MISTRA)
- ❖ The John D. and Catherine T. MacArthur Foundation
- ❖ The Swedish Environmental Protection Agency
- ❖ The Swedish International Development Cooperation Agency (Sida)
- ❖ The Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (FORMAS)
- ❖ European Commission, Sixth Framework Programme

In addition, many activities have been carried out jointly with the Abdus Salam International Centre for Theoretical Physics and financed by the ICTP.

A summary of Beijer activities

Research programmes

In order to stimulate transdisciplinary work the Institute initiates and organizes international research programmes. These programmes are run as networks involving up to 50 scholars in ecology, economics and related disciplines. Graduate students also participate in the research. Each programme consists of a number of different, but related, research project. These projects are carried out by teams consisting of ecologists as well as economists and researchers from other disciplines. Each programme runs for at least one year, and participants are invited to workshops at the Institute to report on the progress being made and to discuss the results. Scholars also spend working periods at the Institute. The programmes are briefly presented in this section.

Marine Biodiversity, Patterns and Processes (MARBIPP)

Marine Biodiversity, Patterns and Processes (MARBIPP), a scientific program with the general objective to provide increased knowledge and end-user directed guidelines for the management of coastal marine biodiversity in Swedish waters. See previous article in the report.

Fish in Shallow Habitats and Coastal Area Services (FISHCASE) – an ecosystem approach to valuing and managing coastal habitats and fisheries in Sweden

This project is a cooperative effort between the Beijer Institute (Sandra Lerda, Patrik Rönnbäck and Tore Söderqvist) and the Kristineberg Marine Research Station (Leif Pihl, Johan Stål and Håkan Wennhage). The project is funded for the period of 2002-05 by FORMAS and is coordinated with related research carried out in MARBIPP. The research work carried out at the Beijer Institute focuses on economic valuation of fish recruitment supported by coastal habitats situated along the West Coast of Sweden. The importance of this ecosystem service to four fish species is subject to study in the project: plaice, eel, cod and sea trout. These four species are characterized by a varying degree of dependence to particular habitats for their recruitment.

Inclusive Wealth and Accounting Prices (IWAP)

In this research programme, we attempt to test whether it would be possible to estimate accounting prices for ecological systems. The study area will be the Stockholm County. The methods developed for estimating the accounting prices can later be applied to large scale systems, in order to assess the sustainability of the joint economic – natural systems. See previous article in the report.

The Resilience Alliance

After the success with the Resilience Network project the focus on the resilience has evolved into the Resilience Alliance of which the Beijer Institute is an institutional member. The Resilience Alliance is a consortium of institutions that seeks novel ways to integrate science and policy in order to discover foundations to sustainability. It includes universities, government and non-government agencies as partners in a program of research and communications aimed at the vital, but thus far largely elusive, goal of integrated social, economic and ecological sustainability. Sustainable development and management of global and regional resources is not an ecological problem, not an economic one, nor a social one. It is a combination of all three. The journal *Ecology and Society* (formerly *Conservation Biology*) is owned by the Resilience Alliance. For more information: www.resalliance.consecol.org

Other research projects

Besides the projects that constitute the Institute's research programmes, the Institute's staff is involved in a number of other research projects. A selection of initiated, ongoing and terminated projects during 2005/2006 is listed below.

Consumption of fish resources in aquaculture production: implications for supplies of low cost nutritious food for poor consumer groups and its overall socio-economic impact

The general objective is to investigate how the aquaculture sector need for fish resources affects fish protein availability for poor people. Study area is Andhra Pradesh, India. A Sida/Sarec financed project. See previous article in the report.

Dr. Max Troell, Prof. Erri D. Babu, Dr. Tore Söderqvist.

Peri-urban mangrove forests as filters and potential phytoremediators of domestic sewage in East Africa (PUMPSEA)

PUMPSEA is a 3-year research project dedicated to study how mangroves react when exposed to controlled quantities of domestic sewage. It is believed that mangroves are capable of filtering the wastewater that washes the shores around Eastern African urban centers. Therefore, the aim of this project is to come up with a way of using mangroves to treat this domestic sewage by demonstrating this ecosystem service and by examining its ecological and socio-economical effects.

Dr. Patrik Rönnbäck, Dr. Max Troell, the Beijer Institute and Dr. Beatrice Crona, Stockholm University. www.pumpsea.icat.fc.ul.pt

Integrated abalone-seaweed farming in South Africa (ABSEA)

This is a joint research program between Swedish researchers and South African researchers. The core of the research is to develop and test the bioengineering concept of integrated land-based abalone and seaweed cultivation. The unit should have the ability to grow a sufficient quantity of good quality seaweed that can help in sustaining commercial production of abalone in South Africa. Besides this the project also analyzes abalone farming from a larger perspective, including both ecological and socio-economic impacts of the industry on a local and national scale. Scientific findings together with capacity building are the main outcome from the project.

Dr. Max Troell, the Beijer Institute and Dr. Christina Halling, Stockholm University. www.beijer.kva.se/max/absea/

Sharing natural resources with complex dynamics – strategic interaction across temporal and spatial scales with policy implications

More specifically our aim is to answer the following questions:

- ✦ How can institutions respond to the presence of a complex environment, involving discontinuities, thresholds and uncertainty?
- ✦ Within such institutions how do people interact strategically in the presence of complex dynamics and uncertainty?
- ✦ How can we improve management of complex ecosystems and to what extent is there a need to revise current economic approaches to economic policy?

Dr. Anne-Sophie Crépin and Dr. Therese Lindahl, the Beijer Institute.

Pest control with thresholds

This project studies the role of diversity in the management of pests when there is a threshold and a stochastic driver.

Dr. Anne-Sophie Crépin, Dr. Jon Norberg and Prof. Karl-Göran Mäler.

Strategic interaction, asymmetric information and coordination – theoretical predictions and experimental evidence

The aim of this project is to analyze the interaction of asymmetric information and learning in coordination problems. More specifically; How does access to asymmetric information and learning affect the strategic interaction between the agents? What are the welfare consequences for individual actors? What overall welfare consequences can be expected? How do we design policy instruments with the purpose of overcoming the inefficiencies associated with coordination problems? To answer the questions we will use both theoretical predictions and experimental evidence.

Dr. Therese Lindahl, the Beijer Institute and Prof. Magnus Johannesson, Stockholm School of Economics.

SUS.DIV: a network of excellence on sustainable development in a diverse world

SUS.DIV a five-year project (2005-2010) that focuses on the relationship between cultural diversity and sustainable development. It integrates European research capabilities across disciplines and countries to provide our society and polity with the instruments and tools for managing cultural diversity as a key element of a new strategy for sustainable development.

Dr. Ingela Ternström and Dr. Johan Colding, the Beijer Institute. www.ebos.com.cy/susdiv.

Teaching and training

The Institute serves as a catalyst between university departments and institutions working with ecological economic issues, and PhD students are involved in both research programmes and projects. The Institute organises training workshops and international research seminars on environment and development, and international training programmes.

See the Chronology of Beijer and associated networks for details on seminars and workshops held during 2005/2006.

The Ecological and Environmental Economics - EEE Programme

The EEE Programme is a joint three-year programme of ICTP - The Abdus Salam International Centre for Theoretical Physics, FEEM - Fondazione Eni Enrico Mattei, and The Beijer International Institute of Ecological Economics. The core aim of the EEE Programme is organize research and training activities with the final objective of enabling researchers from the developing countries to join the international academic network in the field of ecological and environmental economics.

The EEE programme is described more detailed previously in the Annual Report.

PhD programme in Environmental Economics

The Beijer Institute and the Environmental Economics Unit at Göteborg University established a PhD programme in environmental economics in 1997. The purpose of the programme is to strengthen the capacity in developing countries and in particular the capacity to teach environmental economics at the university level. The programme is supported by SAREC. The PhD programme is described more detailed previously in the Annual Report.

The Stockholm Seminar: Frontiers in Sustainability Science and Policy

This seminar series started in August 2000. It is a series cosponsored by the Beijer Institute, Centre for Transdisciplinary Environmental Research (CTM) at Stockholm University, the International Geosphere-Biosphere Programme (IGBP) at the Royal Swedish Academy of Sciences, the Swedish Biodiversity Centre at the Swedish University of Agricultural Sciences and Uppsala University, (CBM) the Stockholm Environment Institute (SEI), Stockholm International Water Institute (SIWI) and the International Foundation for Science (IFS). The series present lectures from a wide variety of perspectives on sustainability and is focused on the need for a sound scientific basis for sustainable development policy. The arranging institutes get regular visits from acknowledged

researchers from all around the world. The series is arranged to make use of the knowledge those researchers represent and to increase the interactions in the scientific community and between the scientific community and the rest of the society. In the series, the latest research will continuously be presented. The series is primarily for researchers, students, policymakers and media.

During 2005/2006 the following seminars were held at the Royal Swedish Academy of Sciences:

2005

16/9 Dr. Will Steffen

“Slumbering Giants: Potential Surprises in the Earth System”

6/10 Prof. Lance Gunderson

“Moving beyond ‘command and control’ water management – lessons from three iconic systems in the USA”

18/10 Prof. Manfred Max-Neef

“Sustainable Wealth Creation: towards a Trans-disciplinary Economics”

1/11 Prof. Craig Allen

“Resilience and Novelty in Ecosystems and other Complex Systems”

18/11 Prof. Sing C. Chew

“Global Environmental Crisis and Ecological Futures: What Can We Learn From The Past”

24/11 Prof. Steve Yearley

“Understanding the limits on knowledge and decision making: Genetically Modified Organisms in the UK”

2006

11/1 Prof. Bob Costanza

“Developing an Integrated History (and future) of People on Earth – IHOPE”

31/1 Mr. Jonathan Lash

“Healthy Ecosystems – a Prerequisite for Poverty Alleviation”

16/3 Prof. Steve Lansing

“Perfect Order: Recognizing Complexity in Bali”

10/4 Prof. John Robinson

“Accelerating Sustainability in British Columbia: The Centre for Interactive Research on Sustainability”

27/4 Dr. Elisabeth Lindgren

“Climate Change and Human Health – our current knowledge”

4/5 Prof. Douglas Meffert

“Reorganization after Hurricane Katrina: Urban and Coastal Ecosystems in New Orleans”

23/5 Prof. Oliver Coomes

“Livelihood, Environment and Inequality in a Tropical Forest Community of the Peruvian Amazon”

The Askö Meeting²

Since 1993 the Institute has organized an annual meeting in September for informal discussions between ecologists and economists at the Stockholm Centre for Marine Research at Askö, a Swedish island in the Baltic Sea. Each meeting has resulted in a consensus document. The theme for the 13th Askö Meeting (3rd-5th of September 2005) was *Disasters and disastrous policies*.

Staff members' publications and activities

Staff members' research activities are presented at, for example, conferences, workshops and seminars. To stimulate interaction between the staff members regularly internal presentations take place at the Institute. Below is a selection of the staff members' publications and activities during 2005/2006.

Jessica Andersson

Research focus:

Welfare economics, institutional economics and these related to tourism and the environment

At Beijer since: 1998

Commissions:

✦ Work at the Environment Policy Unit at Sida

Other:

✦ Have been on maternity leave the main part of the prescribed period.

² This series of meetings took originally place at Askö, an island in the Trosa Archipelago. Although during the last couple of years we have used other venues we are continuing to call these meetings "Askö" meetings.



Askö Meeting, Kristineberg Marine Research Centre. Participants: Scott Barrett, Paul Ehrlich, Jon Norberg, Jim Wilen, Thomas Sterner, Max Troell, Tore Söderqvist, Simon Levin, Christina Leijonhufvud, Michael Hoel, Tasos Xepapadeas, Anna Sjöström; Buzz Brock, Steve Carpenter, Kanchan Chopra, Karl-Göran Mäler, Jeff Vincent and Leif Pihl.

Sara Aniyar

Research Associate (Economics), the Beijer Institute
Titular professor at the University of Zulia, Maracaibo,
Venezuela

Research focus:

Environmental Analysis of ecosystems
Green accounting
Accounting of Ecosystem Services

Since January 2004 member of the research team responsible for the study: *"Accounting Prices of the Stockholm County's Inclusive Wealth"*

My activities within this during the last year have included

- 1 Participation in the meeting of the network on "Inclusive Wealth and Accounting Prices" (IWAP), held within and with the RANESA Second Training and Research Workshop on Environmental Accounting, Pretoria, 30 July – 3 August, 2006
- 2 Participation in the meeting on "Accounting for Ecosystem Services" Pretoria 3-6 August 2006

- 3 Collection of statistical and economic information on

- ❖ Manufactured capital in the Stockholm County, historic series and trends
- ❖ The tax system
- ❖ Building of a database on the Stockholm County's Population Educational levels, demographic structure, salaries, and other labour market statistical features

- 4 Collection and analysis of background literature on

- ❖ Human capital
- ❖ Tax system in Sweden
- ❖ Relevant information on the county's economy, projections and development plan

- 5 Updating of the data base on Venezuelan Oil and Fixed Capitals as well as Net Foreign Assets Position

Papers in process:

- 1 Capital Gains, non-autonomous resource allocation mechanisms and inclusive wealth with applications to Venezuela. Co-Authorred with Karl-Göran Mäler

- 2 Accounting price of the Stockholm County's Manufactured Capital. Co-Authorred with Karl-Göran Mäler
- 3 Human Capital contribution to Wellbeing in the Stockholm County

At Beijer since: 1998

Seminars and symposium presentations:

- ❖ Inclusive Wealth Seminar and RANESA second technical and training workshop on Environmental Accounting
Pretoria, 2006

Commissions and other activities:

- ❖ Member of the Advisory Committee of LACEEP (the Latin American and Caribbean Environmental Economics Program for research promotion and training)
- ❖ Participation in the LACEEP committee meeting in February 2006 Costa Rica
- ❖ Reviewer for SANDEE (South Asian Network for Development and Environmental Economics) of the research proposal "Evaluation of the protective functions of mangrove vegetation in mitigating the adverse impacts of coastal disasters. (Sub-theme: Natural and other barriers)
- ❖ Reviewer of the paper : "Towards a Sustainability Economics: Principles and Values" for a special Issue of the Canadian Society of Ecological Economics journal "Bioeconomics"
- ❖ Reviewer of the paper "Importancia de la Organización Social en la Valoración Económica de los vínculos entre Manglar y Pesquerías de Camarón Blanco" for the Scientific Journal "Universidad y Ciencia" Universidad Juárez Autónoma de Tabasco, México
- ❖ Participation in a joint work for building the research proposal "A Decision Support System for the Management of Cormorants in Sweden" (With Karine Gil de Weir and Enrique Weir, invited researcher at the Beijer Institute)
- ❖ In charge of the book registration in the Beijer Library

Johan Colding

Research Associate, PhD (Ecology)

Research focus:

Institutions and biological conservation
Social-ecological system analyses
Urban ecology

At Beijer since: 1995

Publications:

- Barthel, S., Colding, J., Folke, C., Elmqvist, T.
2005. *History and local management of a biodiversity rich urban cultural landscape*. Ecology and Society 10 (2): 10. [online] URL: <http://www.ecologyandsociety.org/vol10/iss2/art10/>
- Colding, J., Lundberg, J., Folke, C. *Incorporating green-area user groups in urban ecosystem management*. AMBIO Vol. 35. No. 5. In press.
- Hougnér, C. Colding, J. and Söderqvist, T. In press, *Economic valuation of a seed dispersal service in the Stockholm National Urban Park, Sweden*. Ecological Economics, Available online 27 December 2005.
- Colding, J. 'Ecological land-use complementation' for building resilience in urban ecosystems. In review, Landscape and Urban Planning.
- Colding, J. Lundberg, J. and Lundberg, S. *Multipurpose use of urban lands for biodiversity-support: The potential of golf courses*. Submitted to Nature.
- Colding, J., Lundberg, J., Olsson, P., Tengö, M., Folke, C. and Elmqvist, T. *From sacred groves to golf courses: The role of social capital for sustainable use and conservation of ecosystems*. Submitted to Global and Environmental Change
- Jansson, Å and Colding, J. *Quantifying the effects of urban development on ecosystem service generation on a regional scale: Nitrogen retention and spatial urban planning*. In prep.

Seminars and symposium presentations:

- ❖ *Golfbanors roll för de omgivande ekosystemen*. Seminarium om "Miljö- och naturvård inom golf sporten", 21 oktober 2006. Organized by Svenska Golf förbundet and Naturskyddsföreningen i Stockholms län och Stockholms läns landsting.

Commissions:

- ✦ Received the award of Stiftelsen Kung Carl XVI Gustafs 50-årsfond for his PhD-thesis in 2002 for studies of linked social-ecological systems.
- ✦ Served as a research coordinator for The Millennium Ecosystem Sub-Global Assessment.
- ✦ Serves as a research coordinator for Beijer's participation in the Network of Excellence for Sustainable development in a Diverse World (SUS-DIV), for the implementation of the European Community Sixth Framework Programme.
- ✦ Member in the Resilience Alliance.
- ✦ Serves as regular reviewer for scientific journals, including: AMBIO, Ecological Economics, Ecology and Society, ECOSYSTEMS, Conservation Biology.

Other:

- ✦ Supervision of PhD candidate at the Department of Systems Ecology, Stockholm University.
- ✦ Course co-leader for undergraduate course "Natural Resources and Society" (10 credits), the Department of Systems Ecology, Stockholm University. March 27-June 9 2006.
- ✦ Contributing lecturer at various courses at the Stockholm University.

Anne-Sophie Crèpin

Research Associate, PhD (Economics)

Research focus:

Resource economics with focus on resources with complex dynamics due to diversity, species richness, the interplay of fast and slow variables, threshold effects or spatial dynamics.

At Beijer since: 1998

Publications:

Crèpin. *Incentives for Wetland Creation*. Journal of Environmental Economics and Management, 50(3):598-616, November 2005.

Chapin, Berman, Callaghan, Convey, Crèpin, Danell, Ducklow, Forbes, Kofinas, McGuire, Nuttall, Virginia, Young, Zimov, Christensen, Godduhn, Wall, and Christoph Zockler, 2005. *Polar Systems*. Chapter 26 in Millennium Ecosystem Assessment, Ecosystems and Human Well-Being: Current State and Trends, Vol 1.

Seminars and symposium presentations:

- ✦ SURED 2006 in Ascona, Switzerland.

Other:

- ✦ Referee work for Ambio, Environment and Development Economics, Environmental and Resource Economics, Journal of Bioeconomics, Journal of Environmental Economics and Management, Resource and Energy Economics.

Carl Folke

Research Fellow, the Beijer Institute

Professor, Systems Ecology, Stockholm University

Research focus:

Understanding, managing and governing social-ecological systems for resilience

At Beijer since: 1991-1996 and thereafter as research fellow

Publications:

Adger, W.N., T. Hughes, C. Folke, S.R. Carpenter and J. Rockström. 2005. *Social-Ecological Resilience to Coastal Disasters*. Science 309:1036-1039.

Barthel, S., J. Colding, T. Elmqvist and C. Folke. 2005. *History and Local Management of a Biodiversity Rich, Urban, Cultural Landscape*. Ecology and Society 10(2): 10. [online] URL: <http://www.ecologyandsociety.org/vol10/iss2/art10/>

Berkes, F., T.P. Hughes, R.S. Steneck, J.A. Wilson, D.R. Bellwood, B. Crona, C. Folke, L.H. Gunderson, H.M. Leslie, J. Norberg, M. Nyström, P. Olsson, H. Österblom, M. Scheffer, B. Worm. 2006. *Globalization, Roving Bandits, and Marine Resources*. Science 311:1557-1558

Carpenter, S.R. and C. Folke. 2006. *Ecology for Transformation*. Trends in Ecology and Evolution 21: 309-315.

Deutsch, L. and C. Folke. 2005. *Ecosystem Subsidies to Swedish Food Consumption from 1962 to 1994*. Ecosystems 8:512-528.

Folke, C. 2006. *Conservation against Development versus Conservation for Development*. Conservation Biology 20:686-688.

Folke, C. 2006. *Resilience: The Emergence of a Perspective for Social-Ecological Systems Analyses*. Global Environmental Change 16: 253-267.

Folke, C., T. Hahn, P. Olsson and J. Norberg.
2005. *Adaptive Governance of Social-Ecological Systems*. Annual Review of Environment and Resources 30:441-473.

Gunderson, L.H., S.R. Carpenter, C. Folke, P. Olsson and G.D. Peterson. 2006. *Water RATs (Resilience, Adaptability, and Transformability) in lake and wetland social-ecological systems*. Ecology and Society 11(1): 16. [online] URL: <http://www.ecologyandsociety.org/vol11/iss1/art16>

Hahn, T., P. Olsson, C. Folke and K. Johansson. 2006. *Trust Building, Knowledge Generation and Organizational Innovations: The Role of a Bridging Organization for Adaptive Co-Management of a Wetland Landscape around Kristiansstad, Sweden*. Human Ecology prepublication on line July 18, 2006

Hughes, T., D. Bellwood, C. Folke, R. Steneck and J. Wilson. 2005. *New Paradigms for Supporting the Resilience of Marine Ecosystems*. Trends in Ecology and Evolution 20:380-386

Lebel, L., J.M. Anderies, B. Campbell, C. Folke, S. Hatfield-Dodds, T.P. Hughes and J. Wilson. 2006. *Governance and the capacity to manage resilience in regional social-ecological systems*. Ecology and Society 11(1): 19. [online] URL: <http://www.ecologyandsociety.org/vol11/iss1/art19>

Olsson, P., L.H. Gunderson, S.R. Carpenter, P. Ryan, L. Lebel, C. Folke and C.S. Holling. 2006. *Shooting the rapids: navigating transitions to adaptive governance of social-ecological systems*. Ecology and Society 11(1): 18. [online] URL: <http://www.ecologyandsociety.org/vol11/iss1/art18>

Walker, B. H., L. H. Gunderson, A. P. Kinzig, C. Folke, S. R. Carpenter, and L. Schultz. 2006. *A handful of heuristics and some propositions for understanding resilience in social-ecological systems*. Ecology and Society 11(1): 13. [online] URL: <http://www.ecologyandsociety.org/vol11/iss1/art13>

Commissions:

- ✦ Editor-in-Chief, Ecology and Society www.ecologyandsociety.org
- ✦ Advisory and editorial boards of 13 journals including: Ambio, Conservation Biology,

- ✦ Ecological Economics, Ecosystems, Environmental Conservation, Environment and Development Economics, Frontiers in Ecology and the Environment, Global Environmental Change.
- ✦ Founding member, Steering Committee and Board of Directors of the Resilience Alliance www.resalliance.org
- ✦ Member of the Royal Swedish Academy of Sciences www.kva.se
- ✦ Member of the Environment Committee of the Royal Swedish Academy of Sciences
- ✦ Member of the Science Council of the International Human Dimensions Programme on Global Environmental Change (IHDP)
- ✦ Board member, Beijer International Institute of Ecological Economics
- ✦ Board member, Stockholm Environment Institute
- ✦ Board member, Stockholm International Water Institute
- ✦ Board member of the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (FORMAS)
- ✦ Supervision of three PhD-students (Stephan Barthel, Lisen Schultz, Jonas Åkerman)

Åsa Jansson

Research Associate, PhD (Ecology)

Research focus:

Quantification and valuation of ecosystem services

At Beijer since: 2004

Publications:

Jansson, Å and Colding, J. *Quantifying the effects of urban development on ecosystem service generation on a regional scale – nitrogen retention and spatial urban planning*. In prep.

Seminars and symposium presentations:

- ✦ 2nd workshop on inclusive wealth and accounting prices, April, Trieste, Italy.

Sandra Lerda

Research Assistant, Fil. Lic. (Economics)

Research focus:

Valuation of the contribution of coastal zones to fisheries

At Beijer since: fall 1999 as a PhD student from SLU; since July 2001 as a research assistant

Therese Lindahl

Research Associate, PhD (Economics)

Research focus:

Research focus is on the role of asymmetric uncertainty (knowledge) and complex ecosystem dynamics in resource dilemmas.

At Beijer since: July 2005

Publications:

Thesis: *Strategic and Environmental Uncertainty in Social Dilemmas*. Doctoral Dissertation in Economics, Stockholm School of Economics, June 2005 (Thesis opponent: Professor Martin Dufwenberg, University of Arizona).

Working papers:

Crépin, A-S., Lindahl, T., 2005. *Grazing Games*. Chapter 3 in Strategic and Environmental Uncertainty in Social Dilemmas, Doctoral Dissertation in Economics, Stockholm School of Economics.

Lindahl, T., Johannesson, M., 2005. *Private Information in Common Pools*. Chapter 1 in Strategic and Environmental Uncertainty in Social Dilemmas, Doctoral Dissertation in Economics, Stockholm School of Economics.

Lindahl, T., 2005. *Ignorant Exploitation of a Common Resource*. Chapter 2 in Strategic and Environmental Uncertainty in Social Dilemmas, Doctoral Dissertation in Economics, Stockholm School of Economics.

Lindahl, T., Söderqvist, T., 2005. *Who Wants to Save the Baltic Sea?* Chapter 4 in Strategic and Environmental Uncertainty in Social Dilemmas, Doctoral Dissertation in Economics, Stockholm School of Economics.

Karl-Göran Mäler

Director, Professor (Economics)

Research focus:

Resource and environmental economics.
Option values and irreversible environmental changes.
Cost benefit analysis of the environment and in particular to acid rains.
Environment and development.
International environmental problems.

At Beijer since: 1991

Selected publications:

Mäler, K-G. and Fisher A. *Environment, Uncertainty, and Option Values*. Handbook of Environmental Economics, Vol 2, North Holland, Dordrecht. 2005.

Mäler K-G. and Chuan-Zhong Li. *On the value of resilience in a dynamic economy-environment system*. Incomplete manuscript, 2005

Mäler, K-G. and Aniyar, S. *Capital gains, non-autonomous resource allocation mechanisms and inclusive wealth: An application to oil in Venezuela*. 2005, Beijer Discussion Paper No. xx, 2006

The Mincer equation in imperfect economies. Beijer Discussion Paper No. xx, 2006

Kossioris, G., M. Plexoyakis, A. Xepapadeas, A. de Zeeuw, and K.-G. Mäler, 2006. *Feedback Nash Equilibria for Non-Linear Differential Games in Pollution Control*. Beijer Discussion Paper No. 204. 2006.

Awards

- ✦ Volvo Environment Prize 2002
- ✦ Kenneth E Boulding Prize, by the International Society of Ecological Economists, 2004
- ✦ European Lifetime Achievement Award in Environmental Economics, 2005
- ✦ Elected associate member of The Third World Academy of Sciences 2005
- ✦ Elected fellow of Association of Environmental and Resource Economics 2005

Memberships in professional associations and other activities

- ✦ Swedish Economic Association
- ✦ American Economic Association

- ❖ European Economic Association
- ❖ European Association of Environmental and Resource Economists
- ❖ Member of the Committee on the Prize in Economic Sciences in Memory of Alfred Nobel 1981-1994
- ❖ Past member of the Swedish Council of Economic Advisers
- ❖ Associated member of TWAS, the academy of sciences for the developing world

Patrik Rönnbäck

Research Associate, PhD (Ecology)
 Researcher, Systems Ecology, Stockholm University
 Associate Professor, Natural Sciences & Technology,
 Gotland University

Research focus:

Key words: Integrated Coastal Zone Management, Sustainable Fisheries, Sustainable Aquaculture, Identification and Valuation of Ecosystem Services, Certification Systems (eco- & fair trade labeling), Ecological Footprint, Mangrove Ecosystems and Dependence / Vulnerability of Local Communities, Mangrove Restoration, Sewage Treatment

Main interests: The main focus of my research is on (1) ecological and socio-economic evaluation of ecosystem services and (2) sustainability analysis of mangrove-associated fisheries and shrimp aquaculture. The field of Ecological Economics has provided the conceptual framework for my research since 1996. I have in depth research experience from India, the Philippines, Mozambique and several other countries in Asia and Africa. Currently, I am also involved in research projects aimed at evaluating ecosystem services associated with biodiversity and fisheries in Swedish coastal waters.

At Beijer since: 2003

Publications:

- Bosire, J.O., Crona, B.I., Koedam, N., Kautsky, N., Dahdouh-Guebas, F. & Rönnbäck, P. (submitted) *Trends in macrobenthic colonization as an indicator of ecosystem recovery in reforested mangrove forests*. Biological Conservation
- Crona B. & Rönnbäck P. (2005) *Utilization of Replanted Mangroves as Nursery Ground by Shrimp Communities in Gazi Bay, Kenya*. Estuarine, Coastal and Shelf Science, 65: 535-544

Crona B., Holmgren S. & Rönnbäck P. (in press) *Re-establishment of Epibiotic Communities in Reforested Mangroves of Gazi Bay, Kenya*. Wetlands Ecology & Management

Crona B. & Rönnbäck P. (submitted) *Community Structure and Temporal Variability of Juvenile Fish Assemblages in Natural and Replanted Mangroves, Sonneratia alba Sm., of Gazi Bay, Kenya*. Estuarine, Coastal & Shelf Science

Dahdouh-guebas, F, Collin, S., Lo seen, D., Rönnbäck, P., Depommier, D., Ravishankar, T. & Koedam, N. (2006) *Analysing ethnobotanical and fishery-related importance of mangroves of the East-Godavari Delta (Andhra Pradesh, India) for conservation and management purposes*. Journal of Ethnobiology and Ethnomedicine, 2: 24 [online]

Eklöf J. de la Torres Castro M., Nilsson C. & Rönnbäck P. (in press) *How do seaweed farms influence local fishery catches in a seagrass-dominated setting in Chwaka Bay, Zanzibar?* Aquatic Living Resources

Krause G., Norberg J., Glaser M. & Rönnbäck P. (submitted) *Options and Resilience in a Social-Ecological Mangrove System in Pará (North Brazil)*. Ecology and Society

Pihl, L. Baden, S. Kautsky, N. Rönnbäck, P. Söderqvist, T. Troell, M and Wennhage H. (2006). *Shift in fish assemblage structure due to loss of seagrass Zostera marina habitats in Sweden*. Estuarine and Coastal Shelf Science 67: 123-132.

Rönnbäck, P., M. Troell, L. Pihl, T. Söderqvist, N. Kautsky and H. Wennhage. (submitted) *Ecosystem Goods and Services From Temperate Coastal Habitats – Identification, Valuation and Implications of Ecosystems Shifts*. Ambio

Rönnbäck P., Crona B. & Ingwall L. (submitted) *The Return of Ecosystem Goods and Services in Replanted Mangrove Forests – Perspectives from Two Local Communities in Gazi Bay, Kenya*. Environmental Conservation

Seminars and symposium presentations:

- ❖ Organiser and key speaker at the seminar *Our Ecological Footprint*. Gotland University, Baltic Rim Seminar Series, Visby, December 2, 2005
- ❖ Invited speaker at tsunami seminar *Kortsiktig katastrofhantering – långsiktig hållbar utveck-*

ling: *Erfarenheter från Tsunamikatastrofen i Sydostasien (in Swedish)*. CORDIO & Swedish Water House, Stockholm, April 20, 2005

- ❖ Invited speaker at tsunami seminar *Flodvågskatastrofen i Sydostasien – vad görs och bör göras för att skapa en hållbar återuppbyggnad av miljön och fiskerieringen?* (in Swedish), Royal Swedish Academy of Agriculture and Forestry, Stockholm, April 14, 2005
- ❖ Workshops within PUMPSEA- Peri-urban mangrove forests as filters and potential phyto-remediators of domestic sewage in East Africa. EU – PROGRAM (20-26 February, 2006, Maputo, Mozambique; 11-13 July Lisbon, Portugal).

Commissions:

- ❖ Swedish coordinator for EU financed program PUMPSEA (Peri-Urban Mangrove Forests as Filters and Potential Phyto-remediators of Domestic Sewage in East Africa)
- ❖ Coordinator for SEPA (Swedish Environmental Protection Agency) financed program MAR-BIPP: Ecosystem Goods and Services
- ❖ Reviewing proposal for Swedish Development Research submitted to Sida (Swedish International Development Agency)
- ❖ Reviewing proposal for Western Indian Ocean Marine Science Association (WIOMSA), for its Marine Science for Management (MASMA) programme
- ❖ Continuously appointed to scientifically evaluate manuscript submitted to the journals *Ambio*; *Asian Fisheries Science*; *Contemporary Economic Policy*; *Ecological Economics*; *Estuarine, Coastal and Shelf Science*; *Frontiers in Ecology and the Environment*; *Global Environmental Change*; *Government and Policy*; *Hydrobiologia*; *Journal of Environmental Management*; *Journal of Fish Biology*; *Ocean and Coastal Management*; *Wetlands Ecology and Management*

Teaching and Training:

- ❖ Lecturer and course leader for an advanced course in *Ecological Economics* (15 ECTS credits) (Gotland University)
- ❖ Lecturer, supervisor of project assignments and course planning in the Advanced course in *Trop-*

ical Aquatic Resources Management (15 ECTS credits) (Stockholm University)

- ❖ Supervision of PhD students at Dept. Systems Ecology, Stockholm University: Adriano Macia (co-supervisor and main practical supervisor, degree May 2005); Maricela de la Torres Castro (co-supervisor, degree June 2006); Johan Eklöf (co-supervisor, degree scheduled for 2007); Beatrice Crona (main supervisor, degree scheduled for September 2006)
- ❖ Supervision of Master students at Dept. Systems Ecology, Stockholm University (graduated three students during 2005)

Ingela Ternström

Research Associate, PhD (Economics)

Research focus:

Institutional aspects of common-pool resource management, theoretical and empirical analyses of factors that affect cooperation among resource users (e.g. leadership, group composition, external disturbances). Understanding the causes for institutional failure in common-pool resource management, and developing methods for predicting and avoiding it.

The effect of HIV/AIDS on local natural resources, specifically how HIV/AIDS, via its effect on the social and institutional structures of affected communities, will affect the way local natural resources are used and managed.

At Beijer since: August 2002.

Publications:

- Ternström, I., resubmit. *Cooperation or Conflict in Common Pools*. Journal of Development Economics.
- Ternström, I., 2005. *HIV/AIDS – The True Tragedy of the Commons? Exploring the Effects of HIV/AIDS on Management and Use of Local Natural Resources*. Beijer International Institute of Ecological Economics Discussion Paper, No. 200
- Ternström, I., 2005. *Cooperation or Conflict in Common Pools*. Beijer International Institute of Ecological Economics Discussion Paper, No. 198.
- Ternström, I., 2005. *Disturbances and Resilience in Common-Pool Resource Management Systems*.

Beijer International Institute of Ecological Economics Discussion Paper, No. 197.

Ternström, I.; 2005. *Income Inequality and Cooperation in Common Pools*. Beijer International Institute of Ecological Economics Discussion Paper, No. 199.

Seminars and symposium presentations:

- ❖ *Leadership in common-pool resource management*, IASCP Europe Regional Meeting, Brescia, March 2006.
- ❖ *Linking HIV/AIDS and Management of Local Natural Resources*, Working with Social Issues: Gestalt and the Challenges of Today's World, a Forum on poverty, HIV/AIDS, hunger, social conflict, and natural and man-made disasters, South Africa, March 2006.

Commissions:

- ❖ External reviewer of contributions to a SANDEE book on common-property resources in South Asia.
- ❖ Referee work for the Journal of Institutional Economics and the Sustainable Development Policy Institute.
- ❖ Representing the Beijer Institute in the EU funded network SUS.DIV (a Network of Excellence on Sustainable Development in a Diverse World).

Other:

- ❖ Lecturer in environmental economics at the course in Introductory Environmental Science for Natural Scientists at Stockholm University.
- ❖ Financial controller and human resources coordinator at the Beijer Institute.

Max Troell

Research Associate, the Beijer Institute
Associated Professor, Systems Ecology, Stockholm University

Research focus:

Key words: Environmental Impacts and sustainability of Aquaculture, Coastal Ecosystems, Ecosystem Services, Ecosystem Functions, Biodiversity, Resilience, Integrated Aquaculture, Mangroves

Main interests: Investigate linkages between capture fisheries and aquaculture; identifying resource

dependence and externalities associated with aquaculture production; estimate ecological basis for valuation of mangrove ecosystems, with special emphasis on the interaction with shrimp aquaculture; develop aquaculture techniques built on ecological engineering; studying biodiversity and resilience in temperate coastal habitats and the generation of ecosystem goods and services.

At Beijer since: 1998

Publications:

- Halling, C., G. Aroca, M. Cifuentes, A.H. Buschmann, M. Troell. (2005) *Comparison of suspended cultivation methods of Gracilaria chilensis in an integrated seaweed and fish cage culture*. Aquaculture International 13: 409-422.
- Pihl, L. Baden, S. Kautsky, N. Rönnbäck, P. Söderqvist, T. Troell, M. and Wennhage H. (2006). *Shift in fish assemblage structure due to loss of seagrass Zostera marina habitats in Sweden*. Estuarine and Coastal Shelf Science 67: 123-132.
- Troell, M., D. Robertson-Andersson, R. J. Anderson, J. J. Bolton, G. Maneveldt, C. Halling and T. Probyn (2006). *Abalone farming in South Africa: An overview with perspectives on kelp resources, abalone feed, potential for on-farm seaweed production and socio-economic importance*. Aquaculture 257: 266-281
- Hansen, P., D. Robertson-Anderson and M. Troell (2006). *Control of the herbivorous gastropod Fissurella mutabilis (Sow.) in a land-based integrated Abalone-Seaweed culture*. Aquaculture 255: 384-388.
- Sterner, T., M. Troell, J. Vincent, S. Carpenter, S. Levin, S. Barrett, P. Ehrlich, W. Brock, S. Aniyar, K. Chopra, M. Hoel, K-G, Mäler, J. Norberg, L. Pihl, T. Söderqvist, J. Wilen, A. Xepapadeas (in review) *Disasters and disastrous policies*. (Environment).
- Bolton, J., D. Robertson-Andersson, M. Troell, and C. Halling (In press). *Integrating seaweeds into South African Abalone Aquaculture*. (Global Aquaculture Advocate).
- Deutsch, L., S. Gräslund, C. Folke, M. Troell, M. Huitric, N. Kautsky and L. Lebel. (In review). *Feeding aquaculture growth through globalization: exploitation of marine ecosystems for fishmeal*. (Global Environmental Change).

Rönnbäck, P., M. Troell, L. Pihl, T. Söderqvist, N. Kautsky and H. Wennhage. (Submitted). *Ecosystem Goods and Services From Temperate Coastal Habitats – Identification, Valuation and Implications of Ecosystems Shifts*. (AMBIO)

Troell, M. and P. Tydmer. (Manuscript). *Assumptions and applications of the ecological footprint in aquaculture- misplaced critique*.

Chopin, T., S.M.C. Robinson, M. Troell, A. Buschmann, A. Neori. (in manus). *Ecological Engineering: Multi-Trophic Integration for Sustainable Marine Aquaculture*. (Encyclopedia of Ecology)

Seminars and symposium presentations:

- ❖ Invited expert MASMA – *Self Assessment Meeting*, 3-6 October, 2005, Stockholm.
- ❖ Invited plenary speaker, ASSG International Conference 2005, *The Sustainability of the Shellfish Sector* 27-28 October, 2005, Oban, Scotland.
- ❖ Participating in CONSENSUS, European Union FP6 Key Action Food Quality and Safety, working group WG4 on *Marine systems – focusing on shellfish*, 21-23 November, Oostende, Belgium.
- ❖ Giving seminars at 1st Teaching Workshop on Environmental Economics for the Middle East and North Africa, ICTP, 5-16 December, 2005, Trieste, Italy
- ❖ Workshop within PUMPSEA – Peri-urban mangrove forests as filters and potential phytoremediators of domestic sewage in East Africa. EU- PROGRAMME, 20-26 February, 2006, Maputo, Mozambique.
- ❖ Invited speaker FAO/NACA Workshop, *The Future of mariculture: A regional approach for a responsible development of marine farming in the Asia-Pacific Region*, 6-10 March, 2006, Guangdong, Guangdong Province, China.
- ❖ Invited expert, ASEM- Aquaculture Platform workshop of Food security, EU-INCO, 7-9 May 2006, Firenze, Italy.
- ❖ Paper presented at World Aquaculture Meeting 2006, 10-13 May, Florence, Italy, *Integrating seaweeds into African Abalone aquaculture*, Bolton, J., D. Robertson-Andersson, M. Troell, R. Anderson, G. Maneveldt, C. Halling, A.J. Smit, T. Probyn and S. Peall.

❖ Paper presented at World Aquaculture Meeting 2006, 10-13 May, Florence, Italy, *Ecological balance in land-based farms as key in the rehabilitation of seafood production, following recent natural disasters*, Neori, A., and M. Troell

❖ Mini-workshop on *Valuing ecosystem services*, 15 June, Beijer Institute, Stockholm.

Commissions:

- ❖ Referee work during the report period: Journal of Aquaculture
- ❖ Member of the evaluation committee for grant applications for IFS (International Foundation for Science).
- ❖ Coordinator of sub-group within Aquaculture Expert Panel *Engineering Committee on Oceanic Resources* (ECOR).
- ❖ Swedish coordinator for joint bilateral research programme: Integrated culture of abalone and seaweed in land-based systems. Sida/SAREC.
- ❖ Co-coordinator for SEPA financed program, MARBIPP.
- ❖ External reviewer for scientific evaluation of research paper on marine aquaculture. Marine Aquaculture Task Force, The Woods Hole Oceanographic Institution.
- ❖ Reviewing proposal for Western Indian Ocean Marine Science Association (WIOMSA), for its Marine Science for Management (MASMA) programme.

Teaching and Training:

- ❖ Teaching and supervising students- 10 credit C-level graduate course (Tropical ecology; Management of aquatic resources in the tropics) Dep. of Systems Ecology, Stockholm University and Uppsala University
- ❖ Lecture at course in Ecological Economics at Institute of advanced studies, Gotland University, Autumn 2005, 2 days.
- ❖ Supervision of PhD students and Master students at Department of Systems Ecology, Stockholm University; Cape Town University, South Africa.

Other:

- ❖ Responsibility for technical equipment and supporting role in network and computer issues at the institute.

Enrique Weir

Guest Researcher, PhD (Ecology)
Department of Wildlife and Fisheries Sciences. Texas
A&M University, TX, USA

Research focus:

Sustainable development, wildlife management and climate change. Specific interest: develop a system of ecological simulation where, in spatial and time dimensions, I will analyze the dynamics of aquatic birds, the needs of human production and the tendencies of climate changes in order to develop a plan of sustainable development through a decision-support system.

At Beijer since: November 2005

Publications:

Weir, E. H., W. E. Grant and N. Wilkins. 2006.
Spatial relations of aquatic bird species, irrigation system, water reservoirs and natural areas in the Lower Rio Grande Basin. (submitted)

Gil, K., E.H. Weir, C. Casler and S. Aniyar. 2005.
Ecological Functions and Economic Value of the Neotropic Cormorant (Phalacrocorax brasilianus) in Los Olivitos Estuary. Beijer Discussion Paper Series No. 203. (to be submitted)

Weir, E. H., K.Gil-Weir, C. Casler. 2006. *Bird diversity at Ancon de Iturre-Quisiro dry forest, northwestern Venezuela.* (In preparation)

Weir, L. Enrique, Karine Gil-Weir, and Clark Casler. 2006. *Avifauna of Dinira National Park, Las Porqueras Mountains, western Venezuela.* (In preparation)

Seminars and symposium presentations:

- ❖ Ecological researches in wetland ecosystems of west Venezuela and Texas (USA), Internal Seminar at the Beijer Institute, November 15th 2005.

Commissions:

- ❖ Assessor, Programme Alfan, European Union Programme of High Level Scholarships for Latin America.

Other:

- ❖ Technical Report: Weir, E. H., A. Urbina, K. Gil-Weir, C.Casler, R. Buonocore, G. Andrade, D.Romero, L.Garcia-Pinto, C. Sangronis et al. 2006. Biodiversity in Los Olivitos Mangrove Ecosystem and adjacent zone. Final Report. Caracas. Venezuela. 1000 pp.

Karine Gil-Weir

Guest researcher, PhD (Ecology)
Department of Wildlife and Fisheries Sciences. Texas
A&M University, TX, USA

Research focus:

Wildlife ecology and management, bird ecology, biodiversity and economic value of wildlife.

Current Research:

Since December 2005 I have been working with Dr. E. Weir, and Econ. S. Aniyar in an interdisciplinary research project proposal, a Decision Support System (DSS) for Great Cormorant – Fisheries to contribute in solving a regional and Pan-european environmental conflict. My research interest is to increase our understanding of wildlife population, and how species interact in a complex system.

At Beijer since: November 2005

Publications

Gil-Weir, K., W.E. Grant, and R.D. Slack. 2006.
Demography of the Whooping Crane, a new life table (Ecology). (In preparation)

Gil-Weir, K., W. E. Grant, R. D. Slack, and K. O.Winemiller. 2006. *PDO correlated with the Whooping Crane population fluctuations (Sciences).* (In preparation)

Gil-Weir, K., W.E. Grant, and R.D. Slack. 2006.
Effects of extreme environmental factors on Whooping crane mortality and fecundity rates: A simulation model (Ecological modeling). (In preparation)

Gil, K., E.H. Weir, C. Casler and S. Aniyar. 2005.
Ecological. Functions and Economic Value of the Neotropic Cormorant (Phalacrocorax brasilianus) in Los Olivitos Estuary. Beijer Discussion Paper Series No.203 (to be submitted in Ecological Application).

Other:

- ❖ Technical Report: Weir, E. H., A. Urbina, K. Gil-Weir, C.Casler, R. Buonocore, G. Andrade, D. Romero, L.Garcia-Pinto, C. Sangronis et al. 2006. Biodiversity in Los Olivitos Mangrove Ecosystem and adjacent zone. Final Report FONACIT 98003428. Caracas. Venezuela. 1000 pp.

Publications

The Institute communicates its research to scholars, students, policymakers and the general public in several ways.

The Beijer Publication Series

Scientific papers published in refereed journals or in books that have undergone review are published in the *Beijer Reprint Series* in order to facilitate the dissemination of research results. These reprints might earlier have appeared as a *Discussion Paper*. The total number of reprints since 1991 is at present 215, of which 2 was produced during 2005/2006.

The *Beijer Discussion Paper Series* constitutes a forum for unpublished scientific papers whose content should be subject to discussion and comments. 206 *Discussion Papers* have been produced since 1991, and 6 during 2005/2006.

Beijer Occasional Papers is a forum intended for policy documents, workshops proceedings, etc. One *Occasional Paper* was produced during 2005/2006.

Reprint series

214. *Incentives for Wetland Creation*. Anne-Sophie Crépin. Journal of Environmental Economics and Management 50, pp. 598-616, (2005).

215. *Cost-benefit Analysis and Complex River Basin Management in the Stockholm Archipelago in Sweden*. P. Frykblom, H. Scarin, T. Söderqvist and A. Helgesson. 2005. In: Brouwer, R.; Pearce, D (Eds.) Cost-benefit analysis and water resources management, Edward Elgar Publishers, pp. 151-175.

Discussion paper

201. *The Economics of Social Capital*. Partha Dasgupta. 2005.

202. *The Economic Value of Water in the Ganges- Brahmaputra-Meghna (GBM) River Basin*. Nasima Tanveer Chowdhury. 2005.

203. *Ecological Functions and Economic Value of the Neotropic Cormorant (Phalacrocorax brasilianus) in Los Olivitos Estuary, Venezuela*. Karine Gil de Weir, Enrique Weir, Clark Casler and Sara Aniyar. 2005.

204. *Feedback Nash Equilibria for Non-Linear Differential Games in Pollution Control*. G. Kossioris, M. Plexoysakis, A. Xepapadeas, A. de Zeeuw and K-G Mäler. 2006.

205. *Diffusion-Induced Instability and Pattern Formation in Infinite Horizon Recursive Optimal Control*. William Brock and Anastasios Xepapadeas. 2006.

206. *Total Factor Productivity Growth and the Environment: A Case for Green Growth Accounting*. E. Tzouvelekas, D. Vouvaki and A. Xepapadeas. 2006.

Occasional paper

Student papers from the PhD course(2005): Ecology and Environmental Management. Wei Jiegen, Innocent Kabenga, Ping Qin and Precious Zikhali. 2005:2.

For updated lists of the Beijer Publication Series visit our website: www.beijer.kva.se.

A chronology of Beijer and associated networks events

1 July 2005 – 30 June 2006

The year of 2005

1-20/7 An Introductory Course in Environmental and Natural Resource Economics, SANDEE, Bangalore, India

22-26/7 10th Biannual Research and Training Workshop, SANDEE, Bangalore, India

29-31/8 Resilience and Transformation in Social-Ecological Systems, Resilience Alliance Meeting, the Royal Swedish Academy of Sciences

2/9 The Beijer Board Meeting, the Royal Swedish Academy of Sciences

3-5/9 The 13th Askö Meeting "Disasters and Disastrous Policies" at Kristineberg Marine Research Center, Sweden

19-23/10 Meeting on a book on property rights in the Indian subcontinent, ICTP, Trieste, Italy

5-16/12 Joint EEE-CEEPA First Training of Trainers Workshop, ICTP, Trieste, Italy

5-16/12 1st Teaching Workshop on Environmental Economics for the Middle East and North Africa, ICTP, Trieste, Italy

9-12/12 Advance Training Course in Econometrics for Environmental Economists, SANDEE, Colombo, Sri Lanka

14-18/12 11th Biannual Research and Training Workshop, SANDEE, Colombo, Sri Lanka

12-13/1 3rd workshop on Integrated Climate Models: an interdisciplinary assessment of climate impacts and policies, ICTP, Trieste, Italy

5-24/5 An Introductory Course in Environmental and Natural Resource Economics, SANDEE, Dhaka, Bangladesh

26/6-1/7 12th Biannual Research and Training Workshop, SANDEE, Bangkok, Thailand

The year of 2006

4-6/1 Extended Askö Meeting at Stanford: Steady-state Economy – A beacon for the future or a dead-end?, Stanford University, CA, USA



Tore and Max
working by the sea,
Askö meeting at
Kristineberg, 2005.

PHOTO: ANNA SJÖSTRÖM

The Beijer International Institute of Ecological Economics

is an international research institute under the auspices of the Royal Swedish Academy of Sciences. Since 1991, the Beijer Institute has been an institute of ecological economics.

The major objectives of the Institute are to carry out research and to stimulate cooperation between scientists, university departments, and institutes that are working at the interface of ecology and economics. Cooperation efforts include research and training, both nationally as well as internationally.

Major activities of the Beijer Institute are: international research programmes; covering a broad set of research projects, and teaching and training in ecological economics.

Core funding is provided by the Kjell and Märta Beijer Foundation. Funding is also provided by Swedish and international research councils, foundations and other organizations.

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