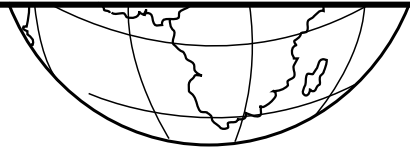




BEIJER Annual Report 2002/2003



Beijer International Institute of Ecological Economics
The Royal Swedish Academy of Sciences



Box 50005, SE-104 05 Stockholm, Sweden
Tel: +46(0)8-673 95 00, Fax: +46(0)8-15 24 64
E-mail: beijer@beijer.kva.se, <http://www.beijer.kva.se>

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.

CONTENTS

DIRECTOR'S COLUMN

Karl-Göran Mäler.....	4
-----------------------	---

ARTICLES

Chairman's Report to the Board Steve Carpenter.....	5
The Ecological and Environmental Economics – EEE Programme Matteo Marsili.....	6
Askö - A Personal View Paul Ehrlich.....	9
Indicators of Sustainable Development Karl-Göran Mäler.....	11
Spatial Dynamic Models of Economic and Ecosystem Interaction Jim Wilen.....	13
Rights and Duties in the Coastal Zone Tore Söderqvist.....	14
Marine Biodiversity, Patterns and Processes (MARBIPP) Max Troell.....	16
Resource Accounting Network for Eastern and Southern Africa (RANESA) Rashid Hassan.....	17
The South Asian Network for Development and Environmental Economics (SANDEE) Priya Shyamsundar.....	19
Small, Firm Steps: The Creation of the Latin American and Caribbean Environmental Economics Program Francisco Alpizar.....	21
Environment and Development Economics Charles Perrings.....	23
PhD Programme in Environmental Economics Thomas Sterner.....	26
Tackling the Economics of Ecosystems Anne-Sophie Crépin.....	29
Valuation of International Recreational Services Jessica Andersson.....	31
Efficient Use of Local Natural Resources Ingela Ternström.....	32
APPENDIX	33
Board of Directors	
Staff Members	
Visiting Scientists and Graduate Students	
Administration	
Funding	
A Summary of Beijer Activities	
Teaching and Training	
Staff Members' Publication and Activities	
Publications	
A Chronology of Beijer Events	

EDITORIAL

Thanks to all the contributors, who made the 2002/2003 Annual Report possible.

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, details about, for example, the Institute's staff, activities and publications are listed in the appendix.

ANNA SJÖSTRÖM
EDITOR

Director's Column

Karl-Göran Mäler, Director, The Beijer Institute

The main events during the last year (July 1 2002 – June 30 2003) were associated with our cooperation with the Abdus Salam International Centre for Theoretical Physics (ICTP) and Fondazione Eni Enrico Mattei (FEEM). Later on in this Annual report there will be more detailed descriptions of the joint activities with ICTP so I will limit myself here to some personal memories from a few events during the past year.

As the reader of past annual reports may remember, The Beijer Institute and ICTP started discussions on cooperation on scientific issues and on capacity building in the third world a couple of years ago. It soon became clear that this endeavor would much benefit if also FEEM could be involved. I should point out that the Beijer Institute has already had a long and productive cooperation with FEEM, for example in our joint research program on “Knowledge as an economic good”. Furthermore, FEEM’s former executive director, Domenico Siniscalco was a member of our board for six years. In 2002 the three parties signed the memorandum of understanding and we immediately started implementing the agreed program. In fact we had already one activity behind us as the Beijer Institute and ICTP organized a teaching workshop on CGE modeling for SANDEE in March 2002.

The formal inauguration of the cooperation took place in February this year. The inauguration was in the middle of a teaching workshop on economics of complex dynamic ecological systems with approx. 70 participants from Asia,

Africa, Latin America and East Europe. These same participants will be asked back to another workshop next year at which they will be asked to present their own research.

Within the cooperation, we started a new research program on “Spatial dynamics” at a small but high level workshop at the Beijer Institute. The idea is here to try to develop managing models for ecosystems based on explicit accounting for spatial structures and diffusion of organisms in space. It turns out that we are facing new mathematical problems in analyzing these issues but I have confidence in that we will be able to overcome these. This research programme is further described by Prof. Jim Wilen later on in the report.

The ultimate objective of the cooperation with ICTP was to create an international home for research and capacity building in the third world. We are now actively discussing with a number of interested partners to accomplish this and I hope that I will be able to announce to you in the next annual report the outcome of these discussions.



KARL-GÖRAN MÄLER
DIRECTOR



Nobel Laureate Prof. Robert Solow and Karl-Göran Mäler at the formal inauguration at the ICTP, Trieste, Italy. Photo: Anne-Sophie Crépin.



Four of the participants from the inauguration in February, 2003 at the ICTP, Trieste, Italy. Photo: Anne-Sophie Crépin.

Chairman's Report to the Board

**Steve Carpenter, Chairman, The Beijer Institute
and Professor Center for Limnology, University of Wisconsin**

The Beijer Institute of Ecological Economics is approaching legendary stature in environmental policy science. The Beijer has achieved its status by steadfast pursuit of excellent science, bringing together the best thinking from economics and ecology to address prominent issues of environmental policy. Besides possessing a sterling scientific reputation, the Beijer is also known for being an exceptionally well-managed institution. The efforts of the Director, past Chairs of the Board, and previous Boards have positioned the Beijer for sustainable excellence. For these reasons, I am honored to be joining the Board as Chair in 2003. I look forward to my first meeting in September.

In this report, the Director has given a full account of the Institute's excellent progress this year. As an incoming Board Chair, I look forward to our discussions of the Institute's projects and prospects during our meeting.

I have greatly enjoyed my previous involvement with Beijer projects, such as research on complexity in ecological-economic systems and my lectures in the course at the Santa Fe Institute. Economic notions of forward-looking agents co-creating their environment through collective choice have surprising implications for ecosystem science. I believe that ecological notions of hysteresis, alternate attractors and shifting resilience raise intellectual challenges for economists. As an ecosystem scientist who specializes in the study of fresh waters, I see many examples of environmental problems that could be solved by better application of the principles of ecological economics. Clearly the Beijer Institute's science is sorely needed in practice.

During February I had the pleasure of lecturing in the inaugural course of the Beijer Institute's new teaching program at the Abdus Salam International Centre for Theoretical Physics, in Italy. I was impressed by the quality



The Beijer Institute's new Chairman for 2003, Professor Steve Carpenter. Photo courtesy: Steve Carpenter.

of the students and the faculty. Clearly the Beijer's reputation for excellence will be carried forward by this new teaching program.

Looking forward, I am enthusiastic about working with Karl-Göran and the Board to continue and advance the Institute's outstanding research program in ecological economics. We will continue to search for the few emergent issues where intellectual challenge and societal importance converge to create priority and opportunity for the Beijer Institute.

Finally, I look forward to working with you, the Board of the Beijer Institute, this year and the years to come.

The Ecological and Environmental Economics – EEE Programme

Matteo Marsili, The Abdus Salam Centre for Theoretical Physics, ICTP, Trieste

The Ecological and Environmental Economics - EEE Programme is a joint programme of ICTP, FEEM, and The Beijer Institute. More information about the programme can be found on: www.ictp.trieste.it/~eee/

2002 – The first year of activity of the EEE Programme

2002 was the first year of activity of the Ecological and Environmental Economics - EEE Programme, a joint three-year programme of ICTP - The Abdus Salam International Centre for Theoretical Physics, Italy, FEEM - Fondazione Eni Enrico Mattei, Italy, and The Beijer International Institute of Ecological Economics, Sweden.

The core aim of the EEE Programme is 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.

Activities concentrate in three main areas:

- Dynamic ecological models. Activities focus on indicators of genuine health, economics and dynamics of complex systems, non-market interactions and informal institutions.
- Indicators of Sustainable Development. Activities focus on the development of a theory for indicators of sustainable development for complex dynamic systems.
- Integrated assessment models (IAMs). Activities focus 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.

The expertise and the complementarities characterising the partners involved in the Programme constitute the premises for a successful research and training programme. In fact, a close co-operation among the institutions involved in the Programme appears to be crucial to face the present research challenges. The ultimate scientific approach to the study of environmental issues is an interdisciplinary or “integrated” one. This not only because it can be interesting and challenging to add a socio-economic dimension to investigation in natural sciences, but most importantly, because socio-economic systems exert

fundamental feed-backs on environmental, ecological and climatic variables neglecting which will lead inevitably to unrealistic conclusions.

This said, it seems natural to exploit the different and complementary skills of ICTP on “hard” natural sciences and of FEEM and The Beijer Institute on socio-economic ones, in particular considering the long tradition of these institutions to work in a multidisciplinary environment.

The workshops organised in the first year of activity of the EEE Programme were:

- “1st Advanced Course on Computable General Equilibrium Modelling (CGE) and the Environment”, February 23rd - March 6th, 2002 - Bangkok, Thailand
- Presentation of the EEE Programme by the Nobel Laureate Prof. Kenneth Arrow (Stanford University, USA) and Prof. Karl-Göran Mäler (The Beijer Institute, Sweden), May 16th, 2002 - University of Trieste, Trieste, Italy
- Workshop on “Property rights and environmental management”, May 22nd - 24th, 2002 - Durban, South Africa

In addition, several seminars and research activities were carried out (see the EEE Programme webpage for a detailed account).

2003 – The second year of activity of the EEE Programme

The second year of activity of the EEE Programme was opened by the official presentation of the Programme to the scientific community and to the City of Trieste. On February 10th, 2003 leading scientists internationally recognised, as the Nobel Laureate Prof. Robert Solow, MIT, USA, Prof. Simon Levin, Princeton University, USA, Dr. Peter Bridgewater, UNESCO, Director of the Division of Ecological Sciences and Prof. Lucio Delcaro, Dean of the University of Trieste, Italy, participated in this one-day special event.

The main representatives of the institutes involved in the EEE Programme, Prof. Erio Tosatti, ICTP Acting-Director, Prof. Sir Partha Dasgupta and Prof. Karl-Göran Mäler, The Beijer Institute, and Prof. Carlo Carraro, Fondazione Eni Enrico Mattei, also offered their contribution to the success of the event. The launch of the Programme was webcasted in real time, with excellent results measured in terms of audience.

A selection of the initiatives scheduled for 2003 is proposed hereby:

- “1st School on Ecological Economics”, January 27th – February 28th, 2003 - ICTP, Trieste, Italy
- Conference on “Theoretical Topics in Ecological Economics”, February 10th - 21st, 2003 - ICTP, Trieste, Italy
- “1st Workshop on Spatial Dynamic Models of Economics and Eco-Systems”, June 16th – 17th, 2003 - Stockholm, Sweden
- “1st Workshop on Integrated Climate Models: an Interdisciplinary assessment of climate impacts and policies”, September 30th – October 3rd, 2003 - ICTP, Trieste, Italy
- “2nd Advanced Course on Computable General Equilibrium Modelling (CGE) and the Environment”, December 1st – 12th, 2003 - ICTP, Trieste, Italy

Detailed accounts, lecture notes and other material on these events can be found on the EEE Programme website.

From 2003, a permanent group of researchers is based in the ICTP for the duration of the Programme. The research is integrated with the research programme currently undertaken at ICTP, in particular with its Weather and Climate Research Group, in order to enhance synergies and complementarities



Prof. Simon Levin. Photo: Anne-Sophie Crépin.

The Future of the EEE Programme

The EEE Programme was envisaged as a three-year Programme. If it proves to be successful, in terms of scientific accomplishments and financial sustainability, it may be desirable to establish a permanent International Centre on Ecological and Environmental Economics, whose final objective, as per the EEE Programme, will be to enable researchers from the developing countries to join the international academic network in the field of ecological and environmental economics. If established, the new permanent International Centre on EEE would offer the researchers from the South the possibility to feel less separated from the kind collegial contact, encouragement and help that make academic life creative in the North.

The interest from the international community in the area of ecological and environmental economics together with sustainable development is considerably recent, and rises from the perception of the severity of the environmental disruption which man, whilst performing his daily activities, is causing to the living planet. The problem of diminishing resources has been long neglected by many countries; the attention has been focused on until now, in most cases, the aspects tied to individual and industry attainments, in connection with progressive affluence and adequate stock returns in invested capital. A long term objective to create productive economies and concentrated economies has not only neglected unreasonable quantification but also the simple emphasis of the social costs of this behaviour.

Achieving sustainable development represents a decisive challenge in the future for mankind. The creators behind the Ecological and Environmental Economics Programme are aware of the fact that this challenge can be overcome only if they take into consideration two key elements: the necessity to deal with the sustainable development themes through a multidisciplinary or integrated approach and the necessity to involve developing countries in this battle. In fact these countries must encounter difficult political choices, in which opposing factors come into play e.g. geophysical factors, social economic factors in connection with the environment, the conservation of the traditional cultural factors, the reduction of the economic disparity and development.

A scientific analysis, to be completed by experts in various fields with origins from various cultural backgrounds and economies, is therefore necessary before the decision process takes place. This would create a capital of human need and international collaboration which together would complement the acquiring of new necessary technology for economic development. It is not feasible to manage the global environment without this various expertise and an international agreement, which also requires the consensual use of a common language.

A multidisciplinary approach and the international cooperation, with a particular focus on developing countries, are the essential preconditions to win the battle that will lead to a sustainable development. Given these premises, the establishment of the International Centre for Ecological and Environmental Economics within the Trieste System seems to be the most favoured alternative.

If established, the new permanent International Centre on EEE would offer the researchers from the South the possibility to feel less separated from the kind collegial contact, encouragement and help that make academic life creative in the North.

The International Centre of Ecological and Environmental Economics, with its competence and expertise, would be proposed to the scientific community as the reference point for the creation of the instruments required to deal with the challenges brought about by sustainable development. The human capital, the scientific training and the continual updating of the significant resources, which the International Centre for Ecological and Environmental Economics would provide to the developing countries, would initiate a virtuous circle of good government and economic development.

In this context, ICTP appears as a crucial partner of the EEE Programme not only for its scientific skills, but also for the unique experience that it has been accumulating while at the same time counting with the collaboration of an impressive number of dedicated scientists in the Third World. For this reason, the three-year period in which the EEE Programme will be hosted and carried out with the support of the ICTP can be considered as an "incubation" period.

ICTP will transmit its scientific skills, networking experience, and knowledge about the Third World researchers characteristics and needs to a Programme that, if will prove to be successful and financial sustainable, will give origin to a permanent International Centre on EEE independent from ICTP.

EEE Programme Personnel

Steering Committee

Prof. Carlo Carraro, Fondazione Eni Enrico Mattei and University of Venice, Italy

Prof. Sir Partha Dasgupta, The Beijer Institute, Sweden and University of Cambridge, UK

Prof. Aart De Zeeuw, Tilburg University, The Netherlands

Prof. Simon Levin, Princeton University, USA

Prof. Karl-Göran Mäler, The Beijer Institute, Sweden

Executive Committee

Ms. Monica Eberle - Programme Manager, Fondazione Eni Enrico Mattei, Italy

Dr. Matteo Marsili, The Abdus Salam International Centre for Theoretical Physics, Italy

Prof. Attilio Wedlin, University of Trieste, Italy

Staff Associates

The EEE Programme Associateships are three-year awards intended exclusively for scientists from and working in developing countries. Staff Associates are entitled to visit the ICTP during the three-year period and offer their contribution to the success of the Programme. Up to the moment, the EEE Programme has granted four Associateships:

Prof. Arcadio Cerda – University of Talca, Chile

Dr. Kanchan Chopra - University of Delhi, Institute of Economic Growth, India

Prof. Rashid M. Hassan - University of Pretoria, South Africa

Prof. Gopal K. Kadekodi - Centre for Multi-Disciplinary Development Research, India

Researchers

Ms. Rossella Bargiacchi, Tilburg University, The Netherlands

Ms. Maria Berrittella, La Sapienza University, Italy

Dr. Andrea Bigano, Katholieke Universiteit Leuven, Belgium

Mr. Francesco Bosello, Fondazione Eni Enrico Mattei, Italy

Mr. Marco Lazzarin, Fondazione Eni Enrico Mattei, Italy

Dr. Francesco Pauli, University of Trieste, Italy

Dr. Roberto Roson, University of Venice and Fondazione Eni Enrico Mattei, Italy

Askö – A Personal View

**Paul R. Ehrlich, Professor, Department of Biological Sciences,
Stanford University**

From my viewpoint, the cheeriest academic development in the last dozen years has been the building cooperation between economists and ecologists in seeking solutions to the human predicament. Although that cooperation began in a small way decades ago, a major promoter of it has been the Beijer Institute in general, and the Askö meetings it arranges in particular. Those meetings began in 1993, and had a format that has been unique in my experience, and which I think held the key to the extraordinary success of the meetings. They have united the thinking of significant segments of the economics and ecological communities, and produced a steady stream of important papers based on that union dealing with topics as diverse as valuing ecosystem services and resilience in natural and socioeconomic systems.

The format is simple. A group of world-class economists and ecologists (sometimes with representatives of other disciplines) are taken together on a Saturday morning by bus and boat to a marine station on the beautiful Island of Askö in the Trosa archipelago. They lunch together and then spend the afternoon intensely discussing an issue of mutual interest, occasionally taking a break from debate to watch a magnificent sea eagle soar pass the laboratory windows. One or two participants are asked to slave over a computer, taking notes during the meeting.

But it doesn't end there – after a long afternoon of discussing economic growth, environmental ethics, evolution in biological and economic systems, or some other key issue in ecological economics – the group retires for drinks and dinner. That is followed by further socializing including group singing, (except, often, the rapporteurs leave early to prepare for the next day). I emphasize the social side of the meeting, because it



Stockholm Centre for Marine Research, the Askö Laboratory viewed from the sea. Photo: Anna Sjöström.



The 10th Askö Meeting, 2002. Photo courtesy: Anna Sjöström.

supports my favorite theory of how one generates interdisciplinary research and interaction. Rather than take an economist and ecologist, put them in a room and tell them to get research done, feeding them both wine and cheese is a proven approach to stimulating research collaborations. Then friendships would form and interdisciplinary research would blossom naturally. It was Karl-Göran Mäler's genius that set up the Askö meetings in this pattern, with people sharing food, housing, and fun. And it was the cheerful support of Astrid Auraldsson and Christina Leijonhufvud that made Karl's vision work.

On Sunday morning, the rapporteurs summarize the state of the group's view of the issue. Then the discussion that follows is designed to outline and shape a jointly-authored paper that is generated as the main product of the meeting. Return to Stockholm is on Sunday afternoon, and often Monday morning is also spent meeting at the Royal Swedish Academy helping to shape the future paper. There follows a long email correspondence in which a few participants produced drafts of the paper which are circulated by them for improvement and approval. Generally, it has worked like a charm.

Interestingly, the first meeting was basically planned to see if ecologists and economists could learn to talk to each other – and the paper derived from it was titled "Ecologists and economists can find common ground." That they could was shown clearly early in that meeting – once a few matters of definition were done away with there were no battles between economists and ecologists. Indeed, they discovered many areas of mutual interest and common scientific approach. I think it fair to say that in all subsequent meetings ecologists have disagreed with other ecologists and economists with other economists at least as often as ecologists and economists have disagreed.

The posturing that typically occurs at meetings of leading scholars never really took hold.

Almost all Askö meetings have resulted in published papers in first rate journals such as *Science*, which I think is a tribute to the quality, flexibility, and camaraderie of the participants (and, of course, Karl-Göran's iron hand). Forthcoming publications from recent meetings have continued the tradition to tackling tough problems of both theoretical and practical significance. That from the 2000 meeting is entitled "Are we consuming too much?" That from 2001, "Sustainability's compass: Indicators of inclusive wealth. And that from 2002, "Coping with uncertainty: A call for a new science-policy forum." Our experience with consumption paper has been especially instructive. It is a difficult and controversial subject, but the Askö group of ecologists and economists had essentially no trouble coming to agreement on it. The problems came with editors and referees of the journal, in which battles the Askö group stood firm together behind their joint ideas. It was typical of the spirit of Askö.

I will be forever grateful to the Royal Swedish Academy of Sciences for setting up the Beijer Institute of Ecological Economics and involving me in it from the start. If in 1980 someone had told me that the meeting I would enjoy most each year would be on a Swedish island, and that about half of those present would be distinguished economists whom I would consider friends, I would have laughed. Which shows how bad I am at predicting the future. I'm really looking forward to the 2003 meeting on "Spatial heterogeneity in economic and ecological systems," especially since the latter has been a focus of my own research for more than forty years. I'm sure my viewpoint will be greatly broadened by my economist friends.

Indicators of Sustainable Development

Karl-Göran Mäler, Director, The Beijer Institute

Almost immediately after the publication of *Our Common Future* 1987, economists, ecologists and others started to search for an appropriate way of defining sustainable development and of constructing an index which would enable us to judge whether an economy is on a sustainable path or not. The World Commission on Environment and Development defined in a rightly famous sentence sustainable development as a:

“... Development that meets the needs of the present without compromising the ability of future generations to meet their own needs”.

However, this sentence is not completely transparent and can give rise to many different interpretations, so which is the appropriate interpretation? Economists in general favoured, to begin with, the following: Sustainable development is development that does not decrease utility over time. Based on this definition, many economists tried to extend the results from Marty Weitzman's seminal article from 1976, in which he showed that Net National Product (NNP) along an optimal path is equal to the maximum consumption level that can be sustained forever. Thus, a non-decreasing NNP would indicate sustainable development.

There are, however, three problems with this approach:

1. Weitzman assumed linear utility while both empirical and ethical reasons suggest a concave utility
2. Weitzman's theorem is based on the assumption that the economy is on an optimal path which is not true for any real economy
3. The interpretation of sustainable development as development with non-decreasing utility is problematic

Let us discuss these problems briefly. First, all empirical estimates of demand functions indicate that income elasticities are in general different from one, contradicting the assumption of linear utility. Furthermore, from an ethical perspective, a concave utility seems more appropriate as it automatically incorporates a degree of preference for equality between generations. However, if we abandon the linearity assumption, Weitzman's result is no longer valid. Weitzman and Asheim (2002) have rescued part of

the original results by introducing Divisia price indices, but they create new problems.

Second, no economy is optimal, and Weitzman's result is very much tied to the assumption of optimality. Thus it does not give much guidance in constructing a relevant indicator of sustainable development.

Finally, although the interpretation of sustainable development as non-decreasing utility seems to be reasonable (let us forget for the moment the problems of defining and measuring utility), it has at least one serious shortcoming. An economy which is trying to secure higher utility in the future by increasing its savings today (which reduces current utility) would not be regarded to be on a sustainable path. Instead, Dasgupta and Mäler (EDE 2001) suggested that a better interpretation is to say that development is sustainable if social welfare is not decreasing over time. Here, social welfare is defined as the present value of future utilities. Obviously, with this interpretation, utility can be allowed to go down temporarily if it is compensated by enough increases in the future.

The Dasgupta-Mäler interpretation also results in a “practical” indicator of sustainable development. They showed that

“There exist accounting prices (which will differ from market prices, unless the economy is on an optimal path) such that development is sustainable during a time period if and only if the value of all capital stocks (valued with the accounting prices) plus a drift term, that reflects the influence of external factors, is not going down over the time interval. Furthermore, this is true irrespective of whether the economy is optimising or not!”

Since 1998, the Beijer Institute has been involved in mainly theoretical research on the use of wealth or the value of all capital assets as an indicator of sustainable development. However, the idea goes back to Pearce and Atkinson (1993), although they did not provide a rigorous derivation. They also assumed an optimising economy. In 1996, Pearce, Atkinson, and Hamilton published a follow up with some empirical estimates of the change in wealth (or the genuine savings as they called it).! Since then the World Bank has been publishing series of genuine savings in almost all countries in the world. However, the Bank uses in all but

one case market prices as proxies for accounting prices.

The Beijer efforts in this research area have continued and will continue for at least the next three years. The most recent outputs are Arrow, Dasgupta, and Mäler (2003a) *The Genuine Saving Criterion and the Value of Population* and Arrow, Dasgupta, and Mäler (2003b) *Evaluating Projects and Assessing Sustainable Development in Imperfect Economies*. Both these papers introduce population changes and how these should be included in the construction of an indicator of sustainable development. It turns out that under some (restrictive) assumptions, the appropriate indicator is wealth per capita. In more general cases it may be needed to estimate an accounting price of population to have a correct and a special drift term. In the second paper, there is also a systematic analysis of a number of imperfections in an economy their effects on the accounting prices. The result is that, in general, accounting prices will differ from market prices to a high degree. This shows the danger in using theories based on optimising economies for assessing sustainability in real economies.

It seems that the basic theory of inclusive wealth is now well established and it is being accepted by the economics profession (as well as some well known ecologists). On the other hand, we still lack a machinery to estimate the accounting prices and the possible drift term.

One attempt to apply the theory to exhaustible resources has been made by Sara Aniyar, (Aniyar 2003) the Beijer Institute. She looked at depletion of oil in Venezuela, taking new discoveries into account, building on some results in Arrow, Dasgupta, and Mäler (2003b). It turns out that the appropriate accounting price depends on which factors determine the discovery of new reserves (or extension of existing reserves). Unless we know enough about these relations, it seems to be difficult to find the correct accounting price. Her calculations show that the difference in wealth per capita when using different assumptions on the "discovery" function can be very high.

There have been a number of wealth calculations in Southern Africa (most of them by Glenn Marie Lange) and they are of great interest, but they have not addressed the issue of estimating accounting prices of ecosystems as capital goods. However, there is at least one research project addressing this issue. The former chairman of the Board of the Beijer Institute, Brian Walker, has initiated a project for looking into the practical feasibility of estimating wealth and wealth changes in a special region in Australia. The Beijer Institute will be involved in this work.

A research team at the Beijer Institute will also address these issues (if funding can be secured). The team will

consist of Professor Karl-Göran Mäler, Professor Chuan-Zhong Li, Uppsala University, Sara Aniyar, the Beijer Institute, and Åsa Jansson, Stockholm University. The idea is to develop approaches to estimating accounting prices, partly by theoretical analysis and partly through empirical tests. The project will focus on the Stockholm County as the Institute has experience from this area through other projects. The shortcoming of choosing a region for making the studies is that the drift term (that is the influence of external factors) may be the dominant term and changes in wealth will be not that significant. However, the objective of the project is not to assess whether Stockholm County is on a sustainable path or not but to test ideas, methods and theories to find out if we can estimate the accounting prices.

References

- Aniyar, S. (2003), Estimating the Value of Oil Capital in a Small Open Economy: The Venezuela Example, Beijer Discussion Paper 159
- Arrow, K. J., P. Dasgupta, and K.-G. Mäler, (2003a), "The Genuine Savings Criterion and the Value of Population", *Economic Theory*, Cambridge and New York: Cambridge University Press, Chapter 4, pp. 125-144
- Arrow, K.J., P. Dasgupta, and K.-G. Mäler, (2003b), "Evaluating Projects and Assessing Sustainable Development in Imperfect Economies", forthcoming in *Environmental and Resource Economics*.
- Asheim, G. B. and M. Weitzman, (2001), *Economic Letters*, 73, pp. 233-239
- Dasgupta, P., B. Krström, and K-G. Mäler, (1997), "Should Search Costs and New Discoveries be Included in Net National Product?", Beijer Discussion Paper 104
- Dasgupta, P. and K-G. Mäler, (2000), "Net National Product, Wealth, and Social Well-Being", *Environment and Development Economics*, 5(1), pp. 69-93
- Mäler, K-G. (1991), "National Accounts an environmental resources", *Environmental and Resource Economics* 1(1), pp. 1 - 15
- Pearce, D., K., and G. Atkinson (1993), "Capital Theory and the Measurement of Sustainable Development: An Indicator of Weak Sustainability." *Ecological Economics*, 8(1), pp. 103-108
- Pearce, D. K., G. Atkinson, and K. Hamilton, (1996) "Measuring Sustainable Development: Progress and Indicators", *Environment and Development Economics*, 1, pp. 85-101
- Weitzman, M. "On the welfare significance of national product in a dynamic economy, (1976), *Quarterly Journal of Economics*, 90, pp. 156-162
- World Commission (1987), *Our Common Future*, New York: Oxford University Press

Spatial Dynamic Models of Economic and Ecosystem Interaction

Jim Wilen, Professor, Dept of Agriculture and Resource Economics, University of California, Davis

A research program is currently being developed that will examine the dynamics of spatial processes that link economic systems and ecosystems. Some examples of important problems that involve spatial/dynamic processes include: disease transmission, introduction and spread of invasive species, management of species whose abundance is governed by dispersal, regulation of highly porous aquifers, etc. This is an important area of inquiry because while natural resource and environmental economists have developed theories that focus on intertemporal aspects of resource and environmental use, they have given much less attention to the spatial aspects of resource and environmental problems. With increasing evidence of the spatial heterogeneity of resource abundance, coupled with vastly improved data collection at various levels of spatial resolution, there is a need to bring the spatial aspects of resource use into focus in a manner on par with the intertemporal dimensions.

The spatial/dynamic modeling project aims to improve understanding of spatial/dynamic processes by bringing scientists from ecology, physics, systems theory and other disciplines together with economists in order to develop some new integrated models of human/natural system interaction. The program is to be jointly

sponsored by the Beijer Institute and the Environmental and Ecological Economics (EEE) program at Abdus Salam International Centre for Theoretical Physics (ICTP). The intent of the program will be to develop both conceptual and empirical models that illuminate how to best manage resources and environmental systems characterized by spatial dispersal processes.

To launch the new program on spatial dynamics, a small workshop was held in June 2003 at the Royal Swedish Academy of Sciences. The workshop was sponsored by the EEE program, FEEM (Fondazione Eni Enrico Mattei) and the Beijer Institute. Economists, ecologists, and physical systems modelers were brought together for a two day discussion of opportunities to integrate understanding between disciplines. Presentations were given by a variety of participants, outlining disciplinary and methodological perspectives for incorporating space more explicitly into dynamic models of economic and ecosystem interaction. The workshop wrapped up with a discussion of alternative research paths and emphases, and plans to further develop modeling strategies that integrate insights from various disciplines. A program planning effort is underway over this year that will culminate in a multi-year and multidisciplinary research strategy.

Rights and Duties in the Coastal Zone

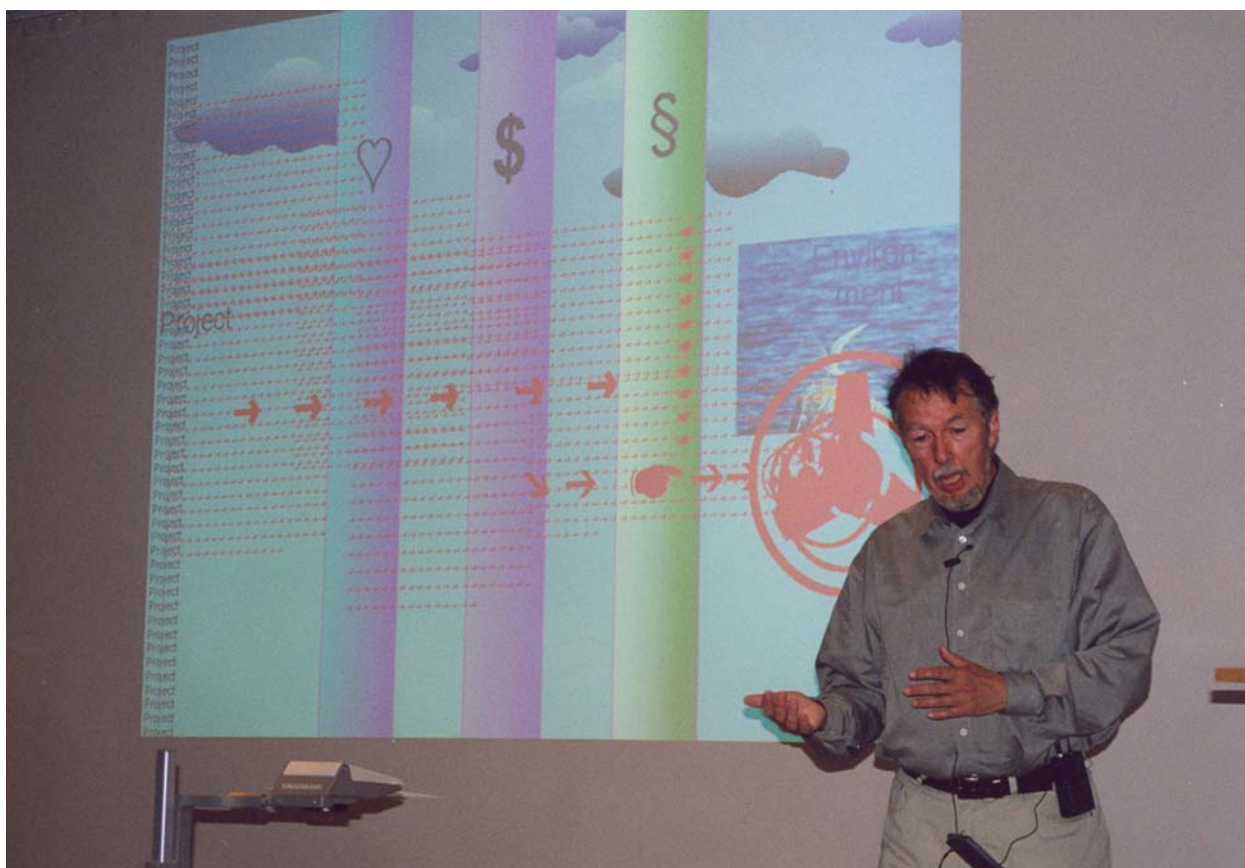
Tore Söderqvist, Associate Professor, Research Associate, The Beijer Institute

2003 is the last year of the research programme Sustainable Coastal Zone Management (SUZOZOMA), funded by the Swedish Foundation for Strategic Environmental Research (MISTRA). The Beijer Institute participates in SUZOZOMA together with Göteborg University, Kristineberg Marine Research Station, Stockholm University and the Swedish National Board of Fisheries. As has been reported in earlier Annual Reports, the Beijer Institute focuses its activities in SUZOZOMA on economic valuation of coastal ecosystem services in Sweden. See www.sucozoma.tmbi.gu.se for a detailed presentation of the whole research programme.

One main event during the last year of SUZOZOMA was the multidisciplinary scientific conference *Rights and Duties in the Coastal Zone*, co-organized by the Institute and held at the Royal Swedish

Academy of Sciences on 12-14 June 2003. The theme of the conference was property-rights regimes in the coastal zone, their associated management systems and institutional solutions when property rights are difficult to define or enforce. This is a quite specific theme for a conference, but contributions from many different scientific disciplines are on the other hand likely to be required for providing a satisfactory elucidation of these issues. It was therefore not easy to predict how many scholars would respond to the call for papers for the conference.

The results were as follows. 57 long abstracts (max. 700 words) were submitted by the deadline of 15 January 2003. The scientific conference committee decided to accept 41 of them. The authors of the accepted abstracts were requested to submit their papers by 15 May. Submitted papers were then made available for download from the



Keynote speaker Staffan Westerlund, Dept. of Law, Uppsala University, at the Rights and Duties Conference, June 2003. Photo: Anna Sjöström.

conference website before the conference. A few authors of the accepted abstracts never submitted any paper, so in the end 32 papers were presented at the conference. These papers represented a mix both in terms of scientific disciplines involved and geographical focuses.

In total, the conference gathered about 70 participants. The lectures of the keynote speakers were announced as public, and this increased their audience still a bit more. The keynote lectures were the following:

1. Susan Hanna (Department of Agricultural and Resource Economics, Oregon State University): Institutional evolution in coastal zones: historical paths and contemporary redirection
2. Svein Jentoft (Institute of Planning and Community Studies, University of Tromsø): Coastal culture – premise or outcome?
3. James E. Wilen (Department of Agriculture and Resource Economics, University of California, Davis): Spatial management of fisheries: recent conceptual and empirical advances
4. Poul Degnbol (Institute for Fisheries Management and Coastal Community Development, Hirtshals): Spatial scale in coastal zone management: the challenge of mediating conflicts between local and large scale interests
5. Thrainn Eggertsson (Faculty of Economics and Business Administration, University of Iceland): The subtle art of major institutional reform: ITQs and property rights in Iceland's fisheries zone
6. Staffan Westerlund (Department of Law, Uppsala University): Have hammer, will see only nails

At the time of writing, abstracts and papers are still downloadable from the conference website www.beijer.kva.se/conference.htm. However, abstracts, papers and some presentations are planned to be placed on a CD, which will later serve as the documentation of the conference. There is no space here for a summary of what was presented and discussed at the conference – this would in any case be a too difficult task for me – so the best way of getting a picture of the conference is to visit the website or reading the CD.

Let me instead make a few reflections. I believe the conference succeeded in being multidisciplinary in the sense that the presentations showed that the issue of coastal zone use can be scientifically approached in a multitude of ways. To me, this gave quick but yet inspiring insights into approaches, methods and literatures of which I had no or very little knowledge before. I

guess this is a bit typical reaction of a researcher. In contrast, the reaction of a policy-maker interested in considering scientific results might be frustration about these manifold approaches and the resulting difficulties in interpreting research results. If so, researchers should be concerned. While doing science for its own sake is respectable, it is not enough. Another goal must be to advise policies. It therefore struck me at the conference that the task of communicating research results is even more demanding and crucial than I previously have realized. In particular, researchers' results and advice can hardly be understood and evaluated by policy-makers if researchers do not satisfactorily explain their specific scientific point of departure and methodology.

The call for papers to the conference asked for research *findings*, something that most researchers presumably are most interested in presenting. But if I get another opportunity to organize a multidisciplinary conference, I would also call for contributions to a session focusing on methodology for mitigating the lack of knowledge of other possible ways of scientifically approaching an issue. Also conference participants having a sincere interest in other disciplines than the one they are most familiar with would probably benefit from such a session.

Finally, I would like to take the opportunity to thank all those who helped this conference to be launched and carried out. In particular, I want to mention SUCOZOMA (co-organizer), MISTRA (funding), Karl Bruckmeier, Anders Carlberg, Håkan Eggert, Ragnar Elmgren, Lena Gipperth, Erik Neuman and Thomas Sterner (members in the scientific conference committee), and Christina Leijonhufvud and Anna Sjöström (my fellow organizers at the Beijer Institute – their efforts were absolutely crucial for the conference).



Keynote speaker Susan Hanna, with conference coordinator Tore Söderqvist. Photo: Anna Sjöström.

Marine Biodiversity, Patterns and Processes (MARBIPP)

Max Troell, PhD, Research Associate, The Beijer Institute

Marine biodiversity, patterns and processes (MARBIPP) is 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. As a more detailed overview of the program was presented in the Beijer annual report 2002, only a summary of objectives and work progress for the work that Beijer is responsible for is presented here. More information about the overall program can be obtained from the program website: <http://www.marbipp.tmbi.gu.se/>

The overall objective of the work conducted by the Beijer group is to gain increased understanding of the functional properties of the biodiversity in different marine biotopes by investigating how these properties contribute to the provision of ecosystem goods and services to society. Further, by estimating the economic value of some goods and services, the economic significance of the marine biotopes and the relation to their biodiversity can be assessed. Collaborating partners in this work are Prof. Nils Kautsky and Dr. Patrik Rönnbäck, Department of Systems Ecology, Stockholm University; and Prof. Leif Pihl, Marine Ecology, Kristineberg Marine Research Station, Gothenburg University. Involved from The Beijer Institute are Dr. Max Troell, Dr. Tore Söderqvist and Sandra Lerda.

A database of the functional ecology of four of MARBIPP key habitats has been compiled. This identifies processes and functions related to generation of goods and services. The work is ongoing and from a more general matrix work is now focused on in depth descriptions of the different habitats. Initially, the economic valuation was based upon a classification of the different key habitats. Such classes- i.e. "ecological types" should be identified within the project- being based on visible changes in structures and processes caused by different degree of natural and/or anthropogenic disturbance regimes. However, this approach has now to some extent been abandoned as it turned out to be very difficult to identify such classes in a more or less continuum of habitat qualities. Instead of classes work now focus on larger shifts- i.e. transfer from one stability domain to another. Ongoing work describes the transformation of vegetation free shallow soft bottoms to algae covered bottoms out from such perspective. Other

studies looking at more distinct phase shifts will include *Fucus* dominated rocky bottoms being transformed into red-algae and mussel dominated systems and the transfer from *Zostera* habitat to bare erosive sediment bottoms.

These studies on larger shifts will, in those cases where enough information is available, result in predictions of the economic implications associated with lost ecosystem goods and services caused by human-induced threats. The results can also provide financial incentives to the protection and restoration of biotopes and their associated biodiversity. The economic analyses can, for example, be used as a management tool that can motivate the investments required to construct and manage marine protected areas, as well as restore degraded coastal biotopes. The exact nature and success of some of the proposed studies will heavily depend on the focus and quality of field data being generated within the programme. Further case studies may also be identified.

Further, a literature database on biodiversity, ecosystem services and ecological information for Swedish coastal key habitats has also been produced. This is available through a web-based interface- making it possible to perform searches through the internet. Its main purpose was as a communicative tool by the researchers within the Beijer group, but it could possibly be extended to include specific reference materials collected within other parts of the program. But if so, this has then to be financed from other sources.

Working papers:

I. Rönnbäck, P., M. Troell, L. Pihl, N. Kautsky, T. Söderqvist, H. Wennhage and S. Lerda. The socio-ecological importance of coastal ecosystems. An analyse of four Swedish key habitats. (manuscript)

II. M. Troell, L. Pihl, L. Deutsch, P. Rönnbäck, and H. Wennhage. Undesirable resilience in a Swedish coastal marine system- alternative shallow soft bottom states. (manuscript)

The core work has so far concentrated on defining and structuring various ecosystem goods and services being

generated from MARBIPPs key ecosystems. This work has resulted in a matrix that link ecosystem functions to the generation of goods and services, and discusses the relative importance of the individual supporting ecosystems. Paper I identifies a wide array of ecosystem goods and services that are separated into four groups: (1) overarching functions maintaining biodiversity; (2) production functions; (3) regulating functions; and (4) social and cultural functions.

As the work in paper II focus on shallow soft bottoms, and also because our proposed case study look upon ecosystem shifts in shallow soft bottom systems, the matrix has been further developed for this ecosystem. Preliminary results indicate that many services will be difficult to

quantify, and consequently the focus will be to qualitatively assess the effect of the algal mat disturbance regime. Paper II look upon a ecosystem shift out from a resilience perspective and discuss the net gain or loss of ecosystem goods and services when a shallow soft bottom system is being transferred into a algal dominated system. It is hypothesised that areas dominated by algal mats turn into self-regenerating systems regarding nutrients, and that food-web structure will be altered. As a result the functional properties of the system will change, and by that different ecosystem services will be expected from the new system. The emerging resilience of the new system is discussed in the context of dominating drivers and management perspectives.

Resource Accounting Network for Eastern and Southern Africa (RANESA)

Rashid Hassan, Professor, Coordinator, RANESA

Over the 2002/2003 year, RANESA has continued its operations under the auspices of the Centre of Environmental Economics and Policy in Africa (CEEPA) at the University of Pretoria, South Africa.

CEEPA is now in its second year of implementing the Collaborative Regional Masters (CRM) Degree Training Programme in Environmental and Resource Economics. A total of 44 applications for full sponsorship were received this year, with female applicants making up 23 percent of this number. Out of the 44 applications, 17 students were offered full sponsorship, compared to only 7 in the previous year. In addition, 5 students were accepted into the CRM program on a self-

sponsored basis in 2003. Students selected came from a wide range of countries, namely Ethiopia, Kenya, Malawi, Mauritius, Sudan, Zambia and Zimbabwe with females constituting 35 percent of the total successful applications and 60 percent of total female applications. The first term of year 2 of the CRM Programme commenced on 30 June 2003. The second term commenced on 25 August 2003 and is currently in session. CEEPA has been fortunate this year in having Professor David Starrett accepting appointment as its external examiner.

During the period 12-14 December 2002, CEEPA hosted an external review committee charged with the task of

reviewing and making recommendations on all aspects of CEEPA, including the CRM programme. The review panel consisted of Professor Charles Perrings, University of York and Professor Jeffrey Vincent, University of California, San Diego. The External Review Committee carried a critical assessment of and made many recommendations on various aspects of the CRM program, research and governance which are currently being implemented by CEEPA.

Over the last year, RANESA, in collaboration with the Beijer Institute as well as other key international agencies in this field has added a set of training activities to complement its research program. The major objective of the training program is to equip participants with new concepts and tools related to environmental economics to enable them to carry out sound policy research. So far, three major training workshops have been offered and two are due later on in the year. The first workshop was a GEF/World Bank Regional Climate, water and agriculture project organized in collaboration with the Food and Agricultural Organization (FAO), and the International Water Management Institute (IWMI) with co-funding from the Finnish Trust Fund and the McArthur Foundation. It took place on June 23 -26 in Accra, Ghana. The workshop trained members of the country teams conducting the economic assessment of the impacts of climate change studies in eleven countries in Africa on how to integrate crop growth simulation and hydrology models to assess the linkages between climate change, stream flow and water availability and agriculture.

In collaboration with the Environment Department of the World Bank, RANESA also organised a technical training workshop on analytical tools for measurement and analysis of the interrelationships between the incidence and severity of poverty and access to natural resources and environmental quality. This training was offered as part of the CEEPA Collaborative Regional Master (CRM) program specialisation course modules during the week of August 11 - 15, 2003 at the University of Pretoria.

Finally, RANESA organized, in collaboration with the International Water Resource Economics Consortium (IWREC) and co-funding from the Rural Development Program of the World Bank a symposium to share recent

developments in economic work on water reforms, institutions' performance, allocation, pricing, and resource accounting. The emphasis was on both methodologies and empirical findings, allowing direct interaction with practitioners from various countries. The workshop took place as one of the events scheduled during the 25th International Conference for Agricultural Economists held in Durban, South Africa, August 16 - 22, 2003.

Still to come are two training workshops. On September 8-11 2003, RANESA will organise a teaching workshop on the Economics of Biodiversity Conservation at the University of Pretoria. Finally, the Ecological and Environmental Economics Programme, the Fondazione Eni Enrico Mattei (FEEM) and the Beijer International Institute of Ecological Economics in collaboration with RANESA (through CEEPA) will organise the 2nd Advanced Course on Computable General Equilibrium Modelling (CGE) and the Environment. The Course will be held in Miramare-Trieste, Italy, from the 1st to the 12th of December. The Course is targeted to holders of post-graduate degrees in economics and fields of direct relevance, with good background in microeconomic theory and quantitative techniques. Qualified candidates from all countries that are members of the UN, UNESCO or IAEA in Africa, South Asia and Latin America can apply.

After a relatively dormant period (apart from the non-degree training workshops mentioned above), RANESA has now received funding from the Nature program of Swedish Sida for three years to continue its work on natural resource accounting (NRA) in Africa. RANESA will extend its NRA activities previously focused on southern Africa to eastern Africa where Tanzania and Ethiopia have been identified as key countries with some pilot work to be initiated in Uganda and Mozambique. The Beijer Institute will continue to play its critical role in this initiative providing technical support and backstopping to the NRA in Africa project.

The South Asian Network for Development and Environmental Economics (SANDEE)

Priya Shyamsundar, Coordinator, SANDEE

The South Asian Network for Development and Environmental Economics (SANDEE) seeks to use economic tools and analyses to address some of South Asia's environmental and developmental challenges. SANDEE is based on the premise that the joint field of environment and development economics offers a useful framework for analyzing the growth-poverty-environmental change nexus. Economic tools can be effectively applied to understand and identify solutions to environmental problems and to develop appropriate mechanism for policy reforms. SANDEE hopes to bring together and strengthen South Asian researchers, practitioners and institutions interested in the inter-connections between development and the environment.

SANDEE has come a long way since our launch at the end of 1999. SANDEE is now an established network with over 1100 colleagues on our electronic list. SANDEE continues to grow and serve the needs of the region in terms of building capacity, both individual and institutional, in environmental and natural resource economics.

SANDEE's research program through its small grants initiative is growing as well. Our biannual research competitions are widely advertised in newspapers, journals and through our electronic list-serve. As expected, initially we received a large number of proposals from Indian researchers but over time, we have seen an increase in grant requests from Sri Lanka, Nepal and Bangladesh. We hope to increase SANDEE's profile and increase awareness about our activities in Pakistan with the help of a number of institutions, so that we can generate more research ideas there. While by the end of June 2003, we had made a total of 27 research grants, the initial cohorts of our researchers have started to provide their final research results. By end of fall 2003, we hope to release several working papers and policy briefs as an outcome of our research grants. Our grants cover diverse topics from community forestry in Nepal, to intellectual property rights related to traditional knowledge in India, to shrimp farming in Bangladesh, to Economic Valuation Of Dutch Canal Associated Wetlands and Development of an Appropriate Financial Support System for Soil Conservation in Tea lands in Sri Lanka, and to construction of an environmental Computable General Equilibrium model to analyze and understand the

impacts of national Environmental Quality Standards for Pakistan. We meet every six months to discuss progress and listen to new ideas.

SANDEE has added a set of training activities to complement its successful research program. Our main objective with the training program is to build capacities of trainers and researchers in new and emerging concepts and tools related to environmental and natural resource economics. We hope to strengthen their skills so that they can re-train others and use these new tools and techniques for sound policy research. We have offered four training courses in the region: The first was a basic course in econometrics for environmental economists with no previous exposure to this field. This one-week course was held in Bangladesh. We also offered two short 4-day



Participants from the training workshop in Econometrics held in Bangladesh, December 9-14, 2002. Photo courtesy: SANDEE.

courses for researchers interested in learning more about policy and research methods and how they can be used in conducting rigorous research. Both these courses were geared toward colleagues interested in applying for SANDEE grants. The courses were held in Pakistan and Bangladesh. Finally, an advanced 12-day course in Household Economics and Resource Economics was organized in June 2003 in Sri Lanka. The course was geared for environmental economists so that they could expand their tool-kit.

One of SANDEE's key goals is to disseminate environmental policy relevant information to practitioners, policy makers and researchers in the region. We have so far published six newsletters, which contain policy news from countries within and outside the region. We use the newsletters as well as our electronic list serve to distribute information about new publications, grant and scholarship availability, up coming training courses, and environmental economics related information. This has successfully resulted in many colleagues being offered opportunities to attend training programs and meetings in different parts of the world. The 7th issue of our newsletter will be published by mid-August.

SANDEE is set up as a regional network so it could learn from each other and build on differing capacities within the region. Our biannual research workshops offer a tremendous opportunity for sharing knowledge. About 40-50 environmental economists attend each research workshop and this has increased our joint understanding of policy and research concerns in the different countries in the region. Over the past year, we have also learnt a lot about the considerable challenges of running a regional network. Despite the difficulties in meeting the needs of multiple countries with varying level of capacities, we have friends everywhere who are eager to join and ready to support the SANDEE family and move its professional agenda forward.

SANDEE has been fortunate in having very strong and committed group of advisers and friends. Besides our technical advisory and management committee which includes Mahesh Banskota, Kanchan Chopra, Partha Dasgupta, Herath Gunathilake, Enamul Haque, Karl-Göran Mäler, Rehana Siddiqui, Thomas Sterner, and Jeff Vincent, we have several other resource persons who attend our workshops and offer their ideas, knowledge and technical and professional expertise. Last winter, we were honored with the presence and guidance of Nobel Laureate Prof. Kenneth Arrow at one of our research workshops held in Dhaka, Bangladesh.

SANDEE is progressing well in achieving its objectives that it was set up for. As SANDEE continues to grow, so do our challenges. It has been over three years since our inaugural in 1999. It is time to reflect and review and look back at achievements and lessons learned in this process. In order to launch SANDEE into its next phase, a team of regional and international advisors have recently undertaken an evaluation of SANDEE's complete program and its activities. The evaluators, Prof. A Vaidyanathan from Madras Institute of Development Studies, Chennai, India and Dr. Stein Hansen from Norway are highly experienced and seasoned professionals who have undertaken the formal evaluation of SANDEE.



More information about the SANDEE network can be found on:
www.sandeeonline.org

Small, Firm Steps: The Creation of the Latin American and Caribbean Environmental Economics Program

Francisco Alpizar, PhD, Coordinator, LACEEP

The Beijer Institute is not a new player when it comes to the creation of capacity building networks in different parts of the world. Despite its acquired expertise in this field, the creation of a Latin American network for capacity building in environmental economics has proven to be a particularly tough nut to crack.

The Beijer Institute's involvement in Latin America can be traced back to a meeting in Costa Rica in 1998, with participants from Argentina, Chile, Brazil, Venezuela, Mexico, Colombia, Bolivia, Ecuador, and Costa Rica. By then, the need for a capacity building network aimed at closing the gap between the large and complex environmental problems facing the region, and the limited analytical and investigative tools commanded by Latin American researchers in the field of environmental economics was clearly established. Unfortunately, it was also clear then that the Latin American experts were not ready to work together, and the meeting ended on a sad note. Having established the need for a capacity building network, the Beijer was not ready to let go, and a second attempt took place in Bahia, Brazil, in 2000. The soil then was fertile and a small committee was appointed to write a first proposal for the creation of the Latin American and Caribbean Environmental Economics Program (LACEEP), which was presented in Yucatan, Mexico in December 2001. In that meeting, I assumed the coordination of the efforts to establish and fund the network, with help from Dr. Leiner Vargas (Costa Rica), Dr. Sara Aniyar (Venezuela) and, later on, from Dr. Sonja Teelucksingh (Trinidad).

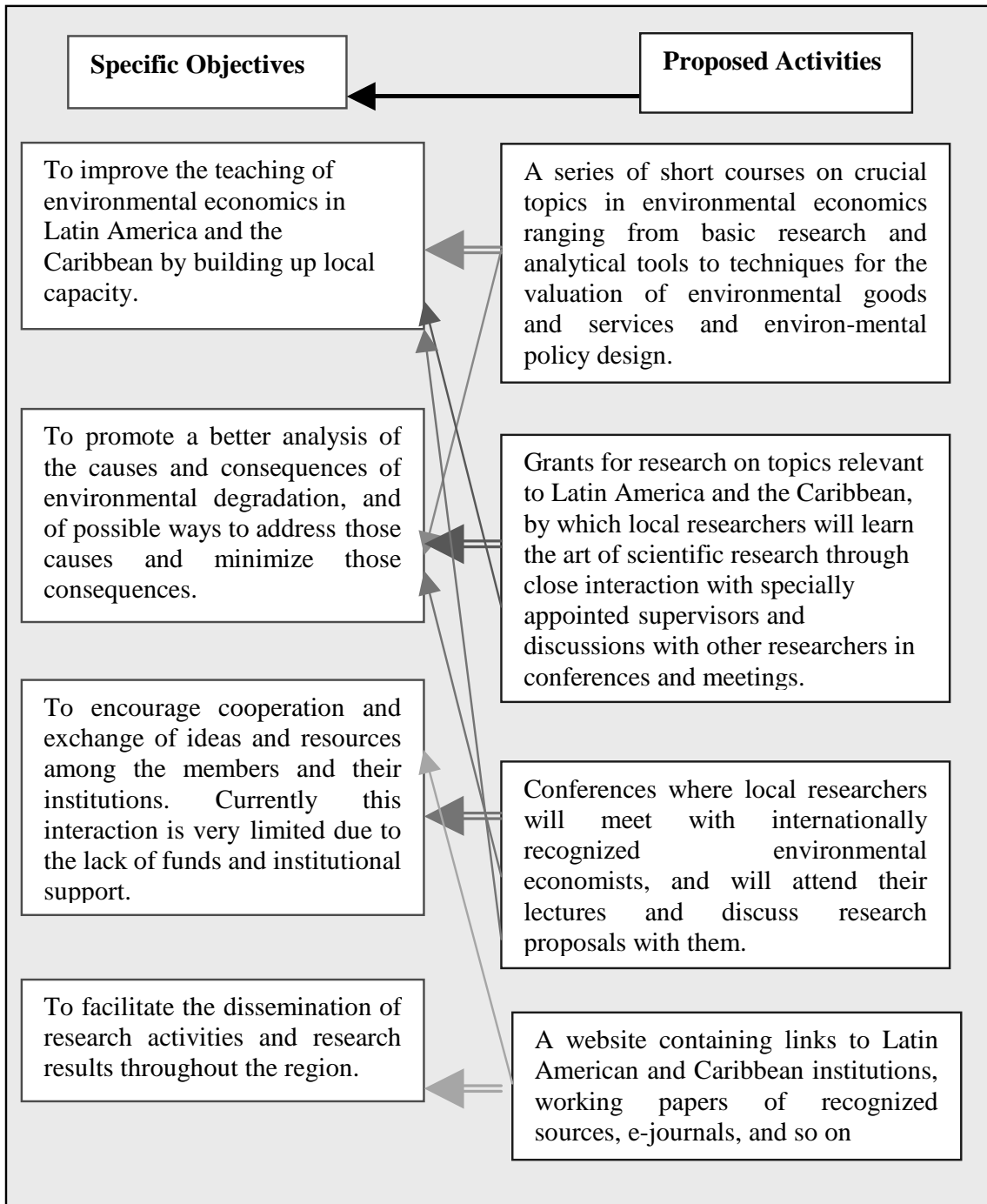
The first "public appearance" of the proposal took place during the Second World Congress of Environmental and Resource Economists in Monterrey, California in June 2002. During our short presentation there, it became plain that there was a clear need to harmonize our objectives with those of the newly created Latin American and Caribbean Association of Environmental and Resource Economists (ALEAR). The aim of ALEAR - "to assemble institutions and professionals interested in investigation, application and disclosing of environmental and natural resource economics" - was a complement to our objective of creating capacity in that field. After that meeting, we started a thorough revision of the proposal, incorporating comments from colleagues, particularly from Gunnar Köhlin (Environmental Economics Unit, Göteborg University) and Prof. Karl-Göran Mäler (see box for summary of objectives

and proposed activities). We also started a more aggressive search for seed funds, which were required to visit potential donors and to establish closer ties with ALEAR. This later objective required special attention and the Beijer Institute decided to organize a joint ALEAR and LACEEP workshop in Peru in April 2003.

This workshop constituted a turning point for both ALEAR and LACEEP. We started by identifying potential ways in which both activities could collaborate, and concluded by agreeing on a far more ambitious design. From the outset it was clear that ALEAR and LACEEP should work together to push forward the field of environmental economics in Latin America. Collaboration was agreed in several aspects, ranging from sharing a web page, a newsletter and a working papers series, to joint workshops, all of which will lead to reduced costs for both organizations. In addition, senior members of ALEAR could act as teachers and reviewers of the capacity building effort of LACEEP and those who received training in LACEEP would be encouraged to become members of ALEAR. The ambitious part of the proposed collaboration was to apply jointly for funds from the international donor community. This would entail a budgetary merge of both organizations. Continuing with the initially proposed structure for LACEEP, the budget will be managed by its host (nowadays CATIE in Costa Rica) which has an internationally recognized financial and auditing system. ALEAR's budget will be transferred to Colombia, where it is legally based. We are sure this new structure will facilitate access to donor agencies, who will basically get two for almost the price of one.

Certainly there is still a long way ahead before we can see LACEEP and ALEAR standing solidly on their feet. But the road ahead now looks brighter than ever. After several attempts, and thanks to Gunnar Köhlin who secured some funds from Sida, we now have a small endowment that will enable us to approach the donor community. Most importantly, the First Latin American Congress of Environmental Economists took place this July in Cartagena, Colombia. The congress was a complete success in terms of participation and quality of the presentations, positioning ALEAR as a compulsory point of reference for the practice of environmental and natural resource economics in the region. The meeting also

Summary of objectives and proposed activities for the LACEEP network.



consolidated the relation between LACEEP and ALEAR, since Dr. Sonja Teelucksingh and I now serve in the Board of Directors of ALEAR. At the moment we are preparing the joint LACEEP-ALEAR proposal and soon we will start

an aggressive search for funds to start the activities proposed.

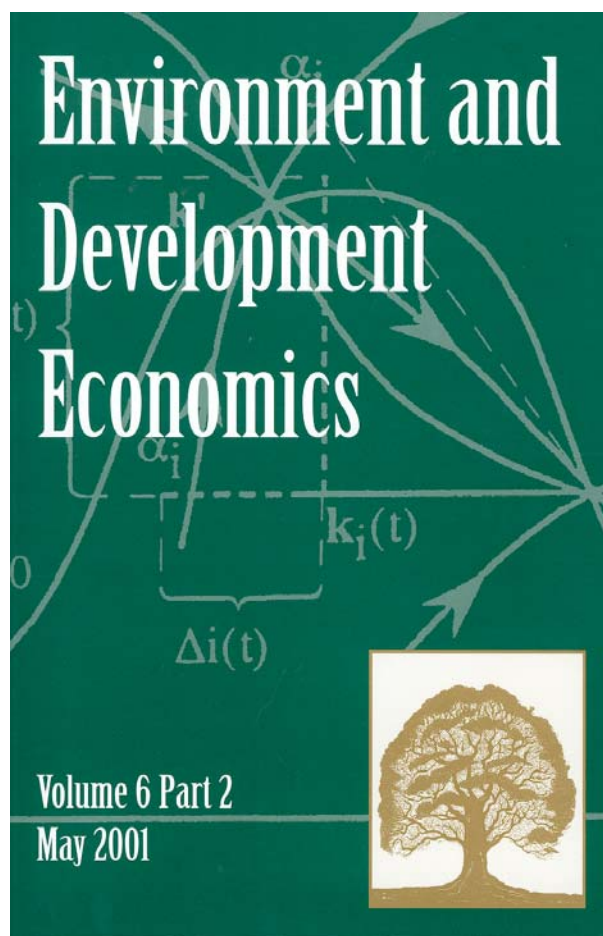
Environment and Development Economics

Charles Perrings, Editor, EDE

The journal is now in its 9th year of production. Three general matters are worth bringing to the attention of the board.

First, to meet the increasing volume of high quality submissions it has been agreed to increase the number of issues per volume from 4 to 6, commencing with Volume 9. The cover dates for each issue will be February, April, June, August, October and December. Aside from making it possible to publish all papers accepted for publication, the change will enable us to clear a backlog of papers, and also to reintroduce features such as the Policy Fora, which have been squeezed out in the last couple of years.

Second, replacements have now been found for two founding Associate Editors, Ed Barbier and Ramon Lopez, who reach the end of their third and final three-year terms in 2003. Our thanks go to Ed and Ramon for their outstanding work on the journal. We have yet to find a replacement for me on my retirement as editor at the end of my second and final five-year term in 2004, but I hope to finalise this within the next six months.



Third, since the second contract between Beijer and CUP comes to an end in 2004, and since the MacArthur Foundation is no longer financing the journal, new sources of funding to cover the journal need to be identified before the end of the current contract.

Performance

The journal continues to perform well by most criteria, but it is still not possible to evaluate its impact relative to other journals in the field. EDE has been indexed on ISI's Web of Science for the last 2 years, but will only receive an impact factor from JCR next year.

Editorial Board

The replacements for Ed Barbier and Ramon Lopez are Erwin Bulte of the University of Tilburg, and Bruce Larson of the University of Connecticut. I consider that the journal is very fortunate in having the services of these two outstanding young environmental economists. They will start to manage manuscripts in October 2003.

During the year, Ros Stockley resigned her post as Assistant Editor in order to take up a job with the Environment Agency. Her contribution to the journal while she was employed at York was exceptional. She has been replaced by Amy Swann recruited from the post of editorial assistant on the journal: Long Range Planning. Although it is time to review the general editorial board of the journal, I propose to leave this until we have identified a new editor for the journal, and then to undertake the task in conjunction with the new editor.

Production 2001-2

As indicated above, we have made the decision to move from 4 to 6 issues a year with effect from Volume 9. Each issue will revert to a standard length of approximately 48000 words, and it is planned to carry the full range of features initially envisaged, including policy fora. Despite some disruption during the change of office staff, production of the journal remains on schedule.

The review process

During the last year we inaugurated our audit of the review process. Scott Barrett was invited to consider the process using a sample of manuscripts. His report was considered at a meeting of the editorial board in Trieste in 2003. It indicates that the process appears to be working reasonably well, and to be producing papers of acceptable quality. The time taken to complete the review process continues to fall. I am still concerned at the small number of reviewers from developing countries (other than India),

but this is something that the associate editors are conscious of, and we are trying to address.

At the Trieste meeting the editorial board considered the linkage between the quality of published papers and the rejection rate. It was agreed that as the quality of submissions improves there is greater scope for using the rejection rate as a quality control mechanism. Indeed, the following tables show that rejection rates have in fact risen quite sharply since 2000. However, so long as the journal remains committed to a capacity building role supported by a constructive review process, it would be counterproductive to aim to replicate the rejection rate of journals such as the Journal of Environmental Economics and Management.

A summary of the decisions reached on papers submitted to date follows. The table shows that the acceptance rate is highest for papers submitted from the USA and Canada, and is lowest for Eastern Europe and the Middle East – although the numbers remain small. The ratio of accepted to submitted papers is still quite low for Eastern Europe, the Middle East, Australia and New Zealand and Latin America.

Historically, we have had a high proportion of ‘withdrawn’ papers. These are papers that are not formally rejected, but where the authors feel unable to meet the revision requirements. This reflects our editorial policy of inviting resubmission of papers that do not pass the minimum test, whilst providing detailed suggestions as to what is required to satisfy that test. In the last two years the number of withdrawn papers has fallen as the number of rejected papers has increased.

Geographical rejection (rejection + withdrawal) rate as a % figure of total submissions less those pending at the end of the calendar year.

	Africa	Asia	Latin America	UK	West Europe	East Europe	Australia and NZ	Middle East	USA and Canada	Total
1999	100	71	99	80	44	100	100	100	42	58
2000	29	57	40	33	70	0	25	67	50	53
2001	100	59	50	60	65	0	66	100	52	58
2002	75	88	100	100	85	100	86	0	72	81
2003*	100	67	0	0	100	0	100	100	100	89

Overall cumulative rejection (rejection + withdrawal) rate since inception

	Africa	Asia	Latin America	UK	West Europe	East Europe	Australia and NZ	Middle East	USA and Canada	Total
rejection rate*	67	68	75	66	62	80	76	78	55	63

Status of manuscripts received March 1st 1995 to August 11th 2003 by geographical area

	Africa	Asia	Latin America	UK	West Europe	East Europe	Australia and NZ	Middle East	USA and Canada	Total
Submitted	40	114	29	46	149	5	31	10	229	653
Accepted	10	30	6	14	47	1	7	2	87	204
Rejected	16	50	14	19	68	3	20	6	90	286
Withdrawn	4	12	4	8	10	1	2	1	17	59
Pending	10	22	5	5	24	0	2	1	35	104

The growth and distribution of submissions is shown in the following table. After a reasonably stable period submissions appear to be growing quite rapidly. Submissions in 2003 are running some 25 per cent ahead of submissions at the same time last year.

Growth and geographical distribution of submissions

	Africa	Asia	South America	UK	West Europe	East Europe	Australia and NZ	Middle East	USA and 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	2	7	4	5	9	2	3	1	26	59
2000	7	14	6	7	22	0	4	4	21	85
2001	1	27	3	5	20	0	3	1	27	87
2002	7	13	3	7	21	1	8	1	29	90
2003*	6	15	2	1	14	0	2	1	19	60

Notes

* Data includes only the 7 months to August 11th 2003. Data do not include policy fora contributions or book reviews.

PhD Programme in Environmental Economics

Thomas Sterner, Professor, Department of Economics, Göteborg University

The Ph.D. program is based on a collaboration between the Environmental Economics Unit, Göteborg University and the Beijer International Institute of Ecological Economics. The target group for this program is students from developing countries and we accept five students every other year. The length of the program is five years where the first two years consist of course work. The courses are typically followed by fieldwork and data collection in their home countries while most of the analysis and supervision is carried out at the EEU.

The objective of the program is to establish research and teaching capacity in developing countries. The program is expected to increase the teaching capacity in order to enable initiation and improvement of undergraduate and master's programs. The graduates of the program are also expected to carry out applied research and give advice that will improve domestic policies.

In the long-term, we expect that the capacity will sustain itself through grants from regional networks, collaborative research arrangements and domestic resources. Our students have discussed these matters with their home affiliations and have developed strategies for their future involvement in teaching, research and policy advice.

Enrolment

Since 1997, five new students are recruited every other year to the program. This enables a critical mass of students that makes it possible to arrange courses and provide a stimulating environment for studies and other activities.

The following criteria are used when selecting the candidates: academic performance – especially the necessary skills in economics, mathematics and English in order to benefit from the program; capacity building context – the capacity of the home institution to make use of the competence to be developed so that the graduate efficiently can support the development of environmental economics capacity in the country through teaching, research and policy advice; Gender – to the extent possible, women are prioritised.

In 2002 no new students were enrolled.

Training

The program spans over a time period of five years of which the first two years consist of intensive course work. The first year is identical to the general Ph.D. program in economics, i.e. mathematics, econometrics, micro economics and macro economics. The second year includes a sequence of courses in environmental economics viz. welfare economics, environmental valuation, natural resource economics and policy instruments together with optional courses such as advance econometrics, development economics, public economics, industrial organization etc. There is also a course in system ecology at the Department of Systems Ecology at Stockholm University. In addition to these courses the students have the option to choose from other graduate courses at the Department of Economics, GU, and elsewhere.

The 1997- and 1999-batch of students have already finished their course work while the 2001-batch are the at the end of their course work.

Maintained links to home institution

One of the most important objectives of this program is to create research and teaching capacity at a number of institutions in developing countries. By maintaining the links to the home institution of the student we increase the potential for this objective to be met. The design of the programme, i.e. the sandwich model, facilitates this linkage. In practice this means that the student divides his/her time between Göteborg University and the institution the student is affiliated to in his/her home country.

Supervision

Each student has a main supervisor, an assistant supervisor as well as external supervisors involved in specific chapters of their thesis work. The selection of main supervisor depends on the thesis topic chosen. Currently, the supervision is carried out by the following staff at Beijer and EEU: Karl-Göran Mäler, Thomas Sterner, Olof Johansson-Stenman, Gunnar Köhlin, Fredrik Carlsson, Håkan Eggert, Peter Martinsson. The following professors have taken on a long-term supervision commitments: Gardner Brown, University of Washington, Per Fredriksson, Southern Methodist University, Stein Holden, Agricultural University of Norway. In addition, a number of thesis chapters are supervised by other external experts.

To a certain degree, EEU and Beijer staff supervise the students already from the start of the program since some already have started research before acceptance to the program while others need an early start to the difficult process of identifying thesis topic. The intensity of the supervision varies depending on the particular stage in which the student is.

Students in the program and their thesis projects

During 2002 there were 14 students at various stages in the program. One student, Francisco Alpizar, obtained his Ph.D. in November of 2002.

Students enrolled in 1997

Hala Abou-Ali, Cairo University, Egypt
Francisco Alpizar, University of Costa Rica, Costa Rica
Eseza Katerega, Makerere University, Uganda
Edwin Muchapondwa, University of Zimbabwe, Zimbabwe

Students enrolled in 1999

Wilfred Nyangena, University of Nairobi, Kenya
Razack Bakari Lokina, National Environment Mngmt Council, Tanzania
Mahmud Yesuf, Addis Abeba Univesity, Ethiopia
Minhaj Mahmud, Jahangirnagar University, Bangladesh
Nasima Chowdhury, University of Dhaka, Bangladesh

Students enrolled in 2001

Rahimaisa Abdula, Philippine Institute for Development Studies, Philippines
Wisdom Akpalu, University of Cape Coast, Ghana
Mintewab Bezabih, Alemaya University, Ethiopia
Jorge Garcia, Universidad de Los Andes, Colombia
Martine Visser, University of Cape Town, South Africa

Essays on environmental policy-making in developing countries

Francisco Alpizar successfully defended his thesis in November 2002. Francisco returned to Costa Rica and is now working for CATIE (Centro Agronómico Tropical de Investigación y Enseñanza), as an associate professor in environmental economics. He has recently been named academic coordinator of the master program in environmental economics. On a more regional basis, he is

also a coordinator of the project proposal for LACEEP and has also been included as a member of the board of ALEAR (Latin American Association of Environmental and Resource Economists).

His thesis consists of five papers dealing with fairly heterogeneous issues, both based on the problems or topics analysed, but also based on the methodologies used to approach them. The overriding motives are the design of environmental policies in the context of a typical developing country (where Costa Rica is used as a representative of such countries), and the study and application of techniques that can provide the necessary information for policy-making.

Special activities

The program has an ambition to create a conducive research environment for the Ph.D. candidates as well as to give them the opportunity to develop their own international and academic contacts with the long-term objective to make them well-rounded professionals as they graduate from the program. Many synergies are developed with other parts of the overall capacity building program, not least the seminar series and the visiting researcher program. A workshop was also convened at the Beijer institute in August 2002 which was well-attended both by the Ph.D. candidates and senior research persons attached to the Beijer Institute Board. Beyond such activities, some individual experiences are reported on below.

Edwin Muchapondwa travelled to Namibia to explore ways of collaborating in research on community-based wildlife conservation with staff at the Environmental Economics Unit of the Directorate of Environmental Affairs in the Namibian Ministry of Environment and Tourism. He also became involved in the data collection, and later analysis, of household resource utilization.

Mahmud Yesuf attended the Poverty Conference organized by Sida in Stockholm in October 2002, as well as a workshop on local management of forest resources in October 2002, which was targeted to produce a project proposal on the same issue. He also participated in a workshop on agricultural issues in November 2002, which was aimed at collecting feedbacks and directions for the thesis work from different resource persons of the unit, and external

supervisors. Finally, he presented a paper on the first international conference on the Ethiopian Economy, held in Addis Ababa, Ethiopia, in December/January 2003.

Martine Visser attended the World Summit on Sustainable Development in Johannesburg during the week of 27 August-2 September 2002. She specifically attended the World Forum for Sustainable Development, which was hosted by the International Research Foundation for Development as well as various sessions at the Waterdome which were hosted by the South African Department of Water Affairs and Forestry.

Wisdom Akpalu attended a workshop in Denmark from Sept. 28 to Oct. 2, 2002, on Theoretical and Practical Issues of Bio-Economic Modelling. The workshop was organised by The Centre for Fisheries and Aquaculture Management and Economics (FAME).

Mintewab Bezabih conducted her first pilot study in December on “Tenants and Owners’ willingness to pay for soil conservation activities: are land transactions deterrent to land management?” in Ethiopia.

Rahimaisa Abdula attended a workshop called “Advanced General Equilibrium Modelling at Washington DC, January 6-11, 2003.

Wilfred Nyangena attended a development conference organised by Sida in Stockholm, October, 17,2002; Forestry Institutions Workshop- Säröhus , October, 26-27, 2002. Agricultural Household Modelling, Göteborg, November,12-13, 2002.Presented preliminary findings from “ Returns to Conservation: Evidence from Kenya”. Regional Strategies to Boost Agricultural Production in Eastern Africa, Nairobi, KARI headquarters, 25-26 January 2003. Presented paper: “Returns to Conservation: Evidence from Kenya”



Some of the PhD students on their annual visit to the Beijer Institute. Here together with Beijer staff and Dr. Brian Walker, Prof. Thomas Sterner, Prof. Kenneth Arrow, Prof. Ann Kinzig, Prof. Partha Dasgupta, Prof. Simon Levin, Prof. Bert Bolin, Prof. Steve Schneider.

Tackling the Economics of Ecosystems

Anne-Sophie Crépin, PhD, Research Associate, The Beijer Institute

On October 24th 2002, on United Nations day, I successfully defended my thesis, "Tackling the Economics of Ecosystems". A large part of it dealt with the economics of non-linear ecosystem: I studied non-convexities in coral reefs and boreal forests and some of their management implications. Many members of the Beijer family were involved in this process and I am grateful for all the help I could get.

I showed that results obtained on shallow lakes are valid in other aquatic and terrestrial ecosystems. The main message is that natural resource management is not easy when the resource managed is produced within an ecosystem with nonlinear dynamics. In particular one cannot anymore rely on simple rules like "marginal cost should equal marginal benefits". This rule is still true but is not enough to help select an optimal management solution. On contrary, following such a rule blindly could lead to a very bad outcome because of multiple steady states. As far as I know, the only way to select the proper path towards an optimal steady state would be to calculate all future costs and benefits of all the paths for which marginal costs equal marginal benefits at all points in time. Another interesting result is that there are Skiba points in those systems, i.e. points in which two completely different future choices lead to the same social welfare.

These results revealed a multitude of new questions that need answers. They also showed that I more than ever needed to work in close collaboration with ecologists. My current research at the Beijer Institute deals with trying to look more deeply into some of these questions together with ecologists and other colleagues.

1. The paradox of biodiversity together with Jon Norberg

This paper concentrates on diversity's insurance value against changes in the environment. We assume that the environment changes continuously due to both cyclical variations and stochastic shocks and that there can be outside inputs to production. Norberg et al showed that if diversity becomes too low or if outside inputs disappear, the system might collapse.

We try to model the economic exploitation of a diverse ecosystem in a changing environment. The ecosystem model reacts in such a way that in each point in time a monoculture of the best-fitted species would be optimal.

But in the long run, the environment changes and so does the best-fitted species implying that a monoculture would lead to considerable resource loss and eventually ecosystem collapse. Our research goes into two directions:

- How do we manage such a stochastic ecosystem to maximize well being derived from the forest over time?
- How do we manage biodiversity reserves to enhance production of goods and services from surrounding ecosystem? Here we introduce a spatial aspect and divide the territory into two regions, one devoted to traditional exploitation, the other acting as a biodiversity reserve.

2. The grazing game with Therese Lindahl, discussions with Bob Scholes for the ecosystem model

We study economic management of a common pool resource when there are threshold effects. Our model departs from a grazing system. We want to model a game where two herders use a common pool resource - grass fields - to feed their cattle. The ecosystem grass-bushes-cattle is nonlinear and can flip between a grass-dominated and a bush-dominated state that can support much less cattle.

We would like to find conditions under which the system may flip towards a bushy state. Furthermore we would like to check whether certain "quality" of the agents - like different expectations, cattle size - affect the result.

3. Extension of the coral reef model in the thesis and policy implications

The coral reef model presented in my thesis included only fast variables of the ecosystem: fish and algae. I now revise the model to include the coral as a slow variable and show how changes in the slow variable can trigger a flip from a coral-dominated to an algae-dominated state.

I then plan to use this model to discuss alternative management methods when one cannot rely on $MC=MB$ / how do we manage for slow variables? Here are some strategies; it might be interesting to model some of them and compare their effect on well being.

- Calculate all future costs and benefits. This is tedious and not realistic because typically there is uncertainty about the future. This calculus



Coral-dominated reef. Photo: Ingrid Nordemar.



Algae-dominated reef. Photo: Ingrid Nordemar.

would need to be revised more or less regularly when new information becomes available.

- Try to detect thresholds and avoid them. This is difficult and not even always possible because detection typically requires crossing the threshold and then you're in the bad region for a long time or even forever. (See Peterson, Carpenter and Brock's recent work on the topic).
- Introduce spatial aspects and divide space into exploitation areas and non-take areas. (See for example Hughes et al). There is a risk that the non-take areas are not big enough to act as regulators for the exploited areas. Furthermore the pressure to transform non-take areas becomes large if there is resource scarcity.
- One could have a rotating stock of non-take areas so that when a system had flipped, it would become a non-take area at least until it recovers. Under this period another system could be

exploited. The drawback is that we would rapidly turn short of pristine areas. This kind of management becomes seriously problematic if it turns out that the flipped areas cannot recover or recover too slowly compared to the rate at which healthy areas are overexploited. Then what we have is just another slash and burn strategy.

- So should we just keep using $MC = MB$ and hope for luck?

References

- Hughes et al, (2003) *Climate Change, Human Impacts, and the Resilience of Coral Reefs*, *Sciences*, 301, pp. 929-933.
- Norberg et al, (2001) *Phenotypic Diversity and Ecosystem Functioning in Changing Environments: A Theoretical Framework*, *Proceedings of the National Academy of Sciences, USA*, 98(20), pp. 11376-11381.
- Peterson, Carpenter, and Brock, (2003), *A Rational Route to collapse*.

Valuation of International Recreational Services

Jessica Andersson, PhD student, The Beijer Institute

Zanzibar in East Africa has recently experienced a tourist boom where the number of visitors have increased from 2000 per year to 90 000 per year in only ten years. This has had great implications for the Government in Zanzibar and for the local inhabitants. The thesis looks at the demand side of the tourist industry followed by an assessment of the factors conducive for economic progress when the tourist industry entered the small island.

The first chapter develops a model to estimate recreational welfare measures for long distance international tourism. The special character of this type of tourism makes most traditional valuation techniques difficult or inappropriate to apply. The visitors in general only visits the site once in a given time period, the cost of visiting the site is not correlated with the distance to the site and the consumers as well as substitute sites are scattered all around the world. To facilitate estimations it is assumed that the good is indivisible in consumption. In the next chapter the model is empirically applied.

In 1998 the coral reefs surrounding Zanzibar and its adjacent islands suffered from coral bleaching. A phenomenon caused by increased sea temperature resulting in coral mortality all over the world. The second chapter estimates the loss in recreational value for Zanzibar due to this

bleaching event. Data from before and after bleaching at two different sites is used for the estimations. The result shows that there has not been any significant change in recreational value and there are several possible explanations to this. The visitors might not be informed about the decreased quality of the reefs, they might not be experienced enough to observe it or since the damages are patchy they might simply not see it.

The last chapter assess the institutional evolution in the coastal zone, which is the area where the tourist industry predominately was established. It attempts to identify factors that have been conducive for the welfare of the local villagers. Social anthropological, legal and ecological studies are used to identify formal and informal restrictions that have had an impact on if compensation and trickle down has taken place in the coastal zones when tourism entered. This is assessed for each of the different ecological zones of importance for the local peoples production strategies and survival. It was found that in many ways the local institutions were prepared to enter into a more complex economy but the time period was too short for institutions to adjust to the entry of the tourist industry to capture its welfare opportunities. An exception was locally owned guesthouses that produced services adjusted to and integrated into prevailing institutions while also capturing part of profit of the industry.

Efficient Use of Local Natural Resources - Individual Actions and Cooperation in a Changing World

Ingela Ternström, PhD, Research Associate, The Beijer Institute

Many of the world's poor people are dependent on local natural resources for their survival. Such resources are often managed as common-pool resources, i.e. they are used in common by a limited group of people. The users are dependent on each other in their use of the resource.

The objective of this project is to improve the understanding of what makes cooperation among the users of a common-pool resource function or fail, especially in a changing world. Furthermore, I will attempt to translate this understanding into a practically useful tool for predicting the breakdown of such cooperation. The focus of my research is thus on cooperation itself and on how the participants' ability to cooperate is connected to various factors and changes in these, rather than on the outcome of the participants' cooperative efforts.

My Ph.D. thesis, "The Management of Common-Pool Resources: Theoretical Essays and Empirical Evidence", was successfully defended in December 2002. It comprises the first steps on the way towards these objectives. The first two chapters examine the effects of poverty on common-pool resource management, using game theory and a non-homogeneous utility function. I show that both income level and income distribution affects the chances for cooperative management of common-pool resources. Since it is reasonable to assume that health is a strong component in a person's utility, I let the utility function mirror the relationship between the consumption of food and health. I then find that the chances for cooperation are greater for richer than for poorer groups of users, but greatest for users that are just managing to get the food they need to remain in good health. For this last group, income inequality will decrease the scope for cooperation.

The third chapter of the thesis contains the first of what will be a series of empirical analyses of new data from irrigation systems in Nepal. The database comprises broad yet detailed information regarding the historical development of ten irrigation systems in the Terai region of Nepal. There is time-series data for a wide range of variables (participants, socio-economic status, infrastructure, external support, environment, leadership, institutional structure etc.) as well as the respondents'

explanations for the changes that has taken place over time. The data was collected in collaboration with colleagues at the Institute of Agriculture and Animal Sciences at the Tribhuvan University in Rampur, Nepal.

In this first analysis I combine statistical methods with case studies based on the narrative information. The results indicate that cooperation works better when there is an individual taking on the role as leader and when a large share of the users belong to the ethnic majority group. Furthermore, there is more cooperation when the participants' average income level is not too low and when the income is evenly distributed. Interestingly, the data seem to indicate that the presence of a Water Users' Association decreases the extent of cooperation although this is often a requirement for getting external support. The increased politicisation in connection with the democratisation process in the country appears to have had a similar effect. In the continued analysis of the data, I will look more closely at some of the variables identified in this first study, especially leadership and majority strength.

The database is unusual as it allows the cooperation process in several similar irrigation systems to be studied over time. In many systems cooperation has deteriorated over time, sometimes to be recovered in the later years. Others show steadily increasing levels of cooperation. These developments illustrate poignantly the need to understand the underlying processes that influence cooperation. A focus on the outcome of cooperation at any one point in time is not enough.

An important step in the analysis of the data is therefore to sort out in more detail *how*, and not only *which*, variables affect cooperation. To understand how the processes that lead to cooperation or failure thereof work in the institutional setting of the ten irrigation systems, I am now embarking on an effort to apply the Institutional Analysis and Development framework to the data. This framework has been developed by Professor Elinor Ostrom and her colleagues at the Workshop in Political Theory and Policy Analysis at Indiana University, where I had the good fortune to spend the spring semester.

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 eleventh annual board meeting was held at the Institute, August 30th, 2002.

Board of Directors 2002-2003

CHAIRMAN

STEPHEN CARPENTER

Professor, Center for Limnology, University of Wisconsin, USA

EX-OFFICIO MEMBERS

ERLING NORRBY*

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

KARL-GÖRAN MÄLER*

Professor, Director of the Beijer Institute, Sweden

MEMBERS

SCOTT BARRETT

Professor of Environmental Economics and International Political Economy, Paul H. Nitze School of Advanced International Studies, John Hopkins University

GEOFFREY HEAL

Professor, Program on Information and Resources, Columbia University, USA

MICHAEL HOEL

Professor, Department of Economics, University of Oslo, Norway

MICHEL LOREAU

Professor, Pierre and Marie Curie University, Paris, France

JANE LUBCHENCO

Professor, Department of Zoology, Oregon State University, USA

THOMAS ROSSWALL

Professor, Executive Director, International Council for Science (ICSU), France

DAVID STARRETT

Professor, Department of Economics, Stanford University, USA

ANASTASIOS XEPAPADEAS

Professor of Economics, Economics Department, University of Crete

* members of the Royal Swedish Academy of Sciences



Beijer Board Meeting 30th August, 2002. Back row: David Starrett, Michael Hoel, Geoffrey Heal, Bert Bolin. Front row: Domenico Siniscalco, Karl-Göran Mäler, Brian Walker, Jane Lubchenco. Photo: Anna Sjöström.

STAFF MEMBERS

FOLKE, Carl, Professor, Research Fellow
 GREN, Ing-Marie, Professor, Research Fellow
 KAUTSKY, Nils, Professor, Deputy Director
 LEIJONHUFVUD, Christina, Administrator
 MÅLER, Karl-Göran, Professor, Director
 SJÖSTRÖM, Anna, Administrator
 SÖDERQVIST, Tore, Associate Professor, Research Associate
 TROELL, Max, PhD, Research Associate

Project Employed Staff

ANDERSSON, Jessica, MSc, Department of Economics, Göteborg University
 ANIYAR, Sara, Professor emerita, University of Zulia, Venezuela
 COLDING, Johan, PhD, Research Associate
 CREPIN, Anne-Sophie, PhD, Research Associate
 HUITRIC, Miriam, FL, Stockholm University
 LERDA, Sandra, MSc, Swedish University of Agricultural Sciences, Uppsala
 NORLING, Teresa, MSc, Stockholm University
 NURHUSSEN, Filli, MSc, Swedish University of Agricultural Sciences, Uppsala
 RÖNNBÄCK, Patrik, PhD, Research Associate
 SCHARIN, Henrik, FL, Swedish University of Agricultural Sciences, Uppsala
 SUNDBERG, Sara, MSc, Swedish University of Agricultural Sciences, Uppsala
 SOUTUKORVA, Åsa, MSc, Research Assistant
 TERNSTRÖM, Ingela, PhD, Research Associate

VISITING SCIENTISTS AND GRADUATE STUDENTS

BENGTSSON, Jan, Professor, Dept. of Ecology and Environmental Research, Swedish University of Agricultural Sciences, Uppsala, Sweden

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.

The Deputy Director is in charge of the Institute's administration.

Christina Leijonhufvud

Christina Leijonhufvud is Administrator. During 2002/2003 she has been responsible for the administration of the Board and Askö meetings in September 2002, the Research Seminar in Kenya in October 2002, and the workshop on Network Co-operation and Sustainable Development in Peru in April 2003. Furthermore she has been administrating the Conference on Rights and Duties in the Coastal Zone and the workshop on Spatial Dynamic Models of Economics and Eco-systems at the Academy in June 2003. 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. Anna also handles the information about the Institute and its work. She is the webmaster for the web page, 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. For 2002/2003 she was also involved in the planning of the Board and the Askö Meetings in September and administrating the Conference on Rights and Duties in the Coastal Zone and the workshop on Spatial Dynamic Models of Economics and Eco-systems at the Academy in June 2003. Furthermore she is also dealing administratively with the PhD programme together with Göteborg University, and the Stockholm Seminar Serie.

General budgetary and accounting issues for the Institute are managed by Tore Söderqvist.

Anna-Maria Palicka and Sebastian Fransson have worked part time with administrative matters.

Investments

During 2002/2003 investments have been made in computers and computer equipment, office equipment and improvements of the premises.

Apartments

The Institute rents two apartments for visiting scientists. The apartments belong to the Royal Swedish Academy of Sciences and are situated at the Academy.

FUNDING

Core funding of the Institute has been provided by the Kjell and Märta Beijer Foundation.

Funding for the Institute's activities 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)

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

Sustainable Coastal Zone Management (SUZOZOMA)

SUZOZOMA is a research programme funded by the Swedish Foundation for Strategic Environmental Research (MISTRA). It was launched in 1997, the first phase was completed and evaluated in 2000, and a three-year second phase started on 1 January, 2001. The Beijer Institute participates in SUZOZOMA together with Gothenburg University, Kristineberg Marine Research Station, Stockholm University and the Swedish National Board of Fisheries. See www.sucozoma.tmbi.gu.se for a detailed presentation of the whole research programme.

On 12-14 June, 2003, the Beijer Institute, SUZOZOMA and MISTRA organized the multidisciplinary scientific conference *Rights and Duties in the Coastal Zone*, see a separate article in this annual report.

The Beijer Institute's research work in SUZOZOMA's first phase has been presented in earlier annual reports. The focus of the Institute's research project in the second phase of SUZOZOMA is economic valuation of coastal ecosystem services. Its main objectives is to provide economic information that are useful for building policies and institutions for coastal zone use, and, more specifically, to improve the understanding of what trade-offs between different coastal zone uses are economically motivated, given due account to the economic significance of coastal ecosystems. The Institute's work in SUZOZOMA is closely coordinated with the research in the MARBIPP and FISHCASE projects, see below.

The research work involves the following items:

1. Economic valuation of Swedish commercial and recreational fisheries: a general review and subsequently a case study on the benefits of improved recreational fisheries in the Stockholm Archipelago.

2. Economic valuation of coastal habitats sustaining fisheries. By combining results from economic valuations of improved fisheries and ecological knowledge on how habitats support fisheries, policies/institutions affecting coastal habitats can be economically assessed to a greater extent. One case study is recreational fisheries of pike and perch and habitats sustaining pike and perch populations in parts of the Stockholm Archipelago. Another case study concerns the effects and costs of measures for improving sea trout habitats.

3. Economic valuation of improved coastal water quality; a case study for the case of the West Coast of Sweden. This study is carried out in cooperation with the Department of Economics at Gothenburg University, and will complement the results obtained in the first phase of SUCOZOMA about the benefits of an improved water quality in the Stockholm Archipelago.

The project team at the Beijer Institute consists of Tore Söderqvist (project leader), Åsa Soutukorva (research assistant) and Sara Sundberg (research assistant). Mikael Sandström (PhD, economist) is associated as expert on modeling for travel cost analysis.

Marine Biodiversity, Patterns and Processes (MARBIPP)

MARBIPP is 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. The programme will run for 5 years (2001-2006) and is being financed by the Swedish Environmental Protection agency. The work carried out by Beijer and collaborators focus on identification and valuation of the generation of ecosystem goods and services from five key Swedish coastal habitats. Partners involved are Stockholm University; Tjärnö Marine Biological Laboratory and Gothenburg University. The Beijer group consists of the following persons: Max Troell, Patrik Rönnbäck, Tore Söderqvist, Leif Pihl, Nils Kautsky, Sandra Lerda and Håkan Wennhage.

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 Conservation Ecology is owned by the Resilience Alliance. The Beijer Institute serves as a mirror site of the journal.

For more information: www.resalliance.consecol.org

Other Research Project

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 2002/2003 is listed below.

Ecological Services of Coral Reef Ecosystems: Values and Threats

Carl Folke, Nils Kautsky, Jessica Andersson, the Beijer Institute, and Fredrik Moberg, Magnus Nyström, Stockholm University.

Aquaculture and Fisheries

C. Folke, the Beijer Institute, N. Kautsky, the Beijer Institute, M. Troell, the Beijer Institute, R. Taylor, R. Goldberg, H. Mooney, M. Beveridge, J. Clay, J. Lubchenco, J. Primavera.

Fish in Shallow Habitats and Coastal Area Services (FISHCASE) – an Ecosystem Approach to Valuing and Managing Coastal Habitats and Fisheries in Sweden

Sandra Lerda, Patrik Rönnbäck and Tore Söderqvist, the Beijer Institute; Leif Pihl, Johan Stål and Håkan Wennhage, Kristineberg Marine Research Station.

Economic Valuation of Ecosystem Services in the National City Park of Stockholm – the Case of Seed Dispersal by Jays

Cajsa Hougner, Stockholm University; Johan Colding and Tore Söderqvist, the Beijer Institute.

Economic Valuation of the Swedish Environment – a Survey

Sara Sundberg and Tore Söderqvist, the Beijer Institute.

Socio-Economic Valuation of Lighthouse Reef Atoll, Belize

Commissioned work by the Belize Audubon Society. Will incorporate a Masters Thesis: "The value of grazers for fishing and tourism at the Lighthouse Reef Atoll Belize", by Antonia Sandman (Systems Ecology, Stockholm University). Miriam Huitric, the Beijer Institute and Stockholm University; Tore Söderqvist, the Beijer Institute, Antonia Sandman, Stockholm University.

Freshwater – Ecological Services

Carl Folke, the Beijer Institute and Stockholm University, Malin Falkenmark, SIWI/NFR, Åsa Jansson, Johan Rockström, Line Gordon, Stockholm University.

National Accounting and Environmental Resources

Karl-Göran Mäler, the Beijer Institute.

The Economics of Irreversible Changes in Ecosystems

Karl-Göran Mäler, the Beijer Institute.

Economics of Mangrove Ecosystems

Sara Aniyar, the Beijer Institute.

Human Capital in the National Accounting Systems - How Should it be Accounted for?

Sara Aniyar, the Beijer Institute.

Environmental Stresses on Coral Reefs, Implications for Ecosystem Functions

Nils Kautsky, the Beijer Institute, and Magnus Nyström.

Assessment of Mangrove Degradation and the Resilience in the Indian Subcontinent: the Cases of Godavari Estuary and South West Sri Lanka

EC project – INCO-DC. Max Troell, the Beijer Institute, Nils Kautsky, the Beijer Institute, and Patrik Rönnbäck, Dept. of Systems Ecology, SU.

Seaweed Integration in Coastal Aquaculture for Increased Production and Sustainability

Max Troell, the Beijer Institute, Nils Kautsky, the Beijer Institute, and Christina Halling, Dept. of Systems Ecology, SU.

Effects of Chemical Use in Southeast Asian Shrimp Farming

Nils Kautsky, the Beijer Institute, Sara Gräslund and Bengt-Erik Bengtsson.

Integrated Culture of Abalone and Seaweed in Landbased Systems

A bilateral programme financed by Sida. Partners: Department of Botany, Univ. Cape Town and Dep of Systems Ecology, Stockholm University. Swedish project leader: Max Troell, the Beijer Institute. Other Swedish participants: Nils Kautsky, the Beijer Institute, and Christina Halling Dep. Systems Ecology, SU.

Economic Analysis of Nonlinear Dynamics in Boreal Forests

Anne-Sophie Crépin, the Beijer Institute

Operationalising Sustainability – Social, Ecological, Economic Evaluation of Resilience

Carl Folke, The Beijer Institute and Stockholm University, Karl-Göran Mäler, The Beijer Institute, Roger Kaspersson, Stockholm Environment Institute, Thomas Elmqvist, Andres Duit, Stockholm University, Anne-Sophie Crépin The Beijer Institute.

Economic and Institutional Tools for Sustainable Management of Biodiversity

Jon Norberg, Stockholm University, Anne-Sophie Crépin, The Beijer Institute, Marco Janssen, Indiana University (USA).

Whole Reef Experimental Algal Removal Under Different Fisheries Management Regimes, Glovers Reef Atoll, Belize

Miriam Huitric, the Beijer Institute and Stockholm University, Tim McClanahan, Wildlife Conservation Society, Melanie Dotherow, University of South Florida, USA, Kajsa Bergman, Tina Elfving, Magnus Nyström, Ninni Nordemar, Stockholm University, Enric Sala, Scripps Institute of Oceanography, USA, Nya A. Muthiga, Kenya Wildlife Service, Kenya.

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. One research seminar on Ecological Economics held in Mombasa, Kenya was organised in 2002/2003.

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 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.

Activities will concentrate in three main areas:

- Dynamic ecological models. Activities focus on indicators of genuine health, economics and dynamics of complex systems, non-market interactions and informal institutions.
- Indicators of Sustainable Development. Activities focus on the development of a theory for indicators of sustainable development for complex dynamic systems.
- Integrated assessment models (IAMs). Activities focus 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.

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 and to establish a firm basis for research that can be used for policy advice.

The programme is supported by SAREC and includes one year of general economic courses, one year of specialization courses, two-three years of data collection and thesis writing. The scholarships are open for applicants from developing countries.

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

The Stockholm Seminar:

Frontiers in Sustainability Science and Policy

'The Stockholm Seminar: Frontiers in Sustainability Science and Policy', started in August 2000. It is a series co-sponsored by the Beijer Institute, the Centre for Research on Natural Resources and the Environment (CNM) at Stockholm University, the International Geosphere-Biosphere Programme (IGBP) at the Royal Swedish Academy of Sciences, the Swedish Biodiversity Centre at the The Swedish University of Agricultural Sciences and Uppsala University, (CBM) the Stockholm Environment Institute (SEI) and Stockholm International Water Institute (SIWI).

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 2002/2003 the following seminars were held at the

Royal Swedish Academy of Sciences:

- 28 November, 2002
Prof. Karl-Göran Mäler, Director, the Beijer Institute. "Sustainability Indicators"
- 30 January, 2003
Dr. Garry Peterson, Center for Limnology University of Wisconsin-Madison. "Adaptive Ecological Management and the Dynamics of a Regional Ecosystem in Northern Florida"
- 19 March, 2003
Dr Louis Lebel, Faculty of Social Sciences, and Director of the Unit for Social and Environmental Research at Chiang Mai University, Thailand. "Harnessing Science for Sustainability in Transitional Economies: Changing Science or Society?"
- 20 March, 2003
Prof. Elinor Ostrom, Workshop in Political Theory and Policy Analysis Center for the Study of Institutions, Population, and Environmental Change, Indiana University. "An Institutional Analysis of the Impact of Human Actions on Forest Conditions"
- 21 March, 2003
Prof. Gordon H. Orians, Professor emeritus of Biology, University of Washington, Seattle. "Alaska's North Slope: Hydrocarbons versus a Sustainable Tundra"
- 24 March, 2003
Prof. Gordon H. Orians, Professor emeritus of Biology, University of Washington, Seattle. "Ecological Indicators. The Value of Small Numbers"
- 13 August 2003
Prof. Robert Costanza, Prof. of Ecological Economics, University of Vermont, Burlington. "Integrated History and future Of the Planet Earth (IHOPE): A proposed research activity of the Earth System Science Partnership (ESSP)"
- 14 August 2003
Prof. Terry Hughes, Scientific Director, Centre for Coral Reef Biodiversity, School of Marine Biology, James Cook University, Townsville. "Climate change, herbivory and resilience of coral reefs"

The Askö Meeting

Since 1993 the Institute has organised 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 Tenth Askö Meeting (30th of August - 2nd of

September, 2002) was: “Dealing With Uncertainty: Policy Making in the 21st Century”.

The consensus document from the tenth Askö Meeting has been accepted for publication in AMBIO and will be out fall 2003.

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 2002/2003.

JESSICA ANDERSSON

PhD Student, Göteborg University

RESEARCH FOCUS

Welfare and Institutional Economics

AT BEIJER SINCE 1996

PAPERS AND PRESENTATIONS

Seminars and symposium presentations:

- Presentation of paper at the Multidisciplinary Scientific Conference on Sustainable Coastal Zone management: Rights and Duties in the Coastal Zone in Stockholm 12-14 June: *To Trickle down or to Trip up*
- Presentation of paper at the Environmental Economics EAERE Conference in Bilbao, 27- 30 June 2003: *To Estimate Recreational Welfare Measures for International and Specialised Tourism*
- Presentation of paper at the Environmental Economic EAERE Conference in Bilbao, 27- 30 June 2003: *The Recreational Cost of Coral Bleaching- a Stated and Revealed Preference Study of International Tourists*
- Three seminars held at the Department of Economics at the University of Gothenburg during different stages of the thesis work.

Commissions

- Produced the study “Environmental considerations in Sida’s Evaluation Revisited; A follow up study six years later” Sida Studies in Evaluation 03/02.
- Organised Workshop for Environmental Economists in East Africa about the agenda for marine research in the region. Zanzibar 20-22 March 2003.

SARA ANIYAR

Economist, Titular professor at the University of Zulia, Maracaibo, Venezuela, and Project employed at the Beijer Institute

AT BEIJER SINCE July 98

RESEARCH FOCUS

Wealth accounting : Wealth as an indicator of the economic performance of a country has been the natural next step in my research program, having started with estimations of a specific natural resource wealth for specific countries (oil in Venezuela and Norway). My focus has enlarged so as to incorporate valuation of the services provides by ecosystems to societies. A literature review has been made and we are in the process building the needed conditions for the application of the techniques for wealth accounting to ecosystems in Sweden.

PAPERS AND PRESENTATIONS

- Estimating accounting prices. Lecture given at the Abdus Salam International Center for Theoretical Physics in Trieste Italy.
- Accounting for natural wealth. Lecture given at the Universidad de Talca, in Talca, Chile
- Estimating the changes in fishermen’s welfare due to changes in the mangrove ecosystems performance as a service provider.. In the First Congress of the Latin American Association of Environmental Economist.

Other academic activities

- Resource person in the Beijer research seminar held in Mombasa, Kenya. October 2002
- Resource person in the Beijer meeting for wealth account studies in Latin America Meeting held in Peru, April 2003
- Participation in the European Congress of Environmental and Resource economist, Bilbao, Spain. June 2003
- Participation in the First Latin American Congress of Environmental Economist, Cartagena, Colombia, July 2003

JOHAN COLDING

Research Associate, PhD (Ecology)

RESEARCH FOCUS

Institutions and biological conservation; Ecosystem management; Urban ecology

AT BEIJER SINCE 1995

PAPERS AND PRESENTATIONS

- Colding, J., Elmqvist, T. and Olsson, P. 2003. *Living with disturbance: building resilience in social-ecological systems*. In Folke, C., Berkes, F. and J. Colding, editors. In *Navigating Social-Ecological Systems: Building Resilience for Complexity and Change*. Cambridge University Press, U.K.
- Berkes, F., J. Colding, and C. Folke, editors. 2003. *Navigating Social-Ecological Systems: Building Resilience for Complexity and Change*. Cambridge University Press, U.K.
- Colding, J., Folke, C. and Elmqvist. 2003. *Social institutions in ecosystem management and biodiversity conservation*. Submitted as an invited feature to *The Journal of Tropical Ecology*.
- Carl Folke, Steve Carpenter, Thomas Elmqvist, Lance Gunderson, CS Holling, Brian Walker, Jan Bengtsson, Fikret Berkes, Johan Colding, Kjell Danell, Malin Falkenmark, Line Gordon, Roger Kaspersen, Nils Kautsky, Ann Kinzig, Simon Levin, Karl-Göran Mäler, Fredrik Moberg, Leif Ohlsson, Per Olsson, Elinor Ostrom, Walrer Reid, Johan Rockström, Hubert Savenije and Uno Svedin. 2002. *Resilience and Sustainable Development: Building Adaptive Capacity in a World of Transformations*. Scientific Background Paper commissioned by the Environmental Advisory Council of the Swedish Government in preparation for WSSD. ICSU Series on Science for Sustainable Development No. 3.
- Elmqvist, T., Folke, C., Colding, J. and Wirén, L. 2002. Stadens ekosystem lever av andra ekosystem. *Formas Tidning Miljöforskning* Nr 1, Februari: 12-14.
- Colding, J. 2002. Parkens mångfald. *Hagabladet* Nr 2 /2002.

Seminars and symposium presentations:

- Speaker at young fellows meeting for the Millennium Ecosystem Assessment. 30 min. presentation of the Stockholm Urban Assessment. June 25, 2003. Farsta Konferenshotell, Stockholm.
- Co-speaker at the Millennium Ecosystem Assessment field trip to the National City Park. 30 min. presentation of the Stockholm Urban Assessment. June 28, 2003. Kungliga Djurgårdsförvaltningen, Stockholm.

Commissions:

- Participant of exam thesis committee for Staffan Halldin. *Motorvägar genom nationalstadsparken. Varför prioriteras inte miljön?*. Course: Miljöledning och miljörevision 20 p. 2002/03. Master thesis presented at the Institution for Systems Ecology, and Centre for Natural Resources and the Environment Stockholm University, February 4, 2003.
- Exam thesis committee for lic. thesis, for Maria Tengö. *The role of management practices for building resilience in local management systems – a case from Northern Tanzania*. Presented at the Institution for Systems Ecology, Stockholm University, March 27, 2003.

Serving as article reviewer for the following journals:

- AMBIO
- Ecological Economics
- Conservation Ecology
- ECOSYSTEMS

ANNE-SOPHIE CRÉPIN

Research Associate, PhD (Economics)

Anne-Sophie Crépin successfully defended her thesis in October 2002. "Tackling the economics of ecosystems", Dissertations in Economics 2002:6, Department of Economics Stockholm University

RESEARCH FOCUS

Complex dynamics in resource economics / Land-use incentives

AT BEIJER SINCE December 1996

PAPERS AND PRESENTATIONS

- "Tackling the economics of ecosystems", Dissertations in Economics 2002:6, Department of Economics Stockholm University
- "Multiple Species Boreal forests – What Faustmann Missed", Forthcoming in *Environmental and Resource Economics*.

Seminars and symposium presentations:

- 7th November 2002 Invited Lecture: "Ekosystemperspektiv i ekonomi", Miljöforskningdagen, Stockholm University, Stockholm Sweden.
- 31 January – 2 February 2003 High-Latitude

Sustainability Workshop, Royal Swedish Academy of Agriculture and Forestry, The International Arctic Research Center, Stockholm, Sweden. Presentation on "Integrated economic and ecological models: issues for economists".

- 12th February 2003 Invited Lecture: Management Issues for Complex Ecosystems: Coral Reefs and Boreal Forests, 27 January - 28 February 2003 School on Ecological Economics and Conference on Theoretical Topics in Ecological Economics, Trieste, Italy
- 16-19 June 2002 10th Ulvön Conference on Environmental Economics and Karl-Gustav Löfgren Symposium, Sweden, presentation of the paper "The paradox of biodiversity" coauthored with Jon Norberg.
- 27-30 June 2003 12th EAERE conference of European Association of Environmental and Resource Economists, Bilbao Spain, poster on "Threshold effects in coral reef fisheries"

CARL FOLKE

Research Fellow, the Beijer Institute and Professor, Dept. of Systems Ecology, Stockholm University

RESEARCH FOCUS

The role that living systems at different scales play in social and economic development and how to manage for resilience in coupled social and ecological systems with applications from fresh water and drainage basin management, coral reefs, aquaculture, urban ecology and studies of the Millennium Ecosystem Assessment and the Resilience Alliance.

AT BEIJER SINCE 1991

PAPERS AND PRESENTATIONS

- Berkes, F., J. Colding and C. Folke (eds.). 2003. *Navigating Social-Ecological Systems: Building Resilience for Complexity and Change*. Cambridge University Press, Cambridge UK. 393 pp.
- Ekins, P., R. C. Folke and De Groot (eds.). 2003. Critical Natural Capital and Strong Sustainability. Special issue of *Ecological Economics*. 44 no. 2/3 pp. 159-292.
- Gunderson, L. and C. Folke. 2003. Toward a "science of the long view". *Conservation Ecology* 7(1): 15. [online] URL: <http://www.consecol.org/vol7/iss1/art15>.
- Deutsch, L., C. Folke and K. Skånberg. 2003 The Critical Natural Capital of Ecosystem Performance as Insurance for Human Well-Being. *Ecological Economics* 44: 205-217.
- Ekins, P., S. Simon, L. Deutsch, C. Folke and R. De Groot. A Framework for the Practical Application of the Concepts of Critical Natural Capital and Strong Sustainability. *Ecological Economics* 44: 165-185.
- Ekins, P., C. Folke and R. De Groot. Identifying Critical Natural Capital. *Ecological Economics* 44: 159-163.
- Gunderson, L., C. Folke, M. Lee and C. S. Holling. 2002. In memory of mavericks. *Conservation Ecology* 6(2): 19. [online] URL: <http://www.consecol.org/vol6/iss2/art19>
- Folke, C., S. Carpenter, T. Elmqvist, L. Gunderson, C.S. Holling and B. Walker. 2002. Resilience and Sustainable Development: Building Adaptive Capacity in a World of Transformations. *Ambio* 31:437-440.
- Folke, C. and L. Gunderson. 2002. A kaleidoscope of change. *Conservation Ecology* 6(1): 19. [online] URL: <http://www.consecol.org/vol6/iss2/art19>.
- Folke, C., J. Colding and F. Berkes. 2003. Synthesis: Building Resilience and Adaptive Capacity in Social-Ecological Systems. In: Berkes, F., J. Colding and C.
- Folke (eds.). *Navigating Social-Ecological Systems: Building Resilience for Complexity and Change*. Cambridge University Press, Cambridge. pp 352-387.
- Berkes, F., J. Colding and C. Folke. 2003. Introduction. In: Berkes, F., J. Colding and C. Folke (eds.). *Navigating Social-Ecological Systems: Building Resilience for Complexity and Change*. Cambridge University Press, Cambridge. pp 1-29.
- Gadgil, M., P. Olsson, F. Berkes and C. Folke. 2003. Exploring the Role of Local Ecological Knowledge in Ecosystem Management: Three Case Studies. In: Berkes, F., J. Colding and C. Folke (eds.). *Navigating Social-Ecological Systems: Building Resilience for Complexity and Change*. Cambridge University Press, Cambridge. pp 189-209.
- Gunderson, L.H., L. Pritchard, C.S. Holling, C. Folke and G.D. Peterson. 2002. A Summary and Synthesis of Resilience in Large-Scale Systems: A Synthesis. In: Gunderson, L.H. and L. Pritchard (eds.). *Resilience and the Behavior of Large-Scale Systems*. Island Press, Washington, DC. pp. 249-266.
- Folke, C. 2002. Entering Adaptive Management and Resilience into the Catchment Approach. In: Balancing Human Security and Ecological Interests in a Catchment – Towards Upstream/Downstream Hydrosolidarity. Stockholm International Water Institute, Report 17. Stockholm, Sweden, pp 39-43.

In press:

- Folke, C. 2003. Social-Ecological Resilience and Behavioural Responses. In: Biel, A, B. Hansson and

- M. Mårtensson (eds.). *Individual and Structural Determinants of Environmental Practice*. Ashgate Publishers, London, in press.
- Falkenmark, M and C. Folke. 2003. Freshwater and Welfare Fragility – Syndromes, Vulnerabilities, Challenges: An introduction to the Special Freshwater Issue. *Royal Society Philosophical Transactions B*.
 - Folke, C. 2003. Freshwater and Resilience: A Shift in Perspective. *Royal Society Philosophical Transactions B*.
 - Hughes, T.P., A.H. Baird, D.R. Bellwood, M. Card, S.R. Connolly, C. Folke, R. Grosberg, O. Hoegh-Gouldberg, J.B.C. Jackson, J. Kleypas, J. Lough, P. Marshall, M. Nyström, S.R. Palumbi, J. Pandolfi, B. Rosen and J. Roughgarden. 2003. Climate Change, Human Impacts, and the Resilience of Coral Reefs. *Science*.
 - Colding, J., C. Folke and T. Elmqvist. 2003. Social Institutions in Ecosystem Management and Biodiversity Conservation. *Tropical Ecology*.
 - Bengtsson, J., P. Angelstam, T. Elmqvist, U. Emanuelsson, C. Folke, M. Ihse, F. Moberg and M. Nyström. Reserves, Resilience, and Dynamic Landscapes. 2003. *Ambio*
- Selected seminars and symposium presentations:
- Sub-global Assessment of the Millennium Ecosystem Assessment, Stockholm, June 26-30, 2003.
 - Science Council, IHPD. "Social-Ecological Resilience for Complexity and Change", International Human Dimensions Program on Global Environmental Change, Bonn, March 5, 2003
 - Balancing Human Security and Ecological Interests in a Catchment – Towards Upstream/Downstream Hydrosolidarity. "Entering Adaptive Management and Resilience into the Catchment Approach.", SIWI Seminar 2002, August 16, 2002.
 - Meeting on the future of the Great Barrier Reef, Townsville, Australia, October 14-18, 2002.
 - Meeting of the Resilience Alliance, Costa Rica, November 8-14, 2002.
 - Envisioning Resilience, Florida April 2003.
 - Urban ecology meeting and shrimp farming meeting at the Beijer Institute in March
 - Two PhD-students (Per Olsson, Patrick Fox) have defended their theses and two (Cecilia Holmlund, Maria Tengö) have defended their licentiate thesis.
 - I have given several lectures and public seminars during the period.
- Selected commissions:
- Editor-in-Chief; Conservation Ecology (www.consecol.org),
 - Book Review Editor; Ecological Economics up to end of 2002.
- Editorial and advisory board of 12 scientific journals including *Ambio*, *Ecological Economics*, *Ecosystems*, *Environmental Conservation*, *Frontiers in Ecology and the Environment*, *Global Change and Human Health*, and *Ocean and Coastal Management*.
 - Member of the Steering Committee and Board of Science of the Resilience Alliance, Member of the Royal Swedish Academy of Sciences, Member of the Environmental Committee of the Royal Swedish Academy of Sciences. Member of the Scientific Advisory Board of the National Center for Ecological Analysis and Synthesis (NCEAS), Santa Barbara, California, Member of the Scientific Committee of the International Human Dimensions Programme on Global Environmental Change (IHDP), Scientific Advisor to the Millennium Ecosystem Assessment, Member of Gustavianska Parkens Vänner, Member of Ralf Yorke Society
 - Board member of the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (FORMAS), Member of the Natural Resources and Environmental Committee of Sida/SAREC and Board member of Albaeco, an Institute devoted to communicate to the general public information on interactions between ecosystems, institutions and the economy.
- ING-MARIE GREN**
- Research Fellow, the Beijer Institute and Professor, Environmental and Resource Economics, Swedish University of Agricultural Sciences
- RESEARCH FOCUS
Policies for water management
- AT BEIJER SINCE 1991
- PAPERS AND PRESENTATIONS
Book chapter, guest editor of a special issue in *Ecological Economics* on large scale management of eutrophicated waters.
- Seminars and symposium presentations
Seminar at National Institute of Economic Research, Stockholm.
- Education etc.
Principal adviser of completion of 2 doctoral theses and 1 licentiate thesis.
- Commissions

Reviewer of manuscripts for several journals, chair of the board of Green Accounting at Statistics Sweden, member of the board of Nuclear Waste Fund, member of the scientific expert group for nuclear waste treatment at Environmental Ministry.

MIRIAM HUITRIC

PhD Student, Dept. of Systems Ecology, Stockholm University

RESEARCH FOCUS

Linking socio-economic driving forces to natural resource degradation focusing on the roles of institutions and organisations.

AT BEIJER SINCE 1998

PAPERS AND PRESENTATIONS

Seminars and symposium presentations:

- “Ecology, biodiversity and functions of coral reefs”. Seminar in Doctoral course: Ecology and Environmental management, 2003. Beijer Institute.
- Deutsch L., Gräslund S. and Huitric M.: Jätteräkor till salu- miljöproblem och drivkrafter/ Tiger prawns for sale – environmental consequences & driving forces. Seminar held at Vardagsakademien for The Centre for Research on Natural Resources and the Environment (CNM), 21 November 2002. <http://www.cnm.su.se>
- Huitric M.; Institutions: from paper to users and back. Seminar held at Environmental Strategies Research Group (FMS), Stockholm, Sweden. 2002.
- Huitric M.: Lobster and conch fisheries of Belize – a history of sequential exploitation. Paper presented at the “Rights and Duties in the Coastal Zone” Conference. The Royal Swedish Academy of Sciences, Stockholm, June 12-14, 2003.

Ongoing research on the lobster and conch fishery of Belize, Central America. This work will take place in three sections:

1. A review and completion of the history of the lobster and conch industry of Belize from a sequential exploitation and pathological point of view.
2. Identifying the driving forces that have steered the development of this fishery focusing on driving forces since the development of fishing co-operatives in the 1960s and their response. The goal is to identify ways to create capacity for learning and self-organisation in order to manage the resource.
3. Discuss the importance of organisation diversity in fisheries management. What role/ knowledge do the

different organisations (Fisheries Department, Fishing co-operatives, NGOs) have when designing and implementing fisheries management?

NILS KAUTSKY

Deputy Director, the Beijer Institute and Professor, Marine Ecotoxicology, Dept. of Systems Ecology, Stockholm University

RESEARCH FOCUS

Integrated Coastal area Management, Tropical Marine Ecology and Ecotoxicology, Global Fisheries and Aquaculture

AT BEIJER SINCE 1997

PAPERS AND PRESENTATIONS

Selected publications

- Folke, C., S.Carpenter, T.Elmqvist, L.Gunderson, CS Holling, B. Walker, J.Bengtsson., F.Berkes, J.Colding, K.Danell, M.Falkenmark, L.Gordon, R.Kaspersen, N.Kautsky, A.Kinzig, S.Levin, K_G: Mäler, F.Moberg, L.Ohlsson, P.Olsson, E.Orstom, W.Reid, J.Rockström, H.Savenije, U.Svedin 2002. Resilience and sustainable development: Building adaptive capacity in a World of Transformations. A background paper commissioned by the Environmental advisory Council of the Swedish Government in preparation for WSSD *ICSU Series on Science for Sustainable Development* No 3. 37pp.
- Huitric, M., C.Folke, N.Kautsky (2002) Development and government policies of the shrimp farming industry in Thailand in relation to mangrove ecosystems-*Ecological Economics* 40(3): 441-455.
- Chopin, T., A.Buschmann, C.Halling, M.Troell, N.Kautsky, A.Neori, G.Kraemer, J.Zertuche-Gonzales, C.Yarish, C. Neefus 2001. Integrating seaweeds into marine aquaculture systems: A key toward sustainability.-*J.Phycol.* 37: 975-986.
- Holmström K., S.Gräslund, A.Wahlström, S. Pongshompoo, BE Bengtsson, N.Kautsky (2002): Antibiotic use in shrimp farming and implications for environmental impacts and human health.- *Int.J.Food Science.Technol.*, inpress.
- Gullström, M., M. de la Torre Castro, S.O. Bandeira, M. Björk, M. Dahlberg, N. Kautsky, P. Rönnbäck, and M. C. Öhman. 2002. Seagrass Ecosystems in the Western Indian Ocean. *Ambio*, 31(7-8):588-596.
- Rönnbäck, P., I.Bryceson, N.Kautsky 2002. Coastal aquaculture development in Eastern Africa and the

Western Indian Ocean: Prospects and problems for food security and local economies. *Ambio*, 31(7-8):537-542.

- Heal G, B. Walker, S. Levin, K. Arrow, P. Dasgupta, G. Daily, P. Ehrlich, K-G. Mäler, N. Kautsky, J. Lubchenco, S. Schneider and D. Starrett 2002. Genetic Diversity and interdependent crop choices in agriculture- *Resource and Energy Economics*, in press.
- Kinzig, A., D. Starrett, K. Arrow, B. Bolin, P. Dasgupta, P. Ehrlich, C. Folke, M. Hanemann, Heal G, M. Hoel, B. O. Jansson, A. M. Jansson, N. Kautsky, S. Levin, J. Lubchenco, K-G. Mäler, S. Pascala, S. Schneider Domenico Siniscalco, B. Walker, (2003). Managing uncertainty at the Science-Policy interface. *Ambio*, in press.
- Scheffer, M., S. Szabo, A. Gagnani, E. H. van Nes, S. Rinaldi, N. Kautsky, J. Norberg, R. M. Roijackers, R. Franken (2003). Floating plant dominance as a stable state. *PNAS* 100(7):4040-4045.
- Troell, M., C. Halling, A. Neori, A. H. Buschmann, T. Chopin, C. Yarish, and N. Kautsky 2003. Integrated Mariculture: Asking The Right Questions. *Aquaculture*, in press.

TEACHING AND TRAINING

- Supervision and co-supervision of 1 Ph.D. student and 5 M.Sc students who graduated in 2002-2003. Ongoing supervision of 10 Ph.D. students.
- Annual teaching of advanced courses on "Tropical aquatic resources management", "Ecotoxicology", "Marine ecology" and Marine faunistics-floristics at Stockholm University, and on "Aquaculture and the environment" at University of Ghent, Belgium.

Commissions etc.

- Member of programme committee of MASMA (Marine Science for Management in Western Indian Ocean) of WIOMSA/Sida program involving 10 African Countries
- Scientific Advisor to the International Foundation for Science (IFS)
- Scientific Adviser to the Swedish Society for Nature Conservation

SANDRA LERDA

PhD Student, Swedish University of Agricultural Sciences

RESEARCH FOCUS

Valuation of the contribution of coastal zones to fisheries.

AT BEIJER SINCE fall 1999 as a PhD student; since July 2001 as a research assistant.

PAPERS AND PRESENTATIONS

Lerda, S. [2003], Investment in land use for pollution abatement under uncertainty, Beijer Discussion Paper No. 172, Stockholm.

Seminars and symposium presentations

"Investment in Wetlands for Pollution Abatement under Uncertainty", paper presented at the First Latin American and Caribbean Congress on Environmental and Resource Economics, Cartagena de Indias, Colombia, July 9-11, 2003.

Course work: Methodology of Economics (Department of Economics, Uppsala University, fall 2002)

KARL-GÖRAN MÄLER

Director at the Beijer Institute, and Professor of Economics, Stockholm School of Economics.

RESEARCH FOCUS

- Resource and environmental economics.
- Option values and irreversible environmental changes.
- Cost benefit analysis of the environment and in particular in relation to acid rains.
- Environment and Development.
- International Environmental Problem.

PAPERS AND PRESENTATIONS

Selected Publications

- Arrow, K.J., P. Dasgupta and K-G. Mäler, The Genuine Savings Criterion and the Value of Population. *Economic Theory* 21 (2003) 217-225. (Also available as Beijer Reprint Series No. 178, The Beijer Institute, Stockholm).
- Arrow, K.J., P. Dasgupta and K-G. Mäler, (2003) Evaluating Projects and Assessing Sustainable Development in Imperfect Economies, *Forthcoming in: Environmental and Resource Economics*.
- Arrow, K.J., P. Dasgupta and K-G. Mäler, (2003), Welfare Economics in Imperfect Economies, *Forthcoming in: Festschrift in Honour of Joseph Stiglitz*.

Seminars and Symposium Presentations

- Lecture at the Stockholm Seminar, the Royal Swedish Academy of Sciences "Sustainability Indicators", November 28th, 2002.
- Lectures at Abdus Salam International Centre for

- Theoretical Physics, February, 2002.
- Lecture at Catie, Costa Rica. January 2003.
- Presentation to panel appointed by the government of the Basque County, 25/6, 2003.
- Lecture at Berlin, June 3rd, 2003.
- Plenary lecture at the ALEAR Congress in Cartagena, Columbia, July 2003.

TEACHING AND TRAINING

- Lecturer at the Follow-up Meeting for selected participants from the workshop on Property Rights and Environmental Management, held 30/9-4/10, 2002 at at the Abdus Salam Centre for Theoretical Physics, ICTP, Italy.
- Teaching at the Beijer Research Seminar on Ecological Economics, held 28-30/10, 2002 in Mombasa, Kenya.
- Teaching at the SANDEE 5th Biannual Research and Training Workshop, held 16-21/12, 2002 in Bangladesh.
- Teaching at the Beijer Workshop on Network Cooperation and Sustainable Development Research in Latin America held 9-16/1, 2003 in Peru.

Other

- Member of the Royal Swedish Academy of Sciences since 1981.
- Member of the Board of Directors of Resources for the Future (RFF) until December 2002.
- Member of the Advisory group, FEEM, Italy
- Referee for European Economic Review, American Economic Review, Journal of Environmental Economics and Management, Economic Journal, European Journal of Environmental Economics, Journal of Economic Development and others.

PATRIK RÖNNBÄCK

Research Associate, PhD (Ecology)

RESEARCH FOCUS

Primarily on ecological and economic evaluation of ecosystem goods and services generated by temperate as well as tropical coastal ecosystems. Recent work has focused on (a) valuating and analyzing the sustainability of fisheries and shrimp aquaculture systems supported by mangrove ecosystems in Africa and Asia, and (b) identifying and evaluating ecosystem goods and services generated by key habitats along the Swedish coastline.

AT BEIJER SINCE 2002

HENRIK SCHARIN

PhD Student, Swedish University of Agricultural Sciences

In December, 2002 Henrik Scharin took his fil. lic. at the Dept. of Economics, Swedish University of Agricultural Sciences

RESEARCH FOCUS

Cost-effectiveness in pollution abatement and policy instruments.

AT BEIJER SINCE April 1998

PAPERS AND PUBLICATIONS

- "The use and usefulness of cost-benefit analysis in water policy and management in Sweden" Co-authored with Peter Frykblom, Tore Söderqvist and Alexandra Helgesson. Forthcoming in *Cost Benefit Analysis and Water Resources Management*, Edited by Roy Brouwer and David Pearce.
- "The Efficient Environmental State of Coastal Zones: A study of the Eutrophication in the Stockholm Archipelago", Forthcoming
- "Efficiency gains of spatially differentiated policy instruments in the presence of marginal abatement cost heterogeneity", Forthcoming

Seminars and symposium presentations:

- "En kostnadseffektiv minskning av eutrofieringen i Stockholms skärgård" Hållbar skärgårds-/kust zonutveckling, Seminarium mellan forskare och tjänstemän, December 11, 2002, Stockholm County Administrative Board.
- Efficiency gains of spatially differentiated policy instrument in the presence of abatement cost heterogeneity. 10th Ulvön anniversary conference on environmental economics & Karl-Gustaf Löfgren Symposium, Ulvön, June 16-19, 2003.

ÅSA SOUTUKORVA

Research assistant, MSc (Economics)

RESEARCH FOCUS

Modelling of recreational demand, and economic valuation of environmental quality and ecosystem services.

AT BEIJER SINCE April 2000

SARA SUNDBERG

Research assistant, MSc (Economics)

AT BEIJER SINCE April 2003

RESEARCH FOCUS

Economic valuation of environmental quality and ecosystem services. Present work within the SUCOZOMA-programme (Sustainable Coastal Zone Management) on valuation of sea trout habitats with the use of the replacement cost method.

PAPERS AND PRESENTATIONS

Sundberg, S., Att värdera miljön genom ersättningskostnader – en granskning av metoden och tillämpning på havsöringshabitat. [To value the environment with the use of replacement costs – an examination of the method and an application to sea trout habitats] Master Thesis 306, Department of Economics, Swedish University of Agricultural Science, Uppsala.

TORE SÖDERQVIST

Research Associate, Associate Professor (Economics)

In May 2003 Tore Söderqvist became Associated Professor in Economics at the Stockholm School of Economics.

RESEARCH FOCUS

Research activities are primarily within the field of applied welfare economics in an interdisciplinary setting, in particular economic valuation of environmental quality/ecosystem services. Present empirical work includes fish recruitment and other coastal ecosystem services in Sweden. Recent work on wetland creation in Sweden has also involved the subject of institutional design of environmental policy.

See also <http://www.beijer.kva.se/staff/tore/tore.html>
AT BEIJER SINCE 1996.

Selected publications:

- Söderqvist, T. Are farmers prosocial? Determinants of the willingness to participate in a Swedish catchment-based wetland creation programme. Accepted for publication in *Ecological Economics*.
- Hökby, S., Söderqvist, T. Elasticities of demand and willingness to pay for environmental services in Sweden. *Environmental and Resource Economics*, in

press.

- Lindahl, T., Söderqvist, T. Building a catchment-based environmental programme: a stakeholder analysis of wetland creation in Scania, Sweden. Accepted for publication in *Regional Environmental Change*.
- Frykblom, P., Scharin, H., Söderqvist, T., Helgesson, A. The use and usefulness of cost-benefit analysis in water policy and management in Sweden. Chapter in: Brouwer, R., Pearce, D. (eds.), *Cost-Benefit Analysis and Water Resources Management*. Edward Elgar Publishing, Cheltenham, UK, in press.
- Söderqvist, T., Lindahl, T. Wetland creation: socio-economic and institutional conditions for collective action. Chapter in: Turner, R. K., van den Bergh, J. C. J. M., Brouwer, R. (eds.), *Managing Wetlands: An Ecological Economics Approach*. Edward Elgar Publishing, Cheltenham, UK, in press.
- Lewan, L., Söderqvist, T., 2002. Knowledge and recognition of ecosystem services among the general public in a drainage basin in Scania, Southern Sweden. *Ecological Economics* 42, 459-467.
- Söderqvist, T., 2002. Constructed wetlands as nitrogen sinks in Southern Sweden: an empirical analysis of cost determinants. *Ecological Engineering* 19, 161-173.
- Gren, I-M., Russell, C. S., Söderqvist, T., 2002. Bridging ecology and economics. reflections on the role of cost-benefit analysis and the design of interdisciplinary research. In: Kriström, B., Dasgupta, P., Löfgren, K-G. (eds.), *Economic Theory for the Environment: Essays in Honour of Karl-Göran Mäler*. Edward Elgar Publishing, Cheltenham, UK, pp. 162-183.

Teaching and training:

- Organizer and lecturer, advanced undergraduate course in Economic Valuation of Environmental Change, Department of Economics, Swedish University of Agricultural Sciences, Uppsala, September-October 2002.
- Contributing lecturer at various courses at Stockholm University, Gotland University College and University College of South Stockholm.
- Supervision of PhD and MSc students at Swedish University of Agricultural Sciences, Uppsala, and Stockholm University.

Seminars and symposium presentations:

- Economic valuation for sustainable development in the Swedish coastal zone, at the multidisciplinary scientific conference Rights and Duties in the Coastal Zone, The Royal Swedish Academy of Sciences, Stockholm, 12 June 2003.
- Economic analysis for sustainability in the Swedish coastal zone at the conference Edbergseminariet, Karlstad University, 29 January 2003.
- Economic valuation of groundwater resources, at the seminar Valuation of Groundwater Resources,

Swedish Environmental Protection Agency,
Stockholm, 15 October 2002.

Commissions:

- Member of the committee evaluating the Ph.D. thesis "Economics of Marine Pollution" by Katarina Elofsson, Department of Economics, Swedish University of Agricultural Sciences, Uppsala, 20 September, 2002.

Other:

- Financial controller at the Beijer Institute.

INGELA TERNSTRÖM

Economist, PhD (Economics)

Ingela Ternström successfully defended her thesis in December, 2002. "The Management of Common-Pool Resources – Theoretical Essays and Empirical Evidence", Dissertation for the Degree of Doctor of Philosophy, Stockholm School of Economics.

RESEARCH FOCUS

Common-pool resource management, with empirical studies of cooperation in irrigation systems in Nepal. Understanding and developing methods for predicting and avoiding institutional failure in common-pool resource management.

AT BEIJER SINCE August 2002.

PAPERS AND PRESENTATIONS

Ternström, I.; 2002, "The Management of Common-Pool Resources – Theoretical Essays and Empirical Evidence", Dissertation for the Degree of Doctor of Philosophy, Stockholm School of Economics, ISBN 91-7258-608-7.

Seminars and symposium presentations:

European Association for Environmental and Resource Economists 2003 Conference: Presentation of the paper "Incentives or Coordination? Cooperation in Irrigation Systems in Nepal" (Ternström, I.).

Center for the Study of Institutions, Population, and Environmental Change, Colloquium, March 2003, "What makes cooperation work? New evidence from irrigation systems in Nepal" (Ternström, I.).

Institutional Analysis and Development Seminar Spring 2003 Mini-conference at the Workshop in Political Theory and Policy Analysis, Indiana University: "Causes for Conflicts In Irrigation Systems in Nepal - Using the IAD Framework to Find the Weakest Link" (Ternström, I.)

MAX TROELL

Research Associate, PhD (Ecology)

RESEARCH FOCUS

Keywords: Aquaculture, Environmental impacts, Ecological engineering, Biodiversity, Ecosystem Functions, Ecological services

Main interests: investigate linkages between capture fisheries and aquaculture; identifying externalities associated with aquaculture production; estimate ecological basis for valuation of mangrove ecosystems, with special emphasis on the interaction with shrimp aquaculture; study aquaculture techniques built on ecological engineering; study linkages between biodiversity in temperate coastal habitats and the generation of ecosystem goods and services.

AT BEIJER SINCE 1998

PUBLICATIONS

- Troell, M., P. Tydemer, P. Rönnbäck and N. Kautsky (2003) Aquaculture- energy use. In: Cleveland, C. (ed.): Encyclopedia of Energy. Academic Press. (in press)
- Troell, M., C. Halling, A. Neori, A. H. Buschmann, T. Chopin, C. Yarish, and N. Kautsky.. Integrated Mariculture: Asking The Right Questions. *Iaquaculture* (in press)
- Dahdouh-Guebas, F., T. Zetterström, P. Rönnbäck, M. Troell, A. Wickramasinghe & N. Koedam. (2002). Recent changes in land-use in the Pambala-Chilaw Lagoon complex (Sri Lanka) investigated using remote sensing and GIS : conservation of mangroves vs. development of shrimp farming. In: F. Dahdouh-Guebas (ed.), Remote sensing and GIS in the sustainable management of tropical coastal ecosystems, *Environment, Development and Sustainability* 4(2): 185-200.
- Rönnbäck, P., A. Macia, G. Almqvist, L. Schultz and M. Troell (2002). Do Penaeid Shrimps have a Preference for Mangrove Habitats? Distribution

Pattern Analysis on Inhaca Island, Mozambique.
Estuarine Coastal and Shelf Science 55:427-436

- Rönnbäck, P., M. Troell, T. Zetterström and D.E. Babu. Mangrove Dependence and Socio-Economic Concerns in Shrimp Hatcheries of Andhra Pradesh, India. *Environmental Conservation* (in press).
- Kautsky, N., Folke, C., Troell, M. and P. Rönnbäck. Odlad fisk är inte så miljövänlig och nyttig som många tror. Kapitel i FORMAS Bok: Fisk. (under tryckning).
- Troell, M. 2003. The role of extractive organisms in integrated coastal zone management. Proceedings from the Edberg Foundation seminar.

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.
- Lecture at course in Ecological Economics at Institute of advanced studies, Gotland University, Autumn 2002, 3 days.
- Course leader and teacher at PhD certificate course - Ecology and Environmental management, given by The Beijer Institute, during 28/4-30/5, 2003
- Ongoing supervision of 2 PhD students at Department of Systems Ecology, Stockholm University.
- Supervision of Master student C. Bredberg, Department of Systems Ecology, Stockholm University (Minor Field Study).
- Member of Evaluation committee for Licentiate Thesis: Cecilia Holmlund, Department of Systems Ecology, Stockholm University. November 2002.

Seminars and symposium presentations

- Presenting two papers at final workshop for INCO-DC Project - Assessment of mangrove degradation and resiliens in the Indian sub-continent: The cases of Godavari estuary and South West Sri Lanka. Pondicherry, India, October 2002
- Invited speaker, Edberg Foundation seminar, Karlstad, 28-29/2-2003.
- Invited plenary speaker at the European Aquaculture Association, Trondheim, Norway. 8-12 August 2003.

Commissions

- Referee work during the report period: *Journal of Aquaculture*; *Environmental*

PUBLICATIONS

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

Books provide a coherent presentation of results from the Institute's research programmes and other comprehensive activities. During 2002/2003 the following books were produced:

Navigating Social-Ecological Systems: Building Resilience for Complexity and Change. Fikret Berkes, Johan Colding, and Carl Folke (eds.), Cambridge University Press, Cambridge. 2002.

Handbook of Environmental Economics Vol 1: Environmental Degredaion and Institutional Responses. Karl-Göran Mäler and Jeffrey R. Vincent (eds.), Elsevier Sciences, Amsterdam. 2003.

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 DISCUSSION PAPER. The total number of reprints since 1991 is at present 179, of which 9 were produced during 2002/2003.

The BEIJER DISCUSSION PAPER SERIES constitutes a forum for unpublished scientific papers whose content should be subject to discussion and comments. 177 DISCUSSION PAPERS have been produced since 1991, and 12 during 2002/2003.

BEIJER OCCASIONAL PAPERS is a forum intended for policy documents, workshops proceedings, etc. One Occasional Paper was produced during 2002/2003.

REPRINT SERIES

171. Nutrient Management for Coastal Zones: A Case Study of the Nitrogen Load to the Nitrogen Load to the Stockholm Archipelago
Henrik Scharin. *Water Science and Technology* Vol 45 No 9 pp. 309-315. (2002)
172. The Repeated Lake Game
William A. Brock and Aart de Zeeuw. *Economics Letters*, 76 (2002) 109-114.
173. Knowledge and Recognition of Ecosystem Services Among the General Public in a Drainage Basin in Scania, Southern Sweden
Lillemor Lewan and Tore Söderqvist. *Ecological Economics* 42 (2002) 459-467.
174. Vehicular Pollution Control in Delhi
Vinish Kathuria. *Transportation Research Part D* 7 (2002) 373-387.
175. Living with Disturbances: Building Resilience in Social-Ecological Systems
Johan Colding, Thomas Elmqvist, and Per Olsson. In: *Navigating Social-Ecological Systems Building Resilience for Complexity and Change*, pp. 163-185, Cambridge University Press. (2002)
176. Exploring the Role of Local Ecological Knowledge in Ecosystem Management: three Case Studies
Medhav Gadgil, Per Olsson, Fikret Berkes, and Carl Folke. In: *Navigating Social-Ecological Systems Building Resilience for Complexity and Change*, pp. 187-209, Cambridge University Press. (2002)
177. Synthesis: Building Resilience and Adaptive Capacity in Social-Ecological Systems
Carl Folke, Johan Colding, and Fikret Berkes. In: *Navigating Social-Ecological Systems Building Resilience for Complexity and Change*, pp. 352-387, Cambridge University Press. (2002)
178. The Genuine Savings Criterion and the Value of Population
Kenneth J. Arrow, Partha Dasgupta, and Karl-Göran Mäler. *Economic Theory* 21 (2003) 217-225.
179. Climate Change, Human Impacts, and the Resilience of Coral Reefs
T.P. Hughes, A.H. Baird, D.R. Bellwood, M. Card, S.R. Connolly, C. Folke, R. Grosberg, O. Hoegh-Guldberg, J.B.C. Jackson, J. Kleypas, J.M. Lough, P. Marshall, M. Nyström, S.R. Palumbi, J.M. Pandolfi, B. Rosen, J. Roughgarden. *Science* Vol. 301: 929-933. (2003).
168. Economic Development, Environmental Degradation, and the Persistence of Deprivation in Poor Countries
Partha Dasgupta. 2002.
169. Set-aside Requirements Versus Production Quotas in Agro-environmental Regulatory Contracts
Anne-Sophie Crépin and Pierre-Alain Jayet. 2002.
170. Genetic Diversity and Interdependent Crop Choices in Agriculture
Geoffrey Heal, Brian Walker, Simon Levin, Kenneth Arrow, Partha Dasgupta, Gretchen Daily, Paul Ehrlich, Karl-Göran Mäler, Nils Kautsky, Jane Lubchenco, Steve Schneider and David Starrett. 2002.
171. The Economics of the World's Poorest Regions
Partha Dasgupta. 2003.
172. Investment in Land Use for Pollution Abatement Under Uncertainty
Sandra Lerda. 2003.
173. Coping With Uncertainty: A Call for a New Science-Policy Forum
Ann Kinzig, David Starrett, Kenneth Arrow, Sara Aniyar, Bert Bolin, Partha Dasgupta, Paul Ehrlich, Carl Folke, Michael Hanemann, Geoff Heal, Michael Hoel, Bengt-Owe Jansson, AnnMari Jansson, Nils Kautsky, Simon Levin, Jane Lubchenco, Karl-Göran Mäler, Stephen W. Pacala, Stephen H. Schneider, Domenico Siniscalco, and Brian Walker. 2003.
174. Social-Ecological Transformations for Ecosystem Management: The Development of Adaptive Co-management of a Wetland Landscape in Southern Sweden
Per Olsson, Thomas Hahn, and Carl Folke. 2003.
175. Adaptive Co-management for Building Resilience in Social-Ecological Systems
Per Olsson, Carl Folke, and Fikret Berkes. 2003.
176. Corruption and Energy Efficiency in OECD Countries: Theory and Evidence
Per G. Fredriksson, Herman R.J. Vollebergh, and Elbert Dijkgraaf. 2003.
177. Comparative Politics and Environmental Taxation: Theory and Quasi-Experimental Evidence
Per G. Fredriksson and Daniel L. Millimet. 2003.

DISCUSSION PAPERS

166. Management Challenges for Multiple-species Boreal Forests
Anne-Sophie Crépin. 2002.
167. Threshold Effects in Coral Reef Fisheries

OCCASIONAL PAPERS

Student papers from the PhD course(2003): Ecology and Environmental Management. Participants: Rahimaisa D. Abdula, Wisdom Akpalu, and Mintewab Bezabih.

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

A CHRONOLOGY OF BEIJER EVENTS 1 July 2002 - 30 June 2003

THE YEAR OF 2002

30/8 The Beijer Board Meeting, the Royal Swedish Academy of Sciences

31/8-2/9 The 10th Askö Meeting, Stockholm Centre for Marine Research, the Askö Laboratory

30/9-4/10 Follow-up Meeting at ICTP, Trieste, for selected participants from the workshop on Property Rights and Environmental Management held earlier in 2002.

28-30/10 Beijer Research Seminar on Ecological Economics, Mombasa, Kenya.

29/10 Fishcase Meeting, Beijer Institute, the Royal Swedish Academy of Sciences

16-21/12 SANDEE 5th Biannual Research and Training Workshop, Bangladesh.

THE YEAR OF 2003

9-16/1 LACEEP workshop, Costa Rica.

27/1-28/2 School on Ecological Economics, The Abdus Salam International Centre for Theoretical Physics, Trieste, Italy.

6-8/4 MARBIPP Meeting, Stockholm Centre for Marine Research, the Askö Laboratory, Sweden.

7-9/4 Workshop on Network Cooperation and Sustainable Development Research in Latin America, Peru.

9/4 Fishcase Meeting, Beijer Institute, the Royal Swedish Academy of Sciences, Stockholm.

28/4-30/5 PhD Course "Ecology and Environmental Management", the Beijer Institute, the Royal Swedish Academy of Sciences, Stockholm.

26-30/5 RANESA Meeting, Mocambique

12-14/6 Conference on Rights and Duties in the Coastal Zone: A Multidisciplinary Scientific Conference on Sustainable Coastal Zone Management, the Royal Swedish Academy of Sciences, co-organized with SUCOZOMA and Mistra, Stockholm.

16-17/6 Workshop on Spatial Dynamic Models of Economics and Ecosystems, the Royal Swedish Academy of Sciences, Stockholm.



The Beijer Staff 2002

Back row: Tore Söderqvist, Carl Folke, Karl-Göran Mäler, Ing-Marie Gren, Nils Kautsky.

Front row: Anna Sjöström, Christina Leijonhufvud and Max Troell.

Photo: Jane Lubchenco.

