

# **BEIJER** Annual Report 2001/2002

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



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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](mailto: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.



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P.O. Box 50005, SE-104 05 Stockholm, Sweden  
Phone: +46 8 673 95 00 Fax: +46 8 15 24 64  
E-mail: [beijer@beijer.kva.se](mailto:beijer@beijer.kva.se) Web site: [www.beijer.kva.se](http://www.beijer.kva.se)

## EDITORIAL

Thanks to all the contributors, who made the 2001/2002 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

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# Director's Column

**Karl-Göran Mäler, Professor, Director, The Beijer Institute**

There are many events and developments during the last year that still are very vivid in my memory, either because of the event itself or its long run consequences. I would like to share with you a couple of these.

The most important one from a long run perspective is the agreement that ICTP, FEEM and the Beijer Institute reached in the beginning of 2002. This agreement is described elsewhere in this Annual report so I don't have go into detail about the nature of the cooperation we have through that agreement initiated. However, a couple of remarks in this column may be needed.

First, one has to understand the difference in scale and scope between ICTP and the Beijer Institute. ICTP is a giant compared to Beijer, with (at least from our perspective) enormous facilities. ICTP receives around 400 guests to schools, conferences etc. annually and has its own guesthouses for these visitors. That had some important implications for our negotiations, as ICTP and the Beijer Institute have different backgrounds, different traditions, and different views on how things should be handled. In the end, we were able to overcome all these difficulties and sign a memorandum of understanding which I believe will benefit both parties substantially.

The idea of the cooperation between ICTP and the Beijer Institute is Miguel Virasoro's and his are the credits if it succeeds and ours is the blame if it fails. Miguel is broad minded in his outlook on science and as he also has the imagination and creativity that is needed to see the benefits from seemingly unlikely configurations, this cooperation between the two institutes is now existing. Miguel has also become a very good friend. Although he has now retired from ICTP, I hope that I will have the opportunity to work with him in the future, either in our joint program or in other activities.

There were of course many other problems in this connection. One, for example, was the limited knowledge we had of the bus system in Trieste with the consequence that Aart de Zeeuw and Tore Söderqvist became the first Beijer representatives who were fined in doing their duty to the progress of ecological economics. Some of the older (and perhaps more experienced) people were able to leave the bus at the time the huge group of controllers entered.



Karl-Göran Mäler at the Workshop in Zanzibar, September 2001. Photo: Anna Sjöström.

Sometimes human capital pays off!

Another, very moving memory has to do with the progress of the networks the Beijer Institute has been involved with in South Asia and Eastern and Southern Africa. To have the privilege of being involved in these networks is rewarding. There is possibly nothing compared with being together with a group of young, extremely enthusiastic, talented, and energetic scholars, discussing serious issues on the application of economics to the analysis of natural systems. If there is any accomplishment I really feel proud of it is the creation of the capacity building program the Beijer Institute has been involved in and the subsequent networks we have been involved in creating! Thank you Priya, Rashid, and Leiner for letting us be involved.

Finally, let me mention some of my own research activities during the last four to five years. I have been interested in the theory behind the "green" NNP for very long, that is the theory that should guide us in reforming the national accounting systems so as to include renewable and non-renewable resources. Almost all contributions to that theory before 1998 were more or less built of the notion of an optimal economy (including my own contributions). However, I have always been very dubious about the correctness of the optimisation assumption. Our economies



Dr. Brian Walker



Prof. Elinor Ostrom



Prof. Bert Bolin



Prof. Domenico Siniscalco

are not optimal, and our theories should reflect this. In 1998, Sir Partha Dasgupta and I were able to find a different way of building this theory by replacing the optimisation assumption by the concept of (not necessarily perfect) forecasting. In developing that idea, we found that NNP was not the desired measure at all but instead wealth, valued by correct (but not optimal) accounting prices. We were able to establish the result that the value of an increase in assets is equivalent to an increase in social welfare (something that is not true of NNP whenever relative prices change). Furthermore, we were able to show that wealth could be used as a foundation for social cost benefit analysis, and in doing this we were able to give a theoretical structure for some results that have been around since UNIDO's Guidelines in the beginning of 1970's. Later we introduced population growth, which gave rise to some extremely interesting, practically important, but subtle issues on how to define social welfare. This work has been intellectually extremely rewarding, but more important is that it is now spreading around and others are working in the same directions. An example is the workshop that Kenneth Arrow and Larry Goulder organised in April at Stanford University, where the idea of using wealth as an indicator of sustainable development was discussed in depth.

One interesting outcome of this is the efforts of our chairman, Professor Brian Walker, to set these ideas to

practical use in Australia. Brian is designing a project in which inclusive wealth will be estimated for a region in Australia. I believe this is the main idea behind Beijer - to build bridges between economics and ecology, and Brian's project is exactly such a bridge.

Brian is now leaving the chair, as he has been on the Board for six years and cannot be reelected according to our bylaws. He has, like his predecessors been deeply involved in the Beijer activities during the last six years and he has been very influential in forming the activities which we now are busy with. For me, he has been not only a chairman, but more a teacher and a wonderful friend. Thank you Brian.

At the end of this year, Bert Bolin, Elinor Ostrom, and Domenico Siniscalco are also leaving the Board of which they have been members for six years. They have all been very active members and put their own marks on our activities. Thank you so much.

KARL-GÖRAN MÄLER  
DIRECTOR

# Chairman's Report to the Board

**Brian Walker, Chairman, The Beijer Institute  
and Dr., CSIRO Sustainable Ecosystems**

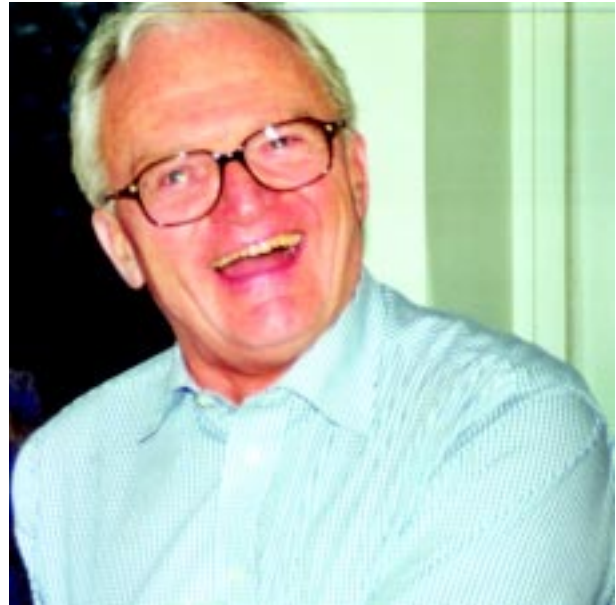
I would like to begin my report by acknowledging the award of the 2002 Volvo Environment Prize, bestowed jointly on the Director, Karl-Göran, and on Partha Dasgupta, the first Chair of the Board. Such recognition is justly deserved and it reflects very positively on the Institute. I am sure you were all as delighted as I was to receive this news, and will join me in congratulating them both.

**T**he Director has given a detailed account of the activities of the Institute and his report indicates clearly the excellent progress that has been made in the past year. The finances of the Institute are sound, with the guarantee of funding from the Beijer Foundation for the next two years. In addition to a number of smaller, particular grants, the success of the grant from the Abdus Salam International Centre for Theoretical Physics enables the Institute to make a significant advance in both its theory and teaching objectives. I thank Karl-Göran and Partha for the successful outcome of their endeavours to get this grant. The initial planning meeting for this program, held in Namibia, produced an exciting set of proposed activities.

As indicated last year, we were not so successful with the application to the MacArthur Foundation for support for the Small Islands and Use of Biodiversity proposals, and the follow-up activities indicate that support is unlikely. However, this was not due to any shortcomings in the proposal but rather to a change in the policies of the MacArthur Foundation.

During the year I participated in my first Teaching course, in Zanzibar, and also in a meeting of the African regional network. I was most impressed with the high level of the course content and with the quality of the "students". The informal atmosphere of the course lent considerably to discussions outside the formal lecture periods, and the follow-up part of this program, keeping the students in a regional network, has done much to raise the level of economics in regard to natural resource use in regions where it is much needed. This aspect of the Beijer program is less well known internationally than its research program, but it is making an excellent contribution to the developing world and I hope that it will continue to thrive.

This will be my last Board meeting and after six years on



Brian Walker has been on the Board for six year, and three of these as Chairman. 2002 will be his last year on the Board. Photo: Sara Aniyar.

the Board, the last three as Chairman, I want to say what a pleasure it has been. It is by far the most enjoyable and satisfying Board I have sat on and I put this down to two important Beijer Institute attributes: Excellence and friendship. I said something along these lines in my Beijer ten-year anniversary comments last year, and have reflected on it since. The science done under the auspices of the Beijer is excellent. It is led by excellent people and it involves other excellent scientists, but it is not only the science that is excellent. The administration and general operation of the Institute is excellent – highly efficient and reliable. Unlike many of its counterparts elsewhere, the Institute does not extend itself so as to lose focus and by keeping constrained it does not get into financial difficulties. In this way it remains doing excellent science in important areas. But what makes it really special is the way that this excellence is so (apparently) casually carried out in such an enjoyable and friendly atmosphere. Few people turn down an invitation to a Beijer event; it's a guarantee of a thoroughly enjoyable time that will stimulate one's mind and lead to a product that will enhance one's



cv! People make this happen, and in the Beijer it is all the people, from the Director to the students. I have greatly enjoyed my interactions with them all, but want to record, in particular, my appreciation and thanks to Karl-Göran, Christina, Anna (and Astrid before her) and Tore, for their hospitality, help and friendship. I have gained enormously through my association with them and with the Beijer, and I look forward to remaining involved, albeit in a different way.

My advice to the Board and the next Chair is to allow the Beijer to continue developing as it has over the past few years. Consideration will have to be given to how to modify it should the CESAS proposal succeed but, as I've said

above, the success of the Beijer lies in the fact that it remains focused on a few main issues that are both intellectually challenging and socially/environmentally important.

Finally, I thank all of you, the Board members, for your input and advice over the time we have served together and I wish you all the best during your remaining time on the Board.

BRIAN WALKER  
CHAIRMAN  
August 2002

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## The Volvo Environment Prize 2002

The Beijer Institute is proud to announce that Professors Karl-Göran Mäler and Partha Dasgupta have been jointly awarded the Volvo Environment Prize for 2002.



The Volvo Environment Prize was formally instituted in May 1988 by the Volvo Annual Shareholders Meeting, with the objective of promoting research and development across the environmental spectrum, by acknowledging people who have made an outstanding contribution to understanding or protecting the environment through scientific, socio-economic or technological innovation or discovery of global or regional importance.

The Volvo Committee's Citation:

“The 2002 Volvo Environment Prize is awarded to Professor Sir Partha Dasgupta and Professor Karl-Göran Mäler, two economists of international distinction, for their outstanding and pioneering contributions to several fields of environmental and resource economics. Together they have made contributions of enormous consequence for understanding the relationship between development, environment and poverty.

Sir Partha Dasgupta and Karl-Göran Mäler are two of the world's leading economists in the fields of environment and resources. They began their careers in the 1960s when environment was emerging as a global concern and, working both separately and together, they have made outstanding contributions to the frontiers of environmental economics.”

Read more on: [www.environment-prize.com/home.html](http://www.environment-prize.com/home.html)

# Cooperation Beijer Institute, FEEM, and ICTP

**Karl-Göran Mäler, Director, The Beijer Institute**

The Beijer Institute has started a very promising cooperation with the Abdus Salam International Centre for Theoretical Physics (ICTP) and Fondazione Eni Enrico Mattei (FEEM) which includes both research and capacity building. FEEM has been a partner of the Beijer Institute in many previous activities. The last was a joint programme on Creation and Transfer of Knowledge, which has been very successful. Therefore, we know many of the scientists in FEEM and we are well aware of their strong standing in the scientific community. Furthermore, FEEM's previous director, professor Dominico Siniscalco, is a member of the Board of the Beijer Institute. However, the cooperation with ICTP is very novel and is perhaps a little bit unexpected. Why should a centre in theoretical physics and an institute in ecological economics be interested in cooperation?

**I**CTP was created by the Nobel Laureate in physics, Abdus Salam. Coming from Pakistan, he was acutely aware of the problems scientists in poor countries experienced in trying to keep up with the research frontiers.

Therefore, he tried in the 1960's to construct an international centre where physicists from the third world could meet and be informed on new developments in theoretical physics. He was successful in finding sponsors and the result was an extremely important centre - ICTP - located in Trieste, Italy. After his death in 1996, the Centre was renamed in his honour. The Centre is operating under the aegis of two UN organisations, UNESCO and IAEA, but is mainly funded by the Italian government. For more information about ICTP, please go to their web page - [www.ictp.trieste.it](http://www.ictp.trieste.it).

Professor Miguel Virasoro, a theoretical physicist from Argentina, became Salam's successor as the director of the Centre. Under his leadership, ICTP expanded in several new directions, for example mathematical ecology (in which Beijer's former Board chairman, Professor Simon Levin, has been of fundamental importance) and in mathematical economics. Through Simon Levin, Beijer's first chairman, Professor Partha Dasgupta and I were introduced to Miguel Virasoro and we described to him the Beijer capacity building programme in the third world and our plans to



The ICTP Main Building, Trieste, Italy.  
Photo: ICTP Photo Archives, Massimo Silvano



Aerial view from the ICTP Campus, Trieste, Italy.  
Photo: ICTP Photo Archives, Massimo Silvano



find a permanent home for these activities. Virasoro, offered us then a possibility to use the facilities at ICTP as an “incubator” while we were looking for that permanent home. This resulted in an agreement by which ICTP and the Beijing Institute will together organise a research program and a capacity building program in environmental economics.

The research program consists of several components. One is the economic analysis of climate change and is administered by Professor Carlo Carraro from FEEM. The Beijing Institute will together with Dr. Matteo Marsili from ICTP organise the remaining components of the research

program, involving the economics of complex dynamic ecosystems and indicators of sustainable development. These research areas will be discussed at an international conference in Trieste in February next year. In June we ran a preliminary workshop in Namibia in order to prepare for this February workshop.

The capacity building program will consist of schools at ICTP, of regional workshops, and of special workshops. There has already been one regional workshop, in cooperation with SANDEE, on CGE modelling in Bangkok in March, and one on property rights and environmental management in South Africa in May.



Photo: ICTP Photo Archives, Massimo Silvano

### **Professor Abdus Salam**

Professor Abdus Salam, Nobel Laureate in Physics (1979), Director of the International Centre for Theoretical Physics (ICTP), Trieste, Italy, from 1964 to December 1993, died in Oxford on 21 November 1996, after a long illness. He was buried in Pakistan where he was born in 1926.

# Conference on Rights and Duties in the Coastal Zone, 12-14 June 2003

Tore Söderqvist, Dr., Research Associate, The Beijer Institute

The Beijer Institute's Annual Report for 2000/01 included a report on the research programme Sustainable Coastal Zone Management (SUCOZOMA), funded by the Swedish Foundation for Strategic Environmental Research (MISTRA). The Institute participates in SUCOZOMA together with Gothenburg University, Kristineberg Marine Research Station, Stockholm University and the Swedish National Board of Fisheries, and focuses its activities on economic valuation of coastal ecosystem services in Sweden. See [www.sucozoma.tmbi.gu.se](http://www.sucozoma.tmbi.gu.se) for a detailed presentation of the whole research programme.

Besides research, a main activity for the Institute in SUCOZOMA is the organization of *Rights and Duties in the Coastal Zone*, a multidisciplinary scientific conference on sustainable coastal zone management with SUCOZOMA and MISTRA as co-organizers and providers of funding. The conference will take place on 12-14 June 2003 at the Royal Swedish Academy of Sciences in Stockholm. Space restrictions at the Academy will make the conference rather small-scale – the maximum number of participants will be about 125.

The background to the conference is the fact that the coastal zone attracts many uses, such as fisheries, recreation and tourism, industry and transportation, i.e. types of development that are compatible only to a limited extent. There are also more indirect uses, for example as a recipient of polluting substances. The coastal zone and its habitats also provide areas for fish to reproduce, recirculate nutrients, provide fish and shellfish catches, etc. An increased human use of the coastal zone carries the risk of substantially reducing this capacity of the coastal zone to deliver ecosystem services. The coastal zone is thus a scene on which a variety of conflicts is being played out. How can widely accepted compromises be achieved between different societal goals, such as sustainability, economic efficiency and equity?

One way to prevent or resolve conflicts is through insightful design and enforcement of property-rights regimes in the coastal zone. Whose are the property rights, i.e. who are entitled to rights and duties in the use of the coastal zone? And what rules for exercising the rights do the property-rights regimes involve? Are present property-rights regimes in the coastal zone inconsistent with the



Photo: Lars-Ove Loo



Photo: Lars-Ove Loo

dynamics of the ecological resource they are supposed to control? For example, do they take into account migration among species and the existence of thresholds in the behaviour of ecosystems?

The conference will aim at comparing various property-rights regimes in the coastal zone, and their associated management systems, with a focus on the developed part of the world. It will also consider various policy instrument options and other formal or informal institutional solutions, in cases when property rights are difficult to define or enforce. Moreover, a deeper understanding is being sought of why some property-rights regimes and management systems fail, while others seem to succeed, in resolving conflicts in a manner consistent with ecosystem behaviour, and with the fulfilment of societal goals, such as sustainability, economic efficiency and equity. It is also hoped that the conference can shed new light on the consequences and design of some institutional features,

such as marine reserves, individual transferable quota systems, and the Water Framework Directive of the European Union.

In order for the conference to achieve these objectives, a call has been sent out for papers on topics related to the issues mentioned above. Long abstracts (max. 700 words) should be submitted to the Institute by 15 January 2003. In addition, a number of distinguished scholars have agreed to participate as keynote speakers. They include Poul Degenbol (Institute for Fisheries Management and Coastal Community Development, Denmark), Thrainn Eggertsson (University of Iceland), Susan Hanna (Oregon State University), Svein Jentoft (University of Tromsø), and James E. Wilen (University of California, Davis).

More information about the conference is available at its website [www.beijer.kva.se/conference.htm](http://www.beijer.kva.se/conference.htm).

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### **Prof. Partha Dasgupta receives knighthood**

The Beijer Institute is delighted to hear that the former Beijer Chairman, Partha Dasgupta, Frank Ramsay Professor of Economics, University of Cambridge has been knighted. Prof. Dasgupta receives the award for his services to Economics.

*Congratulations Sir Partha!*

# Marine Research on Eutrophication: Scientific Basis for Cost Effective Measures in the Baltic Sea (MARE)

Ing-Marie Gren, Professor, Research Fellow, The Beijer Institute

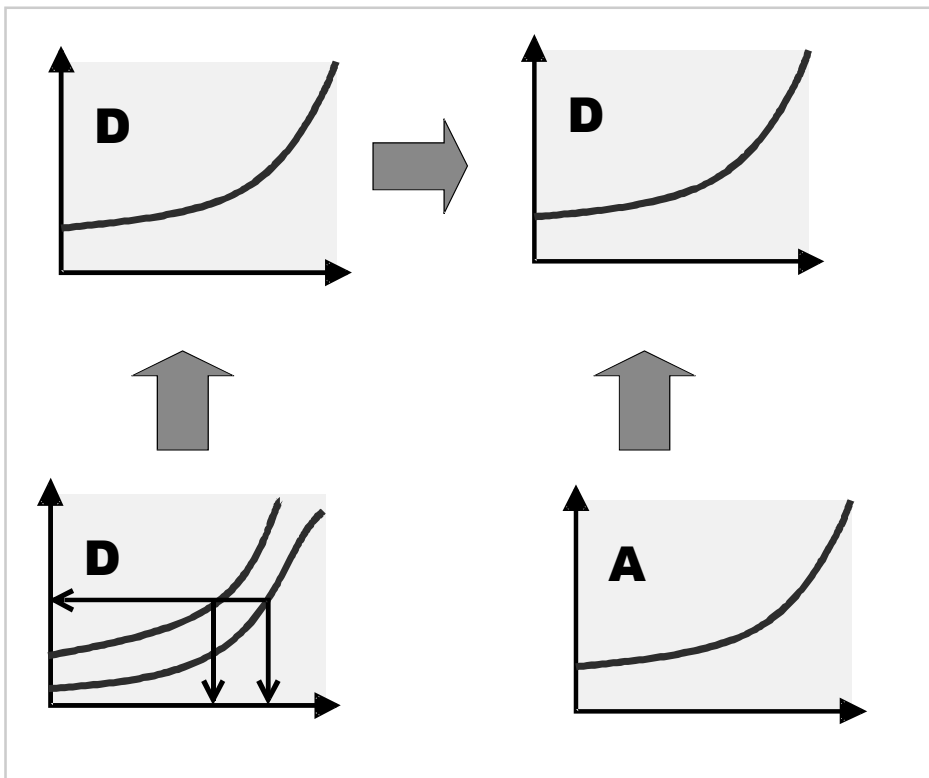
The ultimate purpose of MARE is to develop a decision support system for identifying cost effective strategies for reduced damages of eutrophication in the Baltic Sea. It started July 1, 1999, and ends on March 31, 2003, and is funded by Swedish Foundation for Strategic Environmental Research (MISTRA).

**D**amages from eutrophication is of worldwide concern, and common to damaged waters is the need of integrating nutrient generating activities in the waters catchment with damages in the water. This implies an understanding of nutrient emission, its transport

in surface and surface waters, and associated ecological impacts in the water recipient. These transports and ecological impacts are characterised by uncertainty and dynamics. The principle applied in MARE for approaching these problems is presented in Figure 1.

The ultimate purpose is illustrated in Box D, where each environmental state along the horizontal axis is associated with minimum costs for its achievement. Examples of environmental state can be improved cod reproduction, decreases in frequency of toxic algae blooms, or improved sight depth. In order to find the cost function, knowledge on three principle relations is needed; nutrient

Figure 1: Linking components in the MARE decision support system



concentration and environmental states (Box A), nutrient concentration and nutrient input (Box B), and nutrient input decreases and costs (Box C). The MARE programme is structured around these relations, and the Beijer Institute is solely responsible for that illustrated in Box C, and partly for the relation between minimum costs for various environmental states. In the following, only the Beijer Institute's contributions are presented. Presentation of the overall MARE project can be found at the web site [www.mare.su.se](http://www.mare.su.se).

The Beijer economics project within MARE has been focused on two main questions:

- Which is the allocation of measures among countries that minimises total costs for different targets?
- Which are the effects of alternative Baltic Sea policies?

#### **Cost effective allocation of nutrient abatement measures**

The first question addresses issues on nitrogen versus phosphorus reductions, the role of uncertainty in nutrient transports, implications of time delays between implementing measures and reaching targets, and cost implications of treating Baltic Sea as a 'nutrient productive system'.

Non-linear stochastic programming has been applied for elucidating these issues, and as expected from theoretical analysis, minimum costs are affected by all these factors. The reference case is then a static and deterministic perspective with the target of reducing nitrogen loads to the coastal waters of the Baltic Sea. When comparing minimum cost of nitrogen reductions with that of phosphorus with the same percentage reductions, the results show that phosphorus reduction are less expensive, but the magnitude in cost difference depends on the chosen reduction targets (Elofsson, 2000; Gren et al. 2000).

When investigating the role of uncertainty a lognormal probability distribution was assigned for the coastal load of a given emission level in a drainage basin. A lognormal distribution is more hydrologically relevant since it excludes possibilities of 'negative' deposition on the coast. As demonstrated in Elofsson (2002) and Gren et al (2002),

uncertainty in nutrient transport may double the minimum cost for achieving a nutrient input reduction target as compared to the deterministic case.

In practice, however, nitrogen load reductions to the Baltic Sea are likely to occur some time after emission reductions in the drainage basin. The cost of this is the rent income foregone, which could have been obtained by investing the money corresponding to the costs of abatement measures in something else, such as dividends. The quicker ecological response of a measure in the Baltic Sea, the less expensive is the measure. This implies a cost advantage for measures undertaken directly at the recipient, such as cultivation of mussels for reducing nutrient concentration where damages occur (Hart, 2000).

Although the main research has been devoted to reduce nutrient inputs or nutrient concentrations in the coastal waters, investigations have also been made of the importance of nutrient transports within the Baltic Sea. This is necessary when we are concerned about nutrient loads to a certain basin. Applying input-output modelling of nutrient transports between marine basins in the Baltic Sea, an interesting result is that only very modest water quality improvements can be made by local measures. Significant improvements for all marine basins require basin wide measures (Gren et al. 2002). This can also be seen at the MARE's web site [www.mare.su.se](http://www.mare.su.se).

#### **Implications of alternative Baltic Sea policies?**

This overall question includes four sub-issues; co-operation vs non-cooperation among Baltic Sea countries, charges and permit market system, implications of non-compliance, and permit market system and a dominating country.

Simple theory tells that cooperation among countries generates a certain nutrient reduction target at a lower cost than when countries act on their own. The reason is that cooperation implies that abatement occurs where the costs are lowest. In the case of nitrogen and phosphorus reductions to the Baltic Sea, costs under cooperation can be half of them under noncooperation (Elofsson, 2000; Gren et al 2001a).

Simulations of a permit market system for an overall 50 per cent nitrogen reduction show that some countries – Poland

and Lithuania, may make net gains from a permit market system due to sales of permits. Initial permits are then distributed free of charge. However, it can never be assured that firms in all countries follow the regulation as they should. Under a permit market system, nitrogen can be discharged in the Baltic Sea without permits. A potential buyer of permits then makes gains from avoided permit payments. But, the seller makes losses from less permit sales. Countries with relatively high nitrogen abatement costs, such as Sweden and Denmark, can then make relatively large gains from violation. Simulations indicate that these violation net gains, and net losses for low cost countries like Poland can be significant (Gren, 2001b).

### References

- Elofsson, K., (2000). *Cost efficient reduction in stochastic nutrient supply to the Baltic Sea*. Working Papers series 2000:6, Department of Economics, Swedish University of Agricultural Sciences, Uppsala
- Gren, I-M., Turner, K., and F. Wulff (2000). *Managing a Sea: Ecological Economics of the Baltic Sea*. Earthscan, London, UK.
- Gren, I-M. (2001a). International versus national actions against pollution of the Baltic Sea. *Environmental and Resource Economics*, 20(1):41-59.
- Gren, I-M., Destouni, G. and R. Tempone (2002). Costs and alternative specifications on pollutant probability distributions. *Journal of Environmental Management*, in press
- Gren, I-M, Savchuck, O. and F. Wulff (2002). *Economic incentives for multiple basin management of the Baltic Sea*. draft manuscript
- Gren, I-M., (2001b). *Permit market for stochastic pollution, noncompliance and market power*. Working paper 2001:7, Department of Economics, Swedish University of Agricultural Sciences.
- Hart, R. (2000). *Dynamic control of stock pollutants – cost effective response to targets*. Working Papers series 2000:1, Department of Economics, Swedish University of Agricultural Sciences, Uppsala
- Projects on costs and incentives for nutrient abatement
1. *Costs and policy instruments on stochastic nutrients to the Baltic Sea*  
Katarina Elofsson (PhD thesis defence September 20, 2002)
  2. *Dynamics of environmental pollution*  
Rob Hart (PhD thesis defended on March 15, 2002)
  3. *Efficient nutrient management in the Mälars region*  
Henrik Scharin (Lic. thesis defence in November 2002)
  4. *Incentives for land use as nutrient sinks*  
Sandra Lerda (Lic thesis planned in autumn 2002)
  5. *Investment in cleaning technologies under uncertainty*  
Ficre Zehaie (lic thesis planned in autumn 2002)
  6. *The value of sea grass for nutrient abatement*.  
Dag Johansson (master thesis, Spring 2002)
  7. *Costs of mussels and reeds for nutrient abatement*  
Håkan Holmgren (master thesis, Autumn 2002)



# Marine Biodiversity, Patterns and Processes (MARBIPP)

Max Troell, Dr., Research Associate, The Beijer Institute

## Program overview

**M**arine 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.

There is today a general concern about the loss of biodiversity at ecosystem, species and genetic levels. One side of this is a fear that biodiversity is tightly linked to the long term survival and health of the human society through the production, or future potential productions, of goods and services. The other side are the aesthetic and ethic concerns of an irreversible destruction of unique biodiversity evolved over long periods of time. Both sides are reflected in a number of national and international political decisions and commitments that focus on biodiversity protection and management, for example, national governmental goals for the environment, the EU Habitat Directive, the Rio Convention. For the political goals to be achievable research and scientific syntheses are urgent. In MARBIPP five main important research directions are addressed:

1. Develop indicators of coastal marine biodiversity
2. Define cause-effect relationships of threats and effects on marine biodiversity and from these predict biodiversity changes at different management and disturbance scenarios
3. Map goods and services produced by marine ecosystems and relate these to biodiversity
4. Design guidelines and assess institutional management for marine biodiversity
5. Analyse how marine ecosystem functions relate to biodiversity

These are general and problem-oriented research directions applicable to any part of marine ecosystems, but it is not possible within the limits of time and money of the program to cover all coastal ecosystems of Sweden and the program therefore a set of five Scandinavian model biotopes has been chosen to work with. Four of these are common and considered as important coastal biotopes covering a large part of the benthic substrates from 0-15m depth (shallow macrophyte vegetation, fucoid seaweed zones, blue mussel beds and shallow soft sediments). The fifth (deep water

coral ecosystems) is representative of unique hotspot biotope of Scandinavian waters.

The program will run for 5 years (start fall 2001) with a total budget of approximately 35 millions of SEK. Nine senior researchers from five different research institutes are contracted and an additional 5-7 senior researchers will be contracted through open applications for part of the program. 6-8 PhD students and 3-4 post-docs will be contracted for part of the program period. The program is funded by the Swedish Environmental Protection Agency, but have links to the EU as well as nationally funded projects on related topics. Further information can be found on the program website: <http://www.marbipp.tmbi.gu.se/>.

## Beijer contribution- Work description

Biodiversity is valuable for many different reasons and from a societal perspective its contribution to ecosystem functions is most crucial. Ecosystem goods such as food and ecosystem services such as waste assimilation represent the benefits human populations derive, directly or indirectly, from ecosystem functions. Elements of biodiversity, not directly used by man, are indirectly used as part of the food webs and processes that facilitate interactions between various ecosystem components.

The work carried out by Beijer and collaborators focuses on identification and valuation of the generation of ecosystem goods and services from four of the identified key habitats within the program. Collaborating partners 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 and Dr. Tore Söderqvist. The total budget is 3 million SEK for the five years period.

## Objectives

The overall objective is to gain increased understanding of the functional properties of the biodiversity in different marine biotopes, and 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.

Specific objectives:

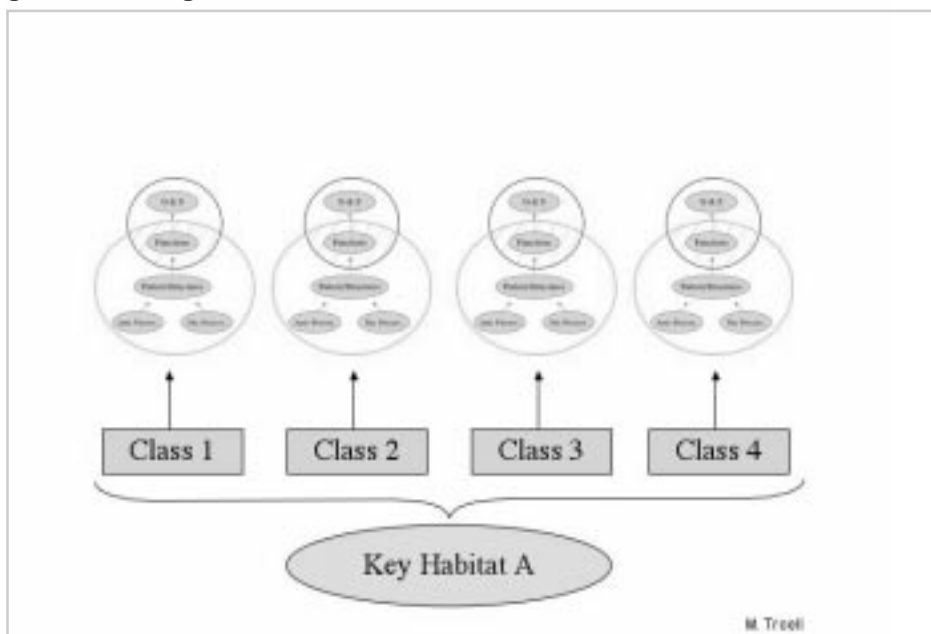
- Compile a database of the functional ecology of four of the MARBIPP key habitats by identifying goods and services from these habitats along the Swedish West and East coast.
- To carry out a high-resolution ecological evaluation of selected key biotopes that relates to the classification within habitats (i.e., different levels of anthropogenic disturbances or natural variation).
- Perform economic valuations of ecosystem goods and services through in depth ecological economic analysis of selected case studies.

### Approach

In order to qualitatively evaluate the ecosystem goods and services generated by the different ecosystems, the initial work will be to review the literature. This review will enable an identification of which goods and services that can be quantitatively assessed based on existing data and what additional information that will be needed from further field investigations, modelling exercises and experimental studies. The most obvious ecosystem goods and services identified at this point, and which will be investigated in quantitative detail, are fisheries recruitment, energy flow and maintenance of water quality.

The economic valuation will be based on a classification of biotopes into a number of different “ecological types” (Fig. 1) that are/have been formed by natural and/or anthropogenic disturbance regimes (e.g. classes of organic enriched shallow soft sediment biotopes; classes of epiphytes on *Zostera/Fucus/Mytilus*-red-algae biotopes; masses of detached drifting red-algae; blue mussel populations in brackish (Baltic Sea) versus fully marine (Skagerrack water). It is important to evaluate if, and possibly how, the different classes in each biotope differ in their ability to generate ecosystem goods and services, and how this relates to biodiversity. To the extent possible, the identified classes within each biotope should be mapped in a local, regional and national scale. Furthermore, the impacts that the different disturbance regimes have on habitat quality will be delivered within the program. It is essential to acknowledge that habitat quality parameters should, if possible, include aspects like vegetative and sediment structure, primary production, secondary production, general biodiversity as well as critical habitat size for the initial generation of goods and services. For instance, the classification of the shallow soft sediment biotope should account for disturbance of macroalgae cover and how this threat influences primary and secondary production as well as general biodiversity

**Fig. 1. Each habitat will be divided into classes with different abilities for generation of goods and services.**



supported by the biotope.

An economic valuation of biodiversity change requires (1) quantitative ecological knowledge of the functional properties of biodiversity, so that the consequences of biodiversity change on the supply of ecosystem goods and services can be predicted, and (2) an investigation of the economic consequences to society of a changed supply of ecosystem goods and services. One main focus of this research would be on item (1), i.e. to gain an improved quantitative understanding of how biodiversity contributes to ecosystems' provision of goods and services to society. Such an improved understanding would be a main contribution of the project, and this is likely to involve research work characterized by a high degree of scientific novelty. It is also a prerequisite for economic valuation activities, whether they are performed within this project or later. While the economic consequences of biodiversity change in some selected cases are likely to be illustrated, the work performed in the project should primarily be viewed as a basis for future valuation activities.

The ecological research work on how ecosystem goods and services are provided will be characterised by a holistic perspective. Biodiversity change causing changes in the supply of ecosystem goods and services might only have very local effects and substitutes produced by other ecosystems or by man might be available. A reduced biodiversity, potentially resulting in a reduced supply of some ecosystem goods and services might in some cases be economically motivated, if the benefits from the activity reducing biodiversity are beneficial enough to society. To some extent, trade-offs between biodiversity and human activities are inevitable, and economic valuation is one tool available for judging what trade-offs are reasonable and what trade-offs are not. One important purpose of the ecological research work is to be wide enough in scope for serving as a basis for ensuing assessments of such trade-offs. A too narrow focus, e.g. on single and geographically small biotopes, might either be useless for such assessments or cause sub-optimal results.

In depth ecological economic analysis will be carried out in the following case studies:

### **1. Role of macro algal blooms and drifting algal mats on biodiversity, ecosystem functioning, and goods and services.**

How is fisheries recruitment of plaice impacted by algal mats in their nursery ground on shallow soft sediments? How is sediment faunal biodiversity and coastal system's nutrient dynamics impacted by algal mats?

### **2. The role of habitat structuring key species for maintaining biodiversity, ecosystem functioning, and goods and services.**

How does a flip from *Zostera*, via bare erosive sediment bottom to *Fucus* community on the resulting gravel/boulder bottom affect ecosystem goods and services?

How does a flip from *Fucus* dominated rocky bottoms to mussel-red algal dominated communities affect biodiversity and ecosystem goods and services? How large areas of the *Fucus* ecosystem are needed to maintain biodiversity?

### **3. How would the disappearance or large scale destruction of blue mussel bottoms affect the capacity for water quality maintenance and energy transfer in the food web locally as well as regionally in the Baltic Sea?**

In cases where enough information is available, predictions can be made of the economic implications associated with lost ecosystem goods and services caused by human-induced threats. The results from the economic valuation 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 case studies will heavily depend on the focus and quality of field data being generated within the programme. Further case studies may also be identified.

### **Progress**

1. Compilation of database on biodiversity, ecosystem services and ecological information for Swedish coastal habitats.
2. Identification of goods and services from Swedish coastal habitats.
3. Working paper: The importance of coastal ecosystem services- a Swedish perspective.

# Resource Accounting Network for Eastern and Southern Africa (RANESA)

**Rashid Hassan, Coordinator, RANESA  
and Professor of Economics, Pretoria University**

During the 2001/2002 year, RANESA continued its activities under the broader umbrella of the newly established regional centre for environmental economics and policy in Africa (CEEPA) at the University of Pretoria. CEEPA coordinates various regional degree and non-degree research and training activities in support of capacity building in the field of environmental economics and policy analysis and awareness among African researchers, policy makers and natural resources managers. One major activity of CEEPA is the Collaborative Regional Master degree training Program in environmental economics and policy analysis in which 14 university departments participate from the eastern, central and southern Africa region.

**R**ANESA has accordingly become the arm of CEEPA that coordinates and runs the Centres' non-degree training, research and networking activities. Although RANESA continued its networking and training activities during the past year, no research grants have been offered due to lack of funds. Nevertheless, the network continued production and publication of its newsletters and policy briefs. Also research completed under RANESA research grants in previous years has been published as part of the new discussion papers series of CEEPA. Four issues have been produced and circulated during this year so far (for more details please visit the CEEPA/RANESA

website: [www.ceepa.co.za](http://www.ceepa.co.za)).

RANESA also continued its non-degree training activities in collaboration with the Beijer Institute as well as other key international agencies in this field. A major training workshop was organised in collaboration with the Beijer Institute and the World Bank Institute on "The linkages between poverty, environment and sustainable development" this year. The workshop was held in Durban, South Africa during May 22-24, 2002 with funding from the McArthur Foundation. Twenty participants from various government, NGO, academic and research institutions in 10 African countries benefited from this training workshop.

RANESA plans to continue its training, research and networking activities into the next three years with funding from Sida Sweden and in collaboration with the Beijer Institute and other agencies. Two research and training workshops are planned to take place next year. The first will be jointly organised with the Resilience Alliance Group and the second will be on computable general equilibrium modelling and analysis for environmental economists in collaboration with the Beijer Institute. The network also plans to revive its research grants and support of the various publication, dissemination and networking activities in the coming years.



## **BEIJER NETWORKS**

GWEN: The Global Wetland Economics Networks  
ICTP: The Abdus Salam International Center for Theoretical Physics  
LACEEN: The Latin American and Caribbean Environmental Economics Network  
MARBIPP: Marine Biodiversity, Patterns and Processes  
MARE: Marine Research on Eutrophication  
RANESA: The Resource Accounting Network for Eastern and Southern Africa  
RESILIENCEALLIANCE  
SANDEE: The South Asian Network for Development and Environmental Economics  
SUZOZOMA: Sustainable Coastal Management  
See separate articles in the Annual Report for most networks.

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

Priya Shyamsundar, Director, SANDEE

The South Asian Network for Development and Environmental Economics (SANDEE) aims to build individual and institutional capacity in South Asia to undertake research on the linkages between economic development and environmental change. Our activities include a small research grants program, training workshops, information dissemination and peer networking. On par with the rest of Beijer's international family, we believe in combining serious learning and sharing of ideas, with some good fun and great friendships.

**S**ANDEE has grown steadily over the last two years. We currently have 17 SANDEE researchers undertaking research on a variety of poverty, environment and natural resource management problems. For example, Bhim Adhikari is working on community forestry in Nepal, while Mainul Huq is studying health impacts of vehicular pollution in Dhaka. Our Indian researchers are studying a range of issues such as the links between environment and migration, arsenic water contamination, and institutional puzzles associated with forests, irrigation and water use. Many of our first group of researchers will finish their projects this year. We hope to have publications such as working papers and policy briefs from these projects.

Through our training program we try to offer both basic and advanced environmental economics courses to meet the needs of researchers with differing levels of skills. This year, we trained about 50 researchers and teachers in basic



The 4th Biannual Research & Training workshop in Bangkok, Thailand. Photo: SANDEE

environmental and resource economics and in advanced techniques related to CGE modeling and the environment. The CGE course was offered in partnership with the Beijer Institute and supported by the Abdus Salam International Centre for Theoretical Physics. Thus, links to Beijer and its larger community continue to be key to SANDEE's development.

Networking is a critical part of what we do. Each of our biannual meetings brings together approximately 40 people from the region. A true positive externality of all of this is the understanding and exchange that occurs between participants from different countries. It is remarkable to be part of the many new friendships that develop among colleagues from countries that are often hostile toward each other. To quote Prabhat Pankaj, a participant at a recent training workshop in Dhaka "You brought 22 men and women of South Asia together, to start a fresh lease of friendship, brotherhood and academic collaboration ... a much needed job in an otherwise mundane and political business the countries of South Asia have unfortunately been involved in." Often, this is the overwhelming sentiment expressed by many participants at SANDEE meetings.

Our newsletters are beginning to become a forum for policy ideas related to environmental economics. I understand they are pinned up in notice boards in Sherbutse College – the only college in Bhutan and elsewhere. We hope to use the newsletter as mechanism to share policy information among South Asian countries.

SANDEE has done reasonably well in its initial growth phase but our challenges are huge and plenty. The geopolitics of the region, indeed of the world, often make simple choices such the venue for a SANDEE workshop a huge problem. We have had to post-pone and move meetings several times last year. The task of capacity strengthening itself poses immense challenges and we are constantly asking ourselves what the right pathways are – but it is a joy to be working on important environmental questions that riddle South Asian countries and we certainly have plenty to do.

Please do visit our website at [www.sandeeonline.org](http://www.sandeeonline.org) for further information about SANDEE.

# The Latin American and Caribbean Environmental Economics Network (LACEEN)

**Leiner Vargas and Francisco Alpizar, Coordinators, LACEEN**

The Latin American and Caribbean Environmental Economics Network (LACEEN) is a capacity building network, initially constituted in Bahía, Brazil in December 2000, under the umbrella of the teaching and research workshop organized by the Beijer Institute. Its potential members are young teachers and researchers in the field of Environmental and Resource Economics, working in universities and main research centers in Latin America and the Caribbean.

**T**he main purpose of the Network is the generation and dissemination of working and researching capacity in Environmental Economics among Latin American and Caribbean academic and research institutions. This should ultimately achieve an improvement in the management of natural resources at all levels of governmental and nongovernmental organizations.

The first Management Committee was elected in Bahía, and had the major tasks of developing a working plan for the launching period. The group was integrated by Hugo Salgado, from Chile; Marlene Attzs, from Trinidad and Tobago; Marcela Bertoni, from Argentina; Elias Pozenato, from Brazil, and Leiner Vargas (coordinator), from Costa Rica. This group worked on the basis of web meetings and email communications, resulting in the development of a proposal specifying the main objectives of the network and prioritizing the areas in which the network should be involved. The main objectives of the Network are: 1) To improve the teaching of Environmental Economics in Latin America and the Caribbean through the build-up of local capacity; 2) to promote research in Environmental Economics in Latin America and the Caribbean; 3) to encourage cooperation and exchange of ideas and resources among Network members and their institutions.

The next general meeting of LACEEN took place in Yucatan, Mexico in December 2001, as part of the research workshop in Environmental Economics, organized by the Beijer Institute. New members joined the effort to launch the network as soon as possible. In particular, Francisco Alpizar, from CATIE, Costa Rica; Sara Aniyar, from the Beijer Institute, and Osmel Manzano, from the Corporación Andina de Fomento in Venezuela. All three joined Leiner Vargas in the coordination of the Network. Francisco Alpizar and Leiner Vargas assumed the leading roles of the Committee.

Since then, this group has further developed the proposal

by specifying the main activities required to achieve the desired objectives. These activities are:

The creation of a web page intended to provide an open forum for the dissemination of information pertaining to Environmental Economics in Latin America and the Caribbean region, as well as a suitable environment for posting ideas and research interests.

The provision of scholarships for research in Environmental Economics. The objective is to give 10 scholarships a year to Latin American researchers in the field of Environmental Economics. Each researcher will work closely with a tutor, in order to enrich the experience and increase the likelihood of a good paper. The 10 best research proposals will be discussed and chosen by a Scientific Committee.

Finally, the Network will organize a workshop/seminar once a year with the following components: 1) Presentation of results from LACEEN-funded research; 2) A short list of candidates will present their research proposals to the scientific committee; 3) Some members of the Scientific Committee will be invited to give short capacity building sessions; 4) A limited number of Latin American researchers will present their papers.

The first public presentation of LACEEN took place during the Second World Congress of Environmental and Resource Economics. The main objective of this meeting was to invite interested scholars from different parts of the world to participate in the Network as members of the Scientific Committee, as tutors or as potential recipients of scholarships. Several scholars expressed their interest and commitment to this activity, among them Prof. John Dixon, from the World Bank and Prof. Thomas Sterner, from Gothenburg University. These scholars joined Prof. Partha Dasgupta and Prof. Karl-Göran Mäler as possible members of the initial Scientific Committee. In the future, we expect distinguished Latin American scholars to join this team as members of the Scientific Committee and tutors. In addition, the presence of several donor institutions increased the relevance of the presentation in this conference and their interest was encouraging.

The future is very promising, considering the commitment and the integration of new people into the Management Committee, the quality and characteristics of the group that will form the Scientific Committee, and the interest expressed by donors. We are currently in the process of presenting the proposal to donor institutions, and plan to formally initiate activities in 2003.



# PhD Programme in Environmental Economics

Thomas Sterner, Professor, Department of Economics, Göteborg University

A joint program between the Environmental Economics Unit, Göteborg University and the Beijer International Institute of Ecological Economics.

This report covers the fifth year of the program in its present form. The PhD program enrolls five students every other year. In the first year the students take standard graduate economics courses. In the second year a sequence of specialization courses in environmental economics are given. Then the students are given the opportunity to design fieldwork and data collection in order to analyse important environmental problems in their respective countries. The theses are expected to be finalized in less than five years.

Since 1997, a total of 17 students have enrolled to carry out a PhD in environmental economics associated with this program (for a list of PhD students, see below). Out of these 17, three have already obtained their PhD's and at present there are 14 students in academically various stages in the program.

As a part of the current agreement, five new students were recruited and started in the fall of 2001. These five new students are included in the total figure of 17. In the following sections we describe the objectives, enrolment, training and other activities of the program as well as the strategy pursued in order to ensure that the training will lead to successful capacity building activities as they return as PhD's to their departments in their home country.

During 2001 one PhD student graduated, namely Adolf Mkenda from Tanzania. He has now returned to his home country and is currently working as a lecturer and researcher in the Department of Economics, University of Dar es Salaam, Tanzania.

## 1.1 Objective

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. It is also expected to lead to research and 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 long term strategies for their future involvement in teaching, research and policy advice.

## 1.2 Enrolment

As stated above, there is, since 1997, a recruitment of five new students every second year to the program. This enables a critical mass of students needed to arrange courses and provide a stimulating environment for studies and other activities. The program receives, however, a continued stream of potential PhD students that are keen to obtain information about the program's activities. The reputation of the program appears, therefore, already to be solid.

In 2001, a new group of five students was selected, approved and enrolled. They started their program in September of 2001.

The following criteria were used: **academic performance** – especially 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 can support the development of environmental economics capacity in the country in a major way through teaching, research and policy advice. **Gender** – to the extent possible women are prioritised.

Currently, there are 14 PhD students in various stages of the program.

## The new students enrolled in 2001 are currently doing course work:

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

**The following five PhD students were enrolled in 1999 and are currently engaged in the third year's course work and data collection:**

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

**The first batch of students enrolled in 1997, is in the final stage of writing their thesis chapters, see further details below:**

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

### 1.3 Training

The training follows a "sandwich model", which starts with two years of course-work in Sweden followed by field work and data collection in their home country after which they return to Sweden to write their thesis.

In the first year the usual mandatory courses in the general economics PhD program are given i.e. math, econometrics, micro- and macroeconomics. In the second year the following sequence of specialization courses are given: welfare theory, environmental valuation, public economics, resource economics, environmental regulation and systems ecology (the latter given by the Department of Systems Ecology, Stockholm University and the Beijer Institute). These specialization courses make the program extremely strong and supports the development of a well-trained resource base not only in developing countries but also in Sweden. Three of the specialization courses were given during 2001; Natural Resource Economics, Environmental Economics and Policy Instruments, and Systems Ecology. The 1999-batch has now concluded their course-work while the 1997-batch is currently concluding their thesis work.

### 1.4 Maintained links to home institution

The objective of this program is to create research and teaching capacity at a number of institutions in developing countries. We do not officially *require* students to go back

to their original institutions, but we work hard to create conditions that facilitate and encourage such a return. A common problem with this type of program is that the trained candidates do not always find it easy to return to their home countries. With this in mind we make great efforts to allow the students to remain in close contact with their home institutions and to choose appropriate and relevant thesis topics.

For example, two graduates from the program so far, Dr Alemu Mekonnen and Dr Tekie Alemu, returned to their home department in Ethiopia. They are now both part of a SAREC supported bilateral research initiative on resource use in rural Ethiopia and heavily involved in undergraduate teaching in environmental economics. Alemu Mekonnen is also involved in AERC activities, including teaching an elective course on environmental economics at the Joint Facility in Nairobi.

Also Adolf Mkenda, who graduated during 2001 returned to his home department at the University of Dar es Salaam in Tanzania.

Already in the selection process we give priority to those students who have solid links to credible institutions. We then encourage the students to travel home several times during their training in order to maintain contacts with their home departments and we encourage the selection of research topics that are relevant to their home context.

During 2001, the 1997-batch of students have worked on their theses while the second group (1999-batch) has been back home to prepare and collect data for their thesis work. These preparations include contacts with relevant institutions and identification of data sources. Even some collection of data occurred.

Over the past years, we have been able to train several people from the same departments. This implies that wherever this has occurred our PhD students return to a research environment with a number of researchers with similar backgrounds, which is stimulating to their work. We also encourage our candidates to develop their contacts with relevant capacity building projects such as the Lake Victoria initiative, the Central American capacity building program through CATIE and Bangladesh Environment Economics and Poverty Programme.

### 1.5 Supervision

Each student has a main supervisor, an assistant supervisor as well as external supervisors involved in specific chapters. The selection of main supervisor depends on the thesis topic chosen. Currently, the supervision is carried out by the following staff at EEU: Thomas Sterner, Olof Johansson-Stenman, Gunnar Köhlin, Fredrik Carlsson, and by guest professors with a long-term commitment to the program. So far, these professors have been Gardner

Brown, University of Washington, Henk Folmer, Wageningen Agricultural University, William F Hyde, CIFOR, Greg Amacher, Virginia Tech, Peter Parks, Rutgers University and Pricilla Cooke St Clair, Pacific Lutheran University, Randy Bluffstone, University of Redlands, Anders Skonhoft, Norwegian University of Science and Technology, Trondheim, and Mustafa Alam, Dhaka University. Professor Brown is currently the external professor mostly involved in supervision. He has also become involved in the Lake Victoria initiative that facilitates his supervision of Eseza Kateregga. This activity has been very successful in that many of the students have been able to gain insight in their particular research interests.

The programme is carried out in collaboration with the Beijer Institute. Professor Karl-Göran Mäler is active in guiding and advising all students. In addition all the PhD candidates were invited to a special supervision workshop at the Beijer Institute coinciding with its annual Board meeting. At this occasion the students received valuable comments from international experts such as Professors Partha Dasgupta, Elinor Ostrom and Brian Walker. Worth mentioning is the fact that Professor Walker, a leading expert in rangeland ecology, was the one who first conceived the idea of local wildlife management in Zimbabwe known as CAMPFIRE. This nation-wide project is the topic of the thesis by Edwin Muchapondwa, one of the students in

the programme.

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. Currently, the first batch of PhD students are in an intense phase where all four students are in the process of finalizing their theses and analysing their data from their field surveys. Two of these four have defended their licentiate papers<sup>1</sup>. The second batch of students are currently in varying stages of collecting data for their first set of papers. Concurrently, the new students have other needs for support. These students need to simultaneously initialise a research topic and conduct course work.

In addition to the regular supervision, the students have benefited from the academic environment of the large group of Swedish PhD students and researchers at EEU and the Beijer Institute. An evidence of this is a number of joint papers that have been initiated.

<sup>1</sup> These are Eseza Kateregga and Francisco Alpízar. The other two Hala Abou-Ali and Edwin Muchapondwa took their licentiate exam early in 2002.



The PhD students together with Prof. Mäler, Prof. Sterner, Dr. Walker and Prof. Starrett at the Royal Swedish Academy of Sciences, September 6th, 2001. Photo: Anna Sjöström

# What a Lovely Day!

Johan Colding, Dr., Researcher, The Beijer Institute

On a beautiful day in the middle of May my mother phoned me at the office of Beijer. She congratulated me to an award I did not know I had received. In fact, I mistakenly thought she was congratulating me for the FORMAS-grant I recently had obtained for my research, and thought she was a bit late in her greetings. When she told me she had read it in the press, I became a bit suspicious and asked her in what Swedish newspaper (because they normally do not announce research grants in the daily press!). Then she said something about the King and the Bernadotte Library and the Royal Castle, and how happy and proud she felt about me. My confused thoughts slowly began to unfold, like a flower opening its petals in the late afternoon: his Majesty King Carl XVI Gustaf of Sweden had awarded me! What a surprise! What a joy! What a lovely day!

When my former supervisor, Professor Carl Folke, over a Christmas lunch was told by Professor Margareta Ihse to turn my doctoral thesis in to the foundation known as *Stiftelsen Konung Carl XVI Gustafs 50-årsfond*, he did not immediately mention this to me. It was a week or so after the lunch at Stallmästaregården that he told me about it. Margareta had been present at my Ph.D.-dissertation last spring, as one of the three persons in the examining committee, and she had obviously liked my thesis. I never thought about it any more since the winter day we managed to send the papers in to the foundation, so I was of course both surprised and delighted when my mother brought forward the glad news. (I should mention, however, that a letter from the committee had been properly sent to me in due time, informing me about the award. However, I had not been emptying my mailbox at the university department for a while since I'm positioned at Beijer and only occasionally visit my former university address.)

The award ceremony took place on May the 30<sup>th</sup>. I was one of about twenty other fortunate scientists that had the honor of receiving the award from the hands of the king. More specifically, I received a check of 100.000 Swedish kronor. The Royal Swedish Academy of Sciences initiated this foundation, together with the Royal Swedish Academy of Agriculture and Forestry, the Royal Swedish Academy of Engineering Sciences and the Federation of Swedish Industries. At the ceremony, a witty King Carl XVI Gustaf,

told the prize-winners that "it was a long time ago" since the foundation was inaugurated – namely, at the time of his 50th birthday!

I was awarded this prize for my studies of social-ecological linkages in relation to the conservation of natural resources. Together with my two colleagues, Carl Folke and Professor Fikret Berkes of Canada, I have focused on the dynamics of local institutions, and in particular, on the dynamics of informal institutions in relation to ecosystem management in common property systems. Informal institutions, like for example social taboos, work for the protection of ecosystems and their biota among many indigenous peoples, but also among local communities of resource users in the Western world that manage natural resources together. Since transaction costs may be lowered by their use, informal institutions often play a key role in ecosystem management and nature conservation activities, although they have seldom been systematically analyzed and studied in this context.

My current research is taking place in the urban setting of Stockholm, and is related to ecosystem management of the National City Park of Stockholm, where I am involved in the Swedish contribution of the UN-supported program *The Millennium Ecosystem Assessment*. The National City Park hosts about 800 different plant species, 250 birds, as well as many keystones, mobile links, and threatened species. The 27 km<sup>2</sup> park is a witness of that city development and nature protection can go hand in hand, however urbanization pressure may pose threat to this delicate balance. Considering that 8% of the green areas have been lost in the Stockholm County during the 1970's and about the same proportion during the 80's and 90's, it is important to develop wise management strategies for the county's remaining green areas. In particular, land use and property rights changes over time need to be studied more closely. What social-ecological linkages, such as informal and informal institutions, are essential for efficient urban ecosystem management is one of the key focuses of my research associated with the National City Park?

I am deeply delighted that the King Carl XVI Gustaf share an interest in the kind of work I am involved. It demonstrates that the work of my colleagues here at Beijer, the department of Systems Ecology at the Stockholm University, and my international colleagues are not passing by unnoticed in Sweden. It was such a lovely moment

when my fiancée Elisabeth and I met with the King in the beautiful Bernadotte library at the Royal Castle where also the prize ceremony took place. Of course, I was nervous when going forward to receive the prize, but fortunately I

did not stumble. After the ceremony, Elisabeth and I went to the appropriately named restaurant Prinsen ('The Prince') and had a lovely dinner. It was, as you may imagine, a royal day in many ways, and certainly one of my most enjoyable!



Dr. Johan Colding receives prize from his Majesty King Carl XVI Gustaf of Sweden



# Report From My Visit to the Beijer Institute

**Per Fredriksson, Associate Professor, Southern Methodist University, Dallas, USA**

This is a report for my visit to the Beijer Institute at the Royal Swedish Academy of Sciences, May 13 – August 9, 2002

I had the opportunity to spend the summer of 2002 at the Beijer Institute. Karl-Göran Mäler kindly invited me to spend the summer in Stockholm, and Tore Söderqvist thankfully timed his leave of absence perfectly so that I could use his office while he was away. Anna Sjöström organized the practical details in an efficient manner.

I very much enjoyed my stay at the Beijer Institute. I consider it a very nice place to work, with an international and social group of Ph.D. students and other scholars. I had the opportunity to meet many new and interesting people, and we also spent many lunches at Lantis restaurant. I look forward to meeting the Beijer staff again, for example at future conferences. I was also able to participate in the last seminar of the spring. The atmosphere was very relaxed which of course facilitated the discussion

and the exchange of ideas.

I was able to pursue several research projects. These include the effect of corruption on energy use in OECD countries (with Elbert Dijkgraaf and Herman Vollebergh, Erasmus University, Rotterdam), and the effect of state ownership of news media on environmental policy outcomes (with Jakob Svensson, Institute of International Economic Studies, Stockholm University).

I feel I had a enjoyable (and productive) stay at the Beijer Institute. I thank Karl-Göran and the rest of the Beijer staff for the hospitality.

Stockholm in July 2002

PER FREDRIKSSON



Per Fredriksson while visiting the Beijer Institute in the summer of 2002.  
Photo: Anna Sjöström



# 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 tenth annual board meeting was held at the Institute, September 7, 2001.

### Board of Directors 2001-2002

#### CHAIRMAN

**BRIAN WALKER**

Dr., Sustainable Ecosystems, CSIRO, Australia

#### 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

**BERT BOLIN\***

Professor Emeritus, Department of Meteorology, Stockholm University, Sweden

**GEOFFREY HEAL**

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

**MICHAEL HOEL**

Professor, Department of Economics, University of Oslo, Norway

**JANE LUBCHENCO**

Professor, Department of Zoology, Oregon State University, USA

**ELINOR OSTROM**

Professor, Workshop in Political Theory and Policy Analysis, Indiana University, USA

**THOMAS ROSSWALL**

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

**DOMENICO SINISCALCO**

Professor, University of Milan, and Director of Fondazione Eni Enrico Mattei, Italy

**DAVID STARRETT**

Professor, Department of Economics, Stanford University, USA

\* members of the Royal Swedish Academy of Sciences, and working committee of the Institute.



Beijer Board 2001-2002. Back row: Erling Norrby, Bert Bolin, Thomas Rosswall, Michael Hoel. Front row: David Starrett, Elinor Ostrom, Karl-Göran Mäler, Jane Lubchenco, Brian Walker, Geoffrey Heal. Photo: Birgitta Sandell Weylandt

## STAFF MEMBERS

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

### Project Employed Staff

ANIYAR, Sara, Professor emerita, University of Zulia, Venezuela  
 COLDING, Johan, PhD, Stockholm University  
 CREPIN, Anne-Sophie, FL, Stockholm University  
 HUITRIC, Miriam, FL, Stockholm University  
 LERDA, Sandra, MSc, Swedish University of Agricultural Sciences, Uppsala  
 NORLING, Teresa, MSc, Research Assistant  
 NURHUSSEN, Filli, MSc, Swedish University of Agricultural Sciences, Uppsala  
 SCHARIN, Henrik, MSc, Swedish University of Agricultural Sciences, Uppsala  
 SOUTUKORVA, Åsa, MSc, Research Assistant

### VISITING SCIENTISTS AND GRADUATE STUDENTS

ANDERSSON, Jessica, MSc, Department of Economics, Göteborg University  
 BENGTSSON, Jan, Professor, Dept. of Ecology and Environmental Research, Swedish University of Agricultural Sciences, Uppsala, Sweden  
 FREDRIKSSON, Per, Assistant Professor, Department of Economics, Southern Methodist University, Dallas, USA  
 HONLONKOU, Albert, Dr., National University of Benin, Benin  
 UZAWA, Hirofumi, Professor, The Japan Development Bank, Japan  
 VAIL, David, Professor, Department of Economics, Bowdoin College, Brunswick, ME, USA  
 WALKER, Brian, Dr., Sustainable Ecosystems, CSIRO, Australia

## ADMINISTRATION

### Office location

The Institute is located in a wing of the early 20<sup>th</sup> 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 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 2001/2002 she has been responsible for the administration of the Board and Askö meetings in September 2001, the Teaching workshop in Zanzibar in September 2001, the Research seminar in Mexico in December 2001, the Research Seminar in South Africa in May 2002 and the planning meeting of the joint ICTP and Beijer programme in Namibia in May 2002. She is also dealing administratively with the RANESA and SANDEE Networks, the EDE journal, the coming handbook of Environmental Economics, and the joint Beijer Institute and ICTP programme.

### Anna Sjöström

Anna started to work at the Beijer Institute as an Administrator in October 2000. She is the webmaster for the Institute's 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 2001/2002 she was also involved in the planning of the Board and the Askö Meeting in September and the Beijer Teaching Workshop in Zanzibar, also in September 2001.

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

Anneli Aaltonen has worked part time with administrative matters.

### Library

The library is continuously upgraded, including subscriptions to scientific journals in ecology, economics, and other relevant natural resources and environmental sciences. Sara Aniyar has been responsible for the upgrading during the year. In addition, the Institute exchanges publication series with several research institutes, international organizations and university departments.

### **Investments**

During 2001/2002 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:

- The Abdus Salam International Centre for Theoretical Physics (ICTP)
- 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)

## **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 (SUCOZOMA)**

SUCOZOMA 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 Institute participates in SUCOZOMA together with Gothenburg University, Kristineberg Marine Research Station, Stockholm University and the Swedish National Board of Fisheries. See [www.sucozoma.tmbi.gu.se](http://www.sucozoma.tmbi.gu.se) for a detailed presentation of the whole research programme.

On 12-14 June, 2003, the Institute, SUCOZOMA and MISTRA will organize the multidisciplinary scientific conference "Rights and Duties in the Coastal Zone", to be held at the Royal Swedish Academy of Sciences. The conference is described in more detail earlier in this annual report, see also the conference website [www.beijer.kva.se/conference.htm](http://www.beijer.kva.se/conference.htm).

The Institute's research work in SUCOZOMA's first phase has been presented in earlier annual reports. The focus of the Institute's research project in the second phase of SUCOZOMA is economic valuation of coastal ecosystem services. Its main objective 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 SUCOZOMA 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. A case study will be recreational fisheries of pike and perch and habitats sustaining pike and perch populations in parts of the Stockholm Archipelago.
3. Economic valuation of improved coastal water quality; a case study in Bohuslän at 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 Institute's project team consists of Tore Söderqvist (project leader), Mikael Sandström (expert, Swedish Research Institute of Trade), Teresa Norling (research assistant), and Åsa Soutukorva (PhD student, research assistant).

**Marine Research on Eutrophication (MARE):  
A Scientific Base for Cost-Effective  
Measures for the Baltic Sea**

Eutrophication continues to be an environmental problem of special concern in the Baltic Sea region. Researchers from the Beijer Institute are involved in one of the subprojects on "Economic Valuation". The program is financed by MISTRA.

Professor Ing-Marie Gren, project leader, the Beijer Institute and the Swedish University of Agricultural Sciences (SLU), Henrik Scharin and Sandra Lerda, The Beijer Institute, Katarina Elofsson, Robert Hart, Håkan Holmgren, and Ficre Zehaie, all from SLU.

**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 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 Dep. Of Systems Ecology, SU; Tjärnö Marine Biological Laboratory, GU. Participants: Max Troell, Patrik Rönnbäck, Tore Söderqvist, Leif Pihl and Nils Kautsky.

**Fisheries Research Programme:  
An Ecosystem Approach to Sustainable  
Aquaculture Development and the Rebuilding  
of Capture Fishery Resources**

A research programme in fisheries has been developed in which a central theme is the interdependence between capture fisheries and aquaculture. We are still looking for funding for the programme. The Fisheries Research Programme has the following general objective: To undertake a research programme on the development of an ecosystem approach to the management of both capture fishery resources and aquaculture, leading both to the restoration and sustainable exploitation of hitherto overexploited capture fishery resources and to the sustainable development of aquaculture, which explicitly recognizes the interdependencies between capture fisheries and aquaculture. The research programme will, in addition, give particular recognition to the inherent and inescapable uncertainties in fishery resource management.

**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](http://www.resalliance.consecol.org)

**OTHER RESEARCH PROJECTS**

Besides the projects that constitute the Institute's research programmes, the Institute's staff is involved in a number of other research projects. A selection of initiated, ongoing and terminated projects during 2001/2002 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.

**Ecosystem services of coastal habitats for  
fisheries – an ecosystem approach to valuing  
and managing coastal habitats and fisheries in  
Sweden (FISHCASE)**

Tore Söderqvist and Teresa Norling, the Beijer Institute; Leif Pihl and Johan Stål, Kristineberg Marine Research Station; and Patrik Rönnbäck, 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.

**Ecological Valuation of the Swedish Environment: a Meta-Analysis**

Stina Hökby and Tore Söderqvist, the Beijer Institute.

**National Accounting and Environmental Resources**

Karl-Göran Mäler, the Beijer Institute.

**The Economics of Irreversible Changes in Eco-systems**

Karl-Göran Mäler, the Beijer Institute.

**Integrated Water Quality and Economic Modelling**

Ing-Marie Gren, the Beijer Institute, and Gia Destouni, Royal Institute of Technology, Stockholm.

**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 Crepin, the Beijer Institute

**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.

**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.

**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 teaching workshop on environmental economics held in Zanzibar, Tanzania, one research seminar in Celestun, Mexico, and one advanced workshop on Property Rights in Durban, South Africa were organised in 2001/2002.

**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 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, the Stockholm Environment Institute and Stockholm International Water Institute.

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 2001/2002 the following seminars were held at the Royal Swedish Academy of Sciences:

- 5 September 2001  
Dr. Brian Walker, Sustainable Ecosystems. CSIRO, Australia, Program Director of the Resilience Alliance, and Chairman of the Beijer Institute. "Analysing a Social-Ecological System for Resilience – The Basis of Sustainability".
- 22 October 2001  
Mr. Achim Steiner, Director General of the World Conservation Union (IUCN). "Partnership for Sustainable Resource Management".
- 6 December 2001  
Prof. J.E. Ong, Centre for Marine & Coastal Studies, Universiti Sains Malaysia, Penang. "Closing the Carbon Budget as a Means to Better Sustainable Mangrove Ecosystem Management".
- 13 December 2001  
Dr. Marco Janssen, Dept. of Spatial Economics, Vrije Universiteit, Amsterdam. "Sunk-cost Effects Made Ancient Societies Vulnerable to Collapse".
- 14 December 2001  
Dr. Bill Adams, Reader in Conservation and Development, Dept. of Geography, University of Cambridge. "Biodiversity, Community and Resources: Making Conservation Sustainable in Africa".
- 28 January 2002  
Prof. Margaret A. Shannon, Associate Professor,

State University of New York at Buffalo, School of Law, "New Principles of Environmental Governance: Challenges of Institutionalizing Emergent Processes".

- 22 May 2002  
Prof. Alexandre Kiss, University of Strasbourg, "Sustainable Development and the Environment: A Lawyer's Perspective".

### 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 Ninth Askö Meeting (8-9th of September) was: Indicators.

The consensus document from the eighth Askö Meeting "Genetic Diversity in Agriculture" has been accepted for publication in Resource and Energy Economics.

### 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 2001/2002.

#### SARA ANIYAR

Titular Professor at the University of Zulia, Maracaibo, Venezuela, Project employed researcher at the Beijer Institute.

RESEARCH FOCUS  
Economic Analysis of Ecosystems  
Green Accounting

AT BEIJER SINCE  
July 98



#### PAPERS AND PRESENTATIONS

- Impacts of Mangrove Forest reductions on the Fishermen's welfare. Paper presented in the IX Ulvön Conference, Sweden.
- Accounting for Oil. Presentation in the Workshop Putting Theory to Work: The measurement of Genuine Wealth. Held at the Stanford Institute for Economic Policy Research, April 2002.
- 2002 Accounting for Oil capital and Net Foreign Assets Position. An enlarged index of sustainability for the Venezuelan and Norwegian economies. Paper presented in the II World Congress in Environmental Economics. Monterey. USA, June 2002.

#### In preparation

- Accounting for Human Capital
- An economic-ecological simulation model of a mangrove ecosystem

#### TEACHING AND TRAINING

- Lecturer at the Beijer Training Course, in Zanzibar, Tanzania, September 2001
- Reviewer of two submitted papers to the Journal Environment and Development Economics
- Lecturer at the VIII Congress Inter Americano Sobre Medio Ambiente, Cima 2001, Talca, Chile.

### JOHAN COLDING

PhD, Project employed researcher

#### RESEARCH FOCUS

Local institutions, traditional resource management and urban ecology

AT BEIJER SINCE  
1995

#### PAPERS AND PRESENTATIONS

- Elmqvist, T., Folke, C. and Colding, J. 2001. Hållbar utveckling = ekologi + samhälle + ekonomi. Formas Tidning Miljöforskning Nr 5-6, December: 46-47.
- 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 Kasperson, 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.
- Berkes, F., J. Colding, and C. Folke, editors. In press. *Navigating Social-Ecological Systems: Building Resilience for Complexity and Change*. Cambridge University Press, U.K.
- Colding, J., Elmqvist, T. and Olsson, P. 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. In press.
- Colding, J., Folke, C. and Elmqvist. Submitted. Social institutions in ecosystem management and biodiversity conservation. Submitted as an invited feature to *The Journal of Tropical Ecology*.

#### Seminars and symposium presentations

- Presentation before directors of environment and planning and local government commissioner in the Stockholm County. Seminar topic: Järvafältet Ännu Bättre!? Eggeby gård, Stockholm.
- Presentation at the office for the environment, Solna townhall. "Vad vinner vi på arterna? Ekosystemtjänster, parker och ekodukter i urbana miljöer". Organizer: Miljökontoret SOLNA STAD.
- Invited speaker at the urban ecology seminar *Spridningsbarriärer och vandringshinder – kunskapsläge och praktiska lösningar*. Naturhistoriska Riksmuseet, March, 2002. Topic: Om stadsparken byggs in – vad händer med den biologiska mångfalden?: Internationella forskningsutblickar. Conference organisers: Naturhistoriska Riksmuseet and Stockholm Environmental Administration.
- Invited speaker at the Scandinavian Golfassociation subdivision, The Scandinavian Turfgrass Research Foundation. April 2002 at Losby G & CC, Oslo, Norway.

#### TEACHING AND TRAINING

- Traditional Resource Management. Lecture at the Ph.D course *Ecology and Environmental management (5p) 2001*. The Beijer Institute.
- Lecture at the Ph.D course *Urban areas in a globalized world: Social-ecological issues (3p)*. Department of Systems Ecology, Stockholm University in collaboration with Center for Natural Resources and the Environment, Stockholm University. November, 2000.
- Lecture at graduate course *Natural Resources and Society: Ecosystem Dynamics and Sustainability Science Course*. Department of Systems Ecology, Stockholm University in collaboration with Center for Natural Resources and the Environment, Stockholm

University. Spring 2001.

- Lecture on graduate course *Management of Aquatic Resources in the Tropics*. Department of Systems Ecology, Stockholm University. Sustainable management of natural resources in tropical forests: Traditional forms of natural resource management. Spring 2001.
- Lecture at graduate course *Natural Resources and Society: Ecosystem Dynamics and Sustainability Science Course*. Department of Systems Ecology, Stockholm University in collaboration with Center for Natural Resources and the Environment, Stockholm University. Spring 2002.
- Ph.D. course organizer, leader and lecturer of the course "Urban Areas in a Globalized World: Building Adaptive Capacity in Social-Ecological Systems" (3p). Organizer: Center for Natural Resources and the Environment, Stockholm University in collaboration with the Beijer Institutete. May 2002.

#### Supervision

- Project supervision on the course *Natural Resources and Society: Ecosystem Dynamics and Sustainability Science Course*. Department of Systems Ecology, Stockholm University. Spring 2002.
- Project supervision on the course *Management of Aquatic Resources in the Tropics*, Department of Systems Ecology, Stockholm University. Spring 2002.

Recipient of award from King Carl XVI Gustaf of Sweden, for studies on social-ecological linkages for the conservation of natural resources. Administrator: Stiftelsen Konung Carl XVI Gustafs 50-årsfond för vetenskap, teknik och miljö. May 30, 2002.



Anne-Sophie Crépin took her fil. lic. at the Department of Economics, Stockholm University, 9 November 2001. Here with supervisor Martin Dufwenberg. Photo: Sandra Lerda.

## ANNE-SOPHIE CRÉPIN

Research assistant, PhD student, Fil.Lic. (Economics)

#### RESEARCH FOCUS

Complex dynamics in resource economics / Land-use incentives

#### AT BEIJER SINCE

December 1996

#### PAPERS AND PRESENTATIONS

- 17<sup>th</sup> January 2002 Seminar on "Management models for multi-species boreal forests" at the Dept. of Forest Economics, Swedish University of Agricultural Sciences in Umeå, Sweden
- 14<sup>th</sup> March 2002 Seminar on "Fishing and nonlinear dynamics in coral reefs" at the Department of Economics, Göteborg University, Sweden
- 18-20 April 2002 Spring Meeting of Young Economists 2002 at the University of Paris 1 France, presentation of the paper "Threshold effects in fisheries - fishing on a coral reef"
- 17-19 June 2002 9th Ulvön Conference on Environmental Economics, Sweden, presentation of the paper "Management challenges for multi-species boreal forests"
- 24-27 June 2002 Second World Congress of Environmental and Resource Economists, Monterey California, presentation of the paper "Management challenges for multi-species boreal forests"

## CARL FOLKE

Research Fellow, the Beijer Institute, and Professor, Department 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. and C. Folke. 2002. Back to the Future: Ecosystem Dynamics and Local Knowledge. In: Gunderson, L.H. and C.S. Holling (eds.). *Panarchy; Understanding Transformations in Human and Natural*

- Systems. Island Press, Washington, DC. pp 121-146.
- Colding, J. and C. Folke. 2001. Social taboos: "Invisible" Systems of Local Resource Management and Biological Conservation. *Ecological Applications* 11:584-600.
  - Elmqvist, T., C. Folke and J. Colding. 2001. Hållbar utveckling = ekologi+samhälle+ekonomi. *Miljöforskning, Formas Tidning*.
  - Elmqvist, T., C. Folke, J. Colding, J. Lundberg and L. Wirén. 2002. Millennium Ecosystem Assessment. *Miljöforskning, Formas Tidning*.
  - Falkenmark, M. and C. Folke. 2002. The Ethics of Socio-Ecohydroecological Catchment Management: Towards Hydrosolidarity. *Hydrology and Earth System Sciences* 6:1-9.
  - Folke, C. 2001. Building Social-Ecological Resilience for Sustainability. In: Svedin, U. (ed.). *Human Dimensions of Global Environmental Change: Swedish Perspectives 2001*. Swedish Council for Planning and Coordination of Research, Stockholm.
  - 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. and T. Elmqvist. 2001. Resilience for a sustainable social, ecological, economic development. Document to the Swedish Ministry of the Environment/Division of International Affairs for the CSD 10 preparatory meeting for Johannesburg 2002, December 7, New York.
  - Folke, C., S. Carpenter, T. Elmqvist, L. Gunderson, C.S. Holling, B. Walker, J. Bengtsson, F. Berkes, J. Colding, K. Danell, M. Falkenmark, M. Moberg, L. Gordon, R. Kaspersson, N. Kautsky, A. Kinzig, S.A. Levin, K.-G. Mäler, L. Ohlsson, P. Olsson, E. Ostrom, W. Reid, J. Rockström, S. Savenije and U. Svedin. 2002. Resilience and Sustainable Development: Building Adaptive Capacity in a World of Transformations. Report for the Swedish Environmental Advisory Council 2002:1. Ministry of the Environment, Stockholm, [www.mvb.gov.se](http://www.mvb.gov.se) in preparation for the World Summit on Sustainable Development and also published in ICSU Series on Science for Sustainable Development No. 3, 2002. International Council for Science, Paris.
  - Huitric, M., C. Folke and N. Kautsky. 2002. Development and Governmental Policies of the Shrimp Farming Industry in Thailand in relation to Mangrove Ecosystems. *Ecological Economics* 40: 441-455.
  - Lambin, E.F, B.L. Turner II, H.J. Geist, S.B. Agbola, A. Angelsen, J.W. Bruce, O.T. Coomes, R. Dirzo, G. Fischer, C. Folke, P.S. George, K. Homewood, J. Imbernon, R. Leemans, X. Li, E.F. Moran, M. Mortimore, P.S. Ramakrishnan, J.F. Richards, H. Skånes, W. Steffen, G.D. Stone, U. Svedin, T.A. Veldkamp, C. Vogel, J. Xu. 2001. The Causes of Land-Use and Land-Cover Change: Moving Beyond the Myths. *Global Environmental Change* 11: 261-269.
  - Naylor, R, R. Goldburg, M. Troell, M. Beveridge, J. Clay, C. Folke, N. Kautsky, J. Lubchenco, H. Mooney and J. Primavera. 2001. Is Aquaculture a net loss? *Conservation Biology in Practice*, 2 (4) 20-21.
  - Nyström, M., and C. Folke. 2001. Spatial Resilience of Coral Reefs. *Ecosystems* 4:406-417.
  - Scheffer, M., Carpenter, S., Foley, J., Folke, C. and Walker, B. 2001. Catastrophic Shifts in Ecosystems. *Nature* 413:591-596
  - Yorque, R., B. Walker, C.S. Holling, L.H. Gunderson, C. Folke, S.R. Carpenter and W.A. Brock. 2002. Toward an Integrated Synthesis. In: Gunderson, L.H. and C.S. Holling (eds.). *Panarchy; Understanding Transformations in Human and Natural Systems*. Island Press, Washington, DC. pp 419-438.
- Selected seminars and symposium presentations
- Sub-global Assessment of the Millennium Ecosystem Assessment, Panama, June 11, 2002.
  - Marine Environmental Law Symposium, Stockholm University, Plenary presentation, May 24, 2002.
  - Kaeser Visting Scholar seminar, Zoology Colloquium, University of Wisconsin April 26 and Seminar at Center for Limnology, Wisconsin April 24, 2002.
  - Resilience Alliance, Chiang Mai, Thailand August 16, 2001.
  - Presentation of Resilience document at the conference Stockholm 30 years on hosted by the Swedish Prime Minister, The Parliament, Stockholm, June 18, 2002.
  - Presentation of Resilience document at Rosenbad, Swedish Environmental Advisory Council, 20 March, 2002
  - Swedish Institute for Ecological Sustainability seminar. FORMAS March 14, 2002.
  - WWF-30 club – Theme the Baltic. Swedish WWF, December 6, 2001.
  - Miljöfrågor och Miljökonsekvensbedömning. Sida Natur, Miljöpolicyenheten, November 29, 2001.
  - Urban ecology. Ministry of the Environment, November 27, 2001.
  - Preparing for Johannesburg 2002. Swedish Environmental Advisory Council, Rosenbad, October 24, 2001
  - Konferens om Forskning inom Arkitektur och Stadsbyggnad. Formas, September 6, 2001
- Selected commissions
- Editor-in-Chief; *Conservation Ecology* ([www.consecol.org](http://www.consecol.org)),
  - Book Review Editor; *Ecological Economics*.
  - Editorial and advisory board of 12 scientific journals including *Ambio*, *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, of the Royal Swedish Academy of Sciences, of the Scientific

Advisory Board of the National Center for Ecological Analysis and Synthesis (NCEAS), Santa Barbara, California, of the Scientific Committee of the International Human Dimensions Programme on Global Environmental Change (IHDP), an Scientific Advisor to the Millennium Ecosystem Assessment.

- 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

Efficient management and incentive mechanisms under conditions of uncertainty

AT BEIJER SINCE  
1991

#### PAPERS AND PRESENTATIONS

- Wulff, F., Bonsdorff, E., Gren I-M., Stigebrandt, A., and S. Johansson. Integrated management of the Baltic Sea. *Ambio* XXX(4-5):254-259, 2001.
- Gren, I-M, Russell, C., and T. Söderqvist. *The use of CBA analysis for complex ecosystem management*. In Dasgupta, P. Krström B Essays in honor of Karl-Göran Mäler. Edward Elgar, London, 2002.
- Gren, I-M., Destouni, G., and R. Temponi, Cost effective control of stochastic coastal water pollution. *Journal of Environmental Management*, forthcoming.
- Gren. I-M., *Permit market for stochastic water pollution: non-compliance and market structure*, Working Paper 7, Department of Economics, Swedish University of Agricultural Sciences, Uppsala, 2001.
- Gren, I-M., and H. Folmer. *Cooperation versus non-cooperation on international pollution: The case of the Baltic Sea*. Beijer Discussion Papers Series 136, Beijer International Institute of Ecological Economics, Royal Swedish Academy of Sciences, Stockholm, 2001.
- Carlsén, H., Drake, L., Eloffsson, K., Gren, I-M., and Pettersson, O.,. *Economics, environment and agriculture*. (in Swedish) SLU-Kontakt, 2002.
- Gren, I-M., *Värde av våtmarker*. i Carlsén, H., et al. Economics, environment and agriculture. (in Swedish)

SLU-Kontakt, 2002.

- Gren, I-M., *Ekologisk skattereform*. i Carlsén, H., et al. Economics, environment and agriculture. (in Swedish) SLU-Kontakt, 2002.
- Gren, I-M., *Differentierade eller enhetliga subventioner*. i Carlsén, H., et al. Economics, environment and agriculture. (in Swedish) SLU-Kontakt, 2002.
- Bonsdorff, E., Elmgren, R., Graneli, E., Gren I-M., Hagström, Å., Hansson, S., Larsson, P., Rahm L., Stihebrandt, A., and F. Wulff. *Vilseledande råd om Östersjön*. *Dagens Nyheter*, DNDebatt, February 29, 2002.

Seminars and symposium presentations:

- Costs of water regulation. Water Symposium, Stockholm, 2001

Commissions:

- Member of the committee evaluating the doctoral thesis "Fish resource and poverty in Zansibar", A. Nkemenda, Department of Economics, Gothenburg University, 2001.
- Opponent on the doctoral thesis "Economics of paper reuse", Ewa Samakovlis, Department of Economics, Umeå University, 2001.
- Member of the committee evaluation the doctoral thesis "Material flow analyses in technosphere and biosphere – metals, natural resources and chemical products", Viveka Palm, Royal Technical High School, 2002.
- Chair of the council of environmental account at Statistics Sweden
- Member of the committee for Phd program at SLU, Ultuna
- Referee for several journals.

TEACHING AND TRAINING

- 5 credit Phd course in environmental management
- 5 credit course at advanced undergraduate level in environmental regulation
- 4 completed master theses
- 1 completed doctoral thesis

### MIRIAM HUITRIC

PhD student at the Department 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

- Huitric M, Folke C and Kautsky N, 2002: Development, governmental policies and impacts of the shrimp farming industry on mangrove ecosystems of Thailand. *Ecological Economics* 40: 441-455.

#### Commissions:

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 Soederquist, the Beijer Institute, Antonia Sandman, Stockholm University.

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  
Beijer International Institute of Ecological Economics  
Professor, Marine Ecotoxicology,  
Dept. 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

- Hogstedt, C., A. Ahlbom, A Aragon, L.Castillo,

N.Kautsky, C.Lidén, I Lundberg, P.Sundin, M.Tedengren, Å.Thörn, C.Wesseling 2001. Experiences from long-term research cooperation between Costa-Rican, Nicaraguan, and Swedish institutions.- *Int.J.Occup.EnvIRON.Health* 7:130-135.

- Kautsky, N., C.Folke, P.Rönnbäck, M.Troell, M.Beveridge and J.Primavera (2001). Aquaculture. In: Encyclopedia of biodiversity Volume 1.pp. 185-197 (Ed. S.Levin et al.). Academic Press.
- 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.Kasperson, 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.
- Naylor, R., R.Goldberg, J.Primavera, N.Kautsky, M.Beveridge, J.Clay, C.Folke, J.Lubchenco, H.Mooney, M.Troell (2001). Is aquaculture a net loss? - *Conservation Biology In Practice* 2(4): 5-6.
- Buschmann, A.H., Troell, M., and Kautsky, N. (2001). Integrated algal farming: A review - *Cahiers Biologie Marine* 42(1-2): 83-90.
- 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.* (in press)
- 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* (in press)

#### TEACHING AND TRAINING

- Supervision and co-supervision of 2 Ph.D.students and 5 M.Sc students who graduated in 2001-2002.
- 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 and Wageningen Agriculture University.

Commissions etc.

- Member of programme committee of MASMA (Marine Science for Management in Western Indian Ocean) of WIOMSA/Sida program involving 11 African Countries
- Scientific Advisor to the International Foundation for Science (IFS)
- Scientific Adviser to the Swedish Society for Nature Conservation
- Opponent Ph.D.thesis of J.Kairo, Univ Brussels, External examiner 2 Indian Ph.D.theses

### SANDRA LERDA

PhD student at Swedish University of Agricultural Sciences, MSc (Economics)

RESEARCH FOCUS

Investment in Land Use for Pollution Abatement under Uncertainty

AT BEIJER SINCE

1999, as a PhD student, officially, as a research assistant, only since July 2001

PAPERS AND PRESENTATIONS

- "The Ecological Footprint Approach: a tool for sustainability?", Student papers from the PhD course on Ecology and Environmental Management, Beijer Occasional Papers. (Aug 2001) [www.beijer.kva.se/publications/occasional\\_papers](http://www.beijer.kva.se/publications/occasional_papers)
- "Reduction of Nutrient Load to the Baltic Sea in the context of an Extended European Union: Time Lags, Costs, and Benefits", paper for the MARE course, with Pia Ahnlund and Martin Isaeus, September 2001.

Seminars and symposium presentations:

- First Annual Meeting of IPEA/DIMAC, Rio de Janeiro, 23 and 24th August, 2001.
- "Investment in Land Use for Pollution Abatement Under Uncertainty", presentation at the 9<sup>th</sup> Ulvön Conference on Environmental Economics, 17-19 June, 2002, Ulvön, Sweden.

Courses:

- PhD course on Marine Eutrophication, Measures and Management, Askö, August 2001
- Urban Areas in a Globalized World: Building Adaptive Capacity in Social-Ecological Systems, KVA, May 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

- Mäler, K-G. (2001), Wealth and Well-being in a Model With Discrete Time, Beijer Discussion Paper Series No. 146. The Beijer Institute, Stockholm.
- Mäler, K-G. (2002), Are Social Welfare Functions Ordinal or Cardinal? Beijer Discussion Paper Series No. 148. The Beijer Institute, Stockholm.
- Arrow, K., G. Daily, P. Dasgupta, P. Ehrlich, L. Goulder, G. Heal, S. Levin, K-G. Mäler, S. Schneider, D. Starrett and B. Walker (2002), Are We Consuming Too Much?, Beijer Discussion Paper Series No. 151. The Beijer Institute, Stockholm.
- Xepapadeas, A., A. de Zeeuw and K-G. Mäler (2002), Feedback Equilibria for a Class of Non-linear Differential Games in Resource Economics. Beijer Discussion Paper Series No. 152. The Beijer Institute, Stockholm.
- Mäler, K-G. (2002), Environment, Uncertainty, and Option Values, Beijer Discussion Paper Series No. 153. The Beijer Institute, Stockholm.
- Dasgupta, P. and K-G. Mäler (2002), Wealth as a Criterion for Sustainable Development, *World Economics* Vol 2, No 3 (2001) pp. 19-44. (Also available as Beijer Reprint Series No. 158, The Beijer Institute, Stockholm).
- Brock, W.A., K-G. Mäler and C. Perrings (2002), Resilience and Sustainability: The Economic Analysis of Nonlinear Dynamic Systems, In: *Panarchy: Understanding Transformations in Human and Natural Systems* pp.261-289. Island Press, Covelo, USA. (Also available as Beijer Reprint Series No. 163, The Beijer Institute, Stockholm).

Seminars and Symposium Presentations

- Contributing lecturer at "Två Timmar om Tid", Centrum för Naturresurs- och Miljöforskning, Stockholm University, 24 January, in Swedish.
- Lecturer at the VIII Congress Inter Americano Sobre Medio Ambiente, Cima 2001, Talca, Chile.
- Lecturer at Workshop at Stanford University, USA, April 2002.
- Lecture at Abdus Salam International Centre for Theoretical Physics, 2002 in Trieste, Italy.

## TEACHING AND TRAINING

- Teaching at the RANESA Workshop held 12-15/8, 2001 at Zanzibar, Tanzania.
- Teaching at the Beijer Teaching Workshop held 17-28/9, 2001 at Zanzibar, Tanzania.
- Teaching at the Beijer Research Seminar held 14-16/12, 2001 at Celestun, Mexico.
- Teaching at the SANDEE Workshop in: CGE Modeling held 23/2-3/3, 2002 at Bangkok, Thailand.
- Teaching at the Beijer Advanced Workshop in: Property Rights held 27-31/5, 2002 in Durban, South Africa.
- Organiser and lecturer in advanced course in Environmental Economics for PhD students, held 23/1-12/6 2002 at the Beijer Institute, Stockholm.

## Commissions

- Member of the Royal Swedish Academy of Sciences since 1981.
- Member of the Board of Directors of Resources for the Future (RFF)
- 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.

**TERESA NORLING**

Research assistant, MSc (Economics)

## RESEARCH FOCUS

Economic valuation of environmental quality/ecosystem services.

AT BEIJER SINCE  
March 2002.

**HENRIK SCHARIN**

## RESEARCH FOCUS

Cost-effectiveness in pollution abatement and policy instruments.

AT BEIJER SINCE  
April 1998

## PAPERS AND PUBLICATIONS

- "Nutrient Management of Coastal Zones: a case study of the nitrogen load to the Stockholm

Archipelago", *Water Science & Technology* 45(9) pp 309-315 © IWA Publishing 2002

## Seminars and symposium presentations:

- "Dagens subventions- och avgiftssystem, ett slöseri med resurser? Vattendagarna 2001, Våtmarker i land och i stad, nödvändiga byggstenar i fungerande avrinningsområden. 20-21 november, Hotel Tylösand, Halmstad
- "Net-Gains of an Efficient Allocation of Abatement Measures in improving the Environmental State of Coastal Zones: A study of the nitrogen Load to the Stockholm Archipelago" 2<sup>nd</sup> world Congress of Environmental and Resource Economists, Monterey, CA USA, June 24-27, 2002.

**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

**TORE SÖDERQVIST**

Research Associate, PhD (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 [www.beijer.kva.se/staff/tore/tore.html](http://www.beijer.kva.se/staff/tore/tore.html)

AT BEIJER SINCE  
1996.

## PAPERS AND PRESENTATIONS

## 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* subject to minor revision. Revised version submitted 17 June 2002.

- Hökby, S., Söderqvist, T. Elasticities of demand and willingness to pay for environmental services in Sweden. Accepted for publication in *Environmental and Resource Economics* subject to revision. Revised version in preparation.
- 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* subject to revision. Revised version submitted 1 Oct. 2001.
- Lewan, L., Söderqvist, T., Knowledge and recognition of ecosystem services among the general public in a drainage basin in Scania, Southern Sweden. Accepted for publication in *Ecological Economics*.
- Söderqvist, T., Constructed wetlands as nitrogen sinks in Southern Sweden: an empirical analysis of cost determinants. Accepted for publication in *Ecological Engineering*.
- Hammer, M., Söderqvist, T., 2001. Enhancing transdisciplinary dialogue in curricula development, *Ecological Economics* 38, 1-5.

#### Seminars and symposium presentations:

- Elasticities of demand and willingness to pay for environmental services in Sweden, seminar at Department of Economics, Swedish University of Agricultural Sciences, Uppsala, 23 Jan. 2002.

#### TEACHING AND TRAINING

- Co-organizer and lecturer, advanced undergraduate course in Economic Valuation of Environmental Change, Department of Economics, Swedish University of Agricultural Sciences, September-October 2001.
- Contributing lecturer at various courses at the Department of Systems Ecology, Stockholm University.
- Supervision of BSc and MSc students at Stockholm University.

#### Commissions:

- Member of the committee evaluating the Ph.D. thesis "Dynamic modelling of environment and economy" by Rob Hart, Department of Economics, Swedish University of Agricultural Sciences, Uppsala, 15 March, 2002.

#### Other:

- Financial controller at the Beijer Institute.

## MAX TROELL

Research Associate, PhD (Ecology)

#### RESEARCH FOCUS

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

My work focuses on investigating linkages between capture fisheries and aquaculture, identifying externalities associated with aquaculture production. I also work with estimating ecological basis for valuation of mangrove ecosystems and how shrimp aquaculture is looked upon from this perspective. Further focus is on ecological engineering and linkages between biodiversity in coastal habitats and generation of ecosystem goods and services.

AT BEIJER SINCE  
1998

#### PAPERS AND PRESENTATIONS

- Halling, C., G. Aroca, A. Buschmann and M. Troell. (submitted). Cultivation of spores for increased production of *Gracilaria chilensis* in an integrated seaweed and fish cage culture. *J. of applied phycology*.
- Naylor, L., R. J. Goldberg, M. Troell, M. Beveridge, J. Clay, C. Folke, N. Kautsky, J. Lubchenco, H. Mooney & J. Primavera. (2001). Is Aquaculture a net loss? *Conservation biology in practice*, vol. 2, no. 4.
- Troell, M., L. Deutsch, P., Rönnbäck, C. Folke and N. Kautsky. (2002). Misperception: Assumption and application of the EF. Beijer Discussion Paper Series No. 150, pp. 10.
- Chopin T., A. Buschmann, C. Halling, M. Troell N. Kautsky, A. Neori, G. Kraemer, J. Zetuche-Gonzalez, Yarish, C. and C. Neefus. (2002). Integrating seaweeds into aquaculture systems: a key towards sustainability. *J. of Phycology*, 37:975-986.
- Troell, M., C. Halling, A. Neori, A. H. Buschmann, T. Chopin, C. Yarish, and N. Kautsky. (In revision). Integrated Mariculture: Asking The Right Questions. *Aquaculture*
- 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. *Environment, Development and Sustainability* (in press).
- 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* (in press).
- Rönnbäck, P., M. Troell, T. Zetterström and D.E. Babu. (re-submitted). Shrimp Hatcheries in Andhra Pradesh, India- Why is the Industry Dependent on Mangrove

Preservation? *Environmental Conservation*.

#### TEACHING AND TRAINING

- Teaching and supervising students- 10 credit C-level graduate course (Tropical ecology; Management of aquatic resources in the tropics) Dep. of Systems Ecology, Stockholm University and Swedish University of Agricultural Sciences, Uppsala.
- Course leader and lecturer on course: Marine and Brackish water ecology, Stockholm University.
- Ongoing supervision of 2 PhD students at Department of Systems Ecology, Stockholm University.

#### Seminars and symposium presentations

- SEPA, workshop on indicators for biodiversity, September 2001, SEPA Stockholm.
- Invited speaker at 18<sup>th</sup> Congress of the Phycological Society of Southern Africa.. January 2002.
- Invited speaker to workshop on "Management of Aquaculture effluents. Oceanic Institute, Hawaii. June 2002.
- Participating in a conference on EC 6:th framework program, arranged by FORMAS, EU-FoU-rådet and SEPA. May 2002.

#### Commissions:

- Referee work during the report period: Journal of Aquaculture; Environmental Management; Aquaculture research; Conservation Ecology.
- Member of evaluation committee for Licentiate defences (2) at Systems Ecology, Stockholm University
- Member of steering group for a recent (2001) established SEPA financed program- Marine biodiversity, patterns and processes (MARBIPP).
- Evaluating grant applications for IFS (International Foundation for Science).
- Referee for research grant applications WIOMSA / MASMA PROGRAMME (2001-2003)
- Supervision of Master and Bsc students at Stockholm and Gothenburg University
- Member of evaluation committee for Licentiate in Philosophy defences, Stockholm University: Sara Gräslund The use of chemicals in southeast Asian shrimp farming, trends and potential risks for environment and human health, April 2002.
- Eva Blidberg – Ecophysiological studies on giant clams (Family: Tridacnidae). June 2002.

#### Project participation:

- Swedish co-ordinator for INCO-DC project: Assessment of mangrove degradation and resilience in the Indian sub continent- the cases of Godavary estuary and south west coast of Sri Lanka.
- Swedish co-ordinator for joint bilateral research programme: Integrated culture of abalone and seaweed in land-based systems. Sida/SAREC contract no: SPR-2000-052/7500714221

- Ecological Engineering in Aquaculture- a joint study in co-operation with University Los Lagos, Chile.
- An Ecosystem Approach to Sustainable Aquaculture Development and the Rebuilding of Capture Fishery Resources. Participating in development of a fishery program where the institute may play an active role in the development of a project framework.
- MARBIPP. Together with colleagues from Beijer and Dep. of Systems Ecology participating in a 5 years SEPA financed program aiming at increasing our knowledge about and develop management guidelines for coastal zone biodiversity. Our main responsibility is to map and value goods and services produced by marine ecosystems and relate these to biodiversity.

#### Others:

Helping with www-pages at the Institute, purchasing technical equipment and supporting role in network and computer issues.

## 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 2001/2002 the following books were produced:

*Panarchy: Understanding transformations in human and natural systems.* Eds. Gunderson, Holling and Peterson. Island Press, Covelo, CA, USA.

*Navigating Nature's Dynamics: Responding to Change in Social-Ecological Systems.* Eds. Folke, C., Berkes, F. and J. Colding. Cambridge University Press, U.K. *Available in December 2002.*

*Resilience and the Behavior of Large-Scale Systems,* Eds. Lance H. Gunderson and Lowell Pritchard Jr. Island Press, Covelo, CA, USA.

### 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 may earlier have appeared as DISCUSSION PAPER. The total number of reprints since 1991 is at present 170, of which 16 were produced during 2001/2002.

The BEIJER DISCUSSION PAPER SERIES constitutes a forum for unpublished scientific papers whose content should be subject to discussion and comments. 163 DISCUSSION PAPERS have been produced since 1991, and 19 during 2001/2002.

BEIJER OCCASIONAL PAPERS is a forum intended for policy documents, workshops proceedings, etc.

### DISCUSSION PAPERS

145. Infrastructure and Economic Development  
Hirofumi Uzawa. 2001.
146. Wealth and Well-being in a Model With Discrete Time  
Karl-Göran Mäler. 2001.
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## A CHRONOLOGY OF BEIJER EVENTS 1 JULY 2001 – 30 JUNE 2002

### THE YEAR OF 2001

- 7/9 The Beijer Board Meeting, The Royal Swedish Academy of Sciences
- 8-9/9 The 9<sup>th</sup> Askö Meeting, Stockholm Centre for Marine Research, the Askö Laboratory
- 2-3/8 Meeting at The Abdus Salam International Centre for Theoretical Physics, Trieste, Italy
- 12-15/9 RANESA Workshop, Zanzibar, Tanzania
- 17-28/9 Beijer Training Workshop, Zanzibar, Tanzania
- 15/10 Workshop: Economic valuation of fisheries, The Beijer Institute, The Royal Swedish Academy of Sciences
- 14-16/12 Beijer Research Seminar: Celestun, Mexico

### THE YEAR OF 2002

- 19-21/1 Planning Meeting, The Abdus Salam International Centre for Theoretical Physics, Trieste, Italy
- 23/1-12/6 Advanced course in Environmental Economics for PhD students, the Beijer Institute, The Royal Swedish Academy of Sciences.
- 23/2-3/3 SANDEE Workshop: CGE Modeling, Bangkok, Thailand
- 13-17/5 PhD course “Urban Areas in a Globalized World: Building Adaptive Capacity in Social-Ecological Systems”, The Royal Swedish Academy of Sciences.
- 28-30/5 Workshop: “Property Rights”, Durban, South Africa.
- 17-28/9 Beijer Training Workshop: Zanzibar, Tanzania
- 2-5/6 Planning Meeting for ICTP cooperation, Namibia.