

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.

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EDITORIAL

Thanks to all the contributors, who made the 2004/2005 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

> Publications A Chronology of Beijer Events

Director's Column

Karl-Göran Mäler, Director, The Beijer Institute

This year is the last year of formal cooperation between ICTP, The Beijer Institute, and FEEM. We have for three years been developing programs for capacity building in environmental economics in poor countries, research on climate, research on nonconvex dynamics in ecosystems and spatial dynamics. These years have been very productive and very enjoyable. I wish to thank, first of all the previous director of ICTP, Miguel Virasoro, for his constant support and genuine interest in what we were trying to achieve, to the present director, Katepalli R. Sreenivasan for his support and interest in the EEE program, to Carlo Carraro who has taken the responsibility to be the local contact person when crisis has been seen on the horizon, but in particular to Monica Eberle, who has been a fantastic person to work with. Thank you all.

t is always a bit nervous to be evaluated. In particular, if you are subject to a scientific evaluation which will determine whether you will be able to continue with your work in the future, you always have reasons (perhaps more mental than real) to be nervous, even if you know that the evaluators are professionals. The Royal Swedish Academy of Sciences has decided to evaluate the performance of all its institutes and the first to be evaluated was the Beijer Institute. The evaluation group consisted of Professors Gardner Brown, Hal Mooney, Jason Shogren. The group was provided with written material (research reports, books, etc.) in advance and they spent three days in Stockholm reading, interviewing staff at the Institute and writing a report. The main question was of course whether they would recommend that the Academy should plan for a continuation of the Institute after my retirement and after the end of the contract with the Beijer Foundation. The term of that contract ends in the end of 2006.

The evaluation committee recommended very strongly that the Institute should be continued and with the same primary mission – to integrate ecology and economics.1 It is now up to the Academy to decide whether it wants to follow this advice and renegotiate the contract with the Beijer Foundation for an extension of the present cooperation. The formal decision by the Academy will probably be in November. Given the evaluation report, I



Karl-Göran at Abisko, September 2004. Photo: Jane Lubchenco.

would be very surprised if the Academy would not decide to continue the Institute.

Given that the Academy decision is for prolongation of the Institute, it has to start immediately to search for a new director. I am due to retire in the end of March next year but have told the Academy that I am willing to continue as acting Director until a new person can take up that duty. That probably means that I will be around to the end of next year. Perhaps I have to write my final director's column next year.

Hand In Tela

KARL-GÖRAN MÄLER DIRECTOR

Chairman's Report to the Board

Ecological Economics and the Resilience of Ecosystem Services

Steve Carpenter, Chairman, the Beijer Institute and Professor Centre of Limnology, University of Wisconsin

The Millennium Ecosystem Assessment (MA; http:// www.MAweb.org) evaluated global conditions and trends of 24 ecosystem services. Among these were provisioning ecosystem services (such as food and fiber production), regulating ecosystem services (such as water purification or climate regulation) and cultural ecosystem services (such as the contributions of ecosystems to education, recreation or spiritual renewal). The MA found that 15 of the 24 ecosystem services were being degraded or used unsustainably. Also, many of the direct drivers of degradation (such as nutrient pollution, climate change, habitat change, and invasions of exotic species) were intensifying. This suggests that ecosystem degradation could get worse in the future. However, indirect drivers (the social trends that affect the direct drivers) show more

complex patterns and their impact is not always easy to predict. For example, the proportion of people living in poverty has declined (though the absolute number of impoverished people has not), more people live in democratic or semi-democratic regimes, armed conflict is decreasing in frequency, and postmaterialistic values are spreading in some regions of the world. These and other complex patterns make it hard to see the future paths of ecosystem services.

To organize the plausible futures of ecosystem services, the MA developed four scenarios (see illustration). Each scenario uses its own internallyconsistent set of changes in drivers, and develops the logical consequences for ecosystem services until 2050. In three of the four scenarios, there were some



Four scenarios for ecosystem services. *TechnoGarden* emphasizes the benefits and risks of green technology in a rapidly globalizing world. *Adapting Mosaic* explores the advances and setbacks that accompany a focus on local and regional adaptive management of natural capital, in a networked world. *Order from Strength* illustrates the consequences of focusing on national security in a world where globalization of the economy is slow. *Global Orchestration* shows the possibilities of a world with low barriers to globalized trade and emphasis on building social and human capital.

Illustrations by Pille Bunnell for the Millennium Ecosystem Assessment; used by permission.

improvements in some ecosystem services. This outcome indicates that all is not "doom and gloom"; there are policies and practices that can improve ecosystem services in the future. All of these policies and practices are in use somewhere in the world today, but none have been widely adopted globally. Therefore, substantial changes in policies worldwide would be needed to achieve the benefits anticipated by the scenarios. Examples of polices that improved ecosystem services in the scenarios are

- Major investments in public goods (e.g. education, infrastructure) and poverty alleviation
- Elimination of trade barriers and subsidies that distort pricing of ecosystem services
- Widespread use of actively adaptive ecosystem management to build resilience of socialecological systems
- Investment in technologies to use ecosystem services more efficiently
- Widespread inclusion of ecosystem services in markets

Principles of ecological economics played an important role in the scenarios. The scenarios suggest important benefits from expanded use of economic instruments and market-based approaches for decision-making about ecosystem services. Examples include mechanisms for expression of consumer preferences (e.g. certification schemes for organic produce or sustainably-produced fish and forest products), payment for ecosystem services (such as Costa Rica's *Pago por Servicios Ambientales*, which brokers payments for sequestered carbon, biodiversity, watershed services and scenic beauty), and taxes or user fees for externalities (such as taxes on excessive use of nutrients).

The scenarios also show that measures to conserve natural resources are more likely to succeed if local communities are given appropriate property rights, share the benefits, and are engaged in decisions. Even today's technology and knowledge can reduce considerably the human impact on ecosystems. However, this information is not yet fully deployed, and is unlikely to be used to its potential until the full value of ecosystem services is taken into account. At present, ecosystem policy is too often trapped in maladaptive practices.

The problem, then, is how do we get there from here? The changes envisioned in the MA scenarios imply sweeping transformations of society's approach to building natural, social, human and manufactured capital — in short, building global inclusive wealth. Transformation will involve breaking down old, maladaptive systems and creating new ones that foster resilient ecosystem services. History suggests that social-ecological systems have sometimes transformed — reorganized completely new ways of living — in times of great turbulence. MA results show that such a transformation is needed now. Fundamental understanding of transformation in social-ecological systems, including the assimilation of ecological economic principles into policy, has never seemed more urgent.

Inclusive Wealth and Accounting Prices (IWAP)

Karl-Göran Mäler, Director, The Beijer Institute

IWAP stands for two different but related activities. First it is an abbreviation of an international network on applied work on inclusive wealth and accounting prices but it is also the name of a Swedish project within that network.

The Swedish IWAP project aims at estimating accounting prices for "all" productive assets in the Stockholm County in order find the change over time of wealth, measured with these accounting prices. We have during this year started with a very serious mapping of the major ecological assets and started assessing their accounting prices. We have also laid the theoretical foundation for estimating changes in human capital. Finally we have estimated accounting prices for produced capital (remember that produced capital in the national accounts are by definition equal one, but that does not take into account taxes on capital income not the possible negative externalities from produced capital). The network has expanded much during the last year through expansion mainly in Africa where RANESA has made a serious start on accounting for natural capital in quite many countries. This is described in more detail in Dr. Rashid Hassan's report on RANESA and CEEPA elsewhere in this annual report. The Australian project in Goulburn-Broken Catchment, Victoria is proceeding along plans. One particular problem encountered has been how to value resilience. Their problem is that the water table is to large extent a stochastic variable. If the water table moves to close to the root zone of the cultivated plants, these will die (the ground water is saline). Today, there seems to be enough resilience (distance from the root zone to the water table) and no problems are encountered. But with heavy rains or failure in the pumps, the whole area used for cultivating diary crops may be destroyed. The risk of this depends on the resilience. What is the value of that resilience? We have now developed a framework to analyze this question (Mäler, Li, Destouni 2005), a framework that also will be applied to salt water intrusion in fresh water wells in the Stockholm Archipelago.

Some Findings from Beijer's Research in SUCOZOMA

Tore Söderqvist, Associated Professor and Researcher, The Beijer Institute

The second and final phase of the multidisciplinary programme research Sustainable Coastal Zone Management (SUCOZOMA) came to an end in 2004. SUCOZOMA started in 1997 and the Beijer Institute has participated in the programme together with Göteborg University, Kristineberg Marine Research Station, Stockholm University and the Swedish National Board of Fisheries. The programme was funded by the Swedish Foundation for Strategic Environmental Research (MISTRA), and the Beijer Institute received about SEK 500,000 per year (about USD 70,000 per year), or SEK 2.7 million in total. In addition, separate funding to Beijer made it possible to organize the scientific conference Rights and Duties in the Coastal Zone at the Royal Swedish Academy of Sciences in June 2003, see Sjöström (2004) for proceedings. Some main scientific results from the whole programme were recently reported in a special issue of Ambio (Vol. 34, No. 2, March 2005), and publication lists for all SUCOZOMA projects are available from www.sucozoma.tmbl.gu.se.

s regards the research carried out at Beijer, a significant part of this work was about economic valuation of environmental improvements in the Swedish coastal zone. I believe it is fair to say that this valuation work constitutes the most detailed research on the benefits of coastal environmental improvements ever undertaken in Sweden. The funding to Beijer also contributed to Ph.D. theses by Monica Campos, Rob Hart and Henrik Scharin (Swedish University of Agricultural Sciences) and Therese Lindahl (Stockholm School of Economics). The main results from the valuation work are summarized below, and the text draws heavily on Söderqvist et al. (2005).

Ecosystem goods and services in the Swedish coastal zone include highly tangible natural resources such as fish for commercial or recreational fisheries, or less tangible services such as fish recruitment opportunities provided by marine habitats, or environmental amenities such as recreational opportunities, bathing water quality and attractive areas for housing. In Sweden and most other industrialized countries with coastal areas, some coastal ecosystem goods and services are subject to increasing scarcity, implying different types of conflicts.

Their increasing scarcity makes it important to investigate the significance of these ecosystem goods and services for people's well-being. Welfare economics theory suggests that changes in well-being can be measured as economic values as revealed by people's trade-offs between scarce resources. So environmental change manifested in, for example, an increased supply of an ecosystem service - involves an economic value (might also be called benefits) as soon as people are willing to make trade-offs between such a change on one hand, and other resources, such as income or time, on the other hand. These trade-offs are typically measured as people's willingness to pay (WTP) for environmental improvements or for avoiding environmental damage. To estimate these values might contribute to a sustainable development by assisting decision-making in at least three ways: (i) through inclusion in cost-benefit analyses (CBA), whose purpose is to reach a judgement whether a suggested (or realized) activity is (was) economically gainful to society or not; (ii) through adjusting national accounts, which might result in "green GDP" indicators; and (iii) through indicating what is proper pricing of ecosystem services in terms of levels of environmental charges and green taxes.

Case studies in SUCOZOMA have made use of revealed preferences methods, such as the travel cost method (TCM), as well as stated preferences methods such as the contingent valuation method (CVM), for estimating the economic value of coastal ecosystem services. See Söderqvist et al. (2005) for a discussion of the methods in a SUCOZOMA context and Freeman (2003) for a general exposition. Results from three case studies are summarized below. A fourth case study reported in Söderqvist et al. (2005) on the economic value of water quality improvements at the Swedish Westcoast was carried out by researchers at Göteborg University, see Eggert and Olsson (2003) for details. See, e.g., Ledoux and Turner (2002) and Sundberg and Söderqvist (2004) for references to other valuation studies on coastal ecosystem goods and services.

The economic value of an improved bathing water quality in the Stockholm Archipelago

The benefits to Swedes from reduced eutrophication effects in the Baltic Sea have been estimated from both regional and international perspectives (Gren et al. 1977, Frykblom 1998, Hökby and Söderqvist 2003). This case study is a regional study on the Stockholm Archipelago and is the most detailed one available from a CBA perspective. The boxes in the upper part of Figure 1 give the background to this study. If there is a change in nutrient emissions in the catchment area of the archipelago, this influences the nutrient load to the sea. However, the impact on the load is dependent on where the emission reduction takes place. If it takes place in a sewage treatment plant situated on the coast, the reduction in load is equal to the reduction in emissions. If an inland measure is taken, part of the effect is lost, due to nutrient retention processes in the drainage basins. That is, the reduction in load will be less than the reduction in emissions. If the nutrient load is reduced, a decreased nutrient concentration in the coastal water can be expected, which in turn is needed for reducing eutrophication effects. The crucial economic question to be answered is whether the benefits of reduced eutrophication effects are large enough to outweigh the costs associated with the measures that are needed for accomplishing the reduced eutrophication effects.



Figure 1. The Stockholm archipelago study (Δ =change in).

In the Stockholm Archipelago study, this question was approached by specifying a particular environmental improvement: a one-metre increase in the average water transparency during the summer, cf. Figure 1. At least in the inner parts of the archipelago, such an improvement would be noticed by recreationists. Historical relationships between nutrient concentration and water transparency in the archipelago suggest that at least a 30 per cent reduction of nitrogen concentration is needed to accomplish the one-metre improvement (Färlin 2002). To conclude what reduction in nitrogen load is required for accomplishing this reduction is tricky for an archipelago area, but an estimated load-concentration function for the Baltic Sea suggests that a minimum of a 40 per cent reduction in nitrogen load is needed (Wulff 2000). This minimum figure corresponds to an annual reduction of the nutrient load to the archipelago amounting to 2725 tonnes (Scharin 2003, 2004). Such a reduction can be realized in many different ways, but the study aimed at identifying the particular combination of measures that would accomplish the 40 per cent reduction in nitrogen load to the lowest costs. The total costs of such a costeffective combination of measures were estimated to be SEK 57 million per vear (Scharin 2003, 2004). The measures were increased sewage water treatment and, to a considerably less extent, reduced fertilizer use.

What about the benefits? Recreational benefits were estimated by a TCM study for estimating people's demand for recreation in the archipelago, with water transparency as one of the explanatory variables (Soutukorva 2005). The presence of other benefits than recreational ones was captured by a CVM study, where people's WTP for a nutrient abatement programme that would give a one-metre increase in water transparency was estimated (Söderqvist and Scharin 2000). Data for the benefit studies were collected by two mail questionnaires to a total of 5500 randomly selected adults living in the counties of Stockholm and Uppsala. Conservative estimates from the studies for the benefits of a one-metre increase in water transparency were SEK 60 million per year (TCM) and SEK 500 million per year (CVM).

While the estimated least total costs are about the same as the estimated recreational benefits, they are considerably lower than the broader benefits as estimated by CVM. This suggests that it would be profitable to society to reduce the nutrient load enough to generate the one-metre increase in water transparency.

The economic value of improved recreational fisheries in the Stockholm Archipelago

Surveys show that some aspects of the economic values of Swedish coastal recreational fisheries have been relatively well studied (Paulrud 2004). However, so far there are very few attempts to link benefit estimates to the underlying ecosystem support to fish reproduction. This might be a serious weakness, since it reduces the potential to make use of the benefit estimates in a CBA setting. For example, the social profitability of projects aiming at increasing the fish stock by restoring or protecting spawning and nursery areas can only be assessed if the benefits of the results (increased catch rate due to a bigger fish stock) can be compared to the costs of measures causing these results.

A major problem in accomplishing such a linking between benefits and costs is that there is seldom sufficient quantitative natural scientific knowledge of relationship between habitat quality and quantity, fish recruitment and fish stocks. One main explanation is the fact that many fish species are not completely dependent on a particular habitat. However, relatively stationary species such as perch and pike might be suitable for a linking. A TCM study on recreational fishing in the Stockholm Archipelago with the aim of not only valuing a bigger fish catch, but eventually also the underlying increased ecosystem support necessary for accomplishing this increase, was therefore initiated.

The TCM study requires information on travel behaviour in the archipelago, i.e. sites visited by respondents, the distance travelled, travel time, travel costs, catch rates etc. This information was gathered in questionnaire surveys in 2002 and 2003, see Soutukorva and Söderqvist (2005) for details. The questionnaire was sent by mail to 500 randomly selected members of the Swedish Association for Recreational Anglers (Sveriges Sportfiskeoch Fiskevårdsförbund) living in Stockholm County or the adjacent Uppsala County. This was done every third month during 12 months to gain information on potential seasonal differences. Another, less detailed, questionnaire was sent to 2000 randomly selected adults living in Stockholm and Uppsala counties.

Data are used for estimating models describing the influence of explanatory variables on the probability that an angler selects a particular fishing site (Olsson et al. 2005). Individual fishing sites were allocated in archipelago zones according to a distance matrix for places in Stockholm County. Table 1 presents results for a conditional logit model for selection of fishing zones in the spring. It includes seven zone-specific explanatory variables: catch in kg per fishing hour for perch, pike, pike-perch, sea trout and herring respectively (positive and significant influence on selecting a fishing zone except for pike catch, which is not significant), travel cost including the cost of time in SEK (negative and significant influence), and accessibility in terms of the number of jetties used by public transportation boats (positive and significant influence).

These results can be used for, inter alia, estimating the WTP for an increased catch per fishing hour for different fish species. As one example, the WTP for doubling the sample average spring catch per hour of perch from 0.8 kg to 1.6 kg amounts to SEK 56 per angler. Such benefit estimates can be compared to the costs for measures that

| Table 1. Descriptive statistics for zone-specific explanatory vari- ables, and estimation results for the conditional logit model of the probability for selecting a recreational fishing zone in the spring. | | | | | | | | | | |
|---|---|--|---|--|--|--|--|--|--|--|
| Explanatory variables | Mean | Standard deviation | Coefficient estimates (standard errors in parentheses, *** denotes a significance level < 0.01; ^o denotes a significance level > 0.1) | | | | | | | |
| Perch | 0.8095 | 1.5088 | 0.3178 (0.0550)*** | | | | | | | |
| Pike | 1.6142 | 2.6456 | -0.0238 (0.0266)° | | | | | | | |
| Pike-perch | 0.2944 | 0.5571 | 0.6883 (0.1124)*** | | | | | | | |
| Sea trout | 0.2214 | 0.2824 | 0.8635 (0.2178)*** | | | | | | | |
| Herring | 0.5558 | 0.8083 | 0.2404 (0.0847)*** | | | | | | | |
| CBF | 3.2925 | 4.2350 | 0.0487 (0.0176)*** | | | | | | | |
| TC_TIME | 286.27 | 328.7983 | -0.0045 (0.0004)*** | | | | | | | |
| Perch, Pike, Pik Herring: catch ir these fish specie CBF: accessibilit jetties used by pi TC_TIME: trave cost of time | e-perch, Sea h kg per fishin es y in terms of ublic transpor I cost in SEK | a trout, ng hour for the number of rtation boats (including | Number of observations: 9540 χ^2 (7 degrees of freedom) = 378*** Pseudo-R ² = 0.21 | | | | | | | |

Table 1. Descriptive statistics for zone-specific explanatory variables, and estimation results for the conditional logit model of the probability for selecting a recreational fishing zone in the spring.

would improve fishing conditions in the archipelago once it exists knowledge of the effects and costs of such measures. Such a comparison would assess the profitability to society of such measures.

Replacement costs of improving habitats for sea trout reproduction

Another case study followed the replacement cost method (RCM) for valuing improved habitats for sea trout reproduction in four Swedish watercourses (Sundberg 2004). Pollution and physical change have implied a decreased sea trout production capacity in many watercourses. Sea trout is an important species in recreational fishing, and this has motivated measures such as stocking of reared sea trout and restoration of watercourses by, for example, removing physical barriers against migration, ensuring sufficient water supply, installing better sewage treatment, creating buffer zones between arable land and watercourses, and putting gravel on the bottom of watercourses for making them more suitable for spawning (Degerman et al. 2001).

Kagghamraån in the SW part of Stockholm County is one watercourse where restoration measures have been taken and evaluated by measurements of sea trout density. There were strong indications that density changes were due to the restoration rather than to any other factor because the density was measured before and after the restoration at the places where restoration took place (Andersson 1998). This made it possible for Sundberg (2004) to relate the costs of restoration to the effects accomplished: SEK 327,000 (once-for-all amount in 1995 prices) for a result of 260 sea trouts returning to the sea per year. Using a long time span of 8-75 years because of considerable uncertainty in the duration of this effect, this results in a replacement cost interval of SEK 16.8-157.1 per extra produced sea trout. Cost items such as time for planning and density measurements and maintenance of restoration measures were not included, but the maintenance necessary is judged to be negligible. See Table 2 for the results of similar computations for three other cases where data on effects and costs were available. Such replacement costs can be compared with those of another approach: increasing the sea trout stock in the sea directly by stocking sea trout. Sundberg (2004) shows that stocking seems to be a cheaper way to accomplish a given increase in the sea trout stock in the sea, but such a comparison ignores the fact that stocking of reared sea trout might reduce the genetic diversity of this species. Moreover, watercourse restoration for the sake of the sea trout might result in positive side-effects such as an increased biological diversity in the watercourse fauna and flora (Hendry et al. 2003).

thus their willingness to make trade-offs for the sake of ecosystem services. Thirdly, nature's heterogeneity might make value estimates unique for a specific setting; for example, the relatively low water transparency in the inner parts of the Stockholm Archipelago implies that a 1-metre increase would make a perceptible difference and it is therefore not surprising that it exists a WTP for such a change. However, such a WTP is not likely to be valid for settings with a considerably different baseline water transparency, for example that of the Swedish Westcoast. Fourthly, the economic context is of importance; for example, income is generally a significant determinant of WTP.

These circumstances are four reasons for why value estimates cannot easily be transferred from their original setting to other settings, and they also illustrate why it can be misleading to generalize average values of ecosystem services. Why this emphasis on the fact that economic values are context-dependent and thus are likely to be difficult to generalize from one setting to another? The most important reason is perhaps that undertaking economic valuation involves a responsibility because its purpose is to advise decision-making. We have indicated what forms this assistance can take, and the Stockholm Archipelago study illustrated how estimated economic

| Watercourse | Type of management measure | Estimated Increase in yearly smolt production | Replacement cost (SEK, once-for-all amount in 2002 prices) | Replacement cost per smolt |
|-------------------------------------|----------------------------------|---|--|----------------------------|
| Kagghamraån (Stockholm county) | Restoration of streambed | 260 | 327 000 | 16.8–157.1 |
| Hammerstaån (Stockholm county) | Weir fishway | 90 | 70 000 | 33.2 |
| Solbergsån (Västra Götaland county) | Fishway | 1630 | 1 004 000 | 8.2–38.5 |
| Kävlingeån (Skåne county) | Fishway | 1190 | 817 000 | 13.7 |



Some final remarks

These case studies exemplify how environmental change in the coastal zone can be economically valued. It can be noted that estimated economic values are dependent on a number of circumstances. Firstly, the method selected for valuation influences the estimates; for example, stated preferences methods such as CVM have the capacity to take non-users' values into account whereas revealed preferences methods such as TCM have not. Secondly, the institutional context matters; for example, economic values might be eroded in open-access situations, and formal (e.g., law) and informal (e.g., norms) institutions in society are likely to determine people's preferences and

values can be used in a CBA. However, whether policymakers will be influenced by such advice or not is another issue.

Finally, let me end this text by thank all people who have worked in Beijer's projects in SUCOZOMA for their efforts. Besides the Ph.D.'s mentioned above, they are Ing-Marie Gren, Stina Hökby, Sandra Lerda, Teresa Norling, Björn Olsson, Mikael Sandström, Åsa Soutukorva and Sara Sundberg. I am also grateful to everyone who have assisted in survey administration, in particular Jenny Andersson, Marie Dahlström, Christina Dandenell and Marija Knezevic, to Christina Leijonhufvud and Anna Sjöström, who contributed heavily to the success of the 2003 conference, and to MISTRA for funding.

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About the Stockholm Urban Research

Johan Colding, Researcher, The Beijer Institute

The year 2005 marks a challenging transition point in human history; for the first time the majority of the world's human population live in cities rather than in rural areas. More people than ever are now influencing and constructing new urban ecological systems that are profoundly different from non-urban systems. Urban ecosystems have been said to represent the most complex mosaic of vegetative land cover and multiple land uses of any landscape and are truly examples of interwoven, linked social-ecological systems. Within cities we find some of the most fundamentally altered ecosystems, and some of the most diverse ecological conditions on the planet. Given the accelerating urbanization worldwide, nations need to increasingly view cities as national resources, not only in an economic and social sense, but also in an ecological, where sustainability and security depend on urban stability and where events in cities can reach far beyond state or national boundaries. Analysing and identifying components that contribute to vulnerability or resilience of urban systems is therefore a critical research area, and indeed a challenging one.

Through the UN-endorsed Millennium Ecosystem Assessment (MA) (http:// www.millenniumassessment.org/) and the urban node of the Resilience Alliance, researchers at the Beijer Institute and the Centre for Transdisciplinary Environmental Research at the Stockholm University have actively been involved in urban research. In the following I would like to describe some features of the Stockholm urban research.

The Stockholm National Urban Park

While Stockholm still can be regarded as a 'green' city, there has been quite a dramatic loss of ecosystems in recent years. About 8 % and 7% of green areas respectively were lost during the 1970s and 1980s due to urban sprawl and this loss is continuing. As a result, red listed species and many species that used to be common in Stockholm (i.e. amphibians, reptiles, and birds) are declining. A key question in the Stockholm urban research is to understand how and in what ways it is possible to improve conditions for species that perform key ecosystem functions over spatial and temporal scales, including keystones and mobile link organisms. The research focuses on the interdependencies between the *Stockholm National Urban Park (NUP)* and those surrounding green areas within a 20 km radius from the centre of the park

Conveniently, the Beijer Institute is located in the midst of this 2700 ha woodland park that became legally declared as an area of 'national interest' in law in 1995 as a result of pressure groups that raised concern about further development projects in the area. Besides harbouring an extremely rich diversity of plants and animals, the park holds unique historical and cultural values that all need to be considered in management.

Oaks have played a central role in the historical development of NUP. On average, 18% of all trees found here consist of oaks, some of which are at least 500 years old. The first written regulations concerning oak harvests date back to the year 1347 when oaks were widely valued as a source for hard wood and for acorn production. Before this date, farmers that managed lands in this area deliberately eliminated oak seedlings from their property to make way for more arable lands. At the end of the 1600s, when large parts of the park were turned into royal hunting grounds, the ruling elite deliberately favoured oak trees, mainly due to its high demand as materials for naval shipbuilding. In 1680 the Royal Djurgården Administration (RDA) was established to manage lands in the park and the royal hunting grounds. The management objective was based on romantic ideals, with the foremost objective to enhance the scenic beauty of the area, favouring stands of broad-leaved trees, particularly oaks. With these ideals the Swedish kings created several English landscape parks in the 1700s, and planted broadleaved and pine forests on partly overgrazed hunting grounds, giving the landscape much of the character that it holds today. This coincided with the era of the park successively being opened up for the public, including the establishment of several recreational and educational institutions.

In terms of biodiversity, NUP holds some 1000 butterfly species, 1200 species of beetles, 250 species of birds, and over 800 vascular plants. Of red-listed species there are more than 60 insects and 32 species of fungi, and several



Figure 1. The Stockholm urban research takes places within the encircled area. This area has a radius of 20 km, representing 15% of the total land area of Stockholm County.

species of vascular plants, mammals, amphibians, reptiles and fish. This high diversity can be attributed the shifting management ideals over time, thus representing in large legacies of past management practices. Also, since oaks (*Quercus robur* and *Q. petrea*) are a major keystone species in this hemiboreal forest zone, they attract up to 1500 species of insects, mosses, fungi and lichens and provide nesting and feeding sites for many birds and bats, including many red-listed species.

The Eurasian Jay and natural oak regeneration When considering that the epidemic oak disease seriously has lead to the decline of oak forests over wide ranges of Europe in the past two decades, active management of one of Europe's largest populations of giant oaks becomes critical. Symptoms of this disease are, however, still rare in NUP. When considering that natural regeneration rates of <u>Quercus</u> spp often are low with regeneration failures due to low growth rate of oak seedlings, an uneven quantity and quality of acorn production, and heavy predation and browsing on acorns and seedlings, it becomes critical to build capacity in the event of this disease spreading to the park and surrounding areas.

In the Stockholm urban research we have dismantled a quite interesting chain of conditions necessary for successful oak regeneration. Since an overwhelmingly proportion of oaks are naturally regenerated, we have identified the Eurasian Jay (Garrulus glandarius) to be a key player in this process. Jays are scatter-hoarding birds that collect and hide acorns during the autumn for later consumption during the winter and spring. However, they hide a considerable amount of acorns each season of which a certain proportion never is found and consumed by the jays. These burrowed and 'forgotten' seeds facilitate regeneration of new oaks over wider spatial scales, and long-distance dispersal of acorns is entirely dependent on the dispersal pattern of the Eurasian Jay. Hence, in order to manage oak trees it becomes necessary to actively manage jays since oak dispersal will be severely hampered over wide ranges in the Stockholm region with the loss of this bird. However, what we also have discovered is that jays highly depend on the presence of coniferous forest. Although results show that they will attempt breeding in most of the forest habitats in the park, pairs possessing territories with a large proportion of coniferous trees are most likely to breed successfully since breeding success positively correlates to the amount of coniferous forest due to nest concealment, food supply, and predation on adults. What all this sums up to is that successful oak management in fact depends on successful preservation and management of coniferous forests!

Recently, we determined the costs of replacing the seed dispersal service performed by jays though human means. Results show that depending upon seeding or planting technique chosen, the Replacement Cost (RC) per pair of jays in the park is SEK 35,000 (USD 4,900) and SEK 160,000 (USD 22,500), respectively. Based on the park's aggregated oak forest-area, average RC for natural oak forest regeneration by jays is SEK 15,000 (USD 2,100) to SEK 67,000 (USD 9,400) per hectare, respectively. These estimates are instructive in determining what investments are needed in management strategies that secure critical breeding and foraging habitats of jays, including coniferous forests and jay movement corridors – investments that build resilience in the oak forests!

Adaptive Co-management

The Jay-studies have demonstrated to us the importance of connectedness over wider spatial and temporal scales for maintaining species diversity in the Stockholm region. Due to the loss of more green areas this connectivity becomes increasingly fragile. Hence, in the Stockholm urban research we try to understand the interdependencies between NUP and surrounding green areas. In this regard, the role of humans become critical and issues such as land uses and property rights key to analyze and understand.

Through GIS we have mapped most land uses, including property rights arrangements within the 20-km study area. Of particular interest is that we have found that private landholders manage a considerably large proportion of the Stockholm urban green space. For example, land uses such as allotment areas, residential gardens, and golf courses cover over 20% of the total land area. However, there exists little integration of these in the current biodiversity governance system of Stockholm, where the dominant strategy has been the establishment of protected areas. As in the United States where about two-thirds of species listed as endangered or threatened depend upon private lands for their survival, successful urban biodiversity conservation also requires the integration of private landholders. In this context, a wider understanding about ways they may contribute to biodiversity management is critical. Hence, researchers involved in the Stockholm urban research are carrying out social inventories with a focus on what management practices and local ecological knowledge these groups possess.

In our studies we have shown that allotment areas and residential gardens are extremely important in sustaining pollinators in the wider landscape.

This spring we also made an inventory of freshwater species associated with golf course ponds. Although analyses of these results is still going on, field observations reveal that even golf courses have a critical role in sustaining many freshwater species, such as aquatic insects and amphibians. To more widely engage different user groups of urban green space in biodiversity management activities, with the aim of improving conditions for species, will be a major focus in the Stockholm urban research. In the years to come we plan to arrange and test various adaptive comanagement designs, where different land uses and their stewards more intimately will become involved in biodiversity management. For a Beijer scientist like myself I am excited to be partaking in this challenge!



Figure 2. There are 128 allotment areas in the studied area. An allotment is a tiny piece of property with individual management of land, usually located adjacent to built-up areas, and originally created for improving the urban worker's health conditions. Although Swedish allotments cannot be used for permanent habitation, gardens provide cultivated vegetables and fruits to their owners for self-sufficiency and for recreation.

Strategic and Environmental Uncertainty in Social Dilemmas

Therese Lindahl, PhD, Stockholm School of Economics and The Beijer Institute

CPR's are characterized by non-excludability and rivalry, which in the traditional economic literature is said to give rise to overexploitation. By similar argument are the features non-excludability and nonrivalry associated with under provision of Public Goods (PG's). However, many CPR's and PG's are natural which can complicate matters. For one, there seldom exists a direct mechanism to determine the exact size or carrying capacity of a resource. Second, many natural resources are characterized by complex resource dynamics.

he prevalence and inefficiencies often associated with CPR's have given rise to an extensive theoretical, empirical and experimental literature with the purpose to identify factors facilitating or frustrating CPR management and the role of environmental uncertainty has not been ignored. Uncertainty combined with rivalry is often said to augment users' incentive to overexploit and thereby increase the probability of resource collapse (see for example Budescu, Rapoport and Suleiman, 1995a and Budescu, Rapoport and Suleiman, 1995b). However, underlying most of the theoretical research is an explicit or implicit assumption of symmetric information, or symmetric lack of information. In reality people generally have access to different sources of information both in terms of quality and quantity, and they may differ in their abilities to process information. In the first two papers of the thesis, the assumption of symmetry is relaxed and both papers demonstrate that from a welfare perspective, the distribution of uncertainty matters too.

Most of the CPR models assume that the shared resource is of fixed size or can generate a constant flow of services. In Paper 3 we aim at providing a more complete picture of the over-exploitation of a common resource, by combining the institutional structure of CPR management with complex ecological dynamics. Another feature of convexconcave resources is due to positive feedback effects; a state can become highly robust and sometimes an ecosystem change may even be irreversible. This is problematic if, for example, we wish to restore a degraded ecosystem and have to decide whether to allocate resources to the purpose. The aim of Paper 4 is to empirically analyze this question, by eliciting peoples' preferences through a hypothetical referendum on the matter.

Private Information in Common Pools, (joint with Magnus Johannesson)

We study a situation where two agents make sequential claims on a common resource, receiving their respective claims only if these are compatible. The first player is privately informed about the resource size. Will the lack of information be detrimental to the uninformed agents? If agents are selfish, theory predicts that the first player will claim the entire resource. If agents care for fairness we show theoretically that private information about resources can mitigate the inefficiency associated with heterogeneous preferences. This result implies that the first mover advantage is reduced and that the informational disadvantage of the second mover becomes a strategic advantage. The experimental results showed that the first player did indeed lower her claim with private information, consistent with the above theory.

Ignorant Exploitation of a Common Resource

The paper considers an entry game between two agents who together have exclusive access to a common resource. The carrying capacity of the resource is uncertain and the two agents differ with respect to the quality of their information and each makes a decision whether or not to exploit. If agents do not differ at all with respect to knowledge there is a coordination problem. However, if agents differ with respect to knowledge, the coordination problem is smaller and this is due to the fact that the ignorant can exploit her lack of knowledge, by adopting a more aggressive strategy, at the expense of the knowledgeable agent; knowledge advantage becomes a strategic disadvantage. The more agents differ with respect to knowledge, the smaller is the probability of resource collapse and the less likely are coordination problems.

Grazing Games (joint with Anne-Sophie Crépin, the Beijer Institute)

There is evidence that above some critical value of grazing pressure, grasslands can flip from a grass-dominated state to an alternate state that is either woody plants-dominated or a dry desert (Resilience Alliance, 2005). Simultaneously grasslands are often the common property of several farmers. We aim at providing a more complete picture of the over-exploitation of a common resource, by combining the institutional structure of CPR management with complex ecological dynamics. We manage to raise questions and doubt about the standard assumptions.

Who Wants to Save the Baltic Sea? (joint with Tore Söderqvist, the Beijer Institute)

Recent research shows that the Baltic Sea has experienced an ecosystem change and is now in a degraded state and moreover, that it is uncertain whether this deterioration is reversible. On the other hand if no measures are taken to improve the water quality the situation may become even worse. (Swedish Environmental Advisory Council, 2005) A natural question then emerges; should resources be devoted to the purpose of restoring the Baltic Sea? To elicit peoples preferences we design a referendum asking people to vote on a hypothetical abatement program. The purpose of the program is to improve the sea water quality of the Baltic Sea, and only with a certain probability is the program successful. In a between-sample test we find that the level of uncertainty has no effect on voting behavior. However, our results are mixed. The within-sample design shows that, not only is uncertainty significant, but dominates all other effects. We have to conclude that we cannot say who wants to save the Baltic Sea; the answer essentially depends on how we ask.

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Spatial/Dynamic Models of Economic and Ecosystem Interaction

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

The Beijer Institute is sponsoring a research program aimed at understanding the dynamics of spatial processes that link ecological and economic systems. Some examples of important problems that involve spatial/dynamic processes include: epidemics, invasive species spread, animal disease transmission, subsurface contamination of porous aquifers, forest pest invasion, and management of marine and terrestrial species governed by dispersal. A common thread among these examples is that each depends upon biophysical mechanisms that can be modeled as dispersal processes. From a policy perspective, these examples pose important questions about where, when and how much regulatory effort ought to be utilized to mitigate the problem.

The spatial/dynamic modeling program is a collaborative effort with FEEM (Fondazione Eni Enrico Mattei) and the Environmental and Ecological Economics (EEE) program at Abdus Salam International Centre for Theoretical Physics (ICTP). While economists have developed a rich body of concepts to understand the intertemporal dimensions of resource and environmental problems, the focus on space and dispersal processes is a relatively new area of inquiry. Accordingly, an important aim of the program is to bring resource and environmental economists together with scientists from ecology, physics, systems theory, and applied mathematics in order to understand how modelers from other disciplines depict spatial dynamic processes. In the end, it is hoped that this new focus on spatial/dynamic processes will provide a natural generalization of concepts economists have developed to understand the dynamic aspects of resource and environmental problems.

The program on spatial dynamic models of economic and ecosystem interaction was launched at a small workshop held in June 2003 at the Royal Swedish Academy of Sciences in Stockholm. At that workshop, an outline for a research program was laid out by Partha Dasgupta, Simon Levin, Karl Goran Maler and Jim Wilen. To kick off the program, economists and scientists from a variety of disciplines were solicited to prepare papers on the theme. These were presented at a two and a half day workshop held in Trieste, Italy in April 2004 at the Abdus Salam International Centre for Theoretical Physics (ICTP). This 2nd Workshop on Spatial Dynamic Models of Economic and Ecosystem Interaction brought a diverse group together to talk about the mathematics of diffusion and of integrated modeling approaches that marry spatial/ dynamic processes with economic optimization frameworks. The workshop laid a foundation of common understanding with some overview and tutorial papers to familiarize participants with the biology, economics, and mathematics of spatial/dynamic processes.

Several broad conclusions were reached at the 2nd Workshop on Spatial Dynamic Models of Economic and Ecosystem Interaction. First, it became apparent that while there has been much descriptive work done with models of spatial processes in physical and ecological systems, there has been less done embedding spatial processes in general optimization frameworks that answer questions about when and where actions should be taken from a management perspective. Second, few disciplines outside of economics depict human users in ways that illuminate how incentives and institutions influence environmental and resource misuse over space and time, and how, as a consequence, human behavior can be modified to influence spatial/dynamic systems in positive ways. Participants agreed, after being exposed to progress in various individual disciplines, that much opportunity exists to collaborate on integrated modeling in multidisciplinary settings. There were fruitful discussions of integrative modeling strategies to better understand spatial/dynamic environmental problems, to highlight spatial and temporal processes that affect ecosystem services, and to illuminate how various externalities that manifest themselves in spatial/dynamics processes might be mitigated.

The 3rd Workshop on Spatial Dynamic Models of Economic and Ecosystem Interaction was held in April 2005, also at the Abdus Salam Centre in Trieste. Whereas the previous workshop served to familiarize participants with the mathematics of diffusion processes, the 3rd Workshop turned attention to crafting economic models that embedded explicit spatial/dynamic diffusion processes within integrated modeling frameworks. Several papers focused on renewable resource systems in which populations diffuse according to either density dependent or density independent mechanisms. Other papers focused on bioinvasions in a spatial setting and there were papers presented on general methodological issues associated with optimized spatial/dynamic systems. Some of the questions raised during presentations and discussions included: are spatial dynamic diffusion systems stabilized in the neighborhood of equilibrium by optimal control, or might some controls lead to Turing instability? What circumstances give rise to corner solution controls (for example, protected areas) as part of optimal spatial dynamic strategies? How do solutions to stochastic spatial dynamic systems differ from deterministic solutions? What roles are played by boundary conditions in spatial systems, and how should boundary conditions be specified? What kinds of transversality conditions are appropriate for modeling integrated spatial dynamic systems? How does the structure of the adjoint system reflect the basic spatial characteristics of the system? What kinds of spatial externalities are generated by spatial diffusion systems, and what kinds of policy instruments are best suited to mitigating spatial dynamic problems? How does spatial heterogeneity affect optimal solutions and how do homogeneous second-best solutions compare with firstbest solutions? These and other similar issues are being addressed for discussion in the next workshop on spatial dynamic modeling of economic and ecosystem interaction to be held in Venice in April 2006.



Karl-Göran Mäler recieving the European Lifetime Achievment Award in Environmental Economics 2005. Photo: Sara Aniyar

Awards

European Lifetime Achievement Award in Environmental Economics 2005 assigned to Prof. KARL-GÖRAN MÄLER

At the 14th Annual Conference of the European Association of Environmental and Resource Economists (Bremen-Germany, June 23-26, 2005), EAERE is recognising outstanding lifetime achievement in the development of the field of Environmental Economics with a special award to Prof. Karl-Göran Mäler (The Beijer Institute, The Royal Swedish Academy of Science, Sweden) and Prof. David Pearce (University College London, UK). The 'European Lifetime Achievement Award in Environmental Economics' recognises those who have already or are about to retire from their full time post and have been significantly involved in the profession in Europe, making outstanding and sustained contributions to the field, including a successful combination of scholarship, institutional development and communication/dissemination.

Environment and Development Economics

Anastasios Xepapadeas, Editor, EDE

I would like to begin this report, my first as the new editor of *EDE*, by acknowledging the excellent job done by my predecessor, Charles Perrings. Charles has been Editor of *EDE* since it began, under the sponsorship of the Beijer Institute, some ten years ago. He has managed, with the assistance of a fine and dedicated group of Associate Editors and excellent support from Cambridge University Press, to establish an internationally appreciated and recognized *Journal. EDE* has become one of the first choice outlets, in the area of Environment and Development, for scientists from Developing Countries.

Editorial matters

I began as Editor on January 1, 2005. During the same period of time, Carl Folke and Phoebe Koundouri joined Erwin Bulte, Kanchan Chopra, Rashid Hassan, Bruce Larson and Bernardo Mueller as Associate Editors, bringing the total to seven. The Associate Editors are an exceptionally dedicated group of scientists that embody the idea of capacity building which the *Journal* promotes.

The Editorial Office in York continued to operate until July 31. At the same time, starting from January 1 preliminary activities were initiated to transfer the new Editorial Office to Crete. After quite a long search for a person with all the necessary qualifications, Joan Stefan was recruited as the new Assistant Editor and started officially as of June 1. During the months of June and July, Miles Lambert, the outgoing Assistant Editor, and Joan worked intensively to ensure a smooth transition and the orderly handover of more than 150 manuscripts that are currently in progress. This included a trip to York by Joan in mid-June in order to meet and discuss the transition in person with Miles Lambert. I would like to thank Miles Lambert for his invaluable assistance and cooperation, and his fine work for the journal up until his very last day; I would also like to thank Charles Perrings for all his support during the transfer period. As of August 1 all files have been transferred to Crete and all editorial issues are being handled by the Crete office.

Another important editorial issue, closely related to the future development of *EDE*, is the fact that the editorial process for handling all manuscripts submitted to the



Journal is becoming fully computerized. Cambridge University Press (CUP) is installing the software program "Scholar One" which will allow the submission - revision processes to be handled through the Internet. There was a meeting in York between Miles Lambert, Joan Stefan and Nash Pal, the consultant for CUP, regarding the final installation stages. The Editorial Office is now in the process of testing the system and fine tuning the templates and the procedures. We expect the system to be fully operational by early autumn. Although this new computerized system of submissions and review will require a period of transition, and requires a slightly greater level of technical familiarity by its users than the old system, it is being adopted by an increasing number of journals, and keeps EDE in line with the latest developments in the field.

Submissions

The increasing trend in submissions that broke the 100 paper barrier in 2004 seems to be continuing in 2005, with 81 papers submitted as of July 31. The growth and geographical distribution of submissions is shown in Tables 1 and 2. As in the past, the majority of submissions comes from Western Europe and North America. In 2005 there has been an increase in submissions from Africa while it seems that there might be a decline in submissions from Asia, South America and Eastern Europe, but these trends will be analyzed more thoroughly with final data at the end of the year. It should also be noted that the data regarding geographical breakdown of submissions does not reflect the fact that many papers have two or more authors who may belong to different geographical areas. Papers are currently attributed to the geographical location of the corresponding author.

Rejection rates

Various estimates of rejection rates are presented in tables 2, 3 and 4. The overall rejection rate seems to be around 50%, although there are wide variations ranging from close to 80% for Eastern Europe and the Middle East to 40% for the USA and Canada. The Journal's policy of capacity building, which implies that a relatively larger number of papers than in similar Journals receive a "revise and resubmit decision with no publication commitment," will continue. This however might imply a relatively higher number of rejections of revised papers if quality standards are ultimately not met. Every effort will be made to treat this delicate policy issue with care, so that researchers from areas where EDE wants to build capacity are not discouraged. A related issue is that with the present constraints of approximately 36 published papers per year (6 papers per issue, 6 issues per year), if EDE has an annual submission of around 120 manuscripts, this would imply a rejection rate of 70% - significantly higher than the present rate - so that the time between acceptance and publication of a paper does not increase. This issue is important for EDE's future prospects and will also be discussed in the following section.

Thoughts for the Future

After ten years, *EDE* has established itself as a respectable journal in the field and probably as a first choice outlet for many researchers from developing countries. I feel, therefore, that *EDE* should continue its current policy of capacity building by providing a good publication outlet for scientists from developing countries and addressing issues pertinent to developing countries. In this context, I would like to increase the profile of the journal in selected geographical areas, especially if year-end figures show that submission rates from certain regions have indeed dropped significantly. I will be discussing this issue with the Associate Editors and soliciting ideas for ways in which to do this. We are also looking at ways to obtain a wider geographical representation of reviewers, which is another strategy that could increase awareness about and submissions to the journal in selected areas.

At the same time *EDE* should follow a strategy that will ensure it a respectable and competitive rating among comparable journals. One measure of a journal's standing, and a criterion in submissions by authors, is its *impact factor* or its *ranking* in various lists which are published from time to time. This is another important policy issue because, on the one hand, *EDE* needs to attract good manuscripts in order to do well in these rankings; on the other hand it should not neglect its unique feature in capacity building in order to do well in the rankings.

Since impact factors depend on citations of papers published in the *Journal*, I feel that *EDE* can take certain concrete steps to increase these ratings. One such step for improving impact factors in the medium-run would be Special Issues on timely topics. There is one almost completed special issue on *Resilience* (edited by Charles Perrings) and there are plans for a special issue on *Infectious Diseases* (Simon Levin has agreed to act as Guest Editor) and another on *Sustainability*. Another step would be the publication of survey papers on relevant issues. It would be hoped that the high quality scientists associated with the Beijer Institute could help in securing some solid survey papers for *EDE*. A third step, in this respect, would be keeping a balance between conceptual papers and empirical papers.

Another issue that affects the *Journal's* long term viability is that the acceptance rate of the *Journal* has created a backlog of papers awaiting publication. It is currently running at 16-18 months, and could increase if a high percentage of the papers currently under revision are ultimately accepted.

A large and continuing backlog will certainly undermine attempts to attract good papers. After discussing the issue with Patrick McCartan of CUP, it seems that CUP is very willing to assist within its given constraints, in order to cope with the problem in the short run. In the long run, however, and if the submission rate keeps going at the rate of the last two years, reducing the backlog implies that the rejection rate should increase. I am hopeful that we will have a strategy in place to deal with this backlog issue by the end of this year.

Finally, we hope that the full computerization of the *Journal* will ultimately help reduce throughput times, make the submission – revision processes more efficient and provide data that will help us analyse the trends and the impacts of our policies on the *Journal*.

| | Africa | Asia | South America | UK | West Europe | East Europe | Australia and NZ | Middle East | USA and Canada | Total |
|-------|--------|------|------------------|----|----------------|----------------|---------------------|----------------|----------------------|-------|
| | | | | | | | | | | |
| 1995 | 5 | 11 | 8 | 6 | 10 | 0 | 0 | 0 | 18 | 58 |
| 1996 | 5 | 5 | 1 | 3 | 11 | 0 | 3 | 1 | 22 | 51 |
| 1997 | 3 | 7 | 1 | 4 | 19 | 2 | 4 | 0 | 35 | 75 |
| 1998 | 3 | 13 | 3 | 8 | 26 | 0 | 4 | 1 | 29 | 87 |
| 1999 | 1 | 7 | 3 | 5 | 9 | 2 | 3 | 1 | 28 | 59 |
| 2000 | 9 | 15 | 5 | 7 | 21 | 0 | 4 | 4 | 21 | 86 |
| 2001 | 1 | 26 | 4 | 5 | 19 | 0 | 3 | 1 | 28 | 87 |
| 2002 | 7 | 13 | 3 | 7 | 21 | 1 | 8 | 1 | 29 | 90 |
| 2003 | 8 | 24 | 2 | 4 | 27 | 1 | 2 | 1 | 28 | 97 |
| 2004 | 3 | 35 | 7 | 4 | 21 | 3 | 3 | 5 | 34 | 115 |
| 2005* | 6 | 7 | 0 | 3 | 16 | 0 | 1 | 2 | 19 | 54 |
| | | | | | | | | | | |

Table 1: Growth and geographical distribution of submissions

Notes

• * Data up to June 30, 2005. As of July 31, 2005 submissions were 81.

• Data for 1999-2005 does not include policy for acontributions or book reviews.

Table 2: Status of manuscripts received March 1, 1995 to July 1, 2005 by geographical area

| | Africa | Asia | Latin America | UK | West Europe | East Europe | Australia and NZ | Middle East | USA and Canada | Total |
|-----------|--------|------|------------------|----|----------------|----------------|---------------------|----------------|----------------------|-------|
| Submitted | 52 | 177 | 36 | 56 | 196 | 9 | 35 | 17 | 290 | 868 |
| Accepted | 15 | 47 | 7 | 18 | 61 | 1 | 8 | 2 | 123 | 282 |
| Rejected | 24 | 78 | 20 | 23 | 92 | 6 | 22 | 13 | 103 | 403 |
| Withdrawn | 6 | 17 | 4 | 8 | 11 | 1 | 3 | 1 | 19 | 71 |
| Pending | 7 | 35 | 5 | 7 | 32 | 1 | 2 | 1 | 45 | 134 |

Table 3: Overall rejection (rejection + withdrawal) rate

| | Africa | Asia | Latin America | UK | West Europe | East Europe | Australia and NZ | Middle East | USA and Canada | Total |
|------------------------------|--------|------|------------------|----|----------------|----------------|---------------------|----------------|-------------------|-------|
| Overall rejection rate | 57 | 53 | 66 | 55 | 51 | 77 | 73 | 81 | 41 | 51 |

Table 4: Geographical rejection (rejection + withdrawal) rate as a % figure of total submissions less those pending at the end of the calendar year.

| | Africa | Asia | Latin America | UK | West Europe | East Europe | Australia and NZ | Middle East | USA and Canada | Total |
|-------|--------|------|------------------|-----|----------------|----------------|---------------------|----------------|----------------------|-------|
| 1998 | 66 | 69 | 33 | 62 | 80 | 0 | 100 | 100 | 61 | 69 |
| 1999 | 100 | 71 | 99 | 80 | 44 | 100 | 100 | 100 | 42 | 58 |
| 2000 | 22 | 53 | 40 | 28 | 66 | 0 | 25 | 50 | 42 | 46 |
| 2001 | 100 | 49 | 50 | 60 | 57 | 0 | 66 | 100 | 46 | 52 |
| 2002 | 42 | 53 | 33 | 56 | 52 | 100 | 74 | 0 | 44 | 50 |
| 2003 | 57 | 81 | 50 | 100 | 87 | 100 | 50 | 100 | 62 | 71 |
| 2004 | 100 | 76 | 100 | 100 | 78 | 100 | 100 | 100 | 33 | 71 |
| 2005* | 50 | 30 | 0 | 0 | 19 | 0 | 100 | 100 | 5 | 19 |

*Figure is % of total submissions from 01/01/05 to 06/30/05

PhD Programme in Environmental Economics

Thomas Sterner, Professor, Department of Economics, Göteborg University

The Environmental Economics Unit at Göteborg University, in collaboration with the Beijer International Institute of Ecological Economics, is, for the 8th year now, running the Ph.D. program in environmental economics. This program is geared towards students and teachers from developing countries. The principal aim of the Ph.D. program is to create and strengthen national and regional environmental economics capacity in developing countries.

Ithough EEU gets a constant flow of enquiries about this program, five students are enrolled every second year – 2004 was not such a year. Since more than 150 applications are received before each enrolment, this implies a rather strong competition over each position provided.. Consequently, the Ph.D. candidates enrolled at EEU are among the best talents in the field of economics in general and environmental economics in particular.

The following criteria are followed when selecting candidates:

- Academic performance –we seek excellence in technical skills in micro-economics, mathematics/ statistics (and English);
- Capacity building context the relevance of the country in question in view of Swedish development collaboration and the capacity of the home institution to make use of the acquired competence so that the graduate efficiently can support the development of environmental economics capacity in the country through teaching, research and policy advice;
- Gender to the extent possible, women are prioritised;

During 2004 EEU had 15 Ph.D. students at various stages in the program from a large number of developing countries (see list below). The EEU/Beijer Ph.D. program is a five year program. After two years of compulsory coursework at EEU/Beijer in Sweden the Ph.D. students typically go back to their home countries to conduct field work. The three remaining years are spent conducting research, which includes, beyond writing on their theses, brief travels to their home countries, visits and workshops overseas, and conference presentations. After graduation from the program at EEU they are expected to go back to their home countries and establish (or develop the existing) environmental economics capacity, mainly through launching BA or MA programs in environmental economics, conduct research and policyrelated advice, with the overall aim of finding effective solutions to the environmental degradation, unsustainable resource use and poverty in their respective country. In the longer term there is a need to further strengthen the environmental economics capacity, but in new forms suited to the country-specific context but building on the graduates from EEU. This "post-doc" capacity development will mainly build on (support to) regional networks, collaborative research arrangements and domestic resources. Typically, EEU staff discuss these matters with the graduate students, in collaboration with their home affiliations, and develop strategies for their future involvement in teaching, research and policy advice. EEU works actively to maintain strong contacts with the program graduates in their future work to develop environmental economics capacity in their countries.

There are strong links between this program and a couple of the other activities mentioned in this document, particularly the courses (activity 2), which are a part of the Ph.D. program but also offered independently to outside participants but also to activities 3 and 4 (Visiting researchers and Book support). During 2004 one of the Ph.D. students in the Ph.D. program graduated: Mahmud Yesuf on Risk, Time and Land Management under Market Imperfections: Applications to Ethiopia. The following students were enrolled in the program at various stages in 2004. A more detailed description of our Ph.D. student's research projects and progress can bee seen below.

Students enrolled in 1997

• Eseza Kateregga, Makerere University, Uganda

Students enrolled in 1999

- Wilfred Nyangena, University of Nairobi, Kenya
- Razack Bakari Lokina, National Env. Mngmt Council, Tanzania
- Mahmud Yesuf, Addis Abeba University, Ethiopia
- Minhaj Mahmud, Jahangirnagar University, Bangladesh

• Nasima Chowdhury, University of Dhaka, Bangladesh

Students enrolled in 2001

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

Students enrolled in 2003

- Anabel Martinez, El Colegio de Mexico, Mexico
- Precious Zikhali, University of Zimbabwe, Zimbabwe
- Jiegen Wei, Chinese Academy of Science, China
- Qin Ping, Chinese Academy of Science, China
- Innocent Kabenga, National University of Rwanda (SAREC, separate funding from bilateral program with Rwanda)

1.1 Ph.D. students and their thesis work

Students enrolled in 1999

Mahmud Yesuf - Ethiopia

Risk, time and land management under market imperfections in Ethiopia

In October 2004 Mahmud Yesuf successfully defended his Ph.D. thesis entitled 'Risk, time and land management under market imperfections: Applications to Ethiopia". Professor Karl-Göran Mäler was the discussant.

The thesis addressed both theoretical and empirical issues pertaining to land management decisions of farm households in developing countries working under an imperfect market and institutional setting (with case studies from Ethiopia). Using techniques in experimental economics, efforts were also made to assign some quantitative measures to the most important parameters (such as risk and time preferences) in the same decision making process.

A Dynamic Economic Model of Soil Conservation with Imperfect Markets and Institutions: This paper develops a dynamic soil conservation model that explicitly incorporates labor, capital and land market imperfections and their interactions to suit the problems of smallholders in many developing countries. We use the model to analyze the impact of these institutional and market imperfections on the optimal levels of labor allocations into cultivation and conservation efforts. Risk Preferences of Farm Households in Ethiopia: This study measures farmers' attitudes towards risk using an experimental approach for a sample of 262 farm households in the Ethiopian highlands. We find more than 50 percent of the households in the severe to extreme risk aversion category, with a constant partial risk aversion coefficient of more than 2.00.

Time Preferences of Farm Households in Ethiopia: This study measures farmers' time preferences (subjective discount rates) using an experimental approach with monetary incentives for a sample of 262 farm households in the Ethiopian highlands. The median discount rates are found to be more than 43 percent, which is more than double the interest rate on the outstanding debt. Given imperfect credit markets, household wealth (physical asset) levels are found to be highly correlated to this attitude measure.

Market Imperfections and Farm Technology Adoption Decisions: An Empirical Analysis: In this paper, Mahmud investigates the impacts of market and institutional imperfections on farm technology adoptions in a model that considers fertilizer and soil conservation adoptions as related decisions. Controlling for plot characteristics and other factors, we find that a household's decision to adopt fertilizers does significantly and negatively depend on whether the same household adopts soil conservation. The reverse causality, however, is insignificant. We also find outcomes of market imperfections such as limited access to credit, plot size, risk considerations, and rates of time preference to be significant factors explaining variations in farm technology adoption decisions. Relieving the existing market imperfections will more likely increase the adoption rate of farm technologies.

Nasima Chowdhury - Bangladesh

Water management issues in Bangladesh

The Water Resources of Bangladesh and Some Management Issues: The objective of this paper is to analyze the importance of water management in Bangladesh, and highlight the key economic, geographic, environmental and geopolitical factors that are developing and/or constraining the water management issues of Bangladesh.

The Economic Value of Water in the Ganges-Brahmaputra-Meghna (GBM) River Basin. The GBM is one of the world's largest river systems originating from the Himalayas. The objective of this paper is to analyse how water is valued (economically) in the two neighbouring countries, India and Bangladesh. Of particular interest is the irrigation value of water as it is the major water use in this region.

Conflict and Cooperation in the Ganges Brahmaputra Meghna River Basin: The objective is to give background information on conflict and cooperation in the GBM basin. Issues still unresolved are pollution in the Ganges and abnormal floods and droughts in Bangladesh. We develop a theoretical framework to analyse these issues and show why cooperation may not be achieved in certain cases despite the potential benefits. One way is to check whether and how multilateral cooperation is feasible.

An Empirical Test of Efficiency in Factor Input Allocation among Crops using Bangladesh Data: This study attempts to study whether rural households of Bangladesh allocate their factor inputs efficiently by comparing factor returns and technical rates of substitution between production activities. Tests will be made whether the returns and technical rates of substitution from the rice and jute production functions are equal. The data is from a survey conducted by the IRRI (International Rice Research Institute) in 2000.

Razack Bakari Lokina - Tanzania

Efficiency, Compliance and Risk in Lake Victoria Fisheries

Production Technology and the Role of Skipper Skills in Lake Victoria Fisheries: The rationale for this project is the overfishing in Lake Victoria. The overall purpose is to better understand the driving forces behind it and identify costefficient solutions. In this paper we investigate the role of skipper skills in the productivity of the fishing boats. Results showed that motivation and remuneration system and income received by the skipper have important implications for the efficiency of the boat. Owner-operated vessels were found to be more efficient. Longer experience working as a skipper has a strong positive influence on technical efficiency in Lake Victoria fisheries.

Compliance in Lake Victoria Fisheries: In the second study we assess fishermen compliance behaviour to different conservation measures. Results showed that moral values, social influence and perceived legitimacy to be important in increasing compliance. Also the involvement of community in the management is found to increase compliance. Corruption on the other hand is found to increase violation of the regulations.

Small-scale Fishers and Attitude to Risk Aversion: The third study investigates small-scale fishers' attitude to risk. The results show that some fishermen can generally be characterized as risk seeker and also a relatively larger group of fishermen could be considered as risk neutral. Further, results reveal that fishermen tend to be risk averse when fishing is not the main economic income generating activity.

Minhaj Mahmud - Bangladesh Measuring Trust and the Value of Statistical Lives: Evidence from Bangladesh. The thesis includes five

self-contained essays. The first three essays relates to the measurement of trust using both an experimental and a survey approach, and the other two essays relate to the measurement of the value of (statistical) life using stated preference methods.

Key concepts addressed in this Ph.D. thesis include social capital, trust, social distance, religion, trust game, stake size, field experiment, value of statistical life, contingent valuation, risk reduction, effect of training, willingness to pay, sensitivity to scope, social preference, choice experiment, life-saving programs, relative value of life – all addressed in the context of rural Bangladesh. The thesis is scheduled to be presented for dissertation in March 2005.

Wilfred Nyangena – Kenya

Household determinants and impact of soil conservation adoption in Kiambu, Meru and Machakos districts of Kenya.

Social Capital and Institutions in Rural Kenya: This chapter presents the concept and measurement of social capital variables in a rural agrarian setting. Social capital is believed to play a crucial role for soil conservation and prospects to attain sustainable agriculture in Kenya. Hence, we address such questions as: what are the different dimensions of social capital in rural areas? Are there differences in social capital levels between the regions? Why is it that different communities have different levels of social capital? We make comparisons between districts to clarify whether there is more social capital in Machakos district.

Social Determinants of Soil and Water Conservation in Rural Kenya: This paper investigates the social determinants of soil conservation investments, and in particular the effect of social capital variables at individual and community levels. We link measures of individual and communal social capital with other important economic variables and examine their effect on adoption of soil and water conservation practices.

An Economic Assessment of Soil and Water Conservation Investments: An Application to crop yield: The existing evidence on the impact of soil conservation on crop productivity is not clear-cut. Consequently, this paper assesses the impact of adopting soil conservation practices on crop yield. The work is at an advanced stage and will be completed in the fall of 2005.

Students enrolled in 2001

Rahimaisa Abdula - Philippines

Climate change policy of bio-energy: A Computable General Equilibrium (CGE) analysis of its sectoral and land-use interfaces

This paper explores the inter-sectoral and land-use dynamics behind the development of bio-energy as a climate change policy. Two major issues are mapped in the study, namely (1) the competition between bio-energy and other energy sources, and (2) the competition between different land-use based greenhouse gas (GHG) mitigation options (e.g. afforestation). By employing a computable general equilibrium (CGE) model with a landuse change model, the study can identify interfaces between bio-energy and the rest of the economy and with the land market. It also facilitates mapping policy implications on the economy, and pattern of land-use changes and GHG emission levels. The main policy considered in this study is carbon taxation with revenues geared towards reduction of direct taxes and financing bio-energy subsidies. Results show that carbon taxation per se does not ensure growth within the bio-energy sector, unless the proceeds are directed to subsidize the sector's production.

Investment in bio-energy, as a complementary mitigation policy to carbon taxation, has the desirable feature of improving the domestic energy use and welfare of the rural households. However, it has the drawback of compromising future food security and GHG mitigation by redirecting resources away from crop and livestock production, and by increasing other air pollutants (CH4 and N2O respectively).

Wisdom Akpalu - Ghana

This thesis includes four chapters:

Exclusion in Common Property Resource (CPR) – an Experiment: In a bid to halt the over-exploitation of fishery resources in Ghana, fishing communities, through a community based program are encouraged to draft fishing rules and punishment mechanisms for approval by district assemblies. Consequently, this study seeks to investigate the effectiveness of exclusion (a traditional institution) as a punishment mechanism option in an artisanal fishery management experiment in Ghana, with student-fisher folks as our subjects.

Non-Compliance with Mesh size and Light-attraction Regulations in Artisanal Marine Fishery in Ghana: This research seeks to investigate likely reasons for non-compliance with mesh size and light attraction regulations within a district in Ghana. The study tests the relative strengths of economic and social incentives in violation of these fishing regulations.

Natural Resource Use conflict: Gold mining in Tropical Rain Forest in Ghana: Extraction of gold in Ghana is done in rainforests that provide substantial non-timber benefits. Although resource-use conflicts of this nature are common, models of these interactions are scarce. This paper attempts to model this interaction in a developing country where capital for mining is from foreign direct investment.

The Role of Contribution Norms and Altruism in Co-operation in Public Good Experiment: In a recent development, researchers have argued that in addition to warm-glow and pure altruism, contribution to public goods could also be due to the private norms for public contributions. A contributor feels guilty if his contribution deviates from the norm. Using a repeated public good experiment, we will provide the first empirical test for this hypothesis.

Mintewab Bezabih - Ethiopia

The first quarter of 2004 was spent on preparing for and conducting survey on 'Valuation of Agrobiodiversity by farmers in the Central Highlands of Ethiopia'. She has been working on the data ever since and produced a paper entitled 'Biodiversity Conservation Under Imperfect Seed System: the Role of Community Seed Banking Scheme' out of it. Currently she is working on part of a questionnaire for the joint EEU-EEPF survey, the data from which she is intending to use to write papers on informal land transactions and in particular on the vulnerability of female headed households in such transtactions.

Jorge Garcia - Colombia

This Ph.D. thesis is focused on the use of public disclosure of polluters' environmental indicators as a policy instrument for pollution control. In April 2004, he took his Licentiate degree with the article "The effectiveness of Indonesia's public disclosure program PROPER for industrial pollution control". He then started analyzing mechanisms through which public disclosure of environmental behaviour works. In August 2004 he was awarded the opportunity to spend one academic year at the Agricultural and Resource Economics Department at the University of California at Berkeley.

Martine Visser - South Africa

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

A novel aspect of the work is that it combines inequality and sanctioning behaviour in the voluntary contribution mechanism. The study incorporated various additional experiments, as well as a detailed survey on household characteristics, quota allocation and attitudes and perceptions about both the community and the individuals themselves. Martine is currently collaborating with a colleague (Justine Burns) at the University of Cape Town on two experimental papers. Martine has presented the first paper towards her thesis at EEU, and the paper has subsequently been accepted for the Spring Meeting of Young Economists in Geneva, 2005.

Students enrolled in 2003

Precious Zikhali - Zimbabwe

In 2004 Precious took the following courses: Econometrics II, Microeconomic Theory II, Macroeconomic Theory I and II, Behavioural Economics, Development Economics. The overall theme of Precious' research is 'Forest-based poverty alleviation in rural Zimbabwe'. In order to start this work she attended a CIFOR Poverty and Environment Network Workshop in Bogor, Indonesia (September 21-23, 2004), The workshop was organized by CIFOR to mark the establishment of a network of young researchers, Ph.D. students, their supervisors and the CIFOR scientists working on issues related to forestry and poverty. At the workshop she presented research ideas pertaining to rural households' use of non-timber forest products as safety nets and cushions to deal with shocks such as drought and illness. The argument is that forest products help to mitigate poverty in the face of shocks that rural households face from time to time.

Jiegen Wei - China

In 2004 he took the following courses: Microeconomics I and II, Econometrics II, Macroeconomics I and II, Welfare Economics and Behaviour, Environmental valuation and behaviour, Development economics, Micro-econometrics.

In 2004 Jiegen published "Information Asymmetry, Share Contract and Illegal Logging: A Theoretical And Empirical Investigation of State-Owned forest Resource Dynamics in China" Economic Research Journal (in Chinese) Vol3, 2004. (Joint With Jintao Xu and Ran Tao).

Ping Qin - China

In 2004 Ping took the following courses: Mathematics, Microeconomics I and II, Econometrics II, Macroeconomics I and II, Welfare Economics and behaviour, Environmental valuation and behaviour, Development economics, Public economics, Microeconometrics.

Research conducted by Ping during 2004 pertains to the following broad issue: China has achieved accelerating annual growth rates in agricultural sector since it initiated agricultural reforms in the late 1970s. From 1978 to 1984 agricultural production grew 4.7% a year. Many have attributed this growth to the intensive use of inputs, technological innovation, and efficiency improvement stemmed from the economic reforms. However, many studies on the agricultural efficiency, found that after 1985, efficiency either improved very little or declined. A study by Ping aims at exploring the changes for China's agricultural sector over the period from 1979-2000, and focus on the determinants of the efficiency change in agricultural production. This study has important implications for China's effort to decrease greenhouse gas emissions from the agricultural sector and increase the sustainability of agricultural production.



Ph.D. students at EEU, from top: Elizabeth Földi – Project administrator, Martine Visser- South Africa, Minhaj Mahmud – Bangladesh, Ping Qin – China, Miguel Quiroga – Chile, Jiegen Wei – China, Mintewab Bezabih – Ethiopia, Innocent Kabenga – Rwanda, Wisdom Akpalu – Ghana, Precious Zikhali – Zimbabwe, Razack Bakari Lokina – Tanzania. Missing from the picture: Rahimaisa Abdula – Philippines, Nasima Chowdhury – Bangladesh, Wilfred Nyangena – Kenya, Jorge Garcia – Colombia and Mahmud Yesuf – Ethiopia.

Ecological Economics Course (May 2005)

Innocent Kabenga, PhD Student, EEU Program, Göteborg University

The Environmental Economics Unit (EEU) of the School of Business, Economics and Law at Göteborg University has a long tradition of research and teaching collaboration with other higher learning institutions worldwide. Beijer International Institute of Ecological Economics, under the auspices of the Royal Swedish Academy of Sciences, is one of them, and for some time now EEU has been running a PhD program in Environmental Economics in collaboration with Beijer Institute. One of the core activities in this program is to organize a course in System Ecology and to train the new young PhD students in Environmental Economics to better understand the complexity of ecological systems. The course takes place in May-June, the best time of the year to be in Stockholm which is one of the most beautiful cities in the world.

The Systems Ecology course is organized every other year and it is integrated into the specialization courses of the PhD program offered by EEU at Göteborg University. In May 2005, four PhD students: Precious Zikhali, Ping Qin, Innocent Kabenga and Jiegen Wei from the EEU attended the course at Beijer Institute that was coordinated and supervised by Max Troell. The course lasted for about one month and the students believe that they have benefited a lot from this course.

The purpose of the course was to provide an opportunity for the PhD students in Environmental Economics to acquire the up-to-date knowledge in ecology and to make a link between economic theory and ecological problems. In order to achieve this objective, Max Troell, an ecologist and a researcher at the Institute, has done an excellent job. He invited a number of seasoned researchers in Ecology from different disciplines, institutions and universities, who made the course quite unique compared to a usual course in Ecology.

Many topics were covered during that period of the course in a very conducive environment and the main ones were:

- Fundamentals of Ecology;
- Urban Ecology;
- Mangrove wetland systems: Ecological complexity and ecological basis for economic valuation;

- Ecotoxicology: an ecosystem perspective;
- Fisheries management;
- Coral reefs in the Anthropocene: managing for resilience;
- Modeling: multiple equilibrium systems;
- Management of dynamic landscapes for biodiversity conservation;
- Modeling ecosystems and management,
- The Ecology of freshwater ecosystems;
- Building resilience in agriculture production;
- Landscapes and global cycles.

All the lecturers provided the students with enough reading materials and presented their lectures where discussions were engaged between the students and the lecturers. Access to internet and other facilities was guaranteed and this made further the course more interesting.

Participants in the course were very active and very interested during the lectures and they had enough time of reading and discussion after classes. At the end of the course, all the four students unanimously were convinced that the ecological economics course was absolutely important as it provided them with the knowledge that would help them understand the limits of the assumptions made by environmental economists when they try to model the real world and give some policy proposals. The course also made it clear that it was imperative to have systems thinking approach when dealing with natural resources as to prevent catastrophic situations that may arise based on unsound decisions proposed with less knowledge of how the nature works. As Mäler and Fisher (2005) suggested, in case where there is not enough information whether a decision today will have as a consequence an irreversible change in environmental resource, and in case where information is coming forward with time, it may be socially profitable to postpone a decision until we know more about the costs and benefits1. The participants to the course were overall positive and all ranked the course as very relevant to PhD students in the field of Environmental Economics.

To evaluate the outcome of the course, a term paper was required. The students wrote on different topics: Design

of Marine Protected Areas (Jiegen Wei); Intensive Agriculture, Resilience and Sustainability in Agricultural Systems (Precious Zikhali); Potential ecological and socioeconomic consequences of GM crops (Ping Qin) and Wetlands Ecosystem Services and Their Valuation Problems (Innocent Kabenga). The influence from the course was so deep that some participants are planning to have one of their thesis papers on the topics covered in Ecological Economics.

The participants appreciated the initiative of organizing the course and they would like to thank the EEU and The Beijer Institute for providing them with such an opportunity that is valuable to their present and future research work.

Footnotes

¹Maler, G.K. and Fisher, A. 2005, Environment, Uncertainty, and Option Values. Beijer Discussion Paper Series no. 190.

Awards

The 2005 Kyoto Prize in Basic Sciences focuses on the field of Biological Sciences

Professor Simon A. Levin recieved the award for establishing the field of "spatial ecology" and expanding scientific understanding of the biosphere as a "complex adaptive system."

Professor Levin's use of mathematical models to understand the complex patterns of the biosphere has made a substantial impact on environmental sciences and led to new methods of environmental protection. In 1974, with Dr. Robert T. Paine, he proposed the "patch dynamics model" that forms the basis of many current ecological models for marine and terrestrial ecosystems. He also demonstrated that high species diversity among competitors -- as observed, for example, in rocky intertidal communities, or in tropical rain forests -- can be maintained by recurrent disturbance. Professor Levin has actively collaborated with economists and environmental scientists to propose methods for dealing with environmental problems. His work has shown that ecosystems and the biosphere are not super-organisms, as previously suggested, but complex adaptive systems with apparent regularity emerging from self-organization processes. Among his primary concerns are the staggering losses in biodiversity worldwide that have resulted in the recent past from the mass production, consumption and waste disposal practices of human populations. His 1999 book, "Fragile Dominion," illustrates how the loss of



biodiversity has created direct threats to human survival, and identifies a series of actions urgently necessary for maintaining biodiversity. In proposing many methods of biological conservation and ecosystem management, Professor Levin has made fundamental contributions to environmental science. (http://www.kyotoprize.org/ pressrel 061005.htm)

Congratulations Simon!

Member of the American Philosophical Society

Professor Sir Partha Dasgupta, Cambridge University, and former Beijer Chairman has been elected Member of the American Philosophical Society during 2005.

Congratulations Partha!

Member of the US National Academy of Sciences

Associated Professor Gretchen Daily, Center for Conservation Biology, Stanford University and Beijer Board Member has been elected to the US National Academy of Sciences during 2005.

Congratulations Gretchen!

Middle East and North Africa Network for Environmental Economics

Mohamed Abdrabo, Coordinator, MENANEE

During the late 1990s, interest in environmental and natural resources economics has increased in developing countries. Accordingly, various developing regions in the world have managed, with the support of the Beijer Institute, to develop their own networks. For instance, the Environmental Economics Network for Eastern and Southern Africa (EENESA) and the South Asian Network for Development and Environmental Economics (SANDEE) were launched in 1994 and 1999, respectively.

The Beijer Institute, following its traditions of supporting environmental economics networks in the developing world, held a meeting in Trieste – Italy on 2-4 May 2005 to discuss the possibility of the establishment of an environmental economics network for the Middle East and North Africa Region. The meeting was attended by a number of participants from the Middle East Region including Egypt, Iraq, Israel, and Turkey.

It was found from that meeting that the establishment of such a network is extremely important, especially with the lack of any training and/or academic programmes on environmental economics in most countries of the region. As this means that existing individual and institutional capacities in the field are quite limited, considerable efforts need to be devoted to capacity building efforts and in supporting those already working this field.

Accordingly, it was decided at this meeting to begin working on the establishment of the network right away and I was selected to be in charge of MENANEE at this stage.

The Middle East and North Africa Network for Environmental Economics is a regional network that aims at strengthening the capacity of individuals and institutions in the region in the field of environmental and resources economics. It also intends to focus on the interrelationships between economic development and environmental changes.

In order to attain the above-mentioned mission of MENANEE, a number of activities were identified to be carried out, at this stage, including:

- A small research grant programme to focus on periodical basis, on changing areas of interest within the environmental economics field.
- Training workshops and seminars in environmental and natural resources economics
- A communication network between individuals and institutions with interest in the environment in general and environmental and resource economics in particular
- Awareness raising among policy and decision-makers on the vital linkages between economic development and environmental changes

At this stage efforts will be devoted towards developing the essence of work of the network that could ensure its scientific accomplishments and financial sustainability. Therefore, attention will be given to the following issues:

- Preparing a vision and a medium-term (3 years) work plan, in which priorities, planned activities and funding strategy will be defined
- Exploring funding possibilities with various regional and international organizations with interest in the environment in general and environmental economics in particular, including among others IDRC, SIDA, Norwegian Agency for Development Cooperation, and the US-AID.
- Identifying a potential host of MENANEE secretariat, with contacts already been underway with Dr. Serageldine, the head of the Library of Alexandria for the library to be such a host and he gave his initial approval
- Developing Close communication with other regional environmental economics networks, especially CEEPA and SANDEE, in order to be able to benefit from their experience with network management, funding and operation
- Carrying out information dissemination through, electronic and printed, publications and newsletters, with higher priority in this respect to the development of a web-page and a mailing list
- Formulating a technical advisory board in order to provide technical support and guidance to MENANEE will be formulated

 Preparing national reports on the status of environmental economics in different countries of the region

Finally, it is worth mentioning that it was decided, at the end of Trieste meeting, held last May, that an affirmative step was needed for a proper launching of the network. Accordingly, it was decided that the launching of the network should be done with a workshop on environmental economics for those interested in the region. This workshop will be organized by the Ecological and Environmental Economics (EEE) Programme, which is a joint programme of the Abdus Salam International Centre for Theoretical Physics (ICTP), the Fondazione Eni Enrcio Mattei (FEEM) and the Beijer International Institute of Ecological Economics. The workshop will be held at the ITCP, Trieste – Italy from the 5th to the 16th of December 2005. During that workshop the MENANEE will be officially launched.

The EEE Programme: From Incubation at ICTP to the International Research Centre on Climate Impacts and Policy

Monica Eberle, ICTP, Trieste

2004 was the second year of research activity of the Ecological and Environmental Economics – EEE Programme, a partnership of the Abdus Salam International Center for Theoretical Physics (ICTP), Fondazione Eni Enrico Mattei (FEEM), and the Beijer International Institute of Ecological Economics. The initial efforts of the EEE Programme were characterised by the strengthening of its scientific framework and organisational structure, which led to the development of a coherent research and training programme.

rear 2004's challenge for the EEE Steering Committee was to find a permanent location and to raise funds for the continuation of the Programme after the end of the initial period of hosting and support offered by the Abdus Salam ICTP Centre. As stated in the Memorandum of Understanding concerning the creation of the EEE Programme, "the ICTP, Beijer and FEEM consider that perhaps the time has come to propose the creation of a dedicated international institution on subjects bridging the fields of Ecology, Environmental Sciences, and Economics with special emphasis on the problems of developing countries." The EEE Programme has been envisaged as the embryonic form of such an international institution, with ICTP acting as an 'incubator'. This objective has been achieved: the success of the EEE Programme both in terms of scientific

accomplishments and financial sustainability will lead to the creation of the International Research Centre on Climate Impacts and Policy.

The Centre will be located on the Island of San Giorgio Maggiore, Venice, in the prestigious premises of Fondazione Giorgio Cini, with Fondazione Eni Enrico Mattei playing a leading role. The new Centre will be a spin-off of the EEE Programme and will continue most of its activities, even though the new Centre will be more focused on climate change issues. The research and training activities organised within the EEE Programme will merge into the activities organised by the constituendo "International Research Centre on Climate Impacts and Policy". One of the final objectives of such a centre will be to continue the mission of the EEE Programme: to enable researchers from developing countries to join the international academic network in the field of ecological and environmental economics.

The new Centre will involve the main international research institutes in the field of climate change and beyond. In addition to the founders of the EEE Programme - ICTP, FEEM and the Beijer Institute -, Princeton University, the Massachusetts Institute of Technology, Resources for the Future, CentER – Tilburg University have already expressed their interest in this important initiative. The activities of the forthcoming centre will be developed within the framework of four main areas: (1) the organisation of high- quality conferences on themes linked to climate change; (2) the organisation of conferences that offer an intercultural and interdisciplinary nature on the theme of climate change and environmental economics in general; (3) the organisation of training activities for researchers from developing countries; (4) the creation of a resident research group on climate change.

During the year 2005, the EEE Steering Committee will define the details of the Centre's final structure and the roles of the various institutions who have expressed their interest in the new Centre. The new location on the Venetian lagoon will be fully operative at the beginning of 2006. In the meantime, the EEE Programme will continue its activities at the ICTP, concentrating on its two usual main research areas:

(1) Dynamic ecological models and Indicators of sustainable development. Activities focus on the development of a theory for indicators of sustainable development for complex dynamic systems, of indicators of genuine wealth, economics of complex dynamical systems, non-market interactions and informal institutions. Relevant issues developed within these research areas are: economics of ecosystem resilience applied to soil and lake systems, environmental bifurcation and impacts on tourism (mainly marine), environmental indicators, and spatial issues (diffusion models for fishery, cultivation, grazing behaviour etc.).

(2) Integrated assessment models. Activities focus on the integration between global climate models, regional models of climate impacts, and economic models to assess the economic consequences of climate impacts in a coherent framework. They address the socio-economic dimension of climate change, mitigation and adaptation policies, and focus on the economic (welfare) assessment of climate change impacts.

These two research areas organise a number of activities that significantly contribute to the achievement of the final objectives of the Programme:

• to develop mathematical models in order to understand the interactions between physical, environmental and economic systems;



Research Workshop on Ecosystems and Tourism, Movanan Lodge, Chobe, Botswana, 6-8 January, 2005 Harry Biggs, Oonsie Biggs, Jonathan Barnes, David Cumming, Baldeu Chande, Daniel Motinga, David Starrett, Eric Mutunga, Jessica Andersson, Edwin Muchapondwa and Anna Spenceley. Photo: Christina Leijonhufvud.

- to provide an economic assessment of environmental problems and to design policies to address them;
- to enable researchers from developing countries to join the international academic network in the field of Ecological and Environmental Economics.

The different and complementary skills of ICTP on "hard" natural sciences, and in particular its Weather and Climate Research Group, and the socio-economic expertise of FEEM and The Beijer Institute with their long-standing tradition of work in a multidisciplinary environment, have led to the creation of a wide programme of activities. Such programme is comprised of workshops, capacity-building activities, and seminars; the dissemination of the main research results; a number of co-operations with other researchers based in institutes all around the world.

Since its commencement, the EEE Programme has organised 32 seminars and 29 workshops and capacitybuilding activities (6 in poor countries). Participants in these activities are selected in order to ensure an appropriate balance between the benefits of being taught by top lecturers (not conditional on nationality) and maximising opportunities for researchers coming from developing countries. The most recent activities organised by the EEE Programme are listed below.

- 2nd workshop on Integrated Climate Models: an Interdisciplinary Assessment of Climate Impacts and Policies (29-30 November 2004, Trieste, Italy)
- Research Workshop on Ecosystems and Tourism in Southern Africa: Economic and Ecological Resilience (6-8 January 2005, Chobe, Botswana)
- Teaching Workshop Follow-up of the Teaching Workshop on Accounting for Urban Environment (11-13 January 2005, Arusha, Tanzania)
- 3rd Workshop on Spatial Dynamic Models of Economics and Eco-Systems (11-13 April 2005, Trieste, Italy)
- Workshop on Infectious Disease: Theoretical, Ecological and Economic Approaches (13-15 April 2005, Trieste, Italy)
- Workshop on IWAP Inclusive Wealth and Accounting Prices (13-15 April 2005, Trieste, Italy)

• Discussions on possible network on Environmental Economics in the Middle-East (2-4 May 2005, Trieste, Italy)

The main research results achieved by the EEE Programme are disseminated through the EEE working paper series (21 working papers), through the participation in international conferences (14 papers presentations) and through the publication of books (5 books) or papers in renown scientific journals (13 papers). Dissemination also takes place through the EEE Programme website (http:// www.ictp.trieste.it/~eee/), which contains the complete programmes and materials produced within the activities implemented by the Programme, suggested readings downloadable free-of-charge, the list of persons and their addresses linked to the Programme (Committee members, lecturers, speakers, associates, fellows, researchers, participants in past activities), useful links, etc.

Since its commencement, 21 researchers (10 from developing countries) from many countries have worked within the umbrella of the EEE Programme. In addition to co-operation at an individual level, the EEE Programme co-operates regularly with other research institutes in order to improve the quality of climate information and physical impacts of climate change. These institutions include the University of Hamburg, Germany; ABARE - Australian Bureau of Agricultural and Resource Economics, Australia; Potsdam Institute of Climate, Germany; CIRED - Centre International de Recherche sur l'Environnement et le Développement, France; and above all the ICTP Physics of Weather and Climate Section, Italy.

The EEE Programme has also been in close contact with the following regional networks: Resource Accounting Network in Southern and Eastern Africa (RANESA); South Asian Network for Development Economics and Environment (SANDEE); Latin American and Caribbean Association of Environmental and Resource Economists (ALEAR); European Association of Environmental and Resource Economists (EAERE); and Middle East and North Africa Network of Environmental Economists (MENANEE). With reference to the latter, the EEE Programme is very proud of its contribution to the creation of this network. The MENANEE kick-off meeting was held in Trieste in May 2005, with the support of the EEE Programme, and its creation is one of the most important accomplishments of the EEE Programme.

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

Priya Shyamsundar, Coordinator, SANDEE

The South Asian Network for Development and Environmental Economics (SANDEE) is a regional capacity building network that brings together analysts and professionals from the different countries in South Asia to address its environment-povertydevelopment problems. SANDEE seeks to use economic tools and analyses to address some of South Asia's environmental challenges. SANDEE's activities include research, training, information dissemination and regional networking.

ANDEE continues its core activity of support for small research grants. Last year SANDEE made 11 new grants and two study grants. The grants covered issues ranging from the impact of pesticides on health and productivity in Nepal, to changes in hydrological services from forest ecosystems, to identification of pro-poor tourism potential in the Sundarbans. Fifty percent of the grantees were women. In the last year, SANDEE strengthened its ability to provide technical support to researchers by drawing on additional help from various scholars in and outside South Asia. SANDEE has also made it easier for new researchers to apply for grants by asking first for brief concept notes instead of full proposals.

SANDEE delivered four training programs and trained some 96 participants in the last year. SANDEE continues to offer introductory and advanced training workshops. The environment and natural resource economics (EE) course held in the summer of 2004 is a basic course that introduces participants to various aspects of economics that deal with the environment. We have increasingly tried to link the course and its participants to our research program. We also offered an advanced course in late 2004 related to field survey methods and implementation. Our two other courses were a two-day technical training on "Millennium Development Goals (MDG) Needs Assessment-Resource Costing and Information Requirements" and a Policy Research and Proposal Writing Workshop. SANDEE continues to support younger researchers in smaller countries in the region by

hosting the policy research and proposal writing workshops.

SANDEE published seven working papers and seven policy briefs in 2004-05. SANDEE also published several bibliographies that are likely to be useful to researchers interested in different areas of environmental and natural resource economics. The biannual newsletters continue to be very popular. Please visit the SANDEE website (www.sandeeonline.org) to obtain these publications.

On the policy front, SANDEE research studies are slowly beginning to enter the policy debate either among researchers or amongst policy makers and practitioners. For example, Dr. Somanathan's work on water purification behavior was presented to and discussed at the World Bank and Dr. Bhim Adhikari's work was reflected in discussions on new challenges in community forestry in Nepal. Based on her research, Dr. Rucha Ghate continues to keep the tribal of Central India informed about joint forest management and its rules and regulations. Dr. Amita Shah has been invited by the Planning Commission of India to write a chapter for the State Development Report of Gujarat, where she is incorporating a substantial part of her SANDEE research on the links between natural resources, livelihood and migration.

SANDEE welcomes two new donors and two new Committee members. The latest donors are the International Development Research Center (IDRC) Canada and the Norwegian Agency for Development Cooperation (Norad). Dr. David Glover represents IDRC and brings to us his skills and experience as Director of the Economy and Environment Program for Southeast Asia (EEPSEA).

SANDEE also welcomes, Dr. Shanta Devarajan, Chief Economist, South Asia Region, World Bank to its Management and Advisory Committee. Dr. Devarajan brings experience from policy making at the World Bank and from serving as an advisor to another research network, the African Economic Research Consortium.





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

The Centre for Environmental Economics and Policy in Africa (CEEPA), and The Resource Accounting Network for Eastern and Southern Africa (RANESA)

Rashid Hassan, Professor, Coordinator, RANESA

CEEPA's Collaborative Regional Master Program (CRMP) in Environmental Economics.

This program is now in its fourth year of operation. Twenty one students from eight countries in the eastern and southern Africa region have been admitted to the program for its 2004/05 session, making the total number of Africans who received this specialised training add to more than 80 over the four years period.

The environmental economics specialisation modules have been taught by Prof. A. Lumpy of University of Natal, Prof. G. Hertzler of University of Western Australia, Dr. A. Mkenda of the University of Dar Essalam, Dr. E. Mugatana, Dr. R. Mabugu, and Prof. R. Hassan of CEEPA. Prof. D. Starret of Stanford University served as the external examiner for these modules for the third year. This program has now been absorbed and its curricula adopted by the newly established Agricultural Economics Education Board (AEEB) in eastern and southern Africa and will therefore be coordinated and managed by the AEEB Academic Board with CEEPA's assistance starting next year (2006) with additional funding to accomodate more students. This program was funded by the Rockefeller Foundation.

New Initiative Supporting Capacity in Environmental Economics and Policy Analysis in eastern and southern Africa

CEEPA launched mid this year a new program for supporting individual and institutional capacity in environmental economics in the region under support from Sida, Sweden. The new program will provide wide range of opportunities and funding in support of a number of faculty development activities and teaching and research support to African academics and researchers in this field including:

- 1. Visiting fellowships for Africans on sabbatical for residency within Africa or overseas (2 per year)
- 2. Post-doctoral fellowships for Africans who are recent holders of PhD degree in the field currently working outside Africa (2 every year)
- 3. International fellows residency at African universities (one every year)

- 4. Scholarships for PhD students at African universities offering specialised PhD training in this field (2 every year)
- 5. Research grants for African researchers wishing to conduct research in this field (8 every year)
- 6. Training of trainers and research mentoring and support workshops (3 every year)
- 7. Library support to African universities participating in the program
- 8. Support to publications and information dissemination activities

This program is funded by Sida for an initial period of three years (2005-2007). The first two PhD scholarships were granted to the best two students in the CEEPA CRMP in past two years who are now enrolled for PhD studies at the University of Pretoria. The first training of trainers workshop is planned to be held at ICTP in Trieste, Italy in collaboration with the EEE program in December 2005 (find more details on the CEEPA, EEE program or ICTP websites).

RANESA continues to support research, training and networking activities in the eastern and southern Africa region in its second year of Phase 3. Work on construction and use of environmental accounts started in all involved countries (Ethiopia, Tanzania, Uganda, Mozambique, South Africa, Namibia and Botswana). The work underway covers a number of key resource sectors: fisheries (Uganda, Mozambique and Zanzibar), water (SA, Tanzania, Namibia, Botswana, Mozambique), forestry (Tanzania, Namibia, Uganda, Ethiopia), minerals (Tanzania) and soils (Ethiopia).

RANESA successfully concluded in June 2005 its first research and technical training workshop of Phase 3 held in Maputo, Mozambique. 24 trainees from the mentioned countries and 6 resource persons participated in the workshop (for more details on the workshop visit CEEPA website).

RANESA has also collaborated with the ICTP EEE program to establish a new network for environmental economists in the middle east and North Africa (see more details under the EEE program activities and website)

First steps of the Latin American and Caribbean Environmental Economics Program (LACEEP)

Francisco Alpízar, Coordinator, LACEEP

The launching of the Latin American and Caribbean Environmental Economics Program in June 2005 marks the culmination of a long journey that began in December 2000 in the context of a teaching and research workshop organized by The Beijer Institute with the election of the first team in charge of designing and funding a capacity building program for the Latin American and Caribbean region. Since then, The Beijer Institute has been one of the most active and important supporters of this initiative, which has obviously undergone many improvements since the initial conception. Particularly relevant have been The Beijer Institute's teaching and research workshops (México and Perú), which have served as a discussion forum for Latin American researchers interested in capacity building in the Region. From a more personal perspective, it was Prof. Mäler's constant encouragement and firm support that kept me from resigning when times were particularly tough as Program Director of an at the time unfunded capacity building program.

Appily, June 2005 also marks the beginning of a new journey that promises to be as challenging as it is promissory. In late 2004, discussions began with the Canadian International Development Research Center (IDRC) and afterwards with the Department for Research Cooperation of the Swedish International Development Agency (SIDA/SAREC).¹ Together they have now agreed to fund two thirds of the initially proposed program. This budget allows us to launch the capacity building program in a reduced form, while still looking into potential new sources of funding that will enable us to expand our activities. LACEEP's secretariat will be located in Costa Rica and will be hosted by CATIE (Tropical Agriculture and Higher Education Center).

What is LACEEP?

The Latin American and Caribbean Environmental Economics Program is a capacity building effort that combines research grants with close advice and supervision by specifically appointed environmental



economists that are highly recognized for their research in the grantee's field of work. In addition, LACEEP will organize two yearly workshops and short courses, in which the grantees will have the opportunity to discuss their work and be tought by leading economists.

LACEEP's research grants will be awarded through twiceyearly competitions. Interested researchers should first submit a two-page preliminary proposal. Proposals are first assessed on receipt; authors of the most promising entries are then encouraged to send a full research proposal which will be reviewed by external examiners. The authors of the best proposals will be invited to present them at the LACEEP's workshops, in which authors will receive comments from a panel of resource persons. Proposals will be evaluated according to their quality and pertinence. The issues discussed should be relevant to the Latin American and Caribbean context and should include economic analysis of environmental problems or policies. Innovative research topics and methods are encouraged.

This grant program is aimed at junior researchers who are citizens of any country in Latin America or the Caribbean. Applicants should have prior training in economics, preferably at the master level. For proposal of exceptional quality, grants may also be assigned to cover the cost of PhD fieldwork.

In the first round (i.e. for the February 2006 workshop), a minimum of 7 research grants will be assigned. We have received 30 preliminary applications most of them very promising⁺ from researchers in countries with very different

realities: Mexico, Guatemala, Costa Rica, Colombia, Chile, Ecuador, Paraguay, Uruguay, Brazil, Argentina, and Peru. The topics are also very varied. A few researchers are interested in environmental valuation, many hope to do research in environmental policy design and implementation, and others are interested in natural resource management and green accounting, to name a few areas of interest. We are now in the process of working in the design of the final research proposals and, at the same time, identifying potential external referees for the proposals. The first workshop will take place in February 2006 in Costa Rica.

The way ahead

In the months to come, and in addition to the selection of grantees, a few issues are priority for LACEEP. First and foremost, we hope to find additional sources of funding in order to reach the full scale of the program, involving more scholarships and, in the future, a one-month course in environmental economics. We are already exploring new potential sources, but suggestions are always welcome,² particularly if they come with a specific name and address.

Another fundamental task is building a stable group of scientific advisors that could work both as referees and as lectures in our courses and workshops. Several environmental economists have expressed their interest and we hope to formalize a long lasting relationship.

Last but not least, we would be more than glad to receive your ideas and comments. Please contact us at laceep@catie.ac.cr.

Francisco Alpízar, PhD Program Director LACEEP

Footnotes

¹ The search for financial support was enabled by seed funding provided by Gothenburg University, Sweden. ² laceep@catie.ac.cr

Review of the Beijer International Institute of Ecological Economics

Report to the Royal Swedish Academy of Sciences, 17 April 2005

The Royal Swedish Academy of Sciences decided in the end of 2004 to perform international evaluations of its current institutions and their activities. For each institution a panel of international experts, not involved in activities at the institutions under review, should be appointed and given the task of implementing the evaluation. In addition, relevant members of the Academy should be appointed rapporteurs of the expert panels, mainly to provide the experts with facts about Sweden, its academic system and conditions in the research areas under review etc. Brief general terms of reference for the evaluations have been set up (APPENDIX 1). Each evaluation, which shall result in a report to the Academy, will be based on documentation submitted by the institute as well as presentations, interviews and discussions performed in connection with a site visit at the institute. Documentation requested should comprise:

- A summary of the research including an activity plan, main results and publications, dissertations etc.
- A brief description of objectives and methods
- A list of personnel involved (research staff, graduate students, visiting scientists, support staff)
- A brief description of co-operation with other research groups, organisations etc.
- A financial overview
- Future plans

In January 2005 the composition of the evaluation group for the Beijer Institute was completed and dates for the site visit settled. Documentation from the Beijer Institute was distributed to the group in the beginning of March.

Brief history of the Beijer Institute

The Beijer Institute was founded in 1977 thanks to a donation from the Kjell and Märta Beijer Foundation. The institute became well known worldwide under the name The International Institute for Energy, Resources and the Human Environment. This institute came to an end in 1989, but more or less restarted as The Stockholm Environment Institute (SEI), financed by the Swedish Government.

The Academy discussed how to best use the Beijer resources and localities still available and out of several suggested themes for a new institute it was decided in 1990 to launch the Beijer International Institute of Ecological Economics. Its goal is to foster interdisciplinary activities among natural and social scientists, to deepen understanding of the interactions between humans and nature.

Review of the Beijer International Institute of Ecological Economics Report to the Royal Swedish Academy of Sciences, 17 April 2005

Review Committee

Dr. Gardner Brown, Jr., University of Washington Dr. Hal Mooney, Stanford University Dr. Jason Shogren, University of Wyoming Rapporteurs for the Academy Dr. Lars Ericson, Umeå University and member of the academy's class for biosciences Dr. Karl-Gustaf Löfgren, Umeå University and member of the academy's class for economics and social sciences

The committee and rapporteurs met for three days (15-17 April 2005) at the Royal Swedish Academy of Sciences in Stockholm to evaluate the performance of the Beijer Institute over the last five years.

The committee visited the Beijer Institute and interviewed eight individuals, including the director, researchers, students, and the former deputy director. Prior to the meeting, the committee members had informal discussions with colleagues knowledgeable about the Beijer Institute. The process of evaluation involved open discussion between the committee, interviews with researchers and staff, and reading material and research publications. Drs. Ericson and Löfgren provided background information and answered questions about the nature of ecological and economics research in Sweden. Dr. Dick Hedberg, Executive Secretary of International Relations for the Academy, was present in the discussions to answer general questions and provide background information about the Academy. The committee also met with Dr. Gunner Öquist, Secretary General of the Academy.

The committee was charged with addressing five specific evaluation tasks, which were used as a framework for the committee's discussion.

Task 1. Evaluate the quality of research and research training activities of the Institution.

Quality of Research

The committee evaluated the quality of research by considering the calibre of researchers, quantity and quality of journals the material was published in, and the committee's knowledge of the quality and the impact of the research. The committee considered the success based on four elements:

- reframing the question (ignition papers)
- new analytical methods of integration
- changes in how a person thinks about his or her own disciplinary work
- dissemination of ideas
- use of frontier methods of analysis and estimation

Overall the committee agreed that the "reframing the question" work was of exceptional quality. The institute has pulled together serious high calibre researchers asking fundamental questions with the aim of trying to reach and influence a broad general audience. The success is witnessed first by the superb quality of the researchers attracted, and second by the publications in Science, Nature, Ambio, and so on. That said, there have been mixed results relative to the frontiers in using the best tools to move forward the integration of economics and ecology. Based on the evidence presented to the committee, there is a significant gap between the in-house work relative to the high-level reframing work. Whereas the work on resilience has been influential and has lead to important outreach activities and new research activities, the work on valuation has been less innovative.

Quality of research training

The Beijer Institute has focused on "capacity building" by educating students in numerous developing countries principally through courses and workshops. It has created a collaborative course in systems ecology with Stockholm University; there has also been collaboration with the graduate program in the Department of Economics in Göteborg University. Beijer spearheaded the creation of the journal Environmental and Development Economics (EDE) to provide a receptive home for research published by scholars in developing economies. The committee struggled to define a reasonable metric of success for the research training activities. The question is whether success should be defined by the inputs into the program (e.g., high profile researchers and their dedication to it) or the output provided by the capacity building (e.g., EDE special issue based on student work, quantity and quality of students applying to Gothenburg after workshop, the applied and theoretical research of the students).

Workshops served the dual function of educating and identifying the more able students who were then enrolled in the Gothenburg program.

Capacity building in developing countries is an important initiative, but the committee was provided with insufficient information to judge the overall success of these endeavors. No information was provided on tracking what the students did after the workshop programs, and how they chose to retrieve the information for applied purposes provided by the courses. In addition, the composition of the teaching teams—the mix of economists and ecologists—seems to have been dominated by economists. Better documentation and tracking is needed to help determine what the successes and failures have actually been in the capacity building efforts.

Task 2. Comment on the present research agenda in terms of originality and international development and of the unique potential of the Institution.

The committee addressed the question on what is the unique potential and whether it had been met by considering the integration of economics and ecology through (i) reframing the big question, and (ii) practical application done by in-house research. First, the committee agrees that the high level reframing work has been excellent.

Second, concerning the Beijer research agenda at the practical level, disciplinary analytical breakthroughs are less than has been accomplished at the frontiers; but they are advancing the integration of the two disciplines. Part of this deficiency is due to the lack of critical mass at the Beijer and to the diminished link between the high level activities of reframing the question and the day-to-day research applications at Beijer. The unique potential is enormous, but the realization is stymied by the lack of a critical mass needed to meet this potential. The direction if not the magnitude of the trajectory is right. We pose the question of whether one should drop the internal work and adhere to the Aksö meeting style, in which world famous scholars from several disciplines reframe important social issues and provide insightful synthesis. We speculate that ending the in-house work, however, would greatly diminish the overall participation of Swedish scholars in this endeavor; decrease the research with a local, regional, and national focus (e.g., Stockholm Urban Assessment); and reduce the dissemination of research results to the Swedish community. The in-house team, if it is to continue, has to be enhanced. By enhanced, we mean two things— either more in-house researchers to create a critical mass, and more interactions and links with the international researches to enrich the local research community such that there is a spillover to the in-house research teams. To strengthen the in-house capacity in Beijer to take theory to practice, more high level local ecologists and economists are needed, and this would usefully include a mix of Swedish and International researchers and Beijer members.

The present research agenda consists in part of explorations into spatial dynamics, non-convexities,

ecosystem services, and inclusive wealth measures (e.g., greening accounting). These themes have been timely and useful, and could have been strengthened with more resources. Five years ago there seemingly was more interaction and more energy, but now the researchers are down to a reduced crew and the present activities are not enough to achieve the overall objective. There is an incentive question for new program development that arises, given Beijer is at the end of the director's term. '

Task 3. Comment on the degree to which the Institution has been successful in developing a research infrastructure that attracts leading researchers (research teams) from Sweden and abroad.

- High level international researchers—the infrastructure has been established and has been very successful.
- Attracting leading research "teams"—broadly defined, the institute has helped to facilitate sharing ideas and the exchange of information. More specifically, incentives were provided so groups of leading researchers could reach across disciplines to study varied topics (e.g., biodiversity, resilience, nonconvexities, and spatial dynamics). The organization of the research groups has been a reasonable and pragmatic way to create a productive working environment.
- Previous boards have seemed very engaged and active participants in the research agenda; the review committee is encouraged by the stature and composition of the new board and the committee anticipates that the board will continue this tradition.
- Sweden—Less successful from the traditional disciplinary perspective. Historically, for complex reasons, the links were fragile between different ecological schools within Sweden; these links have been strengthened over the years so now there are new opportunities to be exploited. From another perspective, the infrastructure can be viewed as more successful given that it has attracted external funding (e.g., Center for Interdisciplinary Environmental Research at Stockholm University). On the economics

side, Beijer has supported the Ulvön workshop on environmental economics that brings together senior and junior researchers. The links to the community of Swedish valuation researchers seems less robust than desirable, however.

Task 4. Comment on the future research priorities and strategic planning in view of scientific opportunities and available resources Given the prospective change in directors, this is a challenging point to address with any thoroughness. The committee can say this:

- The Beijer Institute should be continued. An open question is to find the "best" plan of transition from the present director to the new director.
- The primary mission should be maintained—the integration of economics and ecology is vital. This is a unique institution designed to unite the two disciplines, and Beijer has built a substantial reputation in addressing this mission.
- The committee urges that a search committee be formed as soon as possible. There should be a search for an internationally recognized scholar. There should be representation in the leadership (director, deputy director) from both disciplines. The committee also suggests the current director be encouraged to remain in whatever capacity necessary until a new director is found within the next 1-2 years.
- The new director should establish a strategic plan for fulfilling future research priorities. At a minimum the committee supports the future efforts of the Institute in the areas of spatial dynamics and the valuation of ecosystem services, both theory and practice. Both are key areas in the integration of economics and ecology, and will attract high level national and international researchers.

Task 5. Comment in general terms on the resources required by the Institution.

The committee believes it is important to find additional resources to:

- enhance in-house capacity to create the critical mass (there are nine full time in-house researchers) necessary for frontier research and more practical application,
- encourage greater interaction within the Swedish research community.

Summary and Recommendation

The Beijer Institute is a unique entity that has produced an outstanding record of achievement during the past decade. In particular, the results emerging from the high level Aksö meetings have brought significant international recognition to the Institute. The workshops have brought worldclass research workers in contact with students. Some program components have had a large impact and multiplying effect but this success has not been uniform across all program elements. In spite of the high success of the Institute in fulfilling its mission much work remains to successfully build the desired interactions between ecology and economics. Thus the review committee strongly recommends that the current mission of the Institute be maintained and that a search for a new director proceed in the near future.

Review Committee

Dr. Gardner Brown is Emeritus Professor of economics at the University of Washington, and holds a part time appointment in the environmental economics unit of the Göteborg University.

Dr. Hal Mooney is the Paul Achilles Professor of Environmental Biology at Stanford University.

Dr. Jason Shogren is the Stroock Distinguished Professor of natural resource conservation and management, and professor of economics at the University of Wyoming.

Interviews at Beijer Dr. Karl-Göran Mäler, Director Dr. Max Troell Dr. Tore Söderqvist Ms. Sandra Lerda Dr. Åsa Jansson Dr. Johan Colding Dr. Carl Folke Dr. Ingela Ternström

Disclosure statements

Professors Karl-Gustaf Löfgren from Umeå and Jason Shogren from Wyoming submitted a proposal lead by professor Bengt Kriström (SLU, Umeå) on the strong environment center of excellence to FORMAS, which is one of many competitors with a proposal submit by Dr. Carl Folke, Stockholm Environmental Institute, and the Beijer Institute. Professor Hal Mooney has worked on a joint paper with researchers associated with the Beijer Institute published in Nature in 2000 (volume 405, pages 1017-1024).

APPENDIX 1 General Terms of Reference for the Review of Academy Research

Institutions

The Review Committee is asked to review the performance of the Academy Research Institution with (a) special reference (focus on) to the last five years, and to comment on its strategic role as a research infrastructure and its scientific importance nationally and internationally. The Review Committee is particularly asked to:

(i) evaluate the quality of research and research training activities of the Institution;

(ii) comment on the present research agenda in terms of originality and international

development and of the unique potential of the Institution; (iii) comment on the degree to which the Institution has been successful in developing a research

infrastructure that attracts leading research teams from Sweden and abroad;

(iv) comment on the future research priorities and strategic planning in view of scientific

opportunities and available resources; and

(v) comment in general terms on the resources required (available to) by the Institution.

The Review Committee is also asked to comment on whether the Academy is an appropriate organisation to accommodate Research Institutions, and to give recommendations for the future

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 twelfth annual board meeting was held at the Institute, September 3rd, 2004.

Board of Directors 2004-2005

CHAIRMAN STEPHEN CARPENTER* Professor, Center for Limnology, University of Wisconsin, USA

EX-OFFICIO MEMBERS GUNNAR ÖQUIST* Professor, Secretary General of the Royal Swedish Academy of Sciences, Sweden

KARL-GÖRAN MÄLER* Director of the Beijer Institute, Sweden

* members of the Royal Swedish Academy of Sciences

MEMBERS SCOTT BARRETT

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

KANCHAN CHOPRA

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

GRETCHEN DAILY

Associate Professor (Research), Department of Biological Sciences, Stanford University, USA

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

MICHAEL HOEL Professor, Department of Economics, University of Oslo, Norway

MICHEL LOREAU Professor, Pierre and Marie Curie University, Paris, France

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

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

ANASTASIOS XEPAPADEAS

Professor of Economics, Economics Department, University of Crete



Beijer Board 2004. Back row: Scott Barrett, Thomas Rosswall, Michael Hoel, David Starrett. Front row: Anastasios Xepapadeas, Stephen Carpenter, Gunnar Öquist, Jane Lubchenco and Karl-Göran Mäler. Photo: Anna Sjöström.

ANNUAL REPORT 2004-2005

STAFF MEMBERS

FOLKE, Carl, Professor, Research Fellow KAUTSKY, Nils, Professor, Deputy Director LEIJONHUFVUD, Christina, Administrator MÄLER, Karl-Göran, Professor, Director SJÖSTRÖM, Anna, Administrator SÖDERQVIST, Tore, Associate Professor, Research Associate TROELL, Max, Associated Professor, Research Associate TERNSTRÖM, Ingela, PhD, Research Associate

Project Employed Staff

ANDERSSON, Jessica, PhD, Department of Economics, Göteborg University ANIYAR, Sara, Professor emerita, University of Zulia, Venezuela COLDING, Johan, PhD, Research Associate CREPIN, Anne-Sophie, PhD, Research Associate JANSSON, Åsa, PhD, Research Associate LERDA, Sandra, FL, Swedish University of Agricultural Sciences, Uppsala RÖNNBÄCK, Patrik, PhD, Research Associate SCHARIN, Henrik, PhD, Swedish University of Agricultural Sciences, Uppsala SOUTUKORVA, Åsa, MSc, Research Assistant

VISITING SCIENTISTS AND GRADUATE STUDENTS

WALSH, Sheila, PhD student, UC San Diego, USA

HORIOUCHI, Kozo, Professor, Hosei University, Japan

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

Office location

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

Organization

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

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

Christina Leijonhufvud

Christina Leijonhufvud is Administrator. During 2004/2005 she has been responsible for the administration of the Board and Askö meetings in September 2004, the Research Workshop on Ecosystems and Tourism in Botswana in January 2005 and the Research Seminar on Accounting for Urban Environment in Tanzania in January 2005. She has been organizing the Marine Resilience meeting at the Academy in October 2004. She is also dealing administratively with the SANDEE Network, the EDE journal, the handbook of Environmental Economics, and the EEE programme together with the ICTP and FEEM.

Anna Sjöström

Anna Sjöström is administrator and also handles the information about the Institute and it's work. She is the webmaster for the Beijer web page. She is also 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 2004 she was also involved in the planning of the Board and the Askö Meeting at Abisko Research Centre in September. Furthermore she is also handling administratively with the PhD programme together with Göteborg University. During January 2004 - January 2005 Anna has been working part time due to studies at the Stockholm University.

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

Sebastian Fransson and Simon Fransson have worked part time with administrative matters.

Investments

During 2004/2005 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.



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

Funding for the Institute's activities between 1 July 2004 – 30 June 2005 has also been provided by:

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

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

A SUMMARY OF BEIJER ACTIVITIES

Research Programmes

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

Sustainable Coastal Zone Management (SUCOZOMA)

SUCOZOMA was 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 the second and last phase ended on 31 December, 2004. The Beijer Institute participated in SUCOZOMA together with Göteborg University, Kristineberg Marine Research Station, Stockholm University and the Swedish National Board of Fisheries. See www.sucozoma.tmbl.gu.se for a detailed presentation of the whole research programme. Some main results from the programme is presented in an article earlier in this annual report.

Marine Biodiversity, Patterns and Processes (MARBIPP)

Marine biodiversity, patterns and processes (MARBIPP), a scientific program with the general objective to provide increased knowledge and end-user directed guidelines for the management of coastal marine biodiversity in Swedish waters. As a more detailed overview of the program was presented in the Beijer annual report 2002. More information about the overall program can be obtained from the program website: http://www.marbipp.tmbl.gu.se/ Recent publication: Troell, M., L. Pihl, P. Rönnbäck, H. Wennhage, T. Söderqvist, and N. Kautsky. 2005. Regime shifts and ecosystem service generation in Swedish coastal soft bottom habitats: when resilience is undesirable. Ecology and Society 10(1): 30. Submitted paper: Pihl, L., S. Baden, N. Kautsky, P. Rönnbäck, T. Söderqvist, M. Troell and H. Wennhage. Shift in fish assemblage structure due to loss of seagrass Zostera marina habitats in Sweden.

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

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

Inclusive Wealth and Accounting Prices (IWAP)

In this research project, we attempt to test whether it would be possible to estimate accounting prices for ecological systems. The study area will be the Stockholm County. The methods developed for estimating the accounting prices can later be applied to large scale systems, in order to assess the sustainability of the joint economic - natural systems.For more details, see Karl-Göran Mäler's article in this annual report.

The Resilience Alliance

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

For more information: www.resalliance.consecol.org

Other Research Project

Besides the projects that constitute the Institute's research programmes, the Institute's staff is involved in a number of other research projects. A selection of initiated, ongoing and terminated projects during 2004/2005 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.

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

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

Quality Assessment of Swedish Environmental Valuation Studies

Åsa Soutukorva and Tore Söderqvist, the Beijer Institute.

Environment Uncertainty, and **Option Values** Karl-Göran Mäler, 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, Impliactions for Ecosystem Functions

Nils Kautsky, the Beijer Institute, and Magnus Nyström.

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 Swdish participants: Nils Kautsky, the Beijer Institute, and Christina Halling Dep. Systems Ecology, SU.

Operationalising Sustainability – Social, Ecological, Economic Evaluation of Resilience

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

Economic and Institutional Tools for Sustainable Management of Biodiversity

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

Efficient Use of Local Natural Resources - Individual Actions and Cooperation in a Changing World Ingela Ternström, the Beijer Institute.

Peri-Urban Mangrove Forests as Filters and Potential Phytoremediators of Domestic Sewage in East Africa (PUMPSEA)

Patrick Rönnbäck, Max Troell, Beatrice Croona, and Nils Kautsky.

Sharing Resources with Complex Dynamics: Strategic Interaction across Temporal and Spatial Scales with Policy Implications

Therese Lindahl, The Beijer Institute and Anne-Sophie Crépin, The Beijer Institute

The Stockholm Urban Assessment (SUA)

Johan Colding, Thomas Elmqvist, Jakob Lundberg, Karin Ahrné, Erik Andersson, Stephan Barthel, Sara Borgström, Andreas Duit, Henrik Ernstsson, and Maria Tengö

TEACHING AND TRAINING

The Institute serves as a catalyst between university departments and institutions working with ecological economic issues, and PhD students are involved in both research programmes and projects.

The Institute organises training workshops and international research seminars on environment and development, and international training programmes. See the Chronology of Beijer and associated networks for details on seminars and workshops held during 2004/2005.

The Ecological and Environmental Economics -EEE Programme

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

The core aim of the EEE Programme is:

- to develop mathematical models to understand the interactions between physical, environmental and economic systems;
- to provide an economic assessment of environmental problems and to design policies to address them;
- to organise research and training activities for researchers from developing countries, with the final objective of enabling them to join the international academic network in the field of ecological and environmental economics.

The aims of the Programme are pursued through the organisation of training courses and workshops, seminars, and also through the formation of a permanent research group based in the ICTP.

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

PhD programme in Environmental Economics

The Beijer Institute and the Environmental Economics Unit at Göteborg University established a PhD programme in environmental economics in 1997. The purpose of the programme is to strengthen the capacity in developing countries and in particular the capacity to teach environmental economics at the university level and to establish a firm The programme is supported by SAREC and includes one year of general economic courses, one year of specialization courses, two-three years of data collection and thesis writing. The scholarships are open for applicants from developing countries.

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

The Stockholm Seminar: Frontiers in Sustainability Science and Policy

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

The series present lectures from a wide variety of perspectives on sustainability and is focused on the need for a sound scientific basis for sustainable development policy.

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

During 2004/2005 the following seminars were held at the

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Prof. Wangari Maathai, Deputy Minister for Environment, Ministry of Environment, Natural Resources and Wildlife, Kenya and Nobel Peace Prize Laureate 2004 giving a seminar at the Stockholm Seminar 23rd of May, 2005. Photo: Jonas Förare.

Royal Swedish Academy of Sciences:

- 10 September 2004 Prof. Boris Worm. "Global decline of large oceanic predators: causes, consequences, conservation"
- 29 September 2004 Prof. David Waltner-Toews. "Complexity, Canon and Narratives: Sustainable Stories in a Ragtime Biosphere"
- 30 September 2004
 Prof. Karin Limburg. "Modeling and Measuring the Process and Consequences of Land Use Change: Drawing the "Red Thread" through Economy, Land Use, and Ecosystem Responses"
- 16 November 2004
 Prof. Riley E. Dunlap. "The Globalization of Citizen Concern for the Environment: Results from Cross-National Surveys"
- 28 April 2005 Prof. Thomas Homer-Dixon. "Ingenuity Theory: Adapting to Complexity"

• 23 May 2005

Prof. Wangari Maathai. "The Green Belt Movement of Kenya: Ecosystems, Livelihoods, Democracy, and Peace"

More information about the seminars can be found on Albaecos website: www.albaeco.com

The Askö Meeting¹

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 12th Askö Meeting (4th - 6th of September, 2004) was: "Economic and Ecological Resilience in Arctic Areas"

The consensus document from the 2004 year's Askö Meeting is available as Beijer Discussion Paper No. 191.

¹ This series of meetings took originally place at Askö, an island in the Trosa Archipelago. Atlhough during the last couple of years we have used other venues (such as our sister research institutes in the Royal Swedish Academy



Askö Meeting at Abisko 2004. Back row: Kjell Danell, Christer Nilsson, Simon Levin, Carl Folke. Michael Hoel, Christina Leijonhufvud, Jane Lubchenco, David Starrett. Anna Sjöström, Anne-Sophie Crépin, Terry Chapin, Scott Barrett. Karl-Göran Mäler, Brian Walker, Tasos Xepapadeas. In front: Steve Carpenter.

of Sciences, we are continuing to call these meetings "Askö" meetings.

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 2004/2005.

JESSICA ANDERSSON

PhD (Economics), Göteborg University

RESEARCH FOCUS Valuation, Institutional and Development Economics

AT BEIJER SINCE 1997

Commissions:

July-March adviser to the Environmental Policy Unit at Sida's, March to June 2005 Maternity leave.

SARA ANIYAR

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

RESEARCH FOCUS

Environmental Analysis of ecosystems Green accounting Since January 2004 member of the research team responsible for the study: "Accounting Prices of the Stockholm County's Inclusive Wealth" My activities within this study from July 04 until Jun 05 have included:

1. Participation in the meeting of the network on "Inclusive Wealth and Accounting Prices" (IWAP), Trieste, Italy, on April 2005. Presentation of the first version of the paper "Accounting price of Manufactured Capital in the Stockholm County" coauthored med Karl-Göran Mäler

- 2. Collection of statistical information and reporting on
- Air pollution in the Stockholm County
- Capital income tax and excess burden in Sweden
- Demographic and labour market statistical information in the Stockholm County (in process)

3. Collection and analysis (partial, not yet completed) of background literature on

- Human capital
- Depreciation of manufactured capital
- Capital income taxation and excess burden
- Relevant information on the county's economy, projections and development plan

4. Updating of the data base on Venezuelan Oil and Fixed Capitals as well as Net Foreign assets Position

Papers in process:

1. Capital Gains, non-autonomous resource allocation mechanisms and inclusive wealth with applications to Venezuela. Co-Authored with Karl-Göran Mäler 2. Accounting price of the Stockholm County's Manufactured Capital. Co-Authored with Karl-Göran Mäler

AT BEIJER SINCE Fall 1998

Seminars and symposium presentations:

- Inclusive Wealth Seminar, ICTP, Trieste, April,2005
- Teacher of a Course on Environmental Economics, Colombia, Universidad de Antioquia, Economic Faculty

Commissions and other activities:

1. Member of the Advisory Committee of LACEEP (the Latin American and Caribbean Environmental Economics Program for research promotion and training)

2. Participation in the committee meeting in March 2005 and in the Second Congress of ALEAR (Latin American Association of Environmental and Resource Economists)

3. Reviewer for SANDEE (South Asian Network For Development and Environmental Economics) of the research proposal "Economic valuation of storm protection function: a case study for the mangrove forest of Orissa, India)

4. In charge of the book registration in the Beijer Library

JOHAN COLDING

Research Associate, PhD (Ecology)

RESEARCH FOCUS

Institutions and biological conservation; Ecosystem management; Urban ecology

AT BEIJER SINCE 1995

PUBLICATIONS:

- Barthel, S., Colding, J., Folke, C. and Elmqvist, T. Social-ecological interactions in the formation of an urban green area: Management implications for the National Urban Park of Stockholm. In press *Ecology and Society*.
- Elmqvist T, Colding J, Barthel S, Borgström S, Duit A, Lundberg J, Andersson E, Ahrné K, Erntson H, Folke C, Bengtsson J. 2004. The dynamics of socialecological systems in urban landscapes: Stockholm and the National Urban Park, Sweden. *Annals of the New York Academy of Sciences 1023*: 308-322.
- CHAPTER 9: SCENARIOS IN SUB-GLOBAL REGIONAL ASSESSMENTS. Coordinating Lead Authors: Louis Lebel and Pongmanee Thongbai,. Lead Authors: Elena Benn, Johan Colding, William Mala, John Agard, Gerhard Petcshel-Held, Kasper Kok, Louis Eramus, Tom Veldkamp, Chuck Ramsay, Yogesh Gokhale, Moneka Zureks, Colin Filer, and Sandra Velarde. Contributing Authors: Hernan Blanco, Tian Xiang Yue, and Tim Lynam. In review for The Millennium Ecosystem Assessment Sub-Global Assessment Report on Scenarios.
- Hougner, C., Colding, J. and Söderqvist, T. Economic valuation of a seed dispersal service in the Stockholm National Urban Park. In review *Ecological Economics*.
- Colding, J., Lundberg, J. and Folke, C. In manus. The potential of locally managed lands in urban ecosystem management.
- Colding, J., Olsson, P. and Lundberg, J. In manus. 'Contextually Preserved Areas': The significance of cultural norms for biodiversity conservation.
- Colding, J. and Folke, C. In manus. New challenges in urban ecology.

Seminars and symposium presentations:

- Presentation of sub-global results related to the Millennium Ecosystem Assessment. Swedish Ministry of the Environment (Miljö- och samhällsbyggnadsdepartementet). April 5. 2005.
- Presentation of sub-global results related to the Millennium Ecosystem Assessment. Swedish

Environmental Protection Agency (Naturvårdsverket). May 12. 2005.

• Presentation at the Museum of Natural History. Storstadsnatur – insikter kring förvaltning av urbana ekosystem. April 25. 2005.

ANNE-SOPHIE CRÉPIN

Research Associate, PhD (Economics)

RESEARCH FOCUS

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

AT BEIJER SINCE 1998

PUBLICATIONS

- Crépin, *Incentives for Wetland Creation*. Forthcoming in Journal of Environmental Economics and Management.
- Chapin, Berman, Callaghan, Convey, Crépin, Danell, Ducklow, Forbes, Kofinas, McGuire, Nuttall, Virginia, Young, Zimov, Christensen, Godduhn, Wall, and Christoph Zockler, forthcoming 2005, Polar Systems, Chapter 26 in Millenium Ecosystem Assessment, *Ecosystems and Human Well-Being: Current State and Trends*, Vol 1.
- Chapin, Peterson, Berkes, Callaghan, Angelstam, Apps, Beier, Bergeron, Crépin, Elmqvist, Folke, Forbes, Fresco, Juday, Niemelä, Shvidenko, Whiteman [2004] Resilience and Vulnerability of Northern Regions to Social and Environmental Change, *Ambio*, 33:344-349.
- Elmqvist, Berkes, Folke, Angelstam, Crépin, Niemelä [2004], The Dynamics of Ecosystems, Biodiversity Management and Social Institutions at High Northern Latitudes, *Ambio* 33:350-355.

OTHER

On maternity leave November 2004-August 2005.

CARL FOLKE

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

RESEARCH FOCUS Resilience in social-ecological system

AT BEIJER SINCE 1991

PUBLICATIONS

- Gunderson, L., C. Folke and M. Janssen. 2005. Integrating Ecology and Society to Navigate Turbulence. Ecology and Society 10(1): 39. [online] URL: http://www.ecologyandsociety.org/vol10/iss1/ art39/
- Hughes, T., D. Bellwood, C. Folke, R. Steneck and J. Wilson. 2005. New Paradigms for Supporting the Resilience of Marine Ecosystems. Trends in Ecology and Evolution 20:380-386
- Gordon, L., W. Steffen, B. Jönsson, C. Folke, M. Falkenmark and Å. Johannessen. 2005. Human Modification of Global Water Vapor Flows from the Land Surface. Proceedings National Academy of Sciences, USA 102:7612-7617
- Folke, C. 2004. Traditional Knowledge in Social– Ecological Systems. Ecology and Society 9(3): 7. [online] URL: http://www.ecologyandsociety.org/ vol9/iss3/art7/
- Gunderson, L. and C. Folke. 2004. Of Thresholds, Invasions, and Regime Shifts. Ecology and Society 9(2): 15. [online] URL: http:// www.ecologyandsociety.org/vol9/iss2/art15/
- Folke, C., S.R. Carpenter, B. Walker, M. Scheffer, T. Elmqvist, L. Gunderson and C.S. Holling. 2004. Regime Shifts, Resilience and Biodiversity in Ecosystem Management. Annual Review of Ecology, Evolution and Systematics 35:557-581.
- Rockström, J., C. Folke, L. Gordon, N. Hatibu, G. Jewitt, F. Penning de Vries, F. Rwehumbiza, H. Sally, H. Savenije and R. Schulze. 2004. A Watershed Approach to Upgrade Rainfed Agriculture in Water Scarce Regions through Water System Innovations: An Integrated Research Initiative on Water for Food and Rural Livelihoods in Balance with Ecosystem Functions. Physics and Chemistry of the Earth 29:1109-1118.
- Olsson, P., C. Folke and F. Berkes. 2004. Adaptive Co-Management for Building Resilience in Social-Ecological Systems. Environmental Management 34:75-90.
- Elmqvist, T., J. Colding, S. Barthel, A. Duit, S. Borgström, J. Lundberg, E. Andersson, K. Ahrné, H. Ernstson, J. Bengtsson and C. Folke. 2004. The Dynamics of Social-Ecological Systems in Urban Landscapes: Stockholm and the National Urban Park, Sweden. Annals of New York Academy of Sciences 1023:308-322.
- Bellwood, D., T. Hughes, C. Folke and M. Nyström. 2004. Confronting the Coral Reef Crisis. Nature 429:827-833.
- Olsson, P., C. Folke and T. Hahn. 2004. Social-Ecological Transformation for Ecosystem

Management: The Development of Adaptive Co-Management of a Wetland Landscape in Southern Sweden. Ecology and Society 9(4): 2. [online] URL: http://www.ecologyandsociety.org/vol9/iss4/art2

Seminars and symposium presentations:

Invited research presentations at several symposiums and seminars and for governmental agencies and ministries

Commissions:

- Editor-in-Chief; Ecology and Society (formerly Conservation Ecology)
- Advisory and editorial boards; Ambio, Aquaculture Economics and Management, Asian Fisheries Science, Conservation and Society, Conservation Biology, EcoHealth, Ecological Economics, Ecosystems, Environmental Conservation, Environment and Development Economics, Frontiers in Ecology and the Environment, Global Environmental Change, International Journal of Sustainable Development and World Ecology, Ocean and Coastal Management
- Member of the Steering Committee and Board of Science of the Resiliance Alliance 1999www.resalliance.org
- Member of the Royal Swedish Academy of Sciences 2002- www.kva.se
- Member of the Environment Committee of the Royal Swedish Academy of Sciences 2003-
- Member of the Science Council of the International Human Dimensions Programme on Global Environmental Change (IHDP) 2002-
- Board member, Stockholm Environment Institute 2004-
- Board member, Center for Transdisciplinary Environmental Research, 2003-
- Board member, Department of Systems Ecology, 1997-
- Board member of the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (FORMAS). 2001-2003, reelected 2004-2006. Time out 2005.

ÅSA JANSSON

PhD (Ecology)

RESEARCH FOCUS

Quantifying ecosystem services in an ecological economic perspective.

AT BEIJER SINCE January 2004

Seminars and symposium presentations: Inclusive Wealth Seminar, ICTP, Trieste, April,2005

KARL-GÖRAN MÄLER

Director at the Beijer Institute

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.

AT BEIJER SINCE 1991

PAPERSAND PRESENTATIONS Selected Publications:

- The Genuine Savings Criterion and the Value of Population, with K. Arrow and P. Dasgupta, 2003, Economic Theory 21 pp. 217-225
- <u>Handbook of Environmental Economics, vol 1</u>, 2003, editor with J. Vincent, North Holland Publishing Co, Amsterdam
- Welfare Economics in Imperfect Economies, with K. Arrow and P. Dasgupta, 2003, in <u>Economics for an</u> <u>Imperfect World</u>, eds. R. Arnott, B. Greenwald, R. Kanbur, and B. Nalebuff, The MIT Press, Cambridge
- The Economics of Shallow Lakes, with A. Xepapadeas and A. de Zeeuw, 2003, <u>Environmental</u> and <u>Resource Economics</u>, 26, No. 4
- The Economics of Non-Convex Ecosystems: Introduction, with P. Dasgupta, 2003, <u>Environmental</u> <u>and Resource Economics</u>, 26, No. 4
- Evaluating Projects and Assessing Sustainable Development in Imperfect Economies, with K. Arrow and P. Dasgupta, 2003, <u>Environmental and Resource</u> <u>Economics</u>, 26, No. 4, December
- Are we consuming too much? with K. Arrow, P. Dasgupta, L. Goulder et al. forthcoming in <u>Journal of</u> <u>Economic Perspectives</u>
- <u>Human Capital in Imperfect Economies</u>, 2004, Discussion paper, Beijer Institute
- <u>A primer on discounting and valuation in</u> <u>environmental economics</u>, 2004, Beijer discussion paper.
- Environmental and Resource Economics: Some Recent Developments, 2004, with P. Dasgupta, submitted

- <u>Option Values in a Static Context</u>, 2005 forthcoming in a festschrift in honor of Karl-Gustaf Löfgren
- <u>Environment, Uncertainty, and Option Values, (</u>with Anthony Fisher), forthcoming in Handbook of Environmental Economics, Vol 2, North Holland, 2005
- <u>Capital gains, non-autonomous resource allocation</u> <u>mechanisms and inclusive wealth: An application to</u> <u>oil in Venezuela</u>, 2005, (with Sara Aniyar), Discussion paper, Beijer Institute

Awards

Volvo Environment Prize 2002

Kenneth E Boulding Prize 2004

European Lifetime Achievement Award in Environmental Economics, 2005

Memberships in professional associations and other activities Swedish Economic Association

American Economic Association

European Economic Association

European Association of Environmental and Resource Economists

Royal Swedish Academy of Sciences (since 1981)

Member of the Committee on the Prize in Economic Sciences in Memory of Alfred Nobel 1981 -1994

Past member of the Swedish Council of Economic Advisers

SANDRA LERDA

Research Assistant, Fil. Lic.

RESEARCH FOCUS Valuation of the contribution of coastal zones to fisheries

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

PATRIK RÖNNBÄCK

Research Associate, PhD (Ecology)

RESEARCH FOCUS

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

AT BEIJER SINCE 2003

Publications:

- Crona, B. & Rönnbäck, P. (2005) Utilization of replanted mangroves as nursery ground by shrimp communities in Gazi Bay, Kenya. *Estuarine, Coastal and Shelf Science*, in press
- de la Torre Castro M. & Rönnbäck P. (2004) Links between humans and seagrasses – an example from tropical east Africa. *Ocean and Coastal Management*, 47: 361-387
- Troell M., Tyedmers P., Kautsky N. & Rönnbäck P. (2004) Aquaculture and Energy Use. In: *Encyclopedia of Energy*, vol. 1: 97-108. Academic Press, London
- Troell, M., Pihl, L., Rönnbäck, P., Wennhage, H., Söderqvist, T. & Kautsky, N. (2005) Regime Shifts and Ecosystem Services in Swedish Coastal Soft Bottom Habitats: When Resilience is Undesirable. *Ecology and Society*, 10: 30 [online]

Commissions:

- Marine biodiversity, patterns and processes (MARBIPP) – a research program aimed to increase knowledge and develop tools for the management of coastal zone biodiversity (funded by the Swedish Environmental Protection Agency, 2001-2006)
- Ecosystem services of coastal habitats for fisheries an ecosystem approach to managing coastal habitats and fisheries in Sweden (funded by the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning, FORMAS, 2002-2005)
- Peri-Urban Mangrove Forests as Filters and Potential Phytoremediators of Domestic Sewage in East Africa (PUMPSEA) (funded by EU, 2005-2008)
- Continuously appointed to scientifically evaluate manuscript submitted to the journals Ambio; Asian Fisheries Science; Contemporary Economic Policy; Ecological Economics; Estuarine, Coastal and Shelf Science; Government and Policy; Hydrobiologia; Journal of Environmental Management; Journal of Fish Biology; Ocean and Coastal Management; Wetlands Ecology and Management
- Referee for research grant applications WIOMSA / MASMA PROGRAMME (funded by Sida).

Other:

• Lecturer in advanced courses in "Ecological Economics, The Ecology of the Coastal Zone, Sustainable Development, and Fisheries Management (Gotland University) and Ecology " and "Management of Tropical Aquatic Resources" (Stockholm University)

• Supervision of PhD and MSc candidates at the Department of Systems Ecology, Stockholm University

HENRIK SCHARIN

PhD Student, Swedish University of Agricultural Sciences

RESEARCH FOCUS

Policy instruments, cost-effectiveness, spatial heterogeneity, cost-benefit analysis.

AT BEIJER SINCE 1998

PUBLICATIONS

- "Management of Eutrophicated Coastal Zones: The quest for an optimal policy under spatial heterogeneity" (2004), Department of Economics, Swedish University of Agricultural Sciences, Doctoral thesis, Agraria 503, 2004.
- "Alternative Decision Schemes for Coastal Water Management" Co-authored with Ing-Marie-Gren & Tore Söderqvist, *The ICFAI Journal of Environmental Economics" Vol 3(1). 2005, pp. 7-28.*
- "The use and usefulness of cost-benefit analysis in water policy and management in Sweden". Co-authored with Peter Frykblom, Tore Söderqvist & Alexandra Helgesson *Cost Benefit Analysis and Water Resources Management*, Edward Elgar, Edited by Roy Brouwer and David Pearce. 2005.



Thomas Zylick, Ing-Marie Gren and Henrik Scharin at the defence of "Management of Eutrophicated Coastal Zones: The quest for an optimal policy under spatial heterogeneity

Henrik Scharin successfully defended his thesis in January 2005. "Management of Eutrophicated Coastal Zones: The quest for an optimal policy under spatial heterogeneity" at the Swedish University of Agricultural Sciences.

ÅSA SOUTUKORVA

Research assistant, MSc (Economics)

RESEARCH FOCUS Economic valuation of ecosystem goods and services

AT BEIJER SINCE 2000

PUBLICATIONS

- Söderqvist, T., Eggert, H., Olsson, B., (2005).
 "Economic Valuation for Sustainable Development in the Swedish Coastal Zone", *Ambio* 34, 169-175.
- Soutukorva, Å., Söderqvist, T., (2005). "Gone Fishing to the Stockholm-Roslagen Archipelago -Results From Surveys on Anglers' Travels, Catches and Habits", Beijer Occasional Paper, 2005:1.

TORE SÖDERQVIST

Research Associate (25% position), Associate Professor of Economics

RESEARCH FOCUS

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

See also www.beijer.kva.se/staff/tore/tore.html

AT BEIJER SINCE 1996

SELECTED PUBLICATIONS

- Gren, I-M., Söderqvist, T., Scharin, H., 2005. Alternative decision schemes for coastal water management. The ICFAI Journal of Environmental Economics 3, 7-28.
- Hougner, C., Colding, J., Söderqvist, T., 2005.
 Economic valuation of a seed dispersal service in the Stockholm National Urban Park, Sweden.
 Manuscript submitted to Ecological Economics.
- Liljestam, A., Söderqvist, T., 2004. Ekonomisk värdering av miljöförändringar: en undersökning om

vindkraftutbyggnad med scenariovärderingsmetoden (CVM) [Economic valuation of environmental change: a contingent valuation study of windpower development]. Report 5403, Swedish Environmental Protection Agency, Stockholm.

- Lindahl, T., Söderqvist, T., 2004. Building a catchment-based environmental programme: a stakeholder analysis of wetland creation in Scania, Sweden. Regional Environmental Change 4, 132-144.
- Lindahl, T., Söderqvist, T., 2005. Who wants to save the Baltic Sea? Paper IV in Lindahl, T., Strategic and Environmental Uncertainty in Social Dilemmas, PhD Thesis, Department of Economics, Stockholm School of Economics.
- Söderqvist, T., Eggert, H., Olsson, B., Soutukorva, Å., 2005. Economic valuation for sustainable development in the Swedish coastal zone. Ambio 34, 169-175.
- Soutukorva, Å., Söderqvist, T., 2005. Gone fishing to the Stockholm-Roslagen Archipelago: results from surveys on anglers' travels, catches and habits. Beijer Occasional Paper Series, The Beijer Institute, Stockholm.
- Troell, M., Pihl, L., Rönnbäck, P., Wennhage, H., Söderqvist, T., Kautsky, N., 2005. Regime shifts and ecosystem services in Swedish coastal soft bottom habitats: when resilience is undesirable. Ecology and Society 10 (1): 30 [online] URL: http:// www.ecologyandsociety.org/vol10/iss1/art30/.

Teaching and training:

- Co-organizer and lecturer, introductory undergraduate course in Environmental Economics and Ecological Economics (10 credits), Department of Natural Sciences, University College of South Stockholm. November 2004-January 2005.
- Contributing lecturer at various courses at Stockholm University, Gotland University College and University College of South Stockholm.
- Supervision of PhD, MSc and BSc students at Stockholm University and Swedish University of Agricultural Sciences, Uppsala.

Seminars and symposium presentations:

• What is a sustainable economic development? Lecture at a course on Aspects of Growth for ministry officials, Government Offices of Sweden, 16 June 2005.

Commissions:

• Member of the committees evaluating PhD theses by Mattias Hjerpe (Department of Water and

Environmental Studies, Linköping University, 27 May 2005) and Anton Paulrud (Department of Forest Economics, Swedish University of Agricultural Sciences, Umeå, 17 September 2004).

• Appraisal of suitability for promotion to professorship for Department of Land Economy, University of Cambridge, March 2005.

INGELA TERNSTRÖM

PhD (Economics)

RESEARCH FOCUS

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

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

AT BEIJER SINCE August 2002

PUBLICATIONS

- Ternström, I., (submitted), Cooperation or Conflict in Common Pool, *Journal of Development Economics*.
- Ternström, I, (submitted), Disturbances and Resilience in Common-Pool Resource Management Systems, *Environment and Development Economics*.
- Ternström, I.; (submitted), Income Inequality and Cooperation in Common Pools, *American Economic Review*.
- Ternström, I.; (submitted), HIV/AIDS The True Tragedy of the Commons? Exploring the Effects of HIV/AIDS on Management and Use of Local Natural Resources, *Environment and Development Economics*.

Seminars and symposium presentations:

- "Why are there Leaders? Towards an Economic Theory of Leadership", Beijer Seminar, June 2005.
- "Exploring the Links Between HIV/AIDS and Common-Pool Resource Management" Workshop on Infectious Disease, The Ecological and Environmental Economics programme, Abdus Salam

International Centre for Theoretical Physics, April 2005.

- "Property Rights: Institutions for Managing Land and Natural Resources", Property Rights to Land and Natural Resources: Institutions, Politics and Culture, Conference at the Agricultural University of Norway: Invited speaker, 2004.
- "Disturbances and Resilience in Common-Pool Resource Management Systems", WOW3 – Workshop on the Workshop 3, Conference arranged by the Workshop in Political Theory and Policy Analysis, Indiana University, 2004.

Commissions:

Referee work for Journal of Institutional Economics.

Other:

- Lecturer in environmental economics at course in Introductory Environmental Science for Natural Scientists at Stockholm University, spring 2005.
- Financial controller at the Beijer Institute.

MAX TROELL

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

RESEARCH FOCUS

Key words: Coastal ecosystems, ecosystem services, ecosystem functions, biodiversity, resilience, environmental impact and sustainability of aquaculture, integrated aquaculture, mangroves

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

AT BEIJER SINCE 1998

PAPERS AND PRESENTATIONS

Publications:

- Neori, A., T. Chopin, M. Troell, A. Buschmann, G. P. Kraemer, C. Halling, M. Spigel and C. Yarish, (2004) Integrated aquaculture: rationale, evolution and state of the art emphasizing seaweed biofiltration in modern mariculture. *Aquaculture* 231: 361-391.
- Troell, M., L. Pihl, P. Rönnbäck, H. Wennhage, T.

Söderqvist, and N. Kautsky. 2005. Regime shifts and ecosystem service generation in Swedish coastal soft bottom habitats: when resilience is undesirable. *Ecology and Society* 10(1): 30. [online] URL: http:// www.ecologyandsociety.org/vol10/iss1/art30/

- Hernández-Cornejo, R., N. Koedam, A. Ruiz Luna, M. Troell, and F. Dahdouh-Guebas. 2005. Remote sensing and ethnobotanical assessment of the mangrove forest changes in the Navachiste-San Ignacio-Macapule lagoon complex, Sinaloa, Mexico. Ecology and Society 10(1): 16. [online] URL: http:// www.ecologyandsociety.org/vol10/iss1/art16/
- Troell, M., A. Neori, T. Chopin and A.H. Buschmann.
 2005. Biological wastewater treatment in aquaculture
 more than just bacteria. World Aquaculture,
 36(1):27-31
- Halling, C., Aroca, G., Cifuentes, M., Buschmann, A.H., and Troell, M. (accepted). Comparison of suspended cultivation methods of *Gracilaria chilensis* in an integrated seaweed and fish cage culture. *Aquaculture International*.
- Pihl, L., S. Baden, N. Kautsky, P. Rönnbäck, T. Söderqvist, M. Troell and H. Wennhage. (Submitted) Shift in fish assemblage structure due to loss of seagrass Zostera marina habitats in Sweden.
- Troell, M., D. Robertson-Andersson, R. J. Anderson, J. J. Bolton, G. Maneveldt, C. Halling and T. Probyn (Submitted). Abalone farming in South Africa: perspectives on kelp resources, abalone feed, potential for on-farm seaweed production and socioeconomic benefits. (Aquatic Resources, Culture and Development)
- Hansen, P., D. Robertson-Anderson and M. Troell (Submitted). Control of the herbivorous gastropod *Fissurella mutabilis* (Sow.) in a land-based integrated Abalone-Seaweed culture. (J. of Aquaculture)
- Deutsch, L., C. Folke, M. Troell, M. Huitric, N. Kautsky and L. Lebel. (submitted). Feeding aquaculture growth through globalization: exploitation of marine ecosystems for fishmeal (Global Environmental Change).

Seminars and symposium presentations: Invited speaker- Expert workshop on "Sustainable Aquaculture", DG JRC European Commission, Institute for Prospective Technological Studies. Held in Seville (Spain), 17th-18th January 2005.

Invited expert: ASEM (ASian European Meeting) aquaculture workshop "Environment and ecosystem preservation" in Qingdao, PR China, 27-29/4, 2005 Commissions:

- Referee work during the report period: Journal of Aquaculture; J. of Experimental Phycology; Conservation Biology; Sida grant proposals
- Member of the evaluation committee for grant applications for IFS (International Foundation for Science).
- Coordinator of sub-group within Aquaculture Expert Panel "Engineering Committee on Oceanic Resources" (ECOR).
- Swedish coordinator for joint bilateral research programme: Integrated culture of abalone and seaweed in land-based systems. Sida/SAREC contract no: SPR-2003-044/75007142-23
- Together with colleagues from Beijer and Dep. of Systems Ecology participating in a 5 years SEPA financed program, MARBIPP, aiming at increasing our knowledge about and develop management guidelines for coastal zone biodiversity. Main responsibility is to map and valuate goods and services produced by marine ecosystems.
- External reviewer for scientific evaluation of research projects within marine sciences and technologies submitted to the Science and Technology Foundation, Portugal.

Teaching and Training:

- Teaching and supervising students- 10 credit C-level graduate course (Tropical ecology; Management of aquatic resources in the tropics) Dep. of Systems Ecology, Stockholm University and Uppsala University
- Course leader and lecturer for PhD certificate course -Ecology and Environmental management, given within the Sida financed PhD Programme, Department of Economics, Gothenburg University
- Lecture at course in Ecological Economics at Institute of advanced studies, Gotland University, Autumn 2004, 2 days.
- Supervision of PhD students and Master students at Department of Systems Ecology, Stockholm University; University of Gävle, Cape Town University, South Africa.

Other:

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

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 2004/2005 the following book was produced:

The Beijer International Institute of Ecological Economics 1991-2001. Ed. Anna Sjöström, 2005.

A compilation of personal memories from the Beijer Institute's activities for the Intitute's 10-year anniversary. Authors: Karl-Göran Mäler, Carl-Olof Jacobson, Kerstin Lindahl-Kiessling, Bengt-Owe Jansson, Carl Folke, Kenneth Arrow, Partha Dasgupta, Simon Levin, Paul Ehrlich, Charles Perrings, Brian Walker, Hirofumi Uzawa and Cliff Russell.

The book can be ordered from the Beijer Institute through Anna Sjöström. E-mail: beijer@beijer.kva.se

The Beijer Publication Series

Scientific papers published in refereed journals or in books that have undergone review are published in the BEIJER REPRINT SERIES in order to facilitate the dissemination of research results. These reprints might earlier have appeared as DISCUSSION PAPER. The total number of reprints since 1991 is at present 213, of which 14 were produced during 2004/2005.

The BEIJER DISCUSSION PAPER SERIES constitutes a forum for unpublished scientific papers whose content should be subject to discussion and comments. 200 DISCUSSION PAPERS have been produced since 1991, and 13 during 2004/2005.

BEIJER OCCASIONAL PAPERS is a forum intended for policy documents, workshops proceedings, etc. One Occasional Paper was produced during 2004/2005.

REPRINT SERIES

200. The Economics of Non-Convex Ecosystems: Introduction Partha Dasgupta and Karl-Göran Mäler. In: The Economics of Non-Convex Ecosystem, P. Dasgupta and K.-G. Mäler (eds.), pp. 1-27 (2004).

- 201. Scale and Scaling in Ecological and Economic Systems Jérôme Chave and Simon Levin. In: The Economics of Non-Convex Ecosystem, P. Dasgupta and K.-G. Mäler (eds.), pp. 29-59 (2004).
- 202. Convex Relationships in Ecosystems Containing Mixtures of Trees and Grass R.J. Scholes. In: The Economics of Non-Convex Ecosystem, P. Dasgupta and K.-G. Mäler (eds.), pp. 61-76 (2004).
- 203. Managing Systems with Non-Convex Positive Feedback
 W.A. Brock and D. Starrett. In: The Economics of Non-Convex Ecosystem, P. Dasgupta and K.-G. Mäler (eds.), pp. 77-104 (2004).
- 204. The Economics of Shallow Lakes Karl-Göran Mäler, Anastasios Xepapadeas and Aart de Zeeuw. In: The Economics of Non-Convex Ecosystem, P. Dasgupta and K.-G. Mäler (eds.), pp. 105-126 (2004).
- 205. Multiple Species Boreal Forests What Faustmann Missed Anne-Sophie Crépin. In: The Economics of Non-Convex Ecosystem, P. Dasgupta and K.-G. Mäler (eds.), pp. 127-148 (2004).
- 206. Evaluating Projects and Assessing Sustainable Development in Imperfect Economies Kenneth J. Arrow, Partha Dasgupta and Karl-Göran Mäler. In: The Economics of Non-Convex Ecosystem, P. Dasgupta and K.-G. Mäler (eds.), pp. 149-187 (2004).
- 207. Elasticities of Demand and Willingness to Pay for Environmental Services in Sweden Stina Hökby and Tore Söderqvist. Environmental and Resource Economics 26:361-383 (2003).
- Mangrove Dependence and Socio-economic Concerns in Shrimp Hatcheries of Andhra Pradesh, India
 P. Rönnbäck, M. Troell, T. Zetterström and D.E. Babu. Environmental Conservation 30 (4):344-352 (2003).
- 209. Are We Consuming Too Much? Kenneth Arrow, Partha Dasgupta, Lawrence Goulder, Gretchen Daily, Paul Ehrlich, Geoffrey Heal, Simon Levin, Karl-Göran Mäler, Stephen Schneider, David Starrett and Brian Walker. Journal of Economic Perspectives Vol 18, No 3, pp. 147-172 (2004).

- 210. Remote Sensing and Ethnobotanical Assessment of the Mangrove Forest Changes in the Navachiste-San Ignacio-Macapule Lagoon Complex, Sinaloa, Mexico Rubi Hernández Cornejo, Nico Koedam, Arturo Ruiz Luna, Max Troell and Farid Dahdouh-Guebas. Ecology and Society 10(1): 16 [online] URL: http://www.ecologyandsociety.org/ vol10/iss1/art16/ (2005).
- 211. Regime Shifts and Ecosystem Services in Swedish Coastal Soft Bottom Habitats: When Resilience is Undesirable
 Max Troell, Leif Pihl, Patrik Rönnbäck, Håkan
 Wennhage, Tore Söderqvist and Nils Kautsky.
 Ecology and Society 10 (1): 30
 [online] URL: http://www.ecologyandsociety.org/ vol10/iss1/art30/ (2005).
- 212. Economic Valuation for Sustainable Development in the Swedish Coastal Zone Tore Söderqvist, Håkan Eggert, Björn Olsson and Åsa Soutukorva. Ambio Vol. 34, No. 2, pp. 169-175, March (2005).
- 213. Alternative Decision Schemes for Coastal Water Management Ing-Marie Gren, Tore Söderqvist and Henrik Scharin. The ICFAI Journal of Environmental Economics, Vol 3, No 1, pp. 7-28, February (2005).

DISCUSSION PAPERS

- 188. Sustainability's Compass: Indicators of Genuine Wealth
 Anastasios Xepapadeas, Steve Carpenter, Sara Aniyar, Kenneth Arrow, Gretchen Daily, Partha Dasgupta, Paul Ehrlich, Carl Folke, Geoff Heal, Michael Hoel, Nils Kautsky, Simon Levin, Jane Lubchenco, Karl-Göran Mäler, Elinor Ostrom, Thomas Rosswall, David Starrett and Brian Walker. 2004.
- 189. Spatial Analysis: Development of Descriptive and Normative Methods with Applications to Economic-Ecological Modelling William Brock and Anastasios Xepapadeas. 2004.
- 190. Environment, Uncertainty, and Option Values Karl-Göran Mäler and Anthony Fisher. 2005.
- 191. Building Resilience and Adaptation to Manage Arctic Change Chapin, F. S., III, M. Hoel, S. R. Carpenter, J. Lubchenco, B. Walker, T. V. Callaghan, C. Folke, S.

Levin, K.-G. Mäler, C. Nilsson, S. Barrett, A.-S. Crépin, K. Danell, T. Rosswall, D. Starrett, and T. Xepapadeas. 2005.

- 192. Criteria for Assessing Sustainable Development: Theoretical Issues and Empirical Evidence for the Case of Greece Dimitra Vouvaki and Anastasios Xepapadeas . 2005.
- 193. Transboundary Pollution Flows, Capital Mobility and the Emergence of Regional Inequalities Simon Levin and Anastasios Xepapadeas. 2005.
- 194. Optimal Control and Spatial Heterogeneity: Pattern Formation in Economic-Ecological Models William Brock and Anastasios Xepapadeas. 2005.
- 195. Economic Valuation of a Seed Dispersal Service in the Stockholm National Urban Park, Sweden Cajsa Hougner, Johan Colding and Tore Söderqvist. 2005.
- 196. Set-aside Requirements Versus Production Quotas in Agro-Environmental Regulatory Contracts Anne-Sophie Crépin and Pierre-Alain Jayet. 2005.

- 197. Adaption to Disturbances in Common-Pool Resource Management Systems Ingela Ternström. 2005.
- 198. Cooperation or Conflict in Common Pools Ingela Ternström. 2005.
- 199. Income Inequality and Cooperation in Common Pools Ingela Ternström. 2005.
- 200. HIV/AIDS The True Tradedy of the Commons? Exploring the effects of HIV/AIDS on Management and Use of Local Natural Resources Ingela Ternström. 2005.

OCCASIONAL PAPERS

Gone Fishing to the Stockholm-Roslagen Archipelago -Results From Surveys on Anglers' Travels, Catches and Habits

Åsa Soutukorva and Tore Söderqvist. 2005:1

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



Research Seminar on Accounting for Urban Environment, Moviaro Lodge, Tanzania 11-13 January 2005 Alebel Bayrau Weldesilase, Karl-Göran Mäler, Christina Leijonhufvud, Etienne Yemek, Albert Honlonkou, Eric Mungatana, Nyasha Kaseke, Ambrose Sansa, David Starrett, Samuel Mwakubo, Solomon Jebessa Gudissa and Wondwossen Tsegaye Aselet. Photo: Christina Leijonhufvud.

A CHRONOLOGY OF BEIJER AND ASSOCIATED NETWORKS EVENTS 1 July 2004 - 30 June 2005

THE YEAR OF 2004

3/9 The Beijer Board Meeting, the Royal Swedish Academy of Sciences

4-6/9 Abisko Research Center, Kiruna, Sweden 12th Askö Meeting "Economic and Ecological Resilience in Arctic Areas"

4-7/10 One week research visit - follow up of the First School on Ecological Economics, ICTP, Trieste, Italy

5-9/11 SANDEE 9th Biannual Research and Training Workshop, Bangalore, India

29-30/11 2nd workshop on Integrated Climate Models: an interdisciplinary assessment of climate impacts and policies, ICTP, Trieste, Italy

13-16/12 GEF/World Bank Regional climate, water and agriculture: Impacts on and adaptation of agroecological systems in Africa. "Understanding and Adapting to Climate Change: What can the World Learn from Africa's Experience?" CEEPA workshop

THE YEAR OF 2005

11-13/1 Research Seminar on Accounting for Urban Environment, EEE programme, Tanzania

6-8/1 Research Workshop on Ecosystems and Tourism in Southern Africa: Economic and Ecological Resilience, EEE programme, Botswana

11-13/4 3rd Workshop on Spatial Dynamic Models of Economics and Eco-Systems, ICTP, Trieste, Italy

13-15/4 Workshop on IWAP - Inclusive Wealth and Accounting Prices, ICTP, Trieste, Italy

13-15/4, 2005 - ICTP, Trieste, Italy "Workshop on Infectious Disease: Theoretical, Ecological and Economic Approaches"

2-4/5 Discussions on possible network on Environmental Economics in the Middle-East, ICTP, Trieste, Italy

2-20/5 Ecology and Environmental management (3p), Ph D Course, Beijer Institute, The Royal Swedish Academy of Sciences

13-16/6 Training and Research Workshop on Environmental Accounting, RANESA, Mozambique