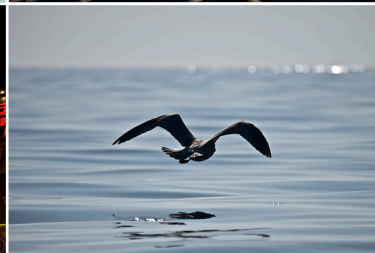
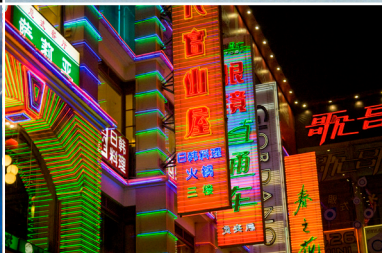


Stockholm Resilience Centre

Research for Governance of Social-Ecological Systems



A centre with:



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Annual Report 2010

Stockholm Resilience Centre Annual Report 2010

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Preface

The year 2010 saw significant advances in the international efforts to recognize the importance of biodiversity and ecosystem services for human development. The Nagoya meeting of the UN Convention on Biodiversity set new concrete targets for the protection of biodiversity. The UN also decided to establish the International Platform on Biodiversity and Ecosystem Service (IPBES), a scientific assessment mechanism similar to the Intergovernmental Panel on Climate Change (the IPCC). The G8 (+5) initiated study on The Economics of Ecosystems and Biodiversity (TEEB) was finalized in 2010 and has strengthened even further the evidence of the costs of ecosystem degradation and the benefits of sustainable stewardship of landscapes and seascapes. The Stockholm Resilience Centre has in different ways contributed to all these three science-policy processes,

by providing scientific inputs, contributing advice, and engaging actively in science-policy dialogues. Even though the core business of the centre is scientific excellence on social-ecological systems research for resilience and human development, the centre also engages actively, together with partners across the world, in providing scientific support to policy processes.

The centre has with its fourth year of existence, and the first ordinary year after the three year start-up phase (2007-2009), established itself as an international scientific partner in inter- and transdisciplinary science on resilience and sustainability. The centre supports the emergence of integrated teams of scientists to address complex human-environment challenges, with the aim of advancing novel and relevant insights. The research ranges from applied research in the



Photo: A.Tedeholmlazote.se

Baltic sea region, field research in Africa, to addressing the risk of inconvenient feedbacks from multiple social and ecological shocks at the global level. We aim at advancing better ways of generating and sustaining human wellbeing in an era of growing turbulence and more rapid global change.

As a response to the external evaluation of the centre at the end of its start-up phase, the centre has invested further in convening dialogues between science, policy and practice on key areas of resilience and development. The centre has also started the process of raising the number of tenure track research positions at the centre, with the support from Stockholm University, the host of the centre. The Resilience Research School is now in full operation, hosting a Master program on Ecosystems, Resilience and Governance, which in 2011 will be

developed into a new research oriented Master program on Social-Ecological Systems for Sustainable Development. The school runs a series of PhD courses, and hosts a first group of centre PhD students.

All these initiatives are important steps in further strengthening the long-term quality and relevance of the centre. Looking ahead the centre will continue to spearhead integrated science on resilience, engaging further in social-ecological research on regional and global change as well as research on resilience and development.



Professor Arild Underdal,
Chair of the Board

Directors' view

The vision of Stockholm Resilience centre is to contribute to a world where social-ecological systems are understood, governed and managed in ways that enhance human well-being and the capacity to deal with complexity and change, for the sustainable co-evolution of human civilisations and the biosphere. This is an important vision that guides all our activities.

At Stockholm Resilience Centre we strive to provide a flexible and creative work environment where scholars integrate social sciences, natural sciences and the humanities in order to generate new insights and solutions in line with our vision. We are continuously testing and developing new approaches to science that cut across scientific disciplines, that involve teaching and training, and that interact with policy and practice. The centre is in fact an experiment in itself on how to conduct interdisciplinary and transdisciplinary research that not only generates top quality science, but also relevant guidance to key development challenges, while at the same time allowing for learning and adaptation. Such experimental arenas are of significance in the quest for sustainable solutions to the massive social-ecological challenges facing humanity. Important features of the experiment include stewardship

of the tension between efficiency and creativity and managing for emergence with 'motivation platforms' that stimulate collaboration, trust and collective action between researchers and networks, increasing the likelihood for new insights and novelty.

Our cross-thematic research structure, with its six interacting themes, has supported such processes and helped us clarify that even in the short term, societies in the world face the need for transformative changes. Some of these may be costly and some may require fundamental behavioural changes. Others may in fact be beneficial, even profitable. All will have to be aimed at achieving human development while sustaining the desired state of the Earth system, which in turn means persisting in a dynamic state of global social-ecological resilience within planetary boundaries. The solutions for the future must be embedded in regional and local contexts, where governance and management, as well as economic paradigms and social values, are founded in a deeper appreciation of how deeply intertwined human societies are with the environmental life-support capacity of planet Earth.

Our emphasis on resilience, regime shifts,

global change and adaptive governance for social-ecological transformation is important in this context. We apply this integrated social-ecological resilience approach to sustainability research on urban social-ecological systems, food security, freshwater and dynamic landscapes, and marine social-ecological challenges. The research collaboration and progress of Stockholm Resilience Centre is increasingly capturing truly intertwined social-ecological systems and important cross-scale interactions and feedbacks from a complexity perspective, as reflected in the research highlights presented in this report. It is truly rewarding to see the rapid spread of interest in social-ecological research and resilience thinking in many parts of the world.

During the year we have prepared for the start of the International Council for Science (ICSU) new Programme on Ecosystem Change and Society (PECS), for which the centre will host the International Programme Office. We have also been engaged in the ICSU visioning process, contributing to identifying the future grand challenges for global sustainability research. The IHOPE global network project, also hosted by the centre, is a useful complement in this context. We are also excited about taking on SwedBio, a Sida-funded programme on ecosystem services and change with a poverty, livelihood and human development focus. The SwedBio programme will be integrated with centre activities and will strengthen our work on the role of resilience for development.

The first tenure track posts announced by the centre, one professorship and one

senior lectureship, have been successfully filled. Recruitment is now underway for three junior lectureships. We have also been fortunate to receive funds from two private foundations that will provide long-term support for four or five posts. A 50% increase in core support from Stockholm University has been obtained during the year. Furthermore, we are participating in two Stockholm University collaborative strategic research grants (BEAM, EkoKlim) with other academic departments, and have received two interdisciplinary Centres of Excellence this year; one from Formas on the Baltic Sea and the other from Nordforsk on marine ecosystems, with our Baltic Nest researchers as central players.

The major challenge with an expanding centre is to avoid spreading ourselves too thin, while simultaneously supporting bottom-up emergence. During the year we initiated a process to start monitoring and continuously assessing our research framework in relation to findings and insights and capture those for new synthesis and theory development. The idea is to help identify strengths, gaps and novel areas, fine-tuning and sharpening the SRC research direction.

The Resilience Research School is in full operation, and much work has been done to fundamentally restructure our Master's programme to match our research agenda. We continue our work of sharing interdisciplinary environmental research experiences across Stockholm University and of widening our collaboration with Swedish and international universities.

The centre has started to engage more

actively in being a convener of science-policy bridging, not only as a outreach activity, but also as an integral part of a joint learning process. An example of this is the SRC-led Baltic-Stern initiative, supported by the Swedish EPA, with the purpose of assessing the costs of action and inaction for a sustainable Baltic Sea.

2010 was the UN International Year of Biodiversity, with the critical meeting of the parties in Nagoya of the Convention on Biodiversity (CBD), the launch of the study on the Economics of Ecosystem Services and Biodiversity (TEEB) and the successful agreement to establish the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES), a scientific assessment initiative similar to IPCC. The centre has been involved in all these

processes, which constitute important avenues to channel scientific knowledge on ecosystem services, resilience and development to world leaders.

Finally, the new Board of Stockholm Resilience Centre is now in place. We are very privileged that Arild Underdal has agreed to continue as chairman, with Frances Westley as vice-chairperson and Thomas Rosswall on the Executive Committee of the Board. A few persons have left the Board; Carole Crumley, Roger Kaspersson and Jacqueline McGlade. We thank you for your tremendous support for the centre so far, and we welcome our new Board members; Bonnie McCay, Leena Srivastava, Gretchen Daily, Johan Kuylenstierna and Pavan Sukhdev. We have exciting times ahead.



*Professor
Johan Rockström,
Centre Director*



*Professor
Carl Folke,
Science Director*



*Dr Olof Olsson,
Deputy Director*



Photo: N.Ryrholm/azote.se

Centre highlights 2010

Our research is framed by a truly integrated view of people and nature in what we refer to as social-ecological systems, with the objective of improved stewardship of ecosystem services for human well-being. Using a resilience lens, we address issues from a complex adaptive systems approach and analyse the many cross-scale interactions that exist, from local to global or from history to the future. There are three features of resilience thinking of significance for analysing social-ecological systems in relation to sustainability:

PERSISTENCE - buffer capacity to withstand shocks in the face of change

ADAPTABILITY - the capacity of people in a social-ecological system to manage

resilience in order to deal with change, move on and continue to develop

TRANSFORMABILITY - the capacity of people in a social-ecological system to create new development pathways when ecological, political, social or economic conditions make the existing system untenable.

Research is structured into themes to provide flexible arenas for sharing perspectives and knowledge from different disciplines, and the themes feed into each other through inductive-deductive science, practice and theory, with active involvement of scholars from the natural sciences, social sciences and the humanities.

The themes currently consist of six overarching areas. The first three themes cluster insights on advanced theory and methods, namely: **Regime shifts and implications in social-ecological systems**; **Global and cross-scale dynamics of social-ecological systems**; and **Multilevel adaptive governance, learning and transformations of social-ecological systems**. These actively interact with the other three cross-area themes; **Water, food and ecosystem services in social-ecological landscapes**; **Coastal and marine social-ecological systems**; and **Urban social-ecological systems**.

Research activities during 2010 were intense, with widespread collaborations and networks, key meetings and workshops organised at the centre platform. These

included several follow-up sessions on the planetary boundaries work, new Baltic Sea research and key insights on ecosystem stewardship, regime shifts and transformations in social-ecological systems. A glimpse of the activities is provided in the following pages.

Three very interesting special journal issues have been produced: *Social Network Analysis in Natural Resource Governance*, edited by Beatrice Crona and Klaus Hubacek, in *Ecology and Society*; *Governance, Complexity and Resilience*, edited by Victor Galaz, Andreas Duit, Katarina Eckerberg and Jonas Ebbesson, in *Global Environmental Change*; and *Environmental Education, Resilience, and Learning: Reflection and Moving Forward*,

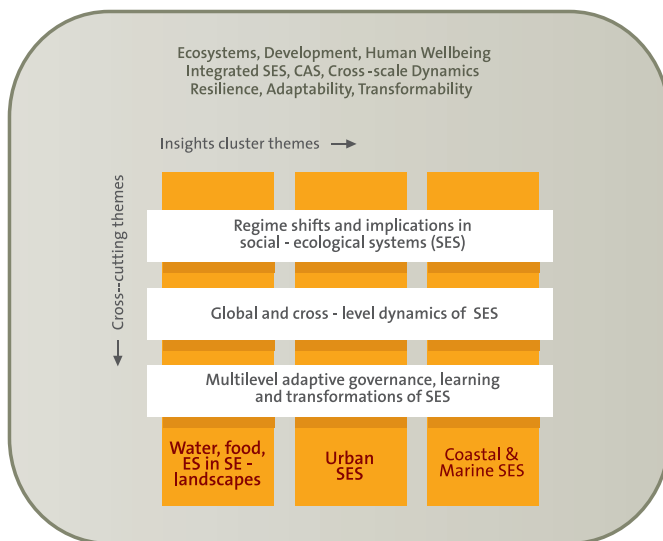


Figure 1. The first three themes deal with advanced theory and methods and actively interact with the other three cross-area themes.



by Marianne Krasny, Cecilia Lundholm and Ryan Plummer, in Environmental Education Research.

In all, well over 100 scientific articles were published in 2010. They appeared in scientific journals covering diverse disciplines, including three publications in Science and leading journals such as Proceedings of the National Academy of Sciences (PNAS), Trends in Ecology and Evolution, Frontiers in Ecology and the Environment, Journal of Hydrology, PlosOne, Public Administration, World Development, Global Environmental Change, BioScience, Marine Policy, Ecology and Society, Ambio, Environmental Conservation, Environmental and Resource Economics, Environmental Science and Technology, Agricultural Water

Management, Global Change Biology, and Critical Review of International Social and Political Philosophy. Centre researchers also produced popular science and outreach papers. For a full list of publications, other research activities and accounts in brief see www.stockholmresilience.su.se/annualreport2010_appendix.



The environmentalist's paradox

Centre researchers analyse why humans do better while the earth does worse.

For some time, ecologists have shown that Earth's life support systems are declining. At the same time, however, human wealth, health, education and life span are increasing.

Paradox not an illusion

Centre researchers Garry Peterson and Maria Tengö together with collaborators from McGill University have been trying to determine why human well-being is increasing while ecosystem services degrade.

The four hypotheses being examined are:

1. Human well-being is actually declining because current ways to measure this are wrong or incomplete.
2. Food production and continued agricultural growth trump all other ecosystems because only provisioning services are important for human well-being.

3. Technology makes humans less dependent on ecosystem services.
4. The worst is yet to come: there is a time lag after ecosystem service degradation before human well-being is affected.

Regarding the first hypothesis, Peterson and colleagues argue that there is a large body of evidence demonstrating that human well-being, even of the worst off, has increased during the past fifty years, suggesting that the paradox is not an illusion.

Mixed support for the other hypotheses

Their assessment of the second hypothesis is that agricultural ecosystems strongly support human well-being.

However, support for hypotheses three and four is mixed. Despite great advances in technology and social organisation that have increased the benefits people get from nature, we have increased rather than

decreased our use of ecosystems.

“There is little evidence from the past of sustained decreases in human well-being caused by environmental decline, but as the scope of human use of the planet has increased there are reasons to remain concerned about the future”, says co-author Maria Tengö.

In addition, there is evidence that regulating ecosystem services that maintain stable environments for people are decreasing locally, while we are pushing the entire earth system across its planetary boundaries.

“These findings do not show that the environment is unimportant, but rather that people are extremely innovative and adaptive. However, the careless destruction of ecological infrastructure is leaving people worse off than they would be if we made more thoughtful investments in ecological infrastructure. We have a lot of understanding of how humanity alters the biosphere, but little understanding of how these changes impact us”, says Garry Peterson.

Time to invest in ecological infrastructure

The authors argue that humanity must invest more in research on ecological infrastructure, particularly three areas: agriculture, cities and infrastructure. In these areas, increased management, research and governance to enhance ecosystem services could yield major gains in human well-being.

Major reasons for this lack of investment are disciplinary boundaries among

researchers and inadequate attention to environmental governance.

“Researchers often address narrow aspects of global environmental change, based upon disciplinary assumptions that are often unconvincing to researchers outside their own discipline. We need research that addresses practical questions beyond disciplinary focus as well as increased theoretical and practical attention to environmental governance”, according to Garry Peterson and Maria Tengö.



Photo: N. Ryrholm/azote.se

Source: Raudsepp-Hearne, C., G.D. Peterson, M. Tengö, E.M. Bennett, T. Holland, K. Benessaiah, G. K. MacDonald and L. Pfeifer. 2010. Untangling the Environmentalist's Paradox: Why is Human Well-Being Increasing as Ecosystem Services Degrade? *BioScience* 60(8):576-589. doi: 10.1525/bio.2010.60.8.4



Photo: A. Nicander/lazote.se

Ending the ocean's 'tragedy of the commons'

Leading marine scientists propose radical changes to rescue the world's oceans from overfishing and pollution.

Centre researchers have frequently warned that the current management of ecosystems is unsustainable, and that the health of ecosystems and human well-being are closely linked.

Unfortunately, typical governance arrangements do not effectively link these two essential elements.

Reversing fish depletion

Based on a successful social experiment in Chile, centre researcher Per Olsson and Science Director Carl Folke along with researchers from ARC Centre of Excellence for Coral Reef Studies and James Cook University say a new approach to marine tenure could help to reverse the maritime 'tragedy of the commons', which has led to the depletion of fish stocks world-wide.

A combination of fisheries collapses and the move to democracy in Chile provided the opportunity to try out some new arrangements for looking after fisheries,

involving a partnership of fishers, scientists and managers.

"There was a general recognition that Chile's fish stocks were in trouble. Things were turbulent and people were looking for answers, which made them open to new approaches. There was also good scientific understanding of the coastal ecosystems of the region on which to base a new management plan", says centre researcher Per Olsson.

A revolutionary national system

Fishers and scientists had been working together on the problem for some years, sharing knowledge and building trust.

This led to the testing of new co-operative models for fishery management, based on research describing the state of fish stocks and the surrounding marine ecosystem. The result is a revolutionary national system of marine tenure that allocates user rights and responsibilities to collectives of fishers.



Photo: T.Dablin/azote.se

A vital ingredient in the change was the move by Chile to democracy after a 17-year dictatorship. This opened the way for reform of the laws governing fishing rights. The new laws gave exclusive ocean territories to local and small-scale fisheries, and excluded the big industrial fishing fleets, which had their own exclusive fishing zone.

Scientists and small fishers then worked together to understand and rebuild the decimated fish stocks in their zone, leading to a shared vision and voluntary agreements on how to manage them. Fishing pressure was reduced in the industrial fishing zone by cutting the number of big vessels.

World-wide potential

Centre Science Director Carl Folke believes that the Chilean experience contains lessons which can potentially apply anywhere in the world where a fishery is in trouble and there are good scientific data on the marine environment.

“You need a shared recognition that something has to be done, you need a good understanding of the marine ecosystem and how to regenerate it, you need trust between scientists and fishers, and you need

a political moment when sweeping changes can be brought in”, he says. “If you have all those things, there is a good chance you can avoid the marine ‘tragedy of the commons’, which has been a feature of fisheries around the world in the past half century.”

The research indicates that the key to managing fisheries may depend on creating agreements that are voluntary and sufficiently flexible to cope with changes in the ocean environment, leading to fisheries that are both ecologically and socially sustainable.

Source: Gelcich, S., T.P. Hughes, P. Olsson, C. Folke, O. Defeo, M. Fernández, S. Foale, L.H. Gunderson, C. Rodríguez-Sieker, M. Scheffer, R. Steneck, and J.C. Castilla. 2010. Navigating Transformations in Governance of Chilean Marine Coastal Resources. Proceedings National Academy of Sciences, USA 107:16794-16799 www.pnas.org/cgi/doi/10.1073/pnas.1012021107

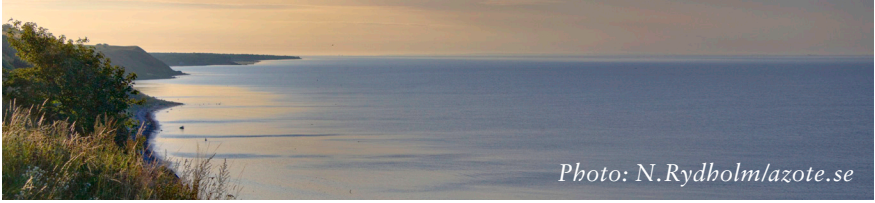


Photo: N.Rydholm/azote.se

Saving the Baltic Sea

Centre research links measures on land with effects in the sea and helps restore its ecological status.

When scientists and policy-makers raise concerns about coastal and marine degradation, the example of the Baltic Sea is seldom omitted. This brackish sea is under considerable strain due to different pressures on the ecosystem, including a large human population in the catchment area and the effects of human activities.

The largest environmental problems are eutrophication caused by increasing nutrient loads, overfishing, bioaccumulation of hazardous substances, risk of chemical and/or oil spills and invasive species. These environmental problems, together with current and future climate changes, are jeopardising the ability of the Baltic Sea to provide ecosystem goods and services, i.e. benefits that people obtain from ecosystems, to the roughly 90 million people inhabiting the drainage area.

Restoring its status

Understanding how to manage the complex and interconnected drivers and pressures affecting the Baltic Sea requires interdisciplinary research, combining

knowledge from different fields.

Stockholm Resilience Centre, spearheaded by its partner Baltic Nest Institute (BNI), has long experience in providing scientific data and scenarios for the entire Baltic drainage basin and Baltic Sea. Their research has formed the basis for national and international decision-making and has played an instrumental role in identifying necessary nutrient reductions as defined by decision-makers in HELCOM for the Baltic Sea Action Plan (BSAP). BSAP is an ambitious action plan to drastically reduce pollution to the Baltic Sea and restore good ecological status by 2021.

Baltic Nest Institute is also undertaking research in a number of national and international projects, including five BONUS projects, which are assessing and modelling Baltic Sea ecosystem response-building capability and developing advanced modelling tools for scenarios of the Baltic Sea ecosystem to support decision-making.



Shift happens

Centre researchers have previously shown that Baltic Sea ecosystems have gone through ecological regime shifts, including a change from a cod- to a sprat-dominated state in the Central Baltic Sea.

This area of research is further investigated in the FORMAS project 'Regime Shifts in the Baltic Sea Ecosystem - Modelling Complex Adaptive Ecosystems and Governance Implications'. The project, which started in 2010, will end in 2014 and aims to investigate the interplay between gradual and abrupt change (regime shifts) in the Baltic and derive governance structures necessary to implement an ecosystem management approach.

BNI and centre researchers also play an important role in the interdisciplinary Baltic Ecosystem Adaptive Management (BEAM) research programme. This programme focuses on the interactions between different environmental problems and how to devise an ecosystem-based management system for the Baltic Sea. The five-year programme gathers a range of researchers from Stockholm University and is part of the Swedish Government's Strategic Research Initiative on Marine Environmental Research.

Stern advice for the Baltic

Another significant partner in the restoration of the Baltic Sea is the BalticSTERN network. The acronym STERN in BalticSTERN stands for Systems Tools and Ecological-economic evaluation – a Research Network and is inspired by the report 'The Economics of Climate Change – the Stern Review' (2007), which investigated the costs and benefits of mitigating climate change. Coordinated by a Secretariat hosted by the centre, BalticSTERN provides cost-benefit analysis regarding the environmental problems of the Baltic Sea. BalticSTERN will advance the understanding of the benefits of an improved marine environment by linking changes in ecosystem services with changes in human welfare. October 2010 saw the publication of 'Baltic Survey – a study in the Baltic Sea countries of public attitudes and use of the sea', which documents the recreational value of the Baltic Sea and shows that people benefiting from the Baltic Sea worry about the environmental situation (see page 20).





Polluters should pay

Inhabitants around the Baltic Sea express worries about the environmental situation.

With 80 per cent of all people living in the Baltic Sea region having spent leisure time there, the Baltic Sea is frequently used for recreational activities such as swimming, sunbathing or just enjoying the sea-shore for walking or picnicking. But there are clouds looming on the horizon.

Despite its young age (approximately 4000 years), the Baltic Sea is under considerable strain due to emissions and other pressures on the ecosystem. This in turn affects the social-ecological services it provides to the roughly 90 million people inhabiting the drainage area. This strain has led researchers to call for a more ecosystem-based management approach.

Many, particularly Finns, Swedes, Estonians and people in the coastal region of Russia, are worried about the environmental situation in the Baltic Sea.

In a survey involving 9000 respondents from all the countries in the region, concerns were expressed about issues such as litter, heavy metals and hazardous substances, everyday oil leakages and the risk of a major oil spill, damage to flora and fauna and algal blooms.

In the survey, entitled 'BalticSurvey - a study in the Baltic Sea countries of public attitudes and use of the sea', the majority of the respondents thought that polluters should pay. They considered increased charges on pollution emissions for individuals and enterprises to be an acceptable way of funding actions to improve the Baltic Sea environment.

"It is clear from the study that people in all countries around the Baltic Sea are benefiting from the recreational values of the Sea and that people are worried about the environmental deterioration. This is the first study published from the international research network BalticSTERN, and it will be very useful as a basis for further research on the benefits and the economic value of the ecosystem services that the Sea gives to society", says Siv Ericsson, head of the BalticSTERN Secretariat, which coordinates the research network.

More scientific reports will follow and in 2012 the Secretariat will compile a synthesis report on costs of action and inaction and cost-effective measures, directed at governments and other decision-makers.



New Marine Nordic Centre of Excellence

Centre awarded funding to create ‘a scientifically excellent project on effect studies’.

On behalf of the Top-level Research Initiative (TRI), Nordforsk has awarded funding for a new Nordic Centre of Excellence on Climate Change Effects on Marine Ecosystems and Resource Economics.

Research Director Carl Folke will co-lead the new programme together with Nils Chr. Stenseth from the Centre for Ecological and Evolutionary Synthesis at the University of Oslo.

“We are most pleased to receive this grant. This is an excellent opportunity to really integrate social and ecological research on fisheries, food webs, climate and the Baltic Sea”, says Carl Folke.

Funding is scheduled to begin in 2011 and will be available for five years. The programme will implement a broad international and multidisciplinary research strategy to explore the biological, economic and societal risks and opportunities of global climate change on fisheries resources in the Nordic region, with the primary focus on Atlantic cod. This will be achieved through primary research that will train a new generation of PhD students and post-docs to

develop internationally collaborative projects that integrate biology, economics and policy.

Centre researchers Thorsten Blenckner, Örjan Bodin, Magnus Nyström and Christoph Humborg are engaged in the programme.

The Centre of Excellence was recognised by the TRI Programme Committee as ‘a scientifically excellent project on effect studies.’

“If money were available to fund only one Nordic Centre of Excellence, this is the one that the panel would recommend to fund. Outstanding people and research ideas, scientifically well-drafted, serious efforts to integrate all work that will be done within the Nordic Centre of Excellence with very original ideas on how to cut across disciplinary boundaries and achieve real integration. This Nordic Centre of Excellence offers added value in many respects. The Nordic Centre of Excellence is led by a strong team, which has provided excellent ideas on training and staff development and has made an outstanding coordination and integration plan”, says the international expert panel.



Crises without borders

Abrupt ecological crises with dire societal consequences force a rethink of crisis management.

In contrast to many aspects of global warming (which can be projected and prepared for), cascading ecological crises tend to be more abrupt, unexpected and notoriously hard to detect in advance. They challenge decision-making and threaten to leave actors in a confused cul de sac of blame games and bickering. For instance, when Paraguay, Uruguay and Argentina experienced one of the worst droughts in decades in 2008 and 2009, it was feared that the crisis would have repercussions for the entire region's economies, particularly related to export figures, fiscal revenues and inflation rates.

“While incremental change requires predictability, stability and efficiency, rapid uncertain change instead demands flexibility, learning and network responses that cut across traditional public boundaries”, say centre researchers Victor Galaz and Fredrik Moberg, in a study conducted together with experts from The Swedish National Centre for Crisis Management Research and Training and

Uppsala University.

They found that cascading ecological crises are not predestined to have failed responses, provided the appropriate conditions to deal with them are provided.

“We know from past research that successful multilevel responses to cascading crises are possible. It's impossible to predict exactly which ecological crises will arise in the future, the only certainty is that they do happen. A crucial research challenge is therefore to understand the conditions under which institutions and decision-makers can deal with these crises,” says Victor Galaz.

Source: Galaz, V., F. Moberg, E-K. Olsson, E. Paglia and C. Parker. Institutional and Political Leadership Dimensions of Cascading Ecological Crises. Public Administration, no. doi: 10.1111/j.1467-9299.2010.01883.x



The inbetweeners

Scale-crossing brokers and new network structures can boost urban ecosystem governance.

Urban areas are increasingly being recognised for their role in generating critical ecosystem services for human well-being. Green areas such as parks, wetlands, cemeteries and urban forests not only provide taken-for-granted services such as shade and space for recreation, but also aerosol filtering and seed dispersal services that support biodiversity.

Unfortunately most areas are considered in isolation rather than ecologically interlinked with other green areas nearby. The consequence is that groups of actors tend to ignore ecological processes beyond their own focus area. For example, cemetery managers tend to form stronger ties with other cemetery managers, and weaker or no ties with actor groups and managers from adjacent green areas.

In an attempt to improve the communication between green area managers in urban Stockholm, centre researchers Henrik Ernstson, Stephan Barthel and Sara Borgström, together with Erik Andersson from the Swedish University

of Agricultural Sciences, have used network theory to develop an alternative social network structure to facilitate the emergence of adaptive capacity among the different actors.

They suggested the creation of midscale managers and scale-crossing brokers to promote new relations between groups with knowledge to improve adaptive governance of the green areas. The potential exists for these brokers, by linking otherwise unconnected actors, to become exceptional crossroads of possibilities and exchanges of experiences.

Source: Ernstson, H., S. Barthel, E. Andersson and S. Borgström. 2010. Scale-Crossing Brokers and Network Governance of Urban Ecosystem Services: The Case of Stockholm, Sweden. Ecology and Society, 15 (4), 28. <http://www.ecologyandsociety.org/vol15/iss4/art28/>



Photo: J.Lokrantz/azote.se

Urban gardens key in times of crisis

In-depth analysis of management of ecosystem services in cities.

Allotment gardens have often been sources of local resilience during periods of crisis. During World War I the number of allotment gardens in Britain surged from 600,000 to 1,500,000, supplying city people with food and other ecosystem services. These gardens were established in parks and sports fields, and even Buckingham Palace turned over its lawns to grow vegetables.

In a study conducted in Stockholm, centre researchers Stephan Barthel, Carl Folke and Johan Colding explored how ecosystem management practices are retained and stored among people and modified and transmitted through time. Today the city of Stockholm contains about 10,000 individual allotment garden plots, occupying 210 ha of land and involving about 24,000 people.

The researchers found that self-organised groups of allotment gardeners support critical ecosystem services that both underpin the production of crops and flowers and spill over to a much larger

portion of the metropolitan landscape.

“This calls for policy-makers to appreciate and actively include citizens that engage in the actual stewardship of urban ecosystem services, whether it is about sustaining urban green areas or designing new ones”, says Stephan Barthel.

As concluded in the study, these allotment gardens serve as ‘pockets of social- ecological memory’ in the urban landscape and constitute a source of resilience for generation of ecosystem services, while counteracting ecological illiteracy.

Source: Barthel S., C. Folke and J. Colding. 2010. Social-ecological memory in urban gardens-Retaining the capacity for management of ecosystem services. Global Environmental Change 20 (2010) 255-265

Biodiversity in the balance

Continuing biodiversity loss is predicted, but could be slowed.

A study published in *Science* comprising a more detailed version of the third Global Biodiversity Outlook report predicts the inevitable continuing decline of biodiversity during the 21st century. However, it also offers hope that this decline could be slowed if emerging policy choices are pursued.

The study argues that fundamental changes are needed in society to avoid future risks of extinctions, declining species populations and large-scale shifts in species distributions.

The 23-member team behind the study, which also include centre researcher Oonsie Biggs, says that the target of stopping biodiversity loss by 2020 ‘sounds good, but sadly isn’t realistic’.

However, the study also presents glimmers of hope: recent scenarios show that slowing climate change and deforestation can help reduce biodiversity loss, provided there are ‘significant opportunities to intervene through better policies, such as those aimed at mitigating climate change without massive conversion of forests to biofuel plantations’.

The authors say that much hinges on the creation of an IPCC-like mechanism for biodiversity (to be called the Intergovernmental Platform on Biodiversity and Ecosystem Services - IPBES). They consider the creation of such a mechanism to be ‘extremely important’ for future decision-making and achieving commonly agreed definitions and indicators for biodiversity.

In a related article in the Policy Forum section of *Science*, centre researcher Thomas Elmquist and colleagues argue that the Convention on Biological Diversity’s 2020 targets are an improvement over the 2010 target, but that there are important missing pieces and that the targets could be strengthened. They claim that IPBES would help create the capacity to evaluate progress toward biodiversity targets and the costs of falling short (see page 42).



Photo: B. Ekberg/azote.se

Source: Pereira, H. M., P. W. Leadley, V. Proença, R. Alkemade, J. P. W. Scharlemann, J. F. Fernandez-Manjarrés, M. B. Araújo, P. Balvanera, R. Biggs, W. W. L. Cheung, L. Chini, H. D. Cooper, E. L. Gilman, S. Guénette, G. C. Hurtt, H. P. Huntington, G. M. Mace, T. Oberdorff, C. Revenga, P. Rodrigues, R. J. Scholes, U. R. Sumaila, M. Walpole. 2010. Scenarios for Global Biodiversity in the 21st Century. Science. vol. 330 no. 6010 pp. 1496-1501 DOI: 10.1126/science.1196624



A wicked problem

Unregulated fisheries resilient to international enforcement measures.

Research has shown that marine areas rich in valuable fish stocks are not sufficiently protected either by local government or by international regulations. Added to the problem are so-called Illegal, Unreported and Unregulated (IUU) fishing vessels, which continue to work on the fringes of international law despite various enforcement measures and international pressure on flag states.

An article written by centre researchers Henrik Österblom and Örjan Bodin together with researchers in Canada and Australia shows how IUU operators in the Southern Ocean use a number of methods to adapt to and evade various enforcement actions. Vessels have started to operate in fleets and receive both logistic support and legal advice during hot pursuits. In addition, they change the vessel name and dump any potential evidence if they are captured.

“IUU operators appear adaptive, likely due to a combination of increased offshore coordination and consolidation, hidden

corporative beneficiaries and substantial monetary assets”, according to Henrik Österblom and Örjan Bodin.

Although tougher actions against vessels have led to less IUU fishing, the resilience and adaptability of the getaway vessels is causing headaches.

Österblom and Bodin argue that no country is immune to IUU fishing, but the ability to effectively address it is dependent on the country’s governance capacity. A decreasing number of countries are willing to flag IUU vessels, so the operators and owners of these vessels are deliberately targeting areas with weak governance.

Source: Österblom H, U.R. Sumaila, Ö. Bodin, J. Hentati Sundberg, A.J. Press. 2010. Adapting to Regional Enforcement: Fishing Down the Governance Index. PLoS ONE 5(9): e12832. doi:10.1371/journal.pone.0012832



Thirsty for more

High agriculture water consumption requires new thinking

No economic sector consumes as much freshwater as agriculture, and researchers are calling for a paradigm shift to curb this trend. An increased thirst for water will eventually disturb the ecosystems that produce the crops and grass that animals consume.

In a study on livestock production and management, centre researcher Lisa Deutsch and others provide a framework to understand the role of water in ecosystems.

“Water needed for animal feed is by far the dominant freshwater challenge in the livestock sector, and a lack of comprehensive understanding of this relationship has led to inadequate management”, says Lisa Deutsch.

Deutsch and her colleagues argue that in order to secure ecosystem protection, future water management needs to go beyond its increasing and slightly misleading focus on blue water and also include green water, e.g. water in the soil that stems directly from rainfall. The researchers also stress the need to better integrate water resource management and land use. Agricultural

production areas are expected to expand by 50 percent by 2050, with all the associated implications.

“The many ways in which ecosystem services may be disturbed by livestock production expansion in the next four to five decades will require the development of strategies and policies for knowledge-based trade-offs between the human need for increased food production and the need to protect the fundamental function of ecosystems services. It’s time for a shift in thinking”, according to the researchers.

Source: Deutsch et. al. 2010. Water-mediated Ecological Consequences of Intensification and Expansion of Livestock Production. In Steinfeld, H.; Mooney, H.; Schneider, F. and Neville, L. (eds.), Livestock in a Changing Landscape, Volume 1. Island Press.

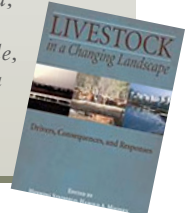




Photo: J.Lokrantz/lazote.se

A framework for the future

Centre helps identify five ‘grand challenges’ to enable future sustainability.

Spearheaded by the International Council for Science (ICSU) in cooperation with the International Social Science Council (ISSC), the international scientific community has identified five grand challenges that, if addressed in the next decade, will deliver knowledge to enable sustainable development, poverty eradication and environmental protection in the face of global change.

The visioning process began in February 2009 and is guided by a Task Team currently chaired by centre Director Johan Rockström.

The five grand challenges are:

1. **FORECASTING** - Improve the usefulness of forecasts of future environmental conditions and their consequences for people.
2. **OBSERVING** - Develop, enhance and integrate the observation systems needed to manage global and regional environmental change.
3. **CONFINING** - Determine how to anticipate, recognise, avoid and manage disruptive global environmental change.

4. **RESPONDING** - Determine what institutional, economic and behavioural changes can enable effective steps toward global sustainability.

5. **INNOVATING** - Encourage innovation (coupled with sound mechanisms for evaluation) in developing technological, policy and social responses to achieve global sustainability.

The challenges are a consensus list of the highest priorities for Earth system research and provide an overarching research framework.

Source: Reid, W.V., D. Chen, L. Goldfarb, H. Hackmann, Y.T. Lee, K. Mokhele, E. Ostrom, K. Raivio, J. Rockström, H. J. Schellnhuber, A. Whyte. 2010. Earth System Science for Global Sustainability: Grand Challenges. Science, 12 November, pp. 916-917.

Centre hosts new global network, IHOPE

A new network consisting of researchers across a range of disciplines has been set up at the centre. The network, called IHOPE (Integrated History and future Of the People on Earth), will share knowledge and projects about historical biophysical and social changes in order to create projections about a sustainable future. The IHOPE initiative is a joint project of the Environment, Economies, Civilisation and Global Change Programme (EECGP), the International Human Dimensions Programme (IHDP), and two core projects of the International Geosphere-Biosphere Programme (IGBP): Past Global Changes (PAGES), and the Analysis, Integration and Modelling of the Earth System (AIMES) project.

Centre hosts office for Programme on Ecosystem Change and Society

Stockholm Resilience Centre will host the international programme office for the new Programme on Ecosystem Change and Society (PECS).

PECS provides scientific knowledge to the proposed Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES). This programme is jointly sponsored by ICSU and UNESCO and complements the four other ICSU sponsored global environmental change programmes and the Earth Systems Science Partnership. PECS aims to develop the academic frontiers in its own right, as

well as providing scientific knowledge to the proposed Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES), which will play a role similar to that of the IPCC in climate change.



Will Steffen awarded honorary doctorate at SU

Senior Research Fellow Will Steffen has been awarded the title of Honorary Doctor at Stockholm University for his work on global environmental change. Steffen is the Executive Director of the Climate Change Institute at the Australian National University in Canberra. He is internationally known for his research, particularly his work on human driving forces behind global environmental change. Will Steffen was formerly the Director of the International Geo-Biosphere Programme (IGBP) at the Royal Swedish Academy of Science, and has been guest researcher at Stockholm University for several years.

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Conferences, workshops and seminars

Stockholm Workshops

Frontiers in social-ecological research

As the name suggests, the Stockholm workshops are held in Stockholm and are organised by the Stockholm Resilience Centre. These international and transdisciplinary workshops represent the frontiers of the research areas of the Stockholm Resilience Centre and its many collaborators around the world. They encompass diverse angles of critical challenges for the resilience of social-ecological systems.

Stockholm Workshops 2010

Confronting the water challenge in a turbulent world - A green-blue resilience approach for global sustainability. Six workshops during 2010. In cooperation with SEI and Potsdam Institute for Climate Impact Research (PIK).

Resilient cities, 26-27 February. In cooperation with Association of European

Schools of Planning (AESOP)

Planetary boundaries, multiple global crises and global governance, 15-17 March

Inconvenient feedbacks in global dynamics, 12-14 April. In cooperation with the Beijer Institute of Ecological Economics

Interactions among the Planetary Boundaries, 14-15 April. In cooperation with the Beijer Institute

Moving thresholds in Earth's life support systems, 15-17 April

Behavioural economics and nature network (BENN), 25-26 May. The Beijer Institute of Ecological Economics

Memory for sustainability, 25 May. IHOPE in cooperation with the Beijer Institute

Undertaking community climate change adaptation: An international community of practice, 24-25 May. In cooperation with SEI



Overcoming the challenges of ‘doing’ participation in the field of environment and development, 28-29 May. In cooperation with SEI and Sida.

Transboundary governance of marine social-ecological systems, Åland, 5-11 June. In cooperation with ARC Centre of Excellence for Coral Reef Studies and AICIS.

Social learning and sustainability: Exploring critical issues in relation to environmental change and governance, 1-2 June. In cooperation with SEI

Mapping the politics of ecology: Environmental politics and policy in a comparative perspective, 28-29 June. In cooperation with Dept. of Political Science, Stockholm University

Ecosystem service indicators: Linking the dynamics of ecosystems to human well-being, 19-21 August, Grinda, Stockholm Archipelago. In cooperation with DIVERSITAS.

Innovation and transformation in social-ecological systems, 6-7 September

Fat-tail generating mechanisms and their implications for planetary stewardship, 11-13 September. Askö, Stockholm Archipelago. In cooperation with the Beijer Institute

Global dynamics and social-ecological resilience in the face of multiple shocks, 14-15 September. In cooperation with the Beijer Institute

Baltic Governance, 19 October. In cooperation with Baltic Nest Institute

Expertise for the future, 1 December



At the intersection of law and resilience

Conference merges the dynamics of social-ecological systems with the predictability of law.

A social-ecological system is by default dynamic, but it is also brittle. Too much rigidity can ultimately cause it to collapse. Law, on the other hand, upholds principles of predictability, reliability and stability. The conference ‘Law for social-ecological resilience’ tried to find ways to merge these seemingly contradictory capacities.

The conference, which took place on 17-19 November 2010, was co-organised by Stockholm Resilience Centre and Stockholm Environmental Law and Policy Centre and gathered an interdisciplinary mix of researchers, lawyers and governance thinkers.

So how can our legal framework deal with the inherent variability of ecological systems?

Professor Barbara Cosens from the University of Idaho suggested that stability at the large scale can provide room for innovation at the local level and fill in the gap when the local level collapses. Multi-

level governance is one key feature to foster resilience. Network analysis can be used in environmental law to find effective networks that are already present.

Centre researcher and conference organiser Jonas Ebbesson outlined the rationales of environmental law which are primarily applied to prevent or repair harm. When it comes to international law, there is a demand for new laws or regulatory regimes, he argued.

According to keynote speaker Ellen Hey from Erasmus University, it is not new regimes that are needed but a better connection between existing agreements on climate, human rights, trade, etc. Many of these agreements have developed in an ad hoc manner and there is not enough clarity on how they should relate to each other.

Stockholm Seminars 2010

The Stockholm Seminars focus on the dynamics and stewardship of social-ecological systems with a special emphasis on the need for a sound scientific basis for sustainable development policy. The Stockholm Seminars are arranged by Albaeco, Stockholm Resilience Centre, the International Biosphere-Geosphere Programme (IGBP) and the Swedish Secretariat for Environmental Earth System Sciences (SSEESS).

28/01: NANCY KNOWLTON

Coral reefs: present, past and future

25/02: NEVILLE CROSSMAN

Modernising irrigation for multiple benefits

15/03: FRANK BIERMANN

World politics in emergency mode

08/04: ROBERT POMERO

Managing overcapacity in small-scale marine fisheries

04/05: J. MARTY ANDERIES

Resource management: Managing difficult trade-offs

07/05: BEDRICH MOLDAN

Changing environment in Central Europe

17/05: GRAEME CUMMING

Dispersal, strategy and resilience

19/05: ALBERT JACQUARD

Economic growth versus uneconomic growth

01/06: JONATHAN FOLEY

The other inconvenient truth:

A global crisis of land use and agriculture

09/06: KJELL ALEKLETT,

KARL HALDING AND JOHAN ROCKSTRÖM
Scenarios of fundamental global challenges

23/08: CLARIE KREMEN

Pollination services and agroecosystems:
Searching for sustainability

24/08: ELLIOTT NORSE

US oceans policy and place-based ecosystem management

16/09: BRIAN WALKER

Global change, the Arctic and resilience

22/09: JEFFREY VINCENT

Evidence of ecosystem services of tropical forests

16/12: THOMAS ELMQVIST AND

ÅSA NORRMAN

Reflections on the post-Nagoya process,
IPBES and TEEB



Practice, Policy and Outreach

2010 marked an increased effort in bridging the centre research with policy and practice.

The Swedish International Biodiversity Programme (Swedbio) was officially placed under the auspices of the centre. This will strengthen the centre's contribution to policy issues such as sustainable livelihoods, equity and human wellbeing.

Similarly, the centre was chosen as host for the BalticSTERN secretariat. BalticSTERN will conduct a cost-benefit analysis of the environmental problems of the Baltic Sea.

The centre was also actively involved at the 2010 UN Convention on Biological Diversity (CBD) in Nagoya. Centre researchers were an integral part of the Swedish delegation as well as hosting

various seminars on issues regarding biodiversity and urbanisation.

Finally, the preparations for the 2011 Nobel Laureate Symposium on Global Sustainability got well under way. Co-organised by the centre, this symposium will gather 40 of the world's most renowned thinkers and experts on global sustainability and will feed into the work of the new High-level Panel on Global Sustainability appointed by the UN Secretary General.



A glimmer of hope

The Nagoya COP10 conference offers sober grounds for optimism in curbing biodiversity loss and getting fragile negotiations back on track.

After the climate talk stalemate in Copenhagen, one would be forgiven for thinking that the eight-metre tall statue of Milanese General Francesco Sforza urging his troops forward was put in place just for the COP10 in Nagoya. The imposing monument, a perfect replica of Leonardo Da Vinci's attempt to create the world's largest statue, stands in the middle of the equally imposing Nagoya Conference Centre, host to the 2010 UN Convention on Biological Diversity (CBD).

Compared with the talks in Copenhagen, the Nagoya conference left delegates with modest grounds for optimism on curbing global biodiversity loss. The 'Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from Their Utilisation' was adopted in the early hours of 30 October 2010 after almost six years of negotiations. A lingering fear in the minds of most delegates was

that if Nagoya failed to deliver a positive outcome, the multilateral system as a whole would suffer another blow. However with the Protocol in place, delegates and all others involved could breathe out, at least for a while.

From 2010 to 2020

The COP also adopted an updated and revised Strategic Plan which failed to meet its original goal of achieving 'a significant reduction in the current rate of biodiversity loss'. The third edition of the Global Biodiversity Outlook report underlined this failure, leaving biodiversity in the balance unless action is urgently taken (see separate story on page 25).

The new strategic plan also included a new set of targets to curb biodiversity loss. The failure to meet the 2010 targets prompted the CBD to look another ten years ahead and develop a new strategic

plan of action which included 20 SMART (Specific, Measurable, Ambitious, Realistic, Timebound) targets for 2020. In an article published in Nature centre researcher Thomas Elmqvist evaluated the 20 targets set by CBD (see separate story page 42).

One of the most positive outcomes of the entire conference was the launch of the final TEEB (The Economics of Ecosystems and Biodiversity) report. Entitled 'Mainstreaming the Economics of Nature', this STERN review-like report calls for wider recognition of nature's contribution to human livelihoods, health, security and culture by decision-makers at all levels (local to national and business to citizens). TEEB produced its first interim report in 2008. Since then it has added a series of more focused studies, which were

all brought together at the conference (see separate story page 41).

The role of cities and urban areas

The City Biodiversity Summit, which was held in parallel to COP10 in Nagoya, used the COP10 momentum to boost its own role in managing biodiversity. As the world becomes increasingly urban, with more than five billion people projected to live in cities by 2030, it is becoming increasingly recognised that cities play an important role in halting global biodiversity loss. The message from the City Biodiversity Summit was clear: give us a better policy framework and we will unfold the local potential to protect global biodiversity (see separate story page 40).





Slowly out of the shadows

Cities demand a stronger voice in curbing global biodiversity loss.

As countries strove to carve out the careful wording for ratification of the Convention on Biological Diversity, cities and local authorities used the momentum to boost their own role in managing biodiversity. Their message was clear: Give us a better policy framework and we will unfold the local potential to protect global biodiversity.

As the world becomes increasingly urban, with more than five billion people projected to live in cities by 2030, it is becoming increasingly recognised that cities are important players in halting global biodiversity loss. Although riddled with increasing uncertainty, cities nevertheless represent an opportunity for change.

At the Nagoya City Biodiversity Summit 2010, which was held concurrently with COP10, a declaration appealed to the international community (and the CBD Parties in particular) to recognise that cities and urbanisation are not all bad. Increasingly growing cities are also hubs for knowledge, innovation and human and financial resources, making them crucial for

solving global environmental problems.

“Local governments provide many services that affect biodiversity both positively and negatively. Public procurement is one such example. When combined, these influences can exert great power toward the conservation and the recovery of biodiversity and ecosystem services”, the declaration states.

At the summit centre researcher Thomas Elmqvist, who helped draft the declaration, also led a highly popular session on how urban biodiversity and ecosystems play an important role in building resilience to climate change. The session focused on the role of equity issues, education, improved disaster management and the importance of community-based resource management.



Firmly on the political radar

New TEEB report gives boost to natural resources assessments.

“The economic importance of the world’s natural assets is now firmly on the political radar as a result of an international assessment showcasing the enormous economic value of forests, freshwater, soils and coral reefs, as well as the social and economic costs of their loss.”

This was the conclusion of the final The Economics of Ecosystems and Biodiversity (TEEB) report, which was launched at the Convention on Biological Diversity’s 10th Conference of Parties meeting (CBD COP10) in Nagoya.

“TEEB has documented not only the multi-trillion dollar importance to the global economy of the natural world, but the kinds of policy shifts and smart market mechanisms that can embed fresh thinking in a world beset by a growing raft of multiple challenges” says Pavan Sukhdev, study leader of TEEB.

The TEEB report is the end result of a two-year study involving centre researchers professor Thomas Elmqvist and professor emeritus Karl-Göran Mäler, who serves

on the TEEB Advisory Board. The report is in line with similar centre research on how ecosystems can be included in wealth measurements. The report calls for wider recognition of nature’s contribution to human livelihoods, health, security and culture by decision-makers at all levels (local to national and business to citizens).

The report also drives home the message that failure of business to account for the value of natural capital, particularly in sectors such as mining, can pose significant business and social risks. Estimations have revealed that the negative impacts, or ‘environmental externalities’, of the world’s top 3,000 listed companies amounts to around US\$ 2.2 trillion annually.



Smart, but smart enough?

Researchers evaluate the 2020 targets for biodiversity loss reduction.

Despite 2010 being the UN International Year of Biodiversity, the vast majority of nations have fallen short of the Convention on Biological Diversity's (CBD) 2010 target to reduce the rate of loss of biodiversity. This has prompted the CBD to look another ten years ahead and develop a new strategic plan of action which includes 20 SMART (Specific, Measurable, Ambitious, Realistic, Timebound) targets for 2020. In an article in *Science*, centre researcher Thomas Elmqvist, along with researchers from the US, Argentina, Chile, France, Germany and the UK, evaluated the 20 targets set by CBD.

Overall, Thomas Elmqvist and his colleagues found that the 2020 targets show a significant improvement over the previous 2010 single target. However, the new targets could also be strengthened in several ways:

“If there have to be 20 targets, then they should address the 20 biggest threats to critical ecosystem services”, says Professor Elmqvist.

Using the Millennium Ecosystem Assessment as a template, the researchers found that four things were missing:

- Functional diversity: The targets are too focused on hierarchical classification rather than assessing the function the species have

- Trade-offs among targets: Different services require different diversity, we cannot have it all

- Conditionality of targets: Targets should be conditional, since ecological functioning may change because the environmental conditions change

- Side-effects of targets: Most targets ignore potential side-effects of achieving the target

To deal with these issues, the researchers welcomed the establishment of an Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), which creates the capacity needed to evaluate the progress on several of the 20 targets.

“It provides an ideal opportunity to put in place a more structured sequence of objectives for the collective management of the biosphere”, says Thomas Elmqvist.

Source: Perrings, C., S. Naeem, F. Abrestani, D.E. Bunker, P. Burkill, G. Canziani, T. Elmqvist, R. Ferrati, J. Fuhrman, F. Jaksic, Z. Kawabata, A. Kinzig, G.M. Mace, F. Milano, H. Mooney, A-H. Prieur Richard, Jschirhart, and W. Weisser. 2010. Ecosystem Services for 2020. Science 330:323-324.



Planetary boundaries presented at TED Global 2010

Centre Executive Director Johan Rockström presented research on resilience and planetary boundaries at this year's TED Global event on 12-16 July in Oxford. With the research behind planetary boundaries as a point of departure, Dr. Rockström held a fast-paced, inspiring talk arguing that the bad news - the gloomy diagnosis for the planet - is in fact the good news.

“There are sufficient innovative approaches out there to transform the current governance of social and ecological systems into sustainable governance within the boundaries of the planet”, says Johan Rockström.

Centre hosts SwedBio

Starting from 2011, Stockholm Resilience Centre will host the Swedish International Biodiversity Programme (SwedBio). Although keeping the familiar SwedBio abbreviation, the programme will change its name to the Programme on Resilience and Development. The new programme will contribute to bridging centre research

with international policy-making on issues such as poverty alleviation, sustainable livelihoods, equity and human well-being, taking into account the need for adaptation and mitigation to ecosystems change such as climate change.



Centre to co-host Third Nobel Laureate Symposium

Nobel Laureates and renowned thinkers such as Mikhail Gorbachev and Mario Molina will meet in Stockholm on 16-19 May 2011 to discuss new approaches to the governance of the world's social and ecological systems. Following on from previous meetings in Potsdam and London, this Symposium will provide an informal setting for productive discussions on how to transform current governance into a more sustainable and adaptive form.

The Symposium is being organised by the Royal Swedish Academy of Sciences, Stockholm Environment Institute, Stockholm Resilience Centre, Beijer Institute for Ecological Economics and Potsdam Institute for Climate Impact Research.

www.globalsymposium2011.org



A Shanghai World Expo success

The ‘Better City, Better Life’ World Expo in Shanghai closed on October 31 after six months of showcasing the latest advancements in technology, science and culture in the national pavilions. During the last month of the Expo, Stockholm Resilience Centre co-hosted a series of seminars and workshops on urban resilience.

The series started with an open seminar at the Nordic Light House on October 17, 2010. This seminar highlighted the perspective of young urban citizens featuring students from USA, India, Kenya and Sweden, who presented their own project visualising ecosystem change in their school’s neighbourhoods. On October 18, centre researcher Thomas Elmqvist took part in the Swedish Institute’s seminar entitled ‘How universities can lead the way for sustainability, addressing solutions to urban growth and climate change challenges, using campuses for innovation and learning’. In a third seminar, the Albano Campus case was used to inspire similar campus construction projects in China.

Centre hosts new BalticSTERN secretariat

BalticSTERN is an international research network for the purposes of performing cost-benefit analysis regarding the environmental problems of the Baltic Sea and giving guidance on cost-effective measures and policy instruments. Through constructing and combining ecological and economic models, different options for managing the environmental risks threatening the Baltic Sea will be analysed.

Based on research in the network and other relevant studies, the Secretariat will make a synthesis report directed at decision-makers, to be published in 2012.



Photo: Samuel Svensäter

Well-known photographer joins the centre

The National Geographic photographer and filmmaker Mattias Klum has joined Stockholm Resilience Centre as a senior fellow on 10 percent of a full-time position. In his role, Klum will contribute to the teaching at the centre as well as other centre activities.



Photo: Friederike Mikulcak

Teaching & training

Stockholm Resilience Centre offers a variety of transdisciplinary courses and programmes on environmental and sustainable development issues. In 2010, the centre had one undergraduate and two Master's programmes, a PhD-level Research School and two undergraduate courses. The courses are developed and promoted in collaboration with several departments at Stockholm University.

Resilience Research School

The centre continue to develop the Resilience Research School aimed to train the next generation of transdisciplinary thinkers and doers on social-ecological

resilience and sustainable development.

In 2010, the PhD students attended two compulsory courses: *Linking Resilience Theory to Research Questions and Design*, lead by centre researchers Beatrice Crona and Line Gordon, and *Resilience Research*, lead by centre researcher Garry Peterson. Visiting researcher Sarah Gergel, Centre for Applied Conservation Research, University of British Columbia, and Garry Peterson, lead the PhD course *Understanding Social-Ecological Landscapes: Short-Course in Spatial Analysis Techniques* which also contributes to their book *Learning Landscape Ecology*.

Masters' Programmes

The Master's programmes at the centre in 2010, Ecosystems, Governance and Globalisation (EGG) and Sustainable Enterprising (SE) remained popular and successful. SRC Senior Research Fellow Steve Lansing was a great asset this year, applying his extensive research in Bali and excellent teaching skills to the course Resilience, Adaptability, Transformability. Our students performed fieldwork across the globe in, e.g., Australia, Chile, Zanzibar, Uruguay, India, and Rwanda. Masters students continue work in all the research themes, e.g., they are an integral part of developing our Regime Shifts Database.

During 2010, an extensive Center-wide effort resulted in the development of a new research-oriented 2-year Master's Programme **Social-Ecological Resilience for Sustainable Development**, starting August 2011. The Programme aims to enhance students' knowledge of the complex interactions between ecological and social dynamics, particularly ecosystem management in the context of change and uncertainty. The new programme will replace our previous MSc Programme Ecosystems, Governance and Globalisation.

The Programme offers one year of courses and a traineeship, and one year spent doing a Master's thesis. The centre continue the development of a programme designed to train practitioners and managers to replace our Masters' programme Sustainable Enterprising which did not admit any new students this year. The new courses will be announced in 2011.

Master Theses 2010

Ecosystems, Governance and Globalisation (EGG)

BENDT, PIM

Social Learning and Diversity of Practice in Community Gardens in Berlin.

GRAHAM, MARNIE

Open space or natural place? The politics, perceptions and practices of place-making in urban co-management, Macassar dunes, South Africa.

GÖRANSSON, NILS

Sustainability strategies, organizational learning and green structure perceptions of Stockholm urban planning organizations - A case study of organizational barriers and opportunities towards managing for ecosystem services within urban planning and development.

HERNANDEZ CEDILLO, MARIA FERNANDA

Exploring possible effects that diversity of preferences for the future within communities could have for adaptive co-management. Case study of a community of farmers in Bali, Indonesia.

HOFFMEISTER, JUAN

How do policies and measures with development objectives promote adaptation to climate change as a co-benefit? The case of rice production in Mozambique.

ISRAELSSON, ELIN

Mind the gap: People-centered biodiversity conservation in policy and practice in Cape Town, South Africa.

ROCHA GORDO, JUAN CARLOS

The domino effect: A network analysis of regime shift drivers and causal pathways.

STANGE, KARI

Towards a more holistic marine management paradigm: Ten years of ICES changes to meet tomorrow's need for science and advice.

STEIN, CHRISTIAN

A Social Network Perspective on the Governance of Green and Blue Water Resources: A Case Study of the Mkindo Catchment, Tanzania.

STERVE, HANNA

Factors restricting adoption of sustainable agricultural practices in a smallholder agro-ecosystem: A case study of the Potshini community, upper Thukela region, South Africa.

WESELY, JULIA

Policy outcomes on water-related ecosystem services in an agricultural landscape in South Africa.

Sustainable Enterprising (SE)

BJÖRLIN SÄLL, KARIN

Walk the talk: political consumers and their information search towards more sustainable consumption choices.

BLOMBERG, JENNY

Constraints and Possibilities for Fortum to support local biodiversity in Stockholm.

ERDELYI, ORSOLYA

Sustainability and organic farming in the light of conventions theory: the example of the Hungarian organic sector.

FORSBERG, JOEL

The effects of the European Union Emission Trading Scheme on the energy enterprises with small carbon dioxide emissions in Sweden.

HERBERTSSON, NICOLE

Corporate Climate Change Adaptation

- A Survey of Swedish Fashion and Textile Companies.

HJELT, BRITTA

Future Trends of Strategic CSR - Illustrated with four case studies of Swedish Multinational Companies.

HORWITZ, MARTIN

The Implementation of United Nations Principles for Responsible Investments among Swedish Investors - A paradigm shift within reach?

JAYAWEERA, INDRAMANI

Livelihood and diversification in Rural Coastal Communities: Dependence on Ecosystems Services and possibilities for Sustainable Enterprising in Zanzibar, Tanzania.

LEVINSON, ELSA

Green Clothes - a survey of peoples willingness to pay for environmental friendly clothes.

POUKKA, RIIKKA

Corporate Responsibility on the Media Sector. Study on the Corporate Responsibility Perceptions of Alma Media's Stakeholders.

RICARD-BOURGET, CATHERINE

The information accuracy of SRI markets - a comparative study between SRI-screening firms and auditing firms.

SALAZAR, REMBERTO

Description and analysis of Institutions for Communal Forest Management in Monte Verde, Bolivia.

YU, AE-LI

Corporate social responsibility and SMEs - Barriers and opportunities in a Swedish perspective.



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