

Annual Report 2009



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Stockholm Resilience Centre Annual Report 2009

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Vision and Mission

The vision of the Stockholm Resilience Centre is a world where social-ecological systems are understood, governed and managed, to enhance human wellbeing and the capacity to deal with complexity and change, for the sustainable co-evolution of human civilizations with the biosphere.

The mission of Stockholm Resilience Centre is to advance research for governance and management of social-ecological systems to secure ecosystem services for human wellbeing and resilience for long-term sustainability. We apply and further develop the scientific advancements of this research within practice, policy and academic training.

Preface

The year 2009 marked the end of the three-year start-up phase of the Stockholm Resilience Centre. During this period the Centre has developed a broad interdisciplinary research programme on the understanding of social-ecological systems and governance and management for resilience and sustainable development. On the initiative of the Mistra Foundation, the Centre was evaluated in preparation for the first ordinary phase 2010-2013.

This external evaluation, carried out by Professor William C. Clark from Harvard University, ranked the Stockholm Resilience Centre as a “world leader in the conduct of interdisciplinary research on the dynamics of inter-connected social-ecological systems”. Based on its record of publication, the Centre is among the top three scientific institutions in the world in this area. This firmly positions the Centre as a global node at the frontier of research on resilience and sustainability. It is also exactly what the Centre set out to achieve when it was launched in 2007. It aimed to develop a thriving and dynamic international research environment, where scientists from the social sciences, natural sciences and humanities could experiment and advance novel research for the sustainable governance and management of social-ecological

systems. The achievements so far are the result not only of the major scientific accomplishments of the centre-based researchers, but also of the broad international research collaboration between the Centre and researchers from around the world.

Clark’s evaluation also pointed to several important challenges. To sustain and further develop its international scientific leadership, the Centre will continue to be an effective science communicator and a convener of science-policy bridging, and it will help train the next generation of resilience thinkers and doers. The coming years will be devoted to strengthening the institutional capacity in all these areas, while at the same time nurturing the flexible, experimental and learning-based approach to generating new insights on some of the pressing human challenges of all time – how to build and maintain resilience for human development in an era of rapid global change.



*Professor Arild Underdal,
Chair of the Board*



*Stockholm Resilience Centre Board members. Top row: Roger Kaspersen, Arild Underdal, Carl Folke, Thomas Rosswall. Middle row: Brian Walker, Christopher Edling, Rashid Hassan. Front row: Frances Westley, Elinor Ostrom, Johan Rockström, Carole Crumley, Anders Wijkman.
Photo: J.Lokrantz/lazote.se*



Photo: ORASIS

Directors' view

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

It is also our strong belief that the only way to effectively contribute to this vision is to fundamentally change the way we go about science. Our internal vision for the Centre is therefore to create a flexible and creative work environment where scholars integrate social sciences, natural sciences and the humanities, in order to generate new insights and solutions that would otherwise not be possible. This is in fact an experiment in itself; how to find the best ways of conducting 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. Simply stated, we believe that new interdisciplinary and transdisciplinary approaches to science that cut across scientific disciplines and that interact with policy and practice are necessary in the quest for sustainable solutions to the massive social-ecological challenges facing humanity.

This experimental arena is of particular importance in the current state of the world. There is an increasing realization that business-as-usual pathways into the future are not viable – be it in financial systems, the governance of climate change, our ways of managing risk and uncertainty or the stewardship of biological diversity and ecosystem services for future human wellbeing. Evidence suggests that even in the short term, societies in the world face the need for transformative changes. Some of these may be costly, at least in the short term. Some may require fundamental life-style changes. Others may in fact be beneficial, even profitable. All will have to be aimed at sustaining development

in a desired state of the Earth system. Humanity has firmly entered an era of rapid global change, where the solutions must be embedded in regional and local contexts, and where governance and management, as well as economic paradigms and social values, must be founded in a deeper appreciation of how intertwined human societies are with the environmental life-support capacity of planet Earth.

It is in this context that we pursue our research on e.g. the resilience of urban environments, ecosystem management in agricultural landscapes and seascapes, the economics of ecosystem functions and bundles of services, knowledge systems and social networks for resilience building, institutions and adaptive governance, tipping points, regime shifts and resilience strategies for social-ecological transformations in the face of rapid global change.

Our research agenda is continuously evolving and, through continuing collaborations and the scientific evaluation of the Centre, we have fine-tuned our research themes, moving from nine to six themes, allowing for further integration within and across thematic areas of research.

2009 was also a year of intensive science-policy bridging. The Centre produced the scientific background report to the high level Swedish EU Presidency meeting in Strömstad on climate change and biodiversity. The outcomes from this meeting, which emphasized the role of ecosystem management and resilience for climate mitigation and adaptation, were carried forward to the climate negotiations in Copenhagen. The Centre will continue to provide policy-relevant science on the links between climate change, ecosystems and development, and on the importance of resilience building in dealing

with climate impacts and other global changes. Our growing emphasis on resilience, global change and governance for social-ecological transformations is important in this context. Furthermore, we highlight the need for new understanding of Earth System interactions and the risk of tipping points at the planetary level, as well as the need for new thinking on cross-scale governance in order for us to remain within planetary boundaries.

The Resilience Research School is now established at the Centre, as our learning arena for Master's students, PhD students and post-doc researchers. Here we provide our own MSc and PhD training, in close collaboration with departments at Stockholm University and other universities in Sweden and across the world.

Of course, the golden shadow of any Nobel Prize falls widely across academic institutions. Everyone wants to be associated, however remotely, with recipients of the world's most prestigious scientific award! However, we consider ourselves to have particular reason to congratulate and celebrate Professor Elinor Ostrom, the 2009 recipient of the Prize in Economic Sciences in Memory of Alfred Nobel. Professor Ostrom's research on the importance and role of collective action and institutions to deal with common pool resources is closely related to our research at the Centre. Professor Ostrom serves on our Centre board, and has had close scientific collaboration with Resilience Centre colleagues for many years. Her Nobel award is a huge recognition of the importance of social-ecological research for governing the commons, and an inspiration to all engaged in transdisciplinary research for a sustainable world.



*Professor
Johan Rockström,
Centre Director*

*Professor
Carl Folke,
Science Director*

*Dr Olof Olsson,
Deputy Director*



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Elinor's year

When Centre board member Elinor Ostrom was awarded the Nobel prize for economics last year, she not only gave research on multilevel governance a boost, but also showed the world that the global commons are not so tragic after all.

Most people didn't see it coming, but few objected when Centre board member Elinor Ostrom (Professor at Indiana University at Bloomington and member of the Resilience Alliance) and Oliver Williamson (University of California at Berkeley) were awarded the 2009 Economics Prize in memory of Alfred Nobel. In a year where the financial crisis did little for the reputation of economics, choosing Ostrom and Williamson as recipients of the prize was a breath of fresh air.

Lobsters and irrigation systems

The first woman to receive the prize, Professor Ostrom has spent some 40 years studying how common pool resources, such as pastures, fisheries and forests, are effectively managed by people. Contrary to the gloomy 'tragedy of the commons', which argues that without clearly defined property rights, common resources will be overexploited

because individuals ignore the effects of their actions on the overall pool, Ostrom demonstrates that people are indeed capable of implementing self-governance measures.

In her research, from lobster fisheries in Maine to irrigation systems in Nepal, Professor Ostrom found that people developed sophisticated systems of institutions to ensure that these resources are not depleted. These measures often involved explicit rules about what people may and may not do and how they would be sanctioned if they did not follow these rules. Furthermore, she found that self-governance and community-driven projects often worked better than ineffective and ill-informed rules of governments. Trust is a key feature for successful governance.

"It's crucial to build enough diversity to cope with the diversity of the world and allow multi-scale systems with multiple scales so that you don't have a uniform, top-down panacea that is predicted to solve everything but instead



of curing it, kills it”, she said in her whiteboard seminar video.

www.stockholmresilience.org/ostrom-whiteboard

Small steps, big difference

Professor Ostrom’s research on how people organize themselves in order to protect an important asset has become particularly relevant to the evolving issue of global environmental change. As a consequence, she was naturally asked to serve on the board when the Stockholm Resilience Centre was launched in 2007.

“It’s a privilege to have Elinor serving on the Stockholm Resilience Centre Board. She has already been engaged with us for many years, going back to a Beijer Institute research programme in the early 1990s on property rights and the performance of natural resource systems. Her work on collective action and common pool resource governance has been a great source of inspiration and has shaped our research on social-ecological systems and resilience thinking”, says Carl Folke, scientific director of the Stockholm Resilience Centre.

Public officials and other geniuses

Professor Ostrom’s work has been praised because it provides insight into collective action and the governance of complex social-ecological systems, which are crucial factors yet ignored by many. Her work also exemplifies the benefit of crossing borders between disciplines. The Centre’s research on adaptive governance and multilevel institutions bonds perfectly with Professor Ostrom’s research on how to govern the world’s resources on different scales.

“A lot of people are waiting for more international co-operation to solve matters like global warming. There is this assumption that there are public officials that are geniuses, and that the rest of us are not. It is important that there is international agreement, but we can be taking steps at family level, community level, civic and national level. There are many steps that can be taken that will not solve it on their own but cumulatively will make a big difference”, said Professor Ostrom.



Photo: M.Kegl/lazote.se

Research themes and highlights 2009

In last year's Annual Report we emphasized that "humanity is faced with the largest challenge ever, to redefine our relationship with the Biosphere, and translate this into operational governance and management to enable sustainable futures". Our research has seriously taken on that challenge. It 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 wellbeing. 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.

To us, resilience is much more than simply recovery or buffer capacity. Centre researchers and collaborators are particularly interested in the interplay between periods of gradual change and periods of abrupt change – how to make use of change and turn crises into new

opportunities towards sustainability. Three features of resilience thinking of significance for analyzing social-ecological systems in relation to sustainability are emphasized:

- **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.

During the start-up phase of the Centre, research collaboration was organized around nine transdisciplinary themes. The aim of these themes was to provide flexible arenas for sharing perspectives and knowledge from

different disciplines. What has been exciting is that the themes have already fed into each other through inductive-deductive science, practice and theory, with active involvement of scholars from the natural sciences, social sciences and the humanities. It is rewarding to see the emergence of broad cross-theme engagement and collaboration, reflecting the benefits of the individual in operating on a mutual dynamic research platform.

Research themes

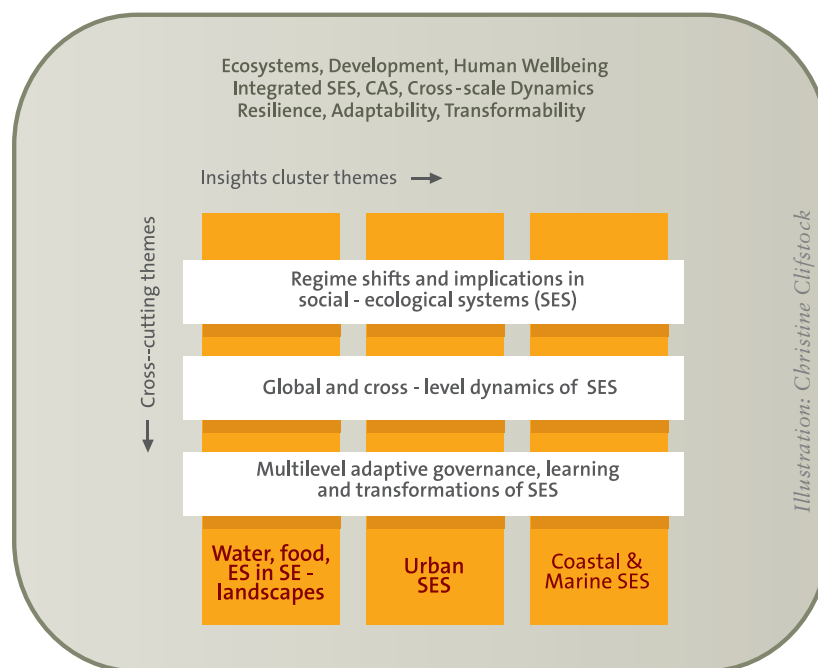
To further stimulate the collaboration and fine tune our research directions, we have reshaped the themes of the Centre into six overarching areas. The first three advance theory and methods, actively interacting with the three latter cross-cutting themes.

- Regime shifts and implications in social-ecological systems – a major research niche of the Stockholm Resilience Centre expanding insights from ecological systems into social-ecological systems as a whole.
- Global and cross-scale dynamics of social-ecological systems - a largely unexplored area focusing on drivers, feedbacks and governance challenges in relation to planetary boundaries and ecosystem services.
- Multilevel adaptive governance, learning

and transformations of social-ecological systems – a highly demanded area focusing on case studies in landscapes and seascapes and comparative analysis.

- Water, food, ecosystem services in social-ecological landscapes – a novel approach connecting work on poverty alleviation, bundles of ecosystem services and their management and governance with ecological regime shifts and global cross-scale dynamics.
- Coastal and marine social-ecological systems – building on the strength of the Baltic Nest Institute, coral reef research, fisheries, aquaculture, regime shifts and marine ecosystem-based management combined in a new way with understanding of social structures, networks and adaptive governance from coastal areas to global levels.
- Urban social-ecological systems – a largely unexplored field in relation to ecosystem services and resilience where Stockholm Resilience Centre is a pioneer in connecting urban issues relating to social-ecological systems with case studies of several cities in different parts of the world.

We envision that between 2010 and 2013, Centre research will evolve around these six theme areas. A few glimpses of research achievement in this context are provided below.





Tipping towards the unknown

With the launch of ‘planetary boundaries’, the Centre has paved the way for a new approach to sustainable development.

In a year when the Copenhagen Climate Conference fizzled into a diplomatic anticlimax, the identification of planetary boundaries was a significant output from the Centre in 2009. Drawing on decades of research on global environmental change, ecological economics, resilience and complex systems, 28 scientists proposed a ‘safe planetary operating space’ that humanity should not transgress in order to live safely. This will allow mankind to continue to thrive for generations to come. The article explicitly states that all parts of Earth are shaped by people and that at the same time all human beings are fundamentally dependent on the collective work of the Earth’s ecosystems – the biosphere and its generation of critical ecosystem services.

Abrupt change can no longer be excluded

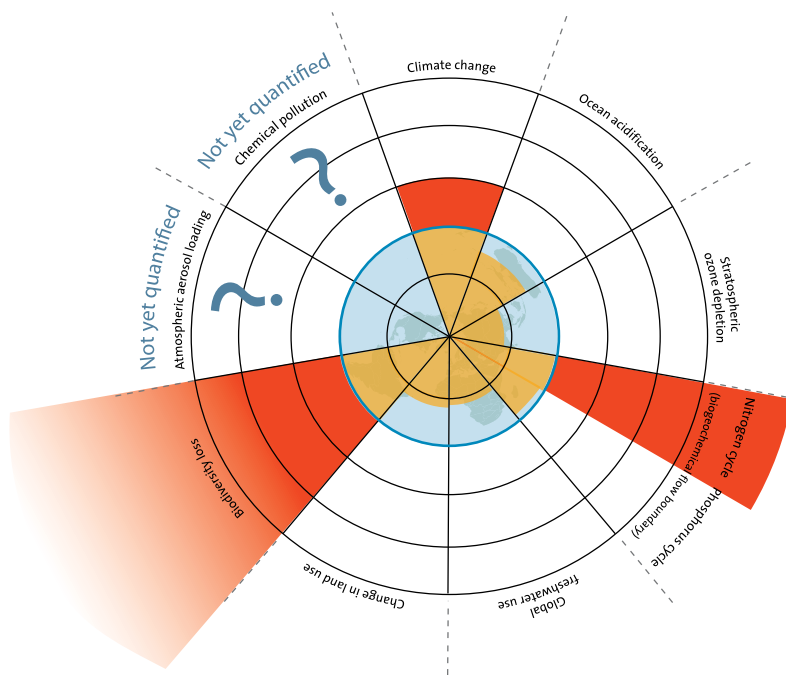
In articles published in the journals ‘Nature’ and ‘Ecology and Society’, the scientists argued that new approaches are needed to help humanity

deal with climate change and other global environmental challenges that lie ahead in the 21st Century.

“The human pressure on the Earth System has reached a scale where abrupt global environmental change can no longer be excluded. To continue to live and operate safely, humanity has to stay away from critical ‘hard-wired’ thresholds in the Earth’s environment and respect the nature of the planet’s climatic, geophysical, atmospheric and ecological processes”, said lead author Johan Rockström.

The nine planetary boundaries identified were climate change, stratospheric ozone depletion, land use change, freshwater use, biological diversity loss, ocean acidification, nitrogen and phosphorus inputs to the biosphere and oceans, aerosol loading and chemical pollution.

However, there is scant room for manoeuvre. Three of the boundaries (climate change, biological diversity and nitrogen input to the biosphere) may already have been transgressed and there is a risk that crossing one boundary



The wedges represent an estimate of the current position for each variable. The inner blue shading represents the proposed safe operating space. Illustration: Christine Clifstock

may seriously challenge the ability to stay within the safe levels of the others.

Humans behind change

The scientists emphasized that the rapid expansion of human activities since the industrial revolution has now generated a global geophysical force equivalent to some of the great forces of nature.

“We are entering the Anthropocene, a new geological era in which our activities are threatening the Earth’s capacity to regulate itself. We are beginning to push the planet out of its current stable Holocene state, the warm period that began about 10,000 years ago and during which agriculture and complex societies, including our own, have developed and flourished”, said co-author Professor Will Steffen.

The researchers stressed that their approach does not offer a roadmap for sustainable development, but does provide an important element by identifying critical planetary boundaries.

“Within these boundaries, humanity has the flexibility to choose pathways for our future development and wellbeing. In essence, we are drawing the first – albeit very preliminary – map of our planet’s safe operating zones. And

beyond the edges of the map, we don’t want to go. Our future research will consider ways in which society can develop within these boundaries – safely, sanely and sustainably”, said co-author Professor Jonathan Foley.



Photo: L.Karlsson/azote.se

Full reference:

Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, III, F.S., Lambin, E., Lenton, T.M., Scheffer, M., Folke, C., Schellnhuber, H., Nykvist, B., De Wit, C.A., Hughes, T., van der Leeuw, S., Rodhe, H., Sörlin, S., Snyder, P.K., Costanza, R., Svedin, U., Falkenmark, M., Karlberg, L., Corell, R.W., Fabry, V.J., Hansen, J., Walker, B.H., Liverman, D., Richardson, K., Crutzen, C., Foley, J. (2009). A safe operating space for humanity. *Nature* 461: 472-475 DOI 10.1038/461472a



Photo: Christine Clifstock

Planetary Boundaries in the media

The articles in *Nature* and *Ecology and Society* introducing the planetary boundaries concept gained a lot of media attention when presented in September 2009. *Scientific American*, *Time*, *Wired*, *Yale Environment 360*, *World Changing*, *Grist* and daily newspapers around the world all covered the story.

Thanks to global press releases by *Nature* and by the Stockholm Resilience Centre in cooperation with several of the co-authors and their universities, the research findings generated several hundred press clippings – in the conventional media in print and online, and in the social media. The global releases were supported by regional press releases, increasing the media interest in for example Australia and the US.

In Sweden the leading daily broadsheet newspaper *Dagens Nyheter* presented the planetary boundaries concept in a full-page article, and it was reported on the Swedish Radio morning news (*Ekot*) and on Swedish Television (*Rapport*).

In the run-up to the UNFCCC climate conference in Copenhagen in December, a second wave of media interest in the planetary boundaries concept was aroused, and the interest persists.

Some clippings of interest:

Scientific American

Grappling with the Anthropocene: Scientists Identify Safe Limits for Human Impacts on Planet. www.scientificamerican.com/article.cfm?id=scientists-identify-safe-limits-for-human-impacts

Time

How Much Human Activity Can Earth Handle? www.time.com/time/health/article/0,8599,1925718,00.html?xid=rss-health

Wired

9 Environmental Boundaries We Don't Want to Cross www.wired.com/wiredscience/2009/09/earth-users-guide/

Yale Environment 360

A Timely Reminder of the Real Limits to Growth <http://e360.yale.edu/content/feature.msp?id=2195>

A dwindling capacity to cope with crises

The planetary boundaries work emphasized that it is time for a new order of cooperative international institutions that are more capable of dealing with the interactive effects of global change.

Energy, food and water crises, climate disruption, declining fisheries, ocean acidification, emerging diseases and increasing antibiotic resistance: the list of serious, inter-related global-scale challenges spawned by the accelerating scale of human activity is long. Unfortunately, the solutions to these challenges are mostly scant and inadequate.

“There are few institutional structures to achieve cooperation globally on the sort of scale now essential to avoid very serious consequences”, warned lead author Professor Brian Walker, affiliated both with the Stockholm Resilience Centre and Australia’s national science agency CSIRO.

A stronger focus on regional and worldwide cooperation

In an article published in *Science* in September 2009, an international group of authors argued that nations alone are unable to resolve the sorts of planet-wide challenges now arising.

The core of the problem is inducing cooperation in situations where individuals and nations will collectively gain if all cooperate, but each faces the temptation to free-load at the expense of the others.

“We are not advocating that countries give up their sovereignty. We are instead proposing a

much stronger focus on regional and worldwide cooperation, helped by better-designed multi-national institutions”, Professor Walker explained. “The challenge of climate change is closely linked to the capacity of ecosystems worldwide to generate services and the wellbeing of the economy rests on this capacity. Such interdependencies have to be tackled through global cooperation. Local and national efforts are already failing”.

Too much focus on single problems

While there are signs of emerging global action on issues such as climate change, there is widespread inaction on others, such as the destruction of the world’s forests to grow biofuels or the emergence of pandemic flu.

“One major obstacle stems from the fact that international institutions primarily focus on single problems, like climate change, often ignoring how different crises interact. New collaborative platforms for how to deal with such interactions are urgently needed”, said Professor Walker.

The scientists concluded that to avoid looming global-scale failures and harness common opportunities, there is a growing need for greater collaboration amongst existing institutions and new institutions, to help construct and maintain a global-scale social contract.



Photo: J. Lokrantz/lazote.se

Reference

Walker et al. 2009. Looming global-scale failures and missing institutions. Science 325: 1345-1346.

www.sciencemag.org

Steering clear of uncertainty

New book on the challenge of navigating our own future in collaboration with the biosphere.

The book ‘Principles of Ecosystems Stewardship: Resilience Based Natural Management in a Changing World’, with contributions from Centre researchers, sets the stage for future research on transformations in social-ecological systems. It covers social tipping points, such as shifts in perceptions, institutions, incentives and governance, and the role of innovation, entrepreneurs and informal networks for seizing windows of opportunity.

With the development of proper ecosystem stewardship, they argue, ecosystem services can continue to support human wellbeing even under conditions of uncertainty and change.

No region beyond hope

”There is no region so resilient that policy-makers and managers can ignore the potential threshold changes. Similarly, there is no region that is beyond hope of substantial enhancement of wellbeing, adaptive capacity and resilience”, said Carl Folke, who is the Centre science director and one of the authors.

The ecosystem stewardship integrates three approaches for sustainable development:

- reducing vulnerability to expected changes
- fostering resilience to sustain desirable conditions in the face of perturbations and uncertainty
- transforming from undesirable trajectories when opportunities emerge.

Shift from reactive to proactive

The first approach focuses on the importance of monitoring trends in stressors that lead to change. Global-scale stresses such as climate change are particularly challenging because they require concerted global action. The second approach emphasises the importance of shifting from reactive resource management to more proactive solutions that can prepare us for the unexpected.

“The key here is to maintain a diversity of options, socially, economically and biologically. If we maintain and develop diversity in all three

areas, we are better equipped to respond and shape changes that come our way”, said Per Olsson, another Stockholm Resilience Centre author.

Crisis as a spur for change

The third approach sets out to find ways for humans to escape from the persistent trajectories of poverty, hunger, civil strife and the overall social-ecological mismanagement that characterizes so many parts of the world.

Transformational change often happens at times of crisis when enough stakeholders agree that the current system is dysfunctional. Crisis or pending crisis can trigger the emergence of new forms of stewardship of the biosphere.

“For example, climate change is a current crisis that could generate new technology and governance solutions that could fundamentally change or create new feedbacks and enhance the fit between ecosystems and governance systems”, said Per Olsson.

The publications on planetary boundaries, missing institutions and ecosystem-based stewardship are all about navigating our own future course, increasing the likelihood for development pathways that can generate, sustain and improve human welfare and wellbeing in collaboration with the biosphere.



Reference

Chapin, F.S. III, Kofinas, G.P., Folke C. (eds.). (2009). Principles of Ecosystem Stewardship: Resilience-Based Natural Resource Management in a Changing World. Springer Verlag, New York.

Crawling the web for eco-crises

By using list servers, market websites and social media, researchers have devised alternative ways to monitor looming ecosystem crises.

Imagine the following: local fishermen in Massachusetts come across a species never seen before – a zebra mussel originally native to the lakes of south-east Russia. Passively spreading by ship or pleasure craft, the filter-feeding mussel appears in lakes worldwide and is found in places as diverse as North-America, the British Isles, Spain and Sweden. Its effects are clearly noticeable in local areas. Docks, boats and anchors are covered by the mussels and they grow so densely that they block pipelines, clogging the water intakes of municipal water suppliers and hydroelectric companies. Scientists also fear they are the cause of thousands of birds being poisoned and killed.

The story of the zebra mussel is true, but the accounts of its global spread go back to the 1970s and before, at a time when the internet still was a research project for military agencies. Today, the spread of the zebra mussel could very well be reported differently. One of the local fishermen in Massachusetts could report the mysterious finding on his Twitter page, a researcher in Northern Italy could blog on similar findings in Lake Garda, while a Swedish youngster could take pictures of a new mussel species he found in Lake Mälaren and post them on an international discussion forum for scouts. Together they could provide crucial information that could help detect changes and looming crises in ecosystems.

Using internet sources as sensors

The internet could be used as an early warning system for potential ecological disasters, say researchers from Stockholm Resilience Centre and the University of East Anglia.

Despite the continuing improvement in ecosystem monitoring, early warnings of pending ecological crisis are still limited by insufficient data and by geographical gaps in official monitoring systems. Finding ways to avert regime shifts is already a key issue for other researchers at the Centre. In an article in 'Frontiers in Ecology and the Environment', Centre researchers and Tim Daw from the University of East Anglia made an initial exploration into the possibilities of using information posted on the internet to detect ecosystems on the verge of tilt.

Autonomous, yet connected

The article, entitled 'Can webcrawlers revolutionize ecological monitoring?', which attracted the attention of Science Daily, Reuters and Wired, highlights the fact that analysis and response are not necessarily organized around a single government actor. On the contrary, both might take place as the result of collaborations between different state and non-state stakeholders.

"If the outputs are available more widely, analysis and responses could even be the result of autonomous actions, assumed by independent organizations and individuals", said lead author Victor Galaz. He is one of the theme leaders of the Centre research theme Adaptive Governance.

Although the article was a promising start, Galaz and his co-authors stress the need for further research into the use of eco-monitoring internet trawlers.

"We recognize that crucial challenges need to be addressed before a web crawler-based early warning system can contribute to the avoidance of abrupt ecosystem change", the authors noted in their article.



Photo: J.Lokrantz/azote.se

Reference

Galaz, V., B. Crona, T. Daw, Ö. Bodin, M. Nyström, P. Olsson (2009). *Can Webcrawlers revolutionize ecological monitoring*, 7. In *Frontiers in Ecology and the Environment (e-View/doi:10.1890/070204)*.



Photo: B. Christensen, J. Lokrantz/azote.se

Two different steady states of coral. Large picture - healthy coral rich in biodiversity. Small picture - algae dominated coral after a regime shift.

Turning back from the brink

Avoiding regime shifts is difficult, let alone predicting them. New research might just have found a way around that problem.

Think of an ecological regime shift like a stock market collapse: it is large, abrupt and heavy on the wallet. For example, the collapse of Canada's Newfoundland cod fishery in the early 1990s directly affected the livelihoods of some 35,000 fisherman and fish processing plant workers, and led to a decline of over \$200 million dollars per annum in cod landing revenues. However, there is one fundamental difference between the stock market and an ecological regime shift. Where stock markets usually bounce back, ecological regime shifts cause long-lasting changes to the ecosystem. Furthermore, they are notoriously difficult to predict. They often come as a surprise, and by the time society realizes what is happening, it is often too late or too costly to reverse the changes. However, new research offers a glimmer of hope, arguing that changes in ecological time series (such as increased variability) can provide early warning of impending regime shifts.

In a PNAS-article entitled 'Turning back from the brink: Detecting an impending regime shift in time to avert it', centre researcher Reinette 'Oonsie' Biggs together with University of Wisconsin researchers Stephen R. Carpenter and William A. Brock investigated whether new early warning indicators of ecological regime shifts can provide sufficient warning to take action to avert undesirable regime shifts.

Biggs, Carpenter and Brock used a fisheries food web model to investigate this question. They explored how close an ecosystem can get to an ecological threshold and still avert a regime shift by management changes being implemented. The model was also used to identify indicators that might give a warning before the point of no return, where it is too late to take action to avert an undesirable regime shift.

Rapid response is essential

The results from the model showed that if the factor responsible for an ecological regime shift can be rapidly altered (e.g. fishing pressure), it is possible to delay successful management action to avert a regime shift until the regime shift is underway. However, if the driver can only be manipulated gradually (e.g. shoreline habitat restoration), management action is needed substantially before a regime shift in order to avert it.

The challenge is that large increases in the indicators (which serve as warnings of an impending regime shift) only manifest themselves once a regime shift has been initiated. This means that the current indicators will only be useful in averting regime shifts if 1) the factor driving the regime shift can be rapidly manipulated, and 2) if management action is taken very rapidly, as soon as the indicators start flashing their warning lights.

In cases where the factor driving the regime shift can only be gradually manipulated, the indicators will usually give warning too late to allow management action to avert the regime shift.

To improve their usefulness in averting ecological regime shifts, the researchers suggested that future research should focus on defining critical indicator levels at which management action should be taken, rather than detecting changes in the indicators.

More proactive decision-making processes needed

Averting ecological regime shifts does not simply require better indicators, but is also dependent on developing policy processes that enable society to respond more rapidly to warnings of impending regime shifts.

“Our results highlight that in systems subject to regime shifts there is often a discrete window for policy action, after which it becomes impossible to avert a shift”, says Biggs. By the time adverse environmental effects become apparent, it is often too late to avert a regime shift. Trial-and-error approaches that wait for evidence of negative environmental impacts before taking action are therefore ill-advised.



Reference

Biggs, R., Carpenter, S.R., Brock, W.A. (2009). *Turning back from the brink: Detecting an impending regime shift in time to avert it. Proceedings of the National Academy of Sciences (PNAS) 106: 826-831.*



Harvest of Baobab leaves in the Sahel region where a re-greening has taken place during recent decades

Out of the dry

The future of the drought-prone region of Sahel has long looked grim, but now it might provide a glimmer of hope for climate change mitigation.

The West African Sahel not only has one of the fastest growing populations in the world, it is also a region where poverty and food insecurity are widespread and recurring. Rain-fed farming is the dominant livelihood, but drought during the 1970s and 1980s turned the region into a dust-choked area hit by severe famines. The grim conditions led scientists and policymakers to believe that vulnerable soils and scarce rainfall were inconsistent with the needs of the growing population of the region. However, to the surprise of many, the regreening witnessed during recent decades has occurred mainly on-farm, in regions with high population densities.

“We know that part of the explanation is returning rainfall, but we want to understand to what degree people’s management practices of the land have contributed to this regreening”, said Line Gordon, who is leading the project ‘Adapting to changing climate in drylands: The re-greening in Sahel as a potential success case’, together with her colleague Elin Enfors.

“A broader aim of the project is to figure out how poor, dry countries can reverse a negative trend, become more resilient and adapt to a changing climate” said Dr Gordon.

In this research, local partners in Niger proved crucial. They helped select four villages with similar biophysical conditions but where two of the villages were considered greener than the other two, in order to examine why change had happened in some places but not in others.

After preparatory reading and workshops in the spring of 2009, an international group of five students from a transdisciplinary Master’s programme at the Centre and the Department of Human Geography at Stockholm University teamed up in the autumn with five students from Abdou Moumouni University in Niger.

“In the beginning of 2009 we only had funding for one year, so we decided to conduct the field study with Master’s students”, explained Dr Gordon. “While in the field, the students could only receive instructions from Elin and

myself by e-mail when they occasionally went to a larger town, but our local partners went out and visited them regularly, which was a great help”.

For ten weeks the students looked at various issues such as yield statistics, farming practices, ownership rights, the distribution of wealth, the use of ecosystem services and the amount of trees and their age. Satellite images were compared against historical aerial photos and farmers were interviewed in order to determine land use changes in different areas.

Back in Stockholm, Drs. Gordon and Enfors are now in the process of analyzing all the data. Thanks to new funding, their work has also been given a substantial boost which will enable them to make a much more in-depth continuation of the study they started in 2009.

“We will continue the close collaboration with our local partners and also extend our research area into Burkina Faso. I hope this project can help us understand how societies can move in a positive direction, despite the difficult circumstances”, said Dr. Gordon.

A life-changing experience

Olivia Puill from France was one of the students participating in the field research in Niger. She interviewed village men and women of all ages about microeconomic issues, with particular emphasis on the redistribution of assets between

village households.

“I went around the villages on the back of my interpreter’s motorcycle. The major obstacle was fitting my interviews in within the villagers’ busy life”, said Olivia. “They work very hard, twice a week they were occupied with market days and during Ramadan there were many religious ceremonies to attend”.

Olivia praised the teaming up of students from Stockholm and Niger:

“The Nigerian students helped us overcome the cultural differences we came across in collecting information, and they seemed inspired by our interdisciplinary resilience approach.”

Although Olivia contracted malaria during her stay in Niger, she is not deterred from future field work.

“It was fantastic to get the chance to use the tools I have studied for several years and turn them into practice”, she said, admitting that it was more difficult than she had thought. “I also had lots of fun together with the village women, who despite their hard life are incredibly hospitable and cheerful. This field trip was a life-changing experience for me”.



Photo: Friederike Mikulcak

Project participants

*Dr. Line Gordon, Stockholm Resilience Centre
Dr. Elin Enfors, Stockholm Resilience Centre
Dr. Lowe Börjesson, Department of Human Geography, Stockholm University
Dr. Jennie Barron, SEI York*

Collaborative partners

*CRESA, Abdou Moumouni University, Niger
INERA, Burkina Faso
Dr. Chris Reij, Vrije University, Netherlands*



Photo: J.Lokrantz/azote.se

Core projects and collaborations

During 2009 the Centre was engaged in many international projects, workshops and research collaborations. Below we provide a sample of such projects, see the Stockholm Resilience Centre website for more information (www.stockholmresilience.su.se).

Centre of Excellence - Resilience and Sustainability: Integrated Research on Social-Ecological Systems

A five-year Centre-of-Excellence (Formel-Exc) project funded by a grant from the Swedish Research Council FORMAS and carried out as a joint effort between the Beijer Institute of Ecological Economics, Stockholm University and Stockholm Environment Institute (SEI), with a strong focus on complex systems, regime shifts and resilience. The grant, of which one year remains, has been instrumental in the start-up phase of the Stockholm Resilience Centre and serves as a core from which the Centre's research

agenda has emerged. Project leaders: Carl Folke, Johan Rockström, Karl-Göran Mäler.

Integrated History and future Of People and the Environment - IHOPE

Long-term sustainability issues need a deeper confluence of new knowledge combining the natural sciences and the humanities. This is reflected in IHOPE, a global network of researchers and research projects, now with its International Programme Office based at the Stockholm Resilience Centre. IHOPE supports sharing knowledge and resources from the biophysical sciences, social sciences and humanities to address analytical and interpretive issues associated with the coupled human-earth system dynamics. The project is part of the Regime Shift theme. Project leaders: Carole Crumley, Sverker Sörlin.

Planetary Boundaries

Research within the Planetary Boundaries framework, with publications in *Nature* and *Ecology & Society* in 2009, continues with work on interacting feedbacks and governance challenges in the context of the boundaries. The research is part of the Stockholm Resilience Centre's collaboration with the Earth System Science Partnership and the Earth System Governance project, and embedded in the Centre's three advancing insights themes on Global Dynamics, Governance and Regime Shifts. Leading researchers: Will Steffen, Victor Galaz.

Global Dynamics and Resilience in the Face of Multiple Shocks

Human activities are driving global environmental dynamics towards systemic changes. We currently lack institutions capable of addressing global-scale governance of those changes. Drawing on the three articles in *Nature*, *Science* and *TREE* (online 2009) referred to above, this research programme will conduct research on the interacting feedbacks of global change, and governance for global social-ecological resilience. Programme leaders: Brian Walker, Stephen Polasky, Anne-Sophie Crépin.

Regime Shifts of Social-Ecological Systems

Several projects, including:

- Understanding, mapping and governing regime shifts in the Baltic Sea, the Arctic, the Sahel and other areas
- Developing a regime shift database
- Early warnings and moving thresholds
- Economic consequences of regime shifts
- Regime shifts in society and throughout history.

Leading researchers: Garry Peterson, Line Gordon, Oonsie Biggs, Anne-Sophie Crépin, Sverker Sörlin, Christoph Humborg, Thorsten Blenckner and the Baltic Nest Institute.

Biodiversity, Bundles of Ecosystem Services and their Governance

Researchers are working to understand functional diversity, ecological networks and ecosystem services. The aim is to develop theoretical tools to assess the resilience of ecosystem services and empirically determine interactions among

ecosystem services in real landscapes as well as the governance implications. Key researchers: Garry Peterson, Line Gordon, Regina Lindborg, Thomas Elmqvist, Jon Norberg, Örjan Bodin.

Learning Platforms, Boundary and Bridging Organizations, Memory, Actors in Adaptive Governance of Social-Ecological Systems

Activities include:

- A special issue of *Environmental Education Research* is in press (Cecilia Lundholm, Ryan Plummer, eds.), with contributions from Lisen Schultz and Emily Boyd.
- Workshops on social-ecological learning are in progress, headed by Åsa Swartling.
- Articles on leadership processes combined with resilience, on middlemen in coastal fisheries, on social-ecological memory and on boundary and bridging organizations are in progress.

Key researchers: Frances Westley, Örjan Bodin, Per Olsson, Beatrice Crona, Lisen Schultz, Stephan Barthel, Thomas Hahn.

Social-Ecological Networks in Adaptive Governance

Networks are an important area of the Stockholm Resilience Centre's research on resilience and social-ecological systems. This research includes several projects on complex adaptive systems and networks in urban systems. A special issue of *Ecology & Society* and a book on social-ecological networks are in progress. Key researchers: Örjan Bodin, Beatrice Crona, Henrik Ernstson, Jon Norberg.

Multilevel Institutions, Adaptive Governance and Resilience

Several projects are investigating governance in relation to abrupt and large-scale social-ecological crisis. They are looking at multilevel governance modes, from laws to informal institutions, for building resilience for the challenges posed by global change. 2009 saw a special issue of *Global Environmental Change* and papers on global governance of abrupt environmental change and international cooperation. In addition, the Stockholm Resilience Centre co-hosted the 2009 Amsterdam Conference of the Earth System Governance



Photo: T.H.Snickars, B.Christensen, J.Lokrantz/lazote.se

Project, with emphasis on governance of adaptation and resilience. Researchers include: Victor Galaz, Andreas Duit, Jonas Ebbesson, Katarina Eckerberg, Per Olsson, Emily Boyd.

Understanding Transformations in Social-Ecological Systems

The main focus of this project is how to avoid or escape from undesirable trajectories while steering towards governance regimes that support flexible, integrated, holistic forms of management of natural resources and ecosystems. The work includes probing case studies, comparative analysis, methods development and theory development. A special issue of *Ecology and Society* on 'Transitions, resilience and governance: Linking technological, ecological and political systems' and several other papers are in progress and in press. Lead researchers: Per Olsson, Emily Boyd, Victor Galaz.

Biosphere Reserves and Resilience

Biosphere Reserves are potential real-world examples of resilience thinking and adaptive governance, acting as learning sites for biodiversity conservation and sustainable development. Projects and case studies are taking place in Kristianstads Vattenrike Biosphere Reserve and the Cape Winelands Biosphere Reserve. Key researchers: Lisen Schultz, Per Olsson, Emily Boyd, Jacob von Heland, Cecilia Lundholm, Thomas Hahn, Thomas Elmqvist, Åsa Jansson.

Madagascar Social-Ecological Systems

The Madagascar work is truly cross-thematic and covers issues related to the dynamics behind the generation of ecosystem services embedded in deep cultural values. Lead researchers: Thomas Elmqvist, Maria Tengö, Jacob von Heland.

The Ecosystem Approach, Marine Seascapes and Social-Ecological Resilience

Several projects dealing with the Baltic Sea, aquaculture development, coral reef dynamics, marine seascapes and marine management.

These include:

- Comparative studies of critical feedback in marine ecosystems
- Seabirds as indicators of ecosystem dynamics
- Institutions and governance of coastal ecosystem services
- Fisheries challenges in the context of regime shifts, global change and adaptive governance

Lead researchers: Henrik Österblom, Max Troell, Christopher Humborg, Magnus Nyström, Thorsten Blenckner, Beatrice Crona, Per Olsson, Maricela de la Torre Castro.

Urban Social-Ecological Systems and Ecosystem Services

Urban biodiversity is dependent on socio-cultural factors for its design, management and protection, activities which also affect local social capital building and democratic governance promotion. These linkages between the nature-culture divide are often overlooked in urban theory. Projects within this research area include:

- Stockholm Metropolitan Region - ecosystem services and biodiversity, ecological design, common pool resources management and network governance
- The international SUPER project on sustainable urban planning for ecosystem services and resilience



Photo: B.Christensen, N.Wijkmark, S.Zefflazote.se

- ESCAPE - urban ecosystem services and social justice
- URBIS - the Urban Biosphere network
- ATLAS – an internet platform for comparing the production and distribution of ecosystem services in 12 international metropolitan landscapes.

Many books and papers are in progress, e.g. the volume *Urban Ecosystem Services and Governance: Building Resilience in Urban Landscapes*. Lead researchers: Thomas Elmqvist, Johan Colding, Henrik Ernstson, Stephan Barthel, Åsa Jansson, Sverker Sörlin.

Freshwater and Ecosystem Services

Several projects are studying freshwater in the context of ecosystem services, resilience, global change, tipping points and governance challenges, often in relation to water for food production. The research spans from smallholder agricultural systems in drylands, related to poverty dynamics and ecosystem services, to global analyses. A major volume - *Confronting the Freshwater Challenge* - is in progress. Key researchers: Johan Rockström, Line Gordon, Malin Falkenmark, Jennie Barron, Elin Enfors, Louise Karlberg, Mats Lannerstad, Holger Hoff.

Resilience Alliance

One of the Stockholm Resilience Centre's most central partners is the Resilience Alliance, an international network of leading research organizations collaborating to explore the dynamics of social-ecological systems. The Resilience Alliance, and its focus on social-ecological systems, emerged out of research programmes of the Beijer Institute in the 1990s. During the year the Stockholm Resilience Centre

has been given a central role in the Resilience Alliance and was engaged in organizing the Resilience Alliance and Resilience Alliance Young Scholars meetings in Canada in the autumn. www.resalliance.org

The Resilience Alliance Young Scholars (RAYS)

RAYS is a loosely connected international network of doctoral and post-doctoral scholars interested in pushing the boundaries of resilience thinking. The ambition is to focus collaborations on innovative ideas and projects with an explicit emphasis on transdisciplinary research and career development. RAYS is coordinated to a great extent by Resilience Centre researchers Oonsie Biggs, Victor Galaz and Beatrice Crona.

The Resilience Alliance Marine Group

A small group of international scholars focusing on coastal and marine social-ecological systems. Three articles are in progress and a meeting was held in the Galapagos in 2009. The group is led by Terry Hughes, ARC Centre of Excellence for Coral Reef Studies, Australia, and Carl Folke.



Photo: T.H.Snickars/azote.se

Publications

2009 marked the end of the Centre's start-up phase. In a forward-looking review, Professor William Clark, an authority in sustainability science at the John F. Kennedy School of Government at Harvard University, provided recommendations on the research, policy and organizational challenges facing the Centre as it moves into its first permanent phase in 2010. Professor Clark concluded that "The Stockholm Resilience Centre has emerged as a world leader in the conduct of interdisciplinary research on the dynamics of inter-connected social-ecological systems. To have achieved this barely two years after its inauguration is a remarkable accomplishment indeed".

In 2009, some 100 articles, including book chapters, were published in scientific journals. Popular science and outreach articles were also produced and several articles are in press.

During the year papers have been published in over fifty different scientific journals covering a wide spectrum of disciplines

including leading journals like Nature, Science, PNAS, TREE, interdisciplinary journals like Global Environmental Change, Ecological Economics, Ecology & Society, and journals like Environmental and Resource Economics, Development Policy Review, Journal of International Development, International Environmental Agreements. Books were released ranging from environmental history, education, law to ecosystem stewardship.

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Photo: E. Hermansson Török

Panel discussion at an EU Commission side event during COP-15 with participation from Stockholm Resilience Centre theme leader Will Steffen (second from the right).

Science, Policy & Practice

The Stockholm Resilience Centre was deeply involved in science, policy and practice dialogues during 2009, at global, European, national and local level. During the second half of 2009 Sweden held the EU presidency and the Stockholm Resilience Centre was commissioned to produce reports and exhibitions and was asked

to give presentations at different EU arenas.

The Stockholm Resilience Centre also contributed to important international processes led by UNEP and has invested a substantial amount of time in developing networks with policymakers and practitioners for future dialogues on global challenges.

Collaborations during the Swedish EU Presidency

Together with Albaeco, the Centre collaborated in various ways with the Swedish EU Presidency during the second half of 2009. The starting point for these collaborations was the high level meeting 'Visions for Biodiversity Beyond 2010 - People, Ecosystem Services and the Climate Crisis' held in Strömstad on 7-9 September. The meeting gathered environment ministers and

senior officials to prepare the revision of the Strategic Plan of the Convention on Biological Diversity. The meeting paid special attention to the links between biodiversity, ecosystem services, climate change and human wellbeing, and a scientific report was prepared to provide background on these links. The report, entitled 'Biodiversity, Ecosystem Services and Resilience:



Photo: G. Seibold

The rosy periwinkle (*Catharanthus roseus*), with its bright pink flowers is used to make drugs to treat diseases like childhood leukemia and Hodgkin’s disease. An example of the interlinkage between biodiversity, ecosystem services and governance shown during the EU high level meeting in Strömstad, Sweden.

Governance for a Future with Global Changes’ was prepared by a working group led by Miriam Huitric of Stockholm Resilience Centre and Albaeco.

The report was presented at a scientific workshop ‘Biodiversity, ecosystem services and governance — targets beyond 2010’, which was held in Tjärnö, Sweden, in the days prior to the Strömstad meeting. The lead author Brian Walker and Centre researchers Lisen Schultz and Thomas Elmqvist gave presentations during the three-day workshop, which attracted researchers and government officials. The outcome from the Tjärnö workshop was directly transferred to the high-level meeting ‘Visions for biodiversity’ and the contents of the report and workshop were reflected in the outcome of the latter.

In addition, a science-based exhibition was held to create an inspiring atmosphere in the conference venue in Strömstad. The exhibition highlighted the links and values of ecosystem services, biodiversity and resilience.

It was produced by the Swedish Presidency in cooperation with Albaeco, Stockholm Resilience Centre and the Swedish Species Information Centre. The Stockholm Resilience Centre contributed a slide show that was on display in delegates’ rooms. The exhibition can also be seen at the website: www.se2009.eu/biodiversity.

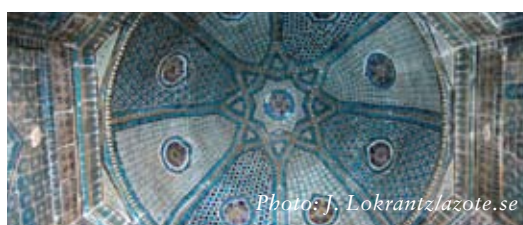


Photo: J. Lokrantz/azote.se

Download Report

The report ‘Biodiversity, Ecosystem Services and Resilience: Governance for a Future with Global Changes’ can be down-loaded at: www.stockholmresilience.org/tjarno

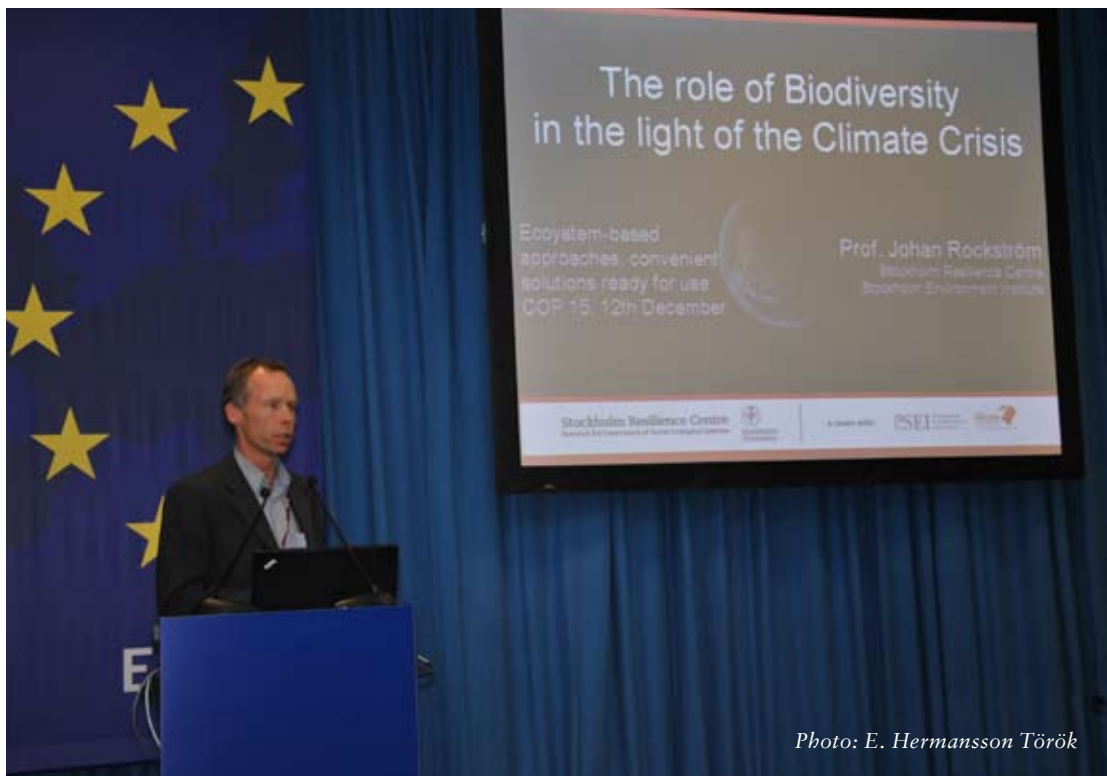


Photo: E. Hermansson Török

Johan Rockström giving a presentation on biodiversity and climate change as part of an EU side event during COP-15

Contributions to the UN climate conference in Copenhagen

The Stockholm Resilience Centre contributed to several side-events at the UN Climate Conference (COP-15) in Copenhagen in December, 2009.

As part of the EU side-event on climate change, ecosystem services and biodiversity organized by the Swedish government and the Swedish Environmental Protection Agency, Centre Director Johan Rockström gave a presentation on biodiversity and climate change. Professor Rockström's presentation merged key aspects of the planetary boundaries concept with data from the report on biodiversity, ecosystem services and resilience that the Centre had prepared for the high-level meeting in Strömstad (see page 28).

The planetary boundaries concept attracted global interest when a group of 28 internationally renowned scientists proposed that global biophysical boundaries, identified on the basis of scientific understanding of the Earth system, could define a 'safe planetary operating space' for humanity.

The planetary boundaries concept was also presented at a second side-event by the EU Commission. Entitled 'Solving the climate challenge within the planetary boundaries', Eric Lambin, Professor at the Department of Geography at the University of Louvain in Belgium and co-author of the article on planetary boundaries, gave a presentation of the planetary boundaries concept, with special focus on deforestation and land use changes. Will Steffen, Centre theme leader and co-author of the article on planetary boundaries, contributed to a panel discussion following Professor Lambin's presentation.



Photo: C.Clifstock

How do you fit several hundred litres of water into one bottle of beer? Resource use discussed at the Manna exhibition.

Manna exhibition in Washington

The Centre-affiliated exhibition Manna — Food in a new light — was displayed at the Swedish Embassy, House of Sweden, in Washington between 1 April and 7 June, 2009.

The exhibition, which shows the connection between ecosystem services and the food on our tables, was part of a two-month programme called Living Green which focused on climate change and sustainable living. Organized by

the Swedish Embassy in the US, the exhibition consisted of a range of seminars, exhibitions and events with both Swedish and American participants.

As part of the Living Green programme, Centre researcher Jonas Ebbesson took part in the seminar ‘A New Climate Change Accord - Legal Character and Commitments’.



Photo: C.Clifstock

How many cows a day does it take to feed a large city with beef? Illustration at the Manna exhibition.



Photo: P.Olofsson, S-E Magnusson

The Swedish biosphere reserve Kristianstads Vattenrike, with the town Kristianstad surrounded by wetlands, home to around 700 nationally red-listed species of flora and fauna.

The strength of a dedicated few

Ecosystem managers strong on networking skills can make a difference.

On 4 June, Centre researcher Lisen Schultz defended her doctoral thesis ‘Nurturing Resilience in Social-Ecological Systems: Lessons Learned from Bridging Organizations’. Based on interviews with dedicated practitioners behind successful conservation projects, she presented new management practices that live up to the demands of today, while simultaneously curbing the unsustainable tapping into the world’s natural resources.

One example is the Swedish biosphere reserve Kristianstads Vattenrike — a former ‘water-logged swamp’ that has now been designated by UNESCO as a model for sustainable development and biodiversity conservation.

Lisen Schultz’s thesis analyzes how the dedicated work of a few individuals has mobilized local farmers, birdwatchers, entrepreneurs and politicians to join forces in transforming the wetland into an asset for the district of Kristianstad. This case study is then compared with similar UNESCO-designated experiences elsewhere in the world. Unlike the more well-

known World Heritage designation, the Biosphere Reserves are meant to protect biodiversity and simultaneously encourage local development by sustaining ecosystem services for human wellbeing.

The results presented in the thesis show that those who succeed are as good at reading people as they are at reading nature itself. By first listening to the needs of potential partners, and then communicating an attractive vision for their project (which goes beyond the mere interest of nature conservation), these dedicated individuals are able to build trust and involve key stakeholders such as politicians, local associations, landowners and financiers. In many cases, they form ‘bridging organizations’ that connect actors across scales and sectors.



IPBES – a new platform for biodiversity and ecosystem services

During 2009 the centre was actively involved in establishing the Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services (IPBES). Envisioned to be ‘an IPCC for biodiversity and ecosystem services’ or ‘a permanent Millennium Ecosystem Assessment’, the IPBES could provide an important mechanism for dialogue between scientists and policymakers that would ultimately contribute to realizing the vision of the Stockholm Resilience Centre.

The IPBES has been discussed since the Millennium Assessment was completed, but it has been difficult to find global agreement on the exact function of such a mechanism, as well as what would be the best governance structure and how to fund it. With the Swedish EU Presidency, a window of opportunity opened for the Centre to make an effective contribution to the discussion, as the Centre was asked to assist the Swedish Environmental Ministry in formulating a common EU position to be presented at the 2nd ad hoc Intergovernmental and Multi-Stakeholder Meeting on IPBES held by UNEP in Nairobi on 5–9 Oct.

Centre researcher Lisen Schultz formed part of the Swedish delegation, and assisted in formulating statements and discussion points both before and during the Nairobi meeting, emphasizing e.g. that the IPBES should be scientifically credible, politically relevant and focused on ecosystem services. In the end, the views on what the IPBES should comprise were still too divergent for the Nairobi meeting to reach a final decision on whether to establish it or not. However, the discussion is far from over, as it was decided that a third – and final – meeting would be convened by UNEP during 2010.

Download Report

Reports of the Nairobi meeting can be found at <http://www.iisd.ca/ymb/biodiv/ipbes2/>



Building a sustainable urban campus

Centre researchers help build visions for a new university campus based on principles of sustainable urban development.

Stockholm University is in dire need of more campus space and the Albano area between Stockholm University, the Karolinska Institute and the Royal Institute of Technology (KTH) has been singled out as a strategically prime location. Located within the world's first national urban park, the Royal National Urban Park, the Albano area has very strong potential to become a world-class campus that will work as a model both in urban planning and university development all over the world. It will also work as a reference point in framing the concept of sustainable city quarters.

With that in mind, researchers from Stockholm Resilience Centre and the Royal Institute of Technology have joined forces with architects from KIT-arkitektur to develop a vision for a new Albano Sustainable Campus. Their proposal was presented at the conference 'Green urbanism at Albano' which was held in Stockholm in October 2009.

The proposal, entitled Patchwork, investigates how ecosystem services can support a better

urban environment and how a science city can be built in a climate-smart way. The new campus should enable production of ecosystem services, conservation of historical values and enhance transdisciplinary knowledge. This can potentially further establish Stockholm as an internationally attractive hub for research and serve as a model for sustainable urban development.

Developing the Albano area is considered to be a unique opportunity. It is the last piece of land available for development under the general

Project participants

*Johan Colding, Stockholm Resilience Centre
Stefan Barthel, Stockholm Resilience Centre
Henrik Ernstson, Stockholm Resilience Centre
Lars Marcus, KTH
Hanna Erixon, KTH
KIT architects*



The sustainable vision for a new campus area at Stockholm University encompass the latest urban ecology research and aims promoting the creation of ecosystem services and institutions to enhance the social, ecological and cultural values. The proposal includes strong stakeholder participation in the management of green areas. Illustration: KIT arkitektur

plan for the Royal National Urban Park. What is done here has the potential to enhance the ecological, cultural and social values of the area. It can potentially contribute to putting Stockholm on the world map as an attractive learning environment.

The proposal also points out that Albano can serve as a gateway between the city and the

national urban park for birds and other migrating animals. Other suggestions include building aqueducts and creating a link for bringing aquatic wildlife to the park.

The 'Green urbanism at Albano' conference

On 29 October 2009, Stockholm Resilience Centre organised the conference 'Green urbanism at Albano' with the aim of providing planning advice for development of the Albano area by three major universities in Stockholm. An additional aim was to make the conference a starting point for a long-term multi-disciplinary and multi-stakeholder learning process that can inspire others around the globe. The conference was arranged in a collaboration between Akademiska Hus (the land owner in the Albano area); Stockholm Resilience Centre (contributor of transdisciplinary knowledge); and Stockholm University (the main tenant in the area).



Folded meadow. The Patchwork proposal shows how an existing bridge can be transformed into an ecoduct. Green contact surface is maximized by folding the structure over itself. Illustration: KIT arkitektur

Urban Atlas: A new tool for future urban planning

The Urban Atlas is an open internet tool that allows citizens, planners and scientists to visualize ecosystems in cities, social-ecological connections and scenarios for climate change adaptation. It is an international collaboration to develop new tools for determining the social-ecological capacity to sustain and provide access to ecosystem services during periods of uncertainty and change.

In phase one, students (aged 16-19) and teachers are invited to formulate questions for future urban planning that are relevant for their city neighbourhood. By providing innovative ways of visualizing science in society, the Urban Atlas can be used to involve citizens in collaborative green urban planning and learning.

In phase two, urban planners and researchers will be targeted. The Urban Atlas will make it possible for citizens, policymakers and scientists to analyze and have a dialogue about different urban development scenarios.

The Urban Atlas is under development by the

Urban Theme at the Stockholm Resilience Centre as a consortium of research groups in twelve cities around the world: Bangalore, Canberra, Cape Town, Chicago, Helsinki, Istanbul, New Delhi, New Orleans, New York, Phoenix, Shanghai and Stockholm. Within the consortium, the Urban Atlas will be used to address a common set of research questions including:

- What are the effects of urban development and land use change on biodiversity and ecosystem services?
- How are different socio-economic groups affected by environmental changes in urban regions?
- How do we facilitate an understanding of complexity and uncertainty?
- How do we capture information about urban dynamics and urban development trajectories important for understanding adaptive and transformative capacity?

www.urbanatlasportal.org

Celebration of the 100th Stockholm Seminar

On a sunny April day, the 100th Stockholm Seminar was celebrated with a half-day symposium focusing on the global challenges of climate change, ecosystem management and human welfare. The symposium, featuring a star cast of scientific minds, filled up the Beijer Hall at the Royal Swedish Academy of Sciences. Originally initiated by Centre Science Director Carl Folke, the Stockholm Seminars can be described as an opportunistic institution, as they

exploit the windows of opportunity that open when interesting researchers visit Stockholm. The lectures are open to a transdisciplinary audience and span a wide range of subjects, with the awareness that human societies and the world's natural systems are truly interdependent as a common theme. The Stockholm Seminars are co-arranged by Albaeco, Stockholm Resilience Centre and IGBP. For more information see www.albaeco.com



Stockholm Seminars 2009

February 2

Prof. Charles Redman

Urban Origins and Sustainability Strategies

March 3

Dr. Ismael Vaccaro

Patrimony and Consumption: Rethinking the Relationships
between Rural Areas and Cities

March 18

Prof. Daniel W. Bromley

Resilience Meets Volitional Pragmatism: a Theory of Co-Evolutionary Change

March 23

Prof. Fikret Berkes

Social-Ecological Systems and Conservation: Putting People Back into the Picture

April 30

100th Stockholm Seminar: Climate, Ecosystems and Development

May 14

Dr. Christian Valentin

Resilience of Sahelian ecosystems through the uneven
spatial distribution of natural resources

May 26

Prof. Jeff Cardille

Summarizing Land-Use Patterns at the Continental Scale:
Searching for and Understanding “Exemplar” Landscapes

June 17

Prof. Jordi Bascompte

Networks of Ecological Interactions in the Face of Global Change

September 4

Prof. Maurice Godelier

In today's world, anthropology is more important than ever

September 22

Vasilis Dakos

Expecting the unexpected: Leading indicators of regime shifts

October 7

Prof. Kenneth Frank

The Social Embeddedness of Natural Resource
Extraction and Use in Small Fishing Communities



Too many vessels, too few fish

The current fisheries policy is dangerously close to depleting the Baltic Sea of fish. A recent project used fisheries management practices from Norway, the USA and Canada in an attempt to curb that trend.

European fisheries have changed dramatically over recent decades. Fleets have become more efficient and the fishing capacity has improved significantly, but at a high price. Years of mismanagement have led to overfishing, bycatches and disgraceful discards. The European Commission has estimated that 80 percent of European stocks are overfished, and the Baltic Sea stocks are no exception.

Much blame has been attributed to the Common Fisheries Policy, the European Union's instrument for the management of fisheries and aquaculture. Despite several reforms and reviews since its inception in the early 1970s, the policy is short of admirers. References to the 'blunt', 'remote', 'highly bureaucratic' and 'top-down' nature of the Common Fisheries Policy (CFP) are common within the literature and the EU is viewed as ineffective in its management of the fisheries sector.

The recent project "Best Practice of Fisheries Management" aimed to improve this management. Centre partner Baltic Nest together with Baltic Sea 2020 and the Institute for European Environmental Policy convened internationally recognized scientists from the natural sciences, economics and social sciences to investigate known examples of successful management that could help the Baltic Sea back onto a sustainable trajectory.

The conclusion from their final report, which was presented in April 2009, is clear:

"The current fisheries management has failed to deliver on its social, economic and environmental goals under the existing European Common Fisheries Policy. Centralized decision-making must be replaced by regional stakeholder management in order to adapt to regional ecosystem conditions."

Getting Into the Right Lane for 2050: A Primer for EU Debate

This report, prepared by the Netherlands Environmental Assessment Agency in collaboration with the Stockholm Resilience Centre, presents a positive vision for a sustainable Europe in 2050, drawing on current EU policy discussions.

Based on this vision, the report also highlights key policy actions that need to be taken within the next five to ten years in order for the EU to meet these long-term goals. 'Getting Into the Right Lane for 2050' focuses on producing

sufficient food for a global population of nine billion while minimizing biodiversity loss; mitigating climate change and enhancing energy security for the EU; as well as developing practical and workable solutions for a low carbon EU transport system. The report is designed to contribute to the debate on the long-term agenda of the next European Commission and the coming presidencies.



Photo: L.Karlsson/azote.se

Teaching & Training

Stockholm Resilience Centre offers a variety of transdisciplinary courses and programmes on environmental and sustainable development issues. We have one undergraduate and two Master's programmes and a PhD-level Research School with special emphasis on resilience. The courses are developed and promoted in collaboration with several departments at Stockholm University. Courses are offered at all levels: undergraduate, Master's and PhD.

Resilience Research School at the Stockholm Resilience Centre

In 2009 a new Resilience Research School was established with the aim of training the next generation of transdisciplinary thinkers and doers on social-ecological resilience and sustainable development. Ten new PhD students joined the Centre when the Research School was launched in August. Seven of the students are affiliated with the Department of Systems Ecology at Stockholm

University, while the others are hosted by the Departments of Political Science, Economics, and Physical Geography and Quaternary Geology. These new students will follow the Centre's own general study plan as well as that of their host Department. The twelve PhD students who were enrolled prior to August 2009 are also part of the new Research School.

Each year we offer a number of ad hoc PhD courses. In 2009, these were: 'Community-conserved areas, multi-level governance and adaptation to climate change' by Fikret Berkes, University of Manitoba, Canada, and 'Complex Adaptive Systems' by Jon Norberg, Stockholm University. Two compulsory PhD courses in the Research School will start in January 2010.



Photo: B.Christensen/azote.se

Ecosystems, Governance and Globalisation, 120 credits.

An interdisciplinary Master's Programme in cooperation with several departments at Stockholm University. The programme includes seven courses: Resilience, Adaptability, Transformability; Philosophy of Science for Interdisciplinary Environmental Research; Ecosystem Management; Adaptive Governance of Social-ecological Systems; Social-ecological Resilience: Applications; International Governance of Ecosystems; and Methods for Transdisciplinary Environmental Research.

In order to attract top international and Swedish students and keep the focus on our primary goals, the Centre decided to split the two programmes into one research-orientated Master's programme and one programme designed to train practitioners and managers. As a consequence, the Centre reduced the number of new students who started the EGG and SE programmes in order to prioritize programme development. The new programmes, with new selection criteria and new courses, will be announced in 2010.

Sustainable Enterprising, 120 credits.

An interdisciplinary Master's Programme in cooperation with several departments at Stockholm University. The programme includes five courses: Resilience, Adaptability and Transformability; Management Tools and Change Management; Environmental Law; Social Responsibility for Sustainable Enterprising; and Academic Theory, Methods, and Writing for Transdisciplinary Research.

Other programmes and courses at the Stockholm Resilience Centre

Hållbar samhällsutveckling, 60 credits.

This one-year introductory level programme on sustainable development gives a basic understanding of the complex interactions between nature and society. Co-coordinated in co-operation with the Department of Physical Geography and Quaternary Geology. Given in Swedish.

Världens Eko, 7,5 credits.

An introductory course on sustainable development, initiated and driven by students, featuring some of Sweden's most qualified researchers and debaters. Given in Swedish.

Sustainable Development from a Resilience Perspective, 5 credits.

An introductory course for undergraduate exchange students from the USA. Within the Swedish Programme at Stockholm University.

Stockholm Resilience Centre Master Theses 2009

Ecosystems, Governance and Globalisation

Abdul Baten, Mohammed

Property rights in mangroves: A case study of the Mahakam Delta, East Kalimantan, Indonesia

Ahammad, Ronju

Understanding institutional changes for reducing social vulnerability to landslides: A case study in the Chittagong city, Bangladesh

Brand, Annelie

Defining and utilizing indicators of Coral Reef Resilience in the Red Sea

Dobom, Avital

Illegal Chinese Fishing in West African Waters: A study on Chinese IUU Activities and its Consequences to Socio-Ecological Systems

Gingrich, Margaret

The Greening of Trade Unions? Factors affecting blue-collar unions' action on climate and energy issues in the United States and Sweden

Meacham, Megan

Path dependency of infrastructure investment: Implications for the sanitation system of Phnom Penh, Cambodia

Moriel, Loïs

Socio-economic drivers influencing sustainability in a social-ecological system: Insights from whale shark tourism in northern Quintana Roo, Mexico

Nordwall, Malin

New Zealand as a model for vector borne disease emergence: Effects of social and environmental factors on dengue

Rathwell, Kaitlyn

Managing Water Quality in a Heterogeneous Landscape: A social Network Perspective

Rudberg, Peter

Furthering the understanding of the adaptation space of organizations: A case study of adaptation to climate change within the Water Supply and Waste Water sector of the Stockholm Region

Schmuki, Anna

The role of a global organization in triggering social learning. Insights from a Case Study of a World Heritage Cultural Landscape Nomination in Bali

Sustainable Enterprising

Holmström, Dag

Sustainable development for tomorrow: Enabling local implementations of global issues in Swedish schools

Steen, Anton

Corporate Social Responsibility in the Wind Power Industry: A study about CSR preferences and stakeholder involvement

Weinestedt, Henrik

Stakeholder Analysis as a Tool for Working with Social Responsibility. Developing a Stakeholder Analysis Method for ISO 26000

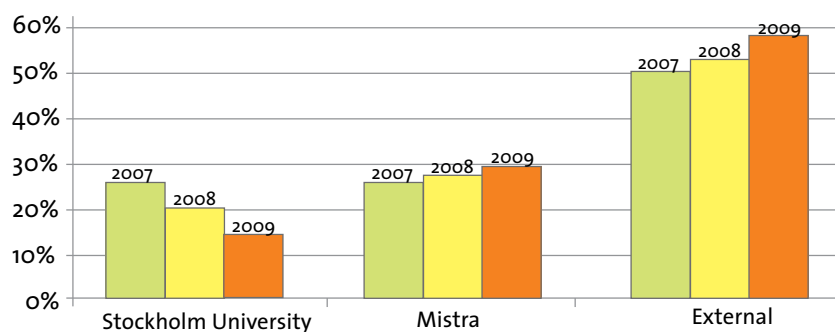


Photo: Christine Clifstock

Appendices

A. Accounts in brief 2009

Grants Allocated to Stockholm Resilience Centre 2007-2009 (Total: 128,4 MSEK)



2007: TOTAL	36.6 MSEK
Stockholm University;	6.1 MSEK
Mistra;	9.0 MSEK
External;	21.5 MSEK

2008: TOTAL	37.4 MSEK
Stockholm University;	7.5 MSEK
Mistra;	10.0 MSEK
External;	19.9 MSEK

2009 TOTAL:	54.4 MSEK
Stockholm University;	8.3 MSEK
Mistra;	15.0 MSEK
External*;	31.1 MSEK*

*External Grant Total 2009:	31,1 MSEK
FORMAS:	14,5 MSEK
The Swedish EPA:	10,7 MSEK
SIDA/Research Council:	5,0 MSEK
EU:	0,9 MSEK

The subsidy from Stockholm University includes income for SRCs Education and Courses.

B. Publications 2009

Published articles

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C. Presentations 2009

Academic Conferences and Workshops

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Biggs, (O) R. Key note speaker, Workshop, EU Environment Advisory Group, Brussels, Belgium, June.

Biggs, O. R., Organizer, Workshop, RAYS Workshop, September

Bodin, Ö., Workshop speaker, Conference, IHDP Open Meeting, Bonn, Germany, April

Bodin Ö., Workshop speaker, Conference, Sustainable Development and Planning IV, Cyprus, Greece.

Bodin, Ö., Workshop speaker, Seminar, Network based models of fragmented landscapes – concept, applicability and predictability, Cape Town, South Africa, December

Bodin, Ö., Workshop speaker, AKILI CAS Colloquium, George, South Africa, Nelson Mandela Metropolitan University, December

Bohn, M., Workshop speaker, Conference, Climate and Cultural Anxiety: Historical and Social Perspectives, Colby College, USA, April

Bohn, M., Workshop speaker, The Historian's Role in Environmental Research, Södertörns Högskola, Sweden, March

Bohn, M., Workshop speaker, Expertise for the Future: Histories of Predicting Environmental Change, Harvard University, USA, November

Boyd, E., Organizer, Conference, "Development Studies Association, 'Climate change and development: urgency, politics and transformations', Development Studies Association, University of Ulster, September.

Boyd, E., Organizer, Workshop, Panel and workshop convenor 'Living with climate futures: Beyond limits to adaptation towards transformations in practice', Oxford, UK, June

Boyd, E., Key note speaker, Seminar Series 'Shifting Gears: the Recession and Climate Change', Leeds University, Centre for Development Studies, Leeds University, November

Colding, J. Workshop speaker, Conference, Urban Net Conference, Stockholm, Sweden, FORMAS, November

Colding J., Project leader, Workshop, SUPER project workshop for Urban Net, Stockholm, Sweden, SUPER project steering committee, November.

Colding, J., Project leader, Workshop, Urban Net Workshop, The SUPER project, Istanbul Technical University, Turkey, April

Colding, J., Workshop speaker, Conference, Det urbana landskapets gröna delar: historia, värde, planering, skötsel och restaurering, Stockholm, Sweden, International Association for Landscape Ecology (IALE), September

Crépin, A-S, Workshop speaker, the 10-years of CeNDEF workshop, Amsterdam, Netherlands, Center for Nonlinear Dynamics in Economics and Finance, January

Crépin, A-S, Keynote speaker, Seminar Series at the Environmental Economics Unit, Gothenburg University, Sweden, February

Crona, B., Organizer, Conference, IHDP Open Meeting, Bonn, Germany, April

Crona, B., Organizer, Workshop, Inception workshop for Commission Research: Migrant Fishers in the Western Indian Ocean, Mombasa, Kenya, January

Crona, B., Keynote speaker, Seminar, University of Maine School of Marine Sciences Seminar, Maine, USA, September

Crona, B., Keynote speaker, Guest Researcher Seminar, University of British Columbia, Fisheries Center, Vancouver, Canada, October

Duit, A., Invited speaker, 'The Ecological State. Crossnational patterns of Environmental Governance Regimes' University of Washington, Department of Political Science, May.

Ebbesson, J., Invited speaker, "Environmental Impact Assessments in the EU", NEPA at 40: A Visionary Statute Confronts the 21st Century Environmental Issues, Conference at George Washington University School of Law, Washington DC, USA, March.

Ebbesson, J., Invited speaker, "IPPC Issues in the European Court of Justice", EU Forum of Judges for the Environment, Conference, Stockholm, October.

Ebbesson, J., Invited speaker, "Energy Justice: What and Why?", Energy Justice Conference, Boulder, Colorado, USA, October.

Ebbesson, J., Invited speaker, "State of Play of Access to information and justice: Where does the future lie?", UNEP Eminent Persons Meeting on Human Rights and the Environment, Nairobi, Kenya, December

Eckerberg, K., Invited speaker, 'The Role of the European Commission: Institutional and Policy Aspects', An event hosted by the Permanent Representation of Sweden to the EU and organized by the Centre for European Policy Studies in conjunction with the Swedish Presidency of the European Union, Brussels, October.

Elmqvist, T. Presentation and poster, Conference, Climate change, global risks, challenges and decisions, Copenhagen, March.

Elmqvist T., Keynote speaker, Conference, "Svensk naturvård 1909-2009", Royal Academy of Sciences, Stockholm, April

Elmqvist, T., TEEB Workshop, London, April

Elmqvist, T., Keynote speaker, the 9th Finnish Conference of Environmental Sciences, Lahti, Finland, May

- Elmqvist, T., Organizer, workshop Governance and Management of Ecosystem Services in Africa under Scenarios of Change, Nairobi, Kenya, May
- Elmqvist, T., Keynote speaker, Conference, “Ekosystem-tjänster - ett verktyg för hållbar utveckling”, Kristianstad Vattenrike, Högskolan Kristianstad and Krinova, June
- Elmqvist, T., Keynote, Urban Nature Forum 2009, June
- Elmqvist, T., Keynote speaker, European IALE Conference “70 years of Landscape Ecology in Europe”, Salzburg, July
- Elmqvist, T., Keynote speaker, UNESCO-conference, “Urban Biosphere Initiative”, Shanghai, August
- Elmqvist, T., Keynote speaker, the Swedish IALE meeting “Urban Landscapes”, the Royal Swedish Academy of Sciences, September
- Elmqvist, T., Participated with several presentations, organized symposia and chairing sessions at the DIVERSITAS Open Science Conference 2 Biodiversity and Society: Understanding connections, Adapting to change”, Cape Town, South Africa, October
- Elmqvist, T., Keynote speaker, Conference “Green urbanism”, Stockholm University, Sweden, October
- Elmqvist, T., Workshop speaker, Urbis- Urban Biosphere Initiative, UNESCO HQ in New York, December
- Elmqvist, T., Participation and presenting at two side-events at the UNFCCC COP15 meeting in Copenhagen, I. A sustainable society under impacts of climate change in a post-COP15 world, organized by International Association of Research Universities. II. Biodiversity and climate change organized by ICLEI, December
- Ernstson, H., Key note speaker, Workshop, Marine Social Connectivity in the Gulf of California, Tucson, Arizona, USA, Comunidad y Biodiversidad, A.C., PANGAS, The University of Arizona, The Nature Conservancy and World Wildlife Fund, August.
- Ernstson, H., Organizer, Conference, Albano Green Urbanism, Stockholm, Sweden, October.
- Ernstson, H., Workshop speaker, Conference, IHDP Open Meeting, Bonn, Germany, April
- Ernstson, H., Workshop speaker, Seminar, Seminar series at the African Centre for Cities, University of Cape Town, South Africa, July
- Ernstson, H., Workshop speaker, Stockholm Resilience Centre Urban Theme Workshop 2009, Cape Town, South Africa, October
- Ernstson, H., Workshop speaker, Conference, Crisis & Capital - a critique of the political economy of crisis, Lund University Sweden, May
- Folke, C., Organizer, Workshop, Ecosystem services in Africa, Nairobi, Kenya, Beijer, Stockholm Resilience Centre, Biosustainability, May
- Folke, C., Organizer, Workshop, Marine resilience group, Galapagos Islands, Ecuador, ARC Centre of Excellence, February
- Folke, C., Invited speaker, Seminar, 100 Stockholm Seminars in Sustainability Science and Policy, Royal Swedish Academy of Sciences, Stockholm, Sweden, April
- Folke, C., Invited speaker, Symposium, Climate change, global risks, challenges and decisions, University of Copenhagen, March
- Folke, C., Key note speaker, Conference, Earth System Governance Amsterdam, Netherlands, November-December
- Folke, C., Organizer, Keynote speaker, Workshop, Resilience Alliance, Gabriola Island, Canada, September - October
- Folke, C., Scientific Committee, Workshop, Program on Ecosystem Change and Society, PECS, Paris, ICSU, June
- Galaz, V., Workshop, Resilience Alliance + RAYS, Gabriola Island, Canada. September-October
- Galaz, V. Key note speaker, Conference, Skoll Forum on Social Innovation, Oxford (UK), March
- Galaz, V. Organizer, Workshop, Ecological Early Warning and Information Technology, Stockholm, Sweden, February
- Galaz, V., Workshop speaker, Conference, International Studies Association (ISA), New York, USA, December
- Galaz, V., Workshop speaker, Governance and Complexity, Erasmus University, Rotterdam, Netherlands, June
- Galaz, V., Organizer, Conference, Earth System Governance, Amsterdam, Netherlands, December
- Galaz, V., Keynote speaker, The Politics of Climate Change, Department of Political Science, Göteborg, Sweden, November
- Gordon, L., Workshop speaker, Conference, CGIAR Science Forum, Wageningen, Netherlands, CGIAR, June
- Lundholm, C., Paper presentation (Halldén O. & Lundholm C.), Conceptual Change and the Complexity of Learning. Threshold Questions, Meaning making and Contextuality, 13th Conference European Association for Research on Learning and Instruction, Amsterdam, Holland, August
- Lundholm, C., Paper presentation (Lundholm C., Hopwood N. & Rickinson M.), Environmental learning: opportunities and challenges for practice and research, Annual Meeting of the American Educational Research Association, Ecological and Environmental Education SIG, San Diego, April
- Jansson, Å., Key note speaker, Conference, Flora och Faunavård, Uppsala, Sweden, April
- Norberg, J., Key note speaker, Conference, Ecological Society of Japan, March
- Norberg, J., Key note speaker, Conference, Diversitas, Capetown, October
- Norberg, J., Key note speaker, Seminar, National Institute for Environmental Studies (NIES Tsukuba), Tsukuba Japan, March
- Norberg, J., Key note speaker, Workshop, SIZEMIC, Tjärnö, June
- Olsson, P., Paper presentation, International Social Innovation Research Conference, Saïd Business, School, Oxford, UK, September

- Olsson, P., Organizing and presenting at a special session at the International conference, “Towards knowledge democracy: consequences for Science, Politics and Media” in Leiden, The Netherlands, August
- Olsson, P., Paper presentation, GECHS synthesis conference ”Human Security in an Era of Global Change”, Oslo, Norway., June
- Olsson, P., Paper presentation, organizing a special session on social learning, and participating in a panel discussion at the IHDP Open Meeting 2009, Bonn, Germany, April
- Peterson, G., Workshop speaker, Assessing multiple ecosystem services across landscapes, Pietermaritzburg, South Africa, University of KwaZulu, Natal
- Ranara, J., Workshop speaker, Conference, 4th Lüneburg Workshop on Environmental and Sustainability Communication - Communication and Learning in Networks, Potentials and Challenges for Environmental Sustainability, Leuphana University, Lüneburg, Germany, September
- Rockström, J., Lecture, Climate for Development in a turbulent world, Climate Change, Global Risks, Challenges and Decisions, Copenhagen University, March
- Rockström, J., Keynote speaker, Climate change, Ecosystems and Human Well-being, The three musketeers of development, Climate, Ecosystems and Development, Stockholm Seminars, KVA, Stockholm, April
- Rockström, J., Keynote speaker, Confronting the water challenge in the face of rapid global environmental change, Nobel Lecture, Pune, India, October
- Rockström, J., Keynote speaker, Utveckling inom Planetens Gränsvärden. Varför vi behöver en ny grön revolution. Hur möter det ekologiska lantbruket klimatproblemen? KSLA, November
- Rosen, F., Workshop speaker, Conference, DIVERSITAS, Cape Town, South Africa, October
- Schultz, L. & Lundholm, C., Learning for resilience? Exploring learning opportunities in Biosphere reserves. Second DIVERSITAS Open Science Conference, Biodiversity and society: understanding connections: adapting to change, Cape Town, South Africa, October.
- Swartling, Å., Organizer, Workshop, Overcoming the challenges of “doing” participation in the field of environment and development, May.
- Sörlin, S., Workshop:”Regime Shifts”, organizer and co-chair, Stockholm Resilience Centre, February
- Sörlin, S., Seminar, “Urban Environmental History”, Urban Mind workshop, Uppsala University, February
- Sörlin, S., “The Situation in the Seventies: The Backdrop of Goodman’s Legacy”, Gordon Goodman seminar, Royal Swedish Academy of Sciences, April
- Sörlin, S., Session chair: “Antarctica: A Continent for Environmental History”, First World Congress of Environmental History, Copenhagen, August
- Sörlin, S., Invited speaker: “Roundtable – Northern Contributions to Environmental History”, First World Congress of Environmental History, Malmö University College, August
- Sörlin, S., Workshop: IHOPE, Integrated History and Future of People on Earth, NCEAS, National Centre for Ecological Assessment and Systems, University of California, Santa Barbara, September
- Sörlin, S., Keynote lecture: ”Urban Knowledge Landscapes – Innovative, Sustainable, Political”, Green Urbanism at Albano: A conference on building a world class university campus in an urban social-ecological context, Aula Magna, Stockholm University, October
- Sörlin, S., Workshop: Nordic Environmental History Network, NEHN, Trondheim, November
- Sörlin, S., Lecture: “The Quantification of Gloom: Numbers, Predictions, and the Language of Environmental Apocalypse from Spengler to Global Change“, Workshop: “Expertise for the Future”, Centre for History and Economics, Harvard University, November
- Sörlin, S., Keynote lecture: “Reversing the Reserves: Reinterpretations of Protected Nature from the Wild to the Urban”, Counter Nature(s): Revising Nature in an Era of Environmental Crisis, Uppsala University, November
- Österblom, H., Organizer, Workshop, Best Practice in Fisheries Management - write up workshop, Waxholm, Sweden, March
- Österblom, H., Workshop speaker, Conference, Towards Knowledge Democracy - Consequences for Science, Politics and Media, Leiden, the Netherlands, RMNO, August
- Österblom, H., Organizer, Workshop, Best Practice in Fisheries Management - Scientific start up, Stockholm Resilience Centre BNI, BalticSea 2020, January
- Österblom, H., Keynote speaker, Drivers of regime shifts in marine and freshwater systems, University of Wageningen, Netherlands, September

Practice, Policy and Outreach

- Boyd, E., Convenor of public panel/debate ‘Climate futures: transformations, politics and urgency’, Stockholm Resilience Centre, ECI, Reading University, June
- Crépin, A-S, Workshop Speaker, Conference under the Swedish EU presidency “The value of our marine environment”, Swedish Environmental Protection Agency, Stockholm, Sweden, September
- Crona, B., Invited speaker, Public lecture, Roving Bandits of Modern Fisheries- effects for local populations, SNF Somaliska Föreningen, May
- Elmqvist, T., Open lecture, “Kina – ett land av städer”, Stockholm University, April
- Elmqvist, T., Meeting with representatives of the parties S, V and Mp on biodiversity and resilience, April
- Ernstson, H., Keynote speaker, Öppet möte om Årstafältet, Nätverket Årstafältet, Årsta folkets hus, Stockholm, Sweden, April
- Folke, C., Workshop speaker, Conference under the Swedish EU presidency “The value of our marine environment”, Swedish Environmental Protection Agency, Stockholm, Sweden, September
- Folke, C., Keynote speaker, Conference, Green business, Veckans affärer, Stockholm, Sweden, January

- Galaz, V., Policy dialogue, Swedish Government International Commission for Climate Change and Development, September
- Galaz, V., Key note speaker and panel, Public lecture, Klimat och politik, Arbetarrörelsens tankesmedja, May
- Galaz, V., Interview Kulturnyhetera, SVT, December
- Kadin, M., Public lecture, Lessons from the ‘world’s best managed’ fisheries, Forum Hållbar Framtid, Riksdagen, March
- Kadin, M., Public lecture, Kedjereaktioner i havet, Naturum Stendörren, August
- Kadin, M., 13 meter hög fågelholk på Stora Karlsö, Sveriges Radio P4 Gotland, July
- Nekoro, M., Invited speaker, Ecosystem services provided by the flooded meadows of Kristianstads Vattenrike, June
- Rockström, J., Keynote speaker, Att göra affärer i Anthropocene, General Electrics Galan, Globen, Stockholm, February
- Rockström, J., Keynote speaker, Conference, Att göra affärer i den globala miljökrisen, Grön Upphandling, MiljöAktuellt, March
- Rockström, J., Lecture, Den globala klimatförändringens drama: Vetenskapen bakom en växande oro och möjligheter till hållbara lösningar, Årsmöte, Ekologiska Lantbrukare, Kolmården, March
- Rockström, J., Dinner speech, Exploring Planetary Boundaries: A Scientific Quest for Humanity’s Safe Operating Space in the Anthropocene, Copenhagen, March
- Rockström, J., Lecture, Klimatfrågan kräver samhällsförändringar på rekordtid, HSB Klimatkonferens, Stockholm, April
- Rockström, J., Lecture, Klimatförändringen är allvarligare än vi trott, behövs nya mål?, Riksdagen, May
- Rockström, J., Keynote speaker, Making Business in the Anthropocene, Ericsson, June
- Rockström, J., Keynote speaker, Facing the Global Environmental Change Crisis, UI, May
- Rockström, J., Keynote speaker, Building Water Resilience in the Anthropocene, Climate Action: Tuning in on Energy, Water, and Food Security, 9th Royal Colloquium, Höga kusten, Bönhamn, June
- Rockström, J., Keynote speaker, Steering clear from catastrophic planetary tipping points: Human Development within the Planetary Boundaries, Tällberg Forum, June
- Rockström, J., Keynote speaker, How on Earth can we live together within the Planetary Boundaries: A Science Conversation, Tällberg Forum, June
- Rockström, J., Keynote speaker, Building Water Resilience in the Anthropocene Reality Check Water, Tällberg Forum, June
- Rockström, J., Keynote speaker, The Role of Biodiversity for Environment and Development, Setting the Strategic Stage for a global agenda on biological diversity, High level meeting: Visions for Biodiversity beyond 2010 – People, Ecosystem Services and the Climate Crisis, Strömstad, September
- Rockström, J., Keynote speaker, Bending the curves from collapse to sustainability: Why we need a global “Apollo” project to save humanity, TEDx, Stockholm, September
- Rockström, J., Keynote speaker, Global Environmental Challenge and Chances for Recovery, Board Room Lunch, Riga, October
- Rockström, J., Keynote speaker, Europa måste leda klimatarbetet, Näringslivets väg efter Köpenhamn, Möjligheter i den nya klimateffektiva ekonomin, BLICC, October
- Rockström, J., Keynote speaker, Planetens tillstånd, Antonia Ax:son Johnsons Stiftelse för Miljö och Utveckling, Stockholm, October
- Rockström, J., Keynote speaker, Utveckling inom Planetens Gränsvärden, Rånäs Slott, October
- Rockström, J., Keynote speaker, Planetary Boundaries: Exploring the Safe Operating Space for Humanity, Biodiversity and Ecosystem Services, Master Class, Club of Rome General Assembly, October
- Rockström, J., Keynote speaker, Business and Development in an era of rapid global environmental change, The new agenda for a green transformation, Nobel week in India, Mumbai, November
- Rockström, J., Keynote speaker, Utveckling inom Planetens Gränsvärden. Det vetenskapliga stödet för ett ”Apollo” projekt för global hållbar utveckling, Skellefteå, November
- Rockström, J., Keynote speaker, Planetary Boundaries: Exploring the safe operating space for humanity challenges for world agriculture, SNF, Radisson, November
- Rockström, J., Keynote speaker, Planetary Boundaries: A new paradigm for decision makers, SEI 20th Anniversary, York, November
- Rockström, J., Keynote speaker, Den globala uppvärmningen uppdatering av forskningsläget, Naturvårdsverket, November
- Rockström, J., Keynote speaker, Making Business within the Planetary Boundaries, Vodafone, London, November
- Rockström, J., Keynote speaker, Utveckling inom Planetens gränsvärden, UI miljökonferens, December
- Rockström, J., Keynote speaker, A social-ecological resilience approach to a “safe” global emission pathway, COP 15 IIASA TERI, December
- Rockström, J., Keynote speaker, The role of Biodiversity in the light of the Climate Crisis, Ecosystem-based approaches, convenient solutions ready for use, COP 15, December
- Rockström, J., Keynote speaker, A Copenhagen Prognosis: Towards a safe climate future, A synthesis of the Science of Climate Change, Environment and Development, Press Conference COP 15, December
- Rockström, J., Four ways to feed the world, New Scientist, interview, November

- Rockström, J., Not even zero carbon by 2050 will be enough, Public Service.co.uk, editorial, December
- Rockström, J., Sustainable Developments - Transgressing Planetary Boundaries, Scientific American, interview, December
- Rockström, J., Voice of America, radio interview on the planetary boundaries, September
- Rockström, J., Så mycket kan jorden tåla, Dagens Nyheter, interview, September
- Rockstrom, J., Jordens balans har rubbats, SVT Rapport, interview, September
- Rockström, J., Grappling with the Anthropocene: Scientists Identify Safe Limits for Human Impacts on Planet, Scientific American, September
- Rockström, J., How Much Human Activity Can Earth Handle? Time.com, September
- Rockström, J., 9 Environmental Boundaries We Don't Want to Cross, Wired, interview, September
- Rockström, J., Provocative New Study Warns of Crossing Planetary Boundaries, Yale Environment 360, interview, September
- Rockström, J., To Tip or Not to Tip - That Is the Question for Copenhagen, The Huffington Post, editorial, October
- Sörlin, S., Seminarium: "Världsundergången?!", med Stefan Fölster, Svenskt Näringsliv och Håkan Bengtsson, Arena. ABF Stockholm, January
- Sörlin, S., Seminar, "International Challenges", NIRPA Nordic Research Policy Network, Swedish Research Council, March
- Sörlin, S., Föredrag: "Polförskjutningar – Internationella Polaråret 2007-2008", inledning vid seminarium Arktis – en region i förändring, Svenska IPY-kommittén & Nordiska rådets svenska delegation, Riksdagens förstakammarsal, 11/3 2009.
- Sörlin, S., Keynote speaker, "Change Processes and Academic Leadership", Hanasaari Cultural Centre, Helsinki, March
- Sörlin, S., Panelsamtal: "Polarforskningens framtid", med statssekr. Peter Honeth, Utbildningsdepartementet, Polarveckan 2009 i Ånn, March
- Sörlin, S., Joint Session of the Antarctic Treaty Consultative Meeting and the Arctic Council, and The 50th Anniversary of the Antarctic Treaty, US Department of State, Washington DC, April
- Sörlin, S., Keynote speaker: "Från kallt krig till global uppvärmning", Arktis i ett förändrat klimat: Nordens roll i Europas säkerhetspolitiska utmaningar, Föreningen Norden, Riksdagens förstakammarsal, May
- Sörlin, S., Seminar: Planetary Boundaries, Tällberg Foundation, June
- Sörlin, S., Seminar, "Kunskapens hjärtan och samhällets blodomlopp", Vetenskap & Allmänhet, Vetenskapsrådet, Visby, July
- Sörlin, S., Plenary lecture: "How Universities Can Take on Increasing Societal Demands – and Remain Powerhouses of Intellectual Freedom", The Knowledge Triangle Shaping the Future of Europe, EU conference under the Swedish Presidency, Gothenburg, September
- Sörlin, S., Lecture: "The Arctic – Region in Flux: A perspective from the International Polar Year 2007-2009", ESF Boreas workshop, Iqaluit, Nunavut, Canada, September
- Österblom, H., Organizer of workshop, Policy dialogue, Best Practice in Fisheries Management, March
- Österblom, H., Co-Organizer, Policy dialogue, Scientific Background Meeting at Tjärnö, Stockholm Resilience Centre, Scientific Council for Biological Diversity, August
- Österblom, H., Part of national delegation, Policy dialogue, High-level Meeting on Biodiversity, Swedish Government, September
- Österblom, H., Public lecture, The Value of our Marine Environment, Swedish Environmental Protection Agency, September
- Österblom, H., Participant, Policy dialogue, IUCN dialogue on IPBES, IUCN, September
- Österblom, H., Presentation, Policy dialogue, Regional Fisheries Management - how to make it work for fisheries and the environment, WWF and OCEAN 2012, September
- Österblom, H., Member of national delegation, Policy dialogue, CCAMLR annual meeting, October - November
- Österblom, H., Invited Keynote speaker, Torskens roll i Östersjöns ekosystem, BalticSea2020, September

C. Staff

Management, administration and communication

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Dan Wilhemsson, PhD Student, Zoology
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Applied Environmental Science
Matilda Baraibar, PhD Student, Economic History
Paul Fuehrer, PhD Student, Sociology
Tomas Persson, PhD Student, Botany
Åsa Romson, PhD Student, Law

Visiting Scientists 2009

Ciara Raudsepp-Hearne, McGill University, Canada
Derek Armitage, Wilfrid Laurier University,
Waterloo, Canada
Elena Bennett, McGill University, Canada
Fikret Berkes, University of Manitoba, Winnipeg, Canada
Frances Westley, University of Waterloo, Kitchener,
Canada
Graeme Cumming, University of Cape Town, South Africa
Jan Sendzimir, IIASA, Austria
Jeff Cardille, University of Montréal, Canada
Joern Fischer, Australian National University, Australia
John Parker, NCEAS, Santa Barbara, USA
John van Breda, Stellenbosch University, South Africa
Jordi Bascompte, Spanish National Research Council
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Robert Costanza, University of Vermont, Vermont, USA
Ryan Plummer, Brock University, St. Catharines, Canada
Stefan Gelcich, Center for Advanced Studies in Ecology
and Biodiversity, Chile
Stephen Polasky, University of Minnesota, USA
Terry Hughes, ARC Centre for Coral Reef Studies,
Australia
Tim Daw, University of East Anglia, UK
Vasilis Dakos, Wageningen University, The Netherlands



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