

Stockholm Resilience Centre

Annual Report

2009



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Contents

- Preface 2**
- Directors' View 3**
- Elinor's year..... 5**
- Research themes and highlights 2009 6**
- Core projects and collaborations..... 21**
- Publications..... 25**
- Science, Policy & Practice 27**
- Teaching & Training..... 36**
- Appendices..... 40**

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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 well-being 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 in academic training.

Preface

The year 2009 marks the end of the three year start-up phase of the Stockholm Resilience Centre. During this period the Centre has developed a broad inter-disciplinary research program on the understanding of social-ecological systems and governance and management for resilience and sustainable development. On the initiative from the core funding agency of the Centre, the Mistra Foundation, the Centre was evaluated in preparation for the 1st ordinary phase 2010-2013.

This external evaluation, carried out by Professor William C. Clark from Harvard University, ranked the Stockholm Resilience Centre as “world leader in the conduct of interdisciplinary research on the dynamics of inter-connected socialecological systems”. Based on publication records the Centre is among the top three scientific institutions in the world in this area. This is a very significant accomplishment, firmly positioning the Centre as a global node in the frontier of research on resilience and sustainability. This is exactly what the Centre set out to achieve in 2007, with the particular aim of developing a thriving and dynamic international research environment, where scientists from the social sciences, natural sciences and humanities can experiment and advance novel research for the sustainable governance and management of social-ecological systems. The achievements so far are not only the result of the major scientific accomplishments of the 50 or so centre researchers located at the Centre at Stockholm University. It is also a result of the broad international research collaboration between the Centre and researchers from around the world.

Of course, the centre faces several challenges in order to sustain its international scientific leadership, while at the same time continuing to successfully developing its other missions; to

be an effective science communicator, to be a convener of science-policy bridging, and contribute to research capacity building of the next generation of resilience thinkers and doers. The coming years will be devoted to strengthen 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

Directors' View

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

It is furthermore 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 environment for international research where scholars from different disciplines address complex social-ecological challenges by integrating social sciences, natural sciences and the humanities, in order to generate new insights and solutions that otherwise would not be possible. This is, in fact, an experiment in itself; how to find the best ways of conducting inter- and transdisciplinary research, which 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 inter- and transdisciplinary approaches to science, which cuts across scientific disciplines and that interacts with policy and practice, are necessary in the quest for sustainable solutions to the massive social-ecological challenges facing humanity.

This experimental arena for research on resilience for sustainability is of particular importance in the current state of the world. Increasingly we realize that business-as-usual pathways into the future are not viable – be it in the financial systems, the architecture for global governance of climate change, in our ways of managing risk and uncertainty, to fundamental challenges of stewardship of biological diversity and ecosystem services for human wellbeing and securing water and food for a world population of nine billion people in only 40 years. Evidence suggests that societies in the world - already in the short term - face the need for transformative changes under multiple social-ecological pressures. Some of these may be costly, at least on 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 as an integrated social-ecological systems as a whole. 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 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 bundle 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.

The Centre is set up to manage for emergence and our research agenda is continuously evolving. After three years of starting up the Centre, our frameworks remains and inspired by actual collaboration and synergies taking place and the scientific evaluation of the Centre, we have in an adaptive manner fine tuned our research themes, moving from eight 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 meeting in Strömstad of the Swedish EU Presidency 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, highlighting 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 to remain within planetary boundaries.

The Resilience Research School is now established at the Centre, as our learning arena for Master students, PhD students and Post-doc researchers. Here we provide our own MSc and PhD training, in close collaboration with departments at Stockholm University, 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, however remotely, associated with recipients of the world's most prestigious scientific award! However, we consider ourselves having a particular reason to congratulate and celebrate Professor Elinor Ostrom, the 2009 recipient of the Prize in Economic Sciences in Memory of Alfred Nobel. Ostroms 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. Ostrom serves on our Centre board, and has since many years a close scientific collaboration with Resilience Centre colleagues. 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

Elinor's year

When board member Elinor Ostrom was awarded the Nobel prize in economics last year, she not only gave research on multilevel governance a boost, but also showed the world that the global commons aren't 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 of the University of California at Berkeley was 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 receivers of the prize was a breath of fresh air.

Lobsters and irrigation systems

As the first woman to receive the prize, 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, 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 can do and not do and how they would be sanctioned if they didn't 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.

- Its crucial to build enough diversity to cope with the diversity of the world and allow multi tile systems with multiple scales so that you don't have uniform, top-down panaceas that is predicted to solve everything but instead of curing it, kills it, she says in her Whiteboard seminar video.

Small steps, big difference

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, Ostrom was naturally asked to serve on the board when the centre was launched in 2007.

- Its 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's research program 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 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

Theories on economic development are often based on theoretic ideals that forget real-life dynamics. Ostrom's work has been praised because it provides insight into collective action and governance of complex social-ecological systems that are crucial, yet ignored by many. And her work exemplifies the benefit of crossing borders between disciplines. The centre's research on adaptive governance and multilevel institutions bonds perfectly with 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, Ostrom argues.

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 taking on that challenge. Furthermore, the research is framed by a truly integrated view of people and nature in what we refer to as social-ecological systems, with the objective of improved stewardship of ecosystem services for human wellbeing. We address those issues from a complex adaptive systems approach and through analyses of cross-scale interactions, from the local to the global, from history to the future and we do it predominantly by applying a resilience lens.

Resilience to us 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 in focus;

- **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 has been organized around nine transdisciplinary themes. The aim of the themes is to provide flexible arenas for sharing perspectives and knowledge from different disciplines. What has been exciting is that the themes already feed into each other through inductive-deductive science, practice and theory with active involvement of scholars from the natural and social sciences and the humanities. It is rewarding to see the emergence of a broad cross-theme engagement and collaboration, reflecting the benefits of the individual in operating on a mutual dynamic research platform.

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.

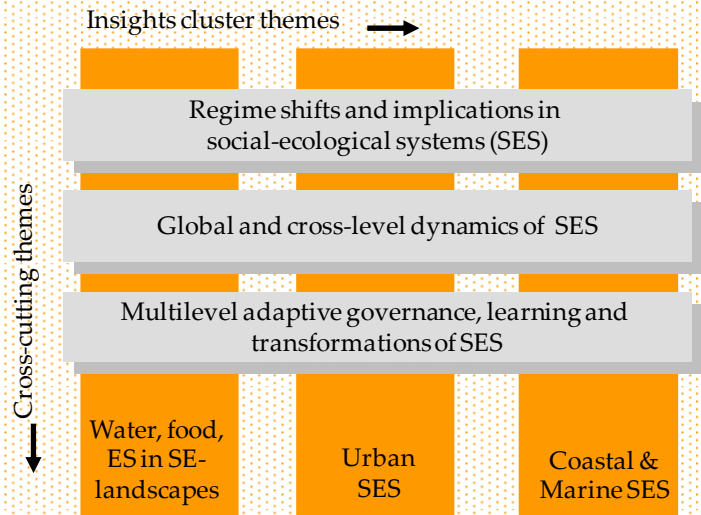
* **Water, food, ecosystem services in social-ecological landscapes** – novel approach by connecting work on poverty alleviation, bundles of ecosystem services and their management and governance, with regime shifts and global cross-scale dynamics.

* **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 fashion 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 SRC is a pioneer in connecting urban issues with social-ecological systems with case studies of several cities in different parts of the world.

We envision that the six theme areas will be the way around which the Centre will organize research activities during 2010-2013. A few glimpses of research achievement in this context are provided below.

Ecosystems, Development, Human Wellbeing
Integrated SES, CAS, Cross-scale Dynamics
Resilience, Adaptability, Transformability



Tipping towards the unknown

With the launch of the planetary boundaries, the centre paved the way for a new approach to sustainable development.

In a year where the Copenhagen climate conference fizzled into a diplomatic anticlimax, the identification of the planetary boundaries was one of the most significant outputs from the centre 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 makes explicit 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

Conveyed 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 threats 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 Earth’s environment, and respect the nature of planet’s climatic, geophysical, atmospheric and ecological processes, says lead author Johan Rockström.

The nine boundaries 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.

But there is scant room for maneuvering. 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 may seriously threaten the ability to stay within the safe levels of the others.

Humans behind change

The scientists emphasize 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, says co-author Professor Will Steffen.

The researchers stress that their approach does not offer a complete 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 well-being. 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, says co-author Professor Jonathan Foley.

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

<http://www.nature.com/news/specials/planetaryboundaries/index.html>

<http://www.ecologyandsociety.org/vol14/iss2/art32/>

Planetary Boundaries in the media

The two articles – in *Nature* and in *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 co-authors and their Universities, the research findings generated several hundreds of press clippings – in traditional 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 daily leading 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 the 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 aroused. And the interest remains.

Some clippings of interest:

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

Bildförslag: Skärmdump över Scientific American klippet

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

Wired 9 Environmental Boundaries We Don't Want to Cross
<http://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>

Links to more press clippings can be found on the centre website.

A dwindling capacity to cope with crises

The planetary boundaries work showed that it's time for a new order of cooperative international institutions that are better 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, intertwined global-scale challenges spawned by the accelerating scale of human activity is long. Unfortunately, the solutions to solve them are mostly scant and inadequate.

— There are few institutional structures to achieve cooperation globally on the sort of scales now essential to avoid very serious consequences, warns 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 a Science article published in September 2009 an international group of authors argue 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 ride on the cost of 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, Walker explains.

- 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, he says.

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, Walker argues.

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

Steering clear of uncertainty

Researchers call for action-oriented stewardship of ecosystems as part of transformation.

It's a well known fact that the human strain on the world's resources is unsustainable. However, new research identifies strategies away from these trajectories. A book published 2009, with contributions from centre researchers, advocates a shift to ecosystem stewardship to replace natural resource management approaches that often uses historic conditions that are not achievable in a rapidly changing world.

No region beyond hope

The book “**Principles of ecosystems stewardship: resilience based natural management in a changing world**” set the stage for future research on transformations in social-ecological systems. It includes social tipping points, like 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 a proper ecosystem stewardship, they argue, ecosystem services can continue to support human well-being even under conditions of uncertainty and change.

- 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 well-being, adaptive capacity and resilience, says Carl Folke, who is the centre science director and one of the authors.

The ecosystem stewardship integrates three approaches for sustainable development, namely

- 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 leads to change. Global-scale stresses such as climate change are particularly challenging because it requires concerted global action. The second approach emphasises the importance of shifting from a 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, says Per Olsson, another Stockholm Resilience Centre author.

Crises 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, says Per Olsson.

The publications on planetary boundaries, missing institutions and ecosystem-based stewardship is about navigating of our own future, how to increase the likelihood for development pathways that can generate, sustain and improve human welfare and wellbeing in collaboration with the Biosphere.

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 ecological regime shifts like a stock market collapse: it's 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-plant workers, and led to a decline of over \$200 million dollars per annum in cod landings revenues. But there is one fundamental difference between the stock market and a regime shift. Where stock markets usually bounce back, 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. But new research represents 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 investigated together with University of Wisconsin researchers Stephen R. Carpenter and William A. Brock whether new early warning indicators of regime shifts may 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 implementing management changes. The model was also used to find out which indicators might give warning before a "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 a regime shift can be rapidly altered (e.g. fishing pressure), successful management action to avert a regime shift may be delayed until a 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 warning of an impending regime shift) only show up once a regime shift is 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 regime shifts, the researchers suggest that future research focus on defining critical indicator levels at which management action should be taken rather than detecting change 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.

Out of the dry

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

The West African Sahel is not only among the fastest growing regions in the world, it is also a region where poverty and food insecurity is widespread and re-occurring. Rain fed farming is the dominating livelihood strategy but drought during the 1970's and 1980's turned the region into a dust-choked area hit by severe famines. The grim conditions lead scientists and policy makers to believe that vulnerable soils and scarce rainfall was inconsistent with the needs of a growing population. But to the surprise of many, the regreening witnessed during the last decades 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, says 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 turn a negative trend, become more resilient and adapt to a changing climate, Gordon says.

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

After preparatory reading and work shops in the spring of 2009, an international group of five students from transdisciplinary masters program both at SRC and the Geography departments 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 students, explains Line Gordon. While in the field, the students could only receive tuition from Elin and me 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 diverse issues such as yield statistics, farming practices, ownership rights, the distribution of wealth, the use of ecosystem services as well as the amount of trees and their age. Satellite images compared to historical aerial photos was used together with interviews of farmers to understand the land use change in different areas.

Back in Stockholm, 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 enable them to make a much more in-depth continuation of the research they started in 2009.

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

Faktaruta:

Stockholm Resilience Centre Researchers:

Dr. Line Gordon

Dr. Elin Enfors

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

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 special focus on the redistribution of assets between village households.

- I went around in the villages on the back of my interpreter's motor cycle. The major obstacle was to fit in my interviews to the villager's busy life, says Olivia. They work very hard, twice a week they were occupied with market days and during Ramadan there were many religious ceremonies to attend to, she continues.

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

- The Nigerien students helped us in overcoming the cultural differences we came across in collecting information, and they seemed inspired by our interdisciplinary resilience approach.

Although Olivia was infected by 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, says Olivia, admitting that it was more difficult than she had thought. And she continues:

- 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.

Crawling the web for eco-crises

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

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

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

Using web sources as sensors

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

Despite increasing improvement of ecosystem monitoring, early warnings of pending ecological crisis is still limited by insufficient data, and geographical gaps in official monitoring systems. Findings 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 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 Web Crawlers 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, says lead author Victor Galaz. He is one of the theme leaders of the centre research theme Adaptive Governance.

Although a promising start, Galaz and his co-authors stress the need for further research into the use of eco-monitoring web crawlers.

- 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 write in their article.

Core projects and collaborations

During the year the Centre has been engaged in many international project, workshops and research collaborations. Below we provide a sample of such projects and refer to the Stockholm Resilience Centre webpage 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 provided by the Swedish Research Council FORMAS, a joint effort between the Beijer Institute, Stockholm University and SEI with a strong focus on complex systems, regime shifts and resilience. The grant, of which one year remains, has been key in the start up phase of the 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 human sciences, reflected in IHOPE (<http://www.aimes.ucar.edu/activities/ihope.shtml>) a program of the global change community, now with an International Program Office in Stockholm led by Carole Crumley and Sverker Sörlin. The project is part of the Regime shift theme at the Resilience Center.

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 SRCs collaboration with 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. Will Steffen and Victor Galaz play leading roles in the project.

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) reported on above, the program will conduct research on the interacting feedbacks of global change and

governance for global social-ecological resilience through planetary stewardship. Brian Walker, Stephen Polasky and Anne-Sophie Crepín lead the program.

Regime Shifts of Social-Ecological Systems

Several project like a) understanding, mapping and governing regime shifts in the Baltic Sea, the Arctic, Sahel and other areas, b) developing a regime shift database, c) early warnings and moving thresholds d) economic consequences of shifts for human wellbeing, e) regime shifts in society and throughout history. Leading roles of SRC researchers Garry Peterson, Line Gordon, Oonsie Biggs, Anne-Sophie Crepin, Sverker Sörlin, Christoph Humborg, Thorsten Blenckner and the Baltic Nest Institute of the SRC.

Biodiversity, Bundles of Ecosystem Service and their Governance

SRC researchers are working to understand functional diversity, ecological networks and ecosystem services, develop practical theoretical tools to assess the resilience of ecosystem services, empirically determine interactions among ecosystem services in real landscapes, and governance implications. Key roles by 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

A special issue of Environmental Education Research (eds. SRC researcher Cecilia Lundholm, fellow Ryan Plummer, and Lisen Schultz, Emily Boyd contributors) is in press, workshops headed by Åsa Swartling on social-ecological learning are in progress, articles on leadership processes combined with resilience, on middlemen in coastal fisheries, on social-ecological memory, on boundary and bridging organizations etc. are in progress. Frances Westley, Örjan Bodin, Per Olsson, Beatrice Crona, Lisen Schultz, Stephan Barthel, Thomas Hahn and other SRC researchers.

Social-Ecological Networks in Adaptive Governance

Networks are an important area of SRC research on resilience and social-ecological systems. There are projects on complex adaptive systems, a special issue of Ecology & Society, an edited book in progress, networks in urban systems etc. SRC researchers working on networks include Örjan Bodin, Beatrice Crona, Henrik Ernstson, Jon Norberg and others.

Multilevel Institutions, Adaptive Governance and Resilience

Several projects investigate governance in relation to abrupt and large-scale social-ecological crisis, multilevel governance modes, from law to informal institutions, for building resilience for the challenges posed by global change, innovations and transformations. A special issue in

Global Environmental Change, papers on global governance of abrupt environmental change, international cooperation etc. SRC co-hosted the 2009 Amsterdam Conference of the Earth System Governance Project with an emphasis on governance of adaptation and resilience. SRC researchers include Victor Galaz, Andreas Duit, Jonas Ebbesson, Katarina Eckerberg, Per Olsson, Emily Boyd, and Victor Galaz.

Understanding Transformations in Social-Ecological Systems

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

Biosphere Reserves and Resilience

Biosphere Reserves (BRs) are potential real-world examples of resilience thinking and adaptive governance put into practice, with learning sites for biodiversity conservation and sustainable development. Projects and case studies (e.g. Kristianstads Vattenrike BR, Cape Winelands BR) and papers are in progress and in press. SRC researchers include Lisen Schultz, Per Olsson, Emily Boyd, Jacob von Heland, Cecilia Lundholm, Thomas Hahn, Thomas Elmqvist, Åsa Jansson and others.

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 are Thomas Elmqvist, Maria Tengö, Jacob von Heland.

The Ecosystem Approach, Marine Seascapes and Social-Ecological Resilience

Several projects are ongoing dealing with the Baltic Sea, aquaculture development, coral reef dynamics, marine seascapes and marine management including work on comparative studies of critical feedbacks 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. SRC researchers include 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 contingent on socio-cultural rationales that besides ecosystem management also contribute to social capital building and democratic governance promotion, issues often overlooked in previous urban research. Several projects are ongoing like the Greater Stockholm Region, green areas and common pool resources management, The Urban-Net, ESCAPE – Governance of urban ecosystem services in Cape Town, and URBIS (the Urban Biosphere network), books and papers are in progress like the volume *Urban Ecosystem Services and Governance: Building Resilience in Urban Landscapes*. Researchers include Thomas Elmqvist, Johan Colding, Henrik Ernstson, Stephan Barthel, Åsa Jansson, Sverker Sörlin.

Freshwater and Ecosystem Services

Several project at SRC focus on freshwater in the context of ecosystem services, resilience, global change and tipping points and governance challenges, often in relation to future water for food production. It spans from smallholder agricultural systems in drylands related to poverty dynamics and ecosystem services, to the re-greening of the Sahel and to global analyses. A major volume - *Confronting the freshwater challenge* - is in progress. Key researchers are Johan Rockström, Line Gordon, Malin Falkenmark, Jennie, Barron, Elin Enfors, Louise Karlberg, Mats Lannerstad, Holger Hoff.

Resilience Alliance

One of the most central partners is the Resilience Alliance (RA), an international network of leading research organizations who collaborate to explore the dynamics of social-ecological systems (www.resalliance.org). The RA and the focus on social-ecological systems emerged out of research programmes of the Beijer Institute in the 1990s and during the year the Centre has received a central role in the Resilience Alliance (RA) and was engaged in organizing the Resilience Alliance and Resilience Alliance Young Scholars meetings in Canada in 2009.

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, Beatrice Crona.

The Resilience Alliance Marine Group

High profile papers are generated by a small group of international scholars focusing on coastal and marine social-ecological systems. The group is led by Terry Hughes and Carl Folke. Three articles are in progress and a meeting was held in the Galapagos in 2009.

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 from the John F. Kennedy School of Government at Harvard University, provided recommendations on the research, policy and organizational challenges facing the SRC as it moves into the first permanent phase in 2010.

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 were published in scientific articles in addition to several books and book chapters. Popular science and outreach articles were also produced and several articles are also in press.

Selected publications

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Science, Policy & Practice

The Stockholm Resilience Centre has been deeply involved in science to practice and policy dialogues during 2009, at global, European, national and local levels. During the second half of 2009 Sweden had 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 lead by UNEP and has invested a substantial amount of time to develop networks with policymakers 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" hosted in Strömstad, 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 give a background on those links.

The report, entitled "Biodiversity, Ecosystem Services and Resilience: 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 includes contributions from a large group of national as well as international researchers and other experts. The main contributors were Stockholm Resilience Centre and the Department of Aquatic Sciences and Assessment at the Swedish University of Agricultural Sciences, and Albaeco had the editorial responsibility.

The report was presented at a scientific workshop "Biodiversity, ecosystem services and governance — targets beyond 2010" that was held on Tjärnö in Sweden, the days prior to the Strömstad meeting. The lead author Brian Walker as well as Centre researchers Lisen Schultz and Thomas Elmqvist, gave presentations during the three day workshop which gathered researchers and government officials.

The outcome from the Tjärnö workshop was directly transferred to the high-level meeting "Visions for biodiversity" and contents from the report and workshop can be found in the outcomes of the meeting.

In addition, a science based exhibition was produced to create an inspiring atmosphere in the conference venue in Strömstad. The exhibition highlighted the links and value 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 with a slide show that was on display in the rooms of the delegates. The exhibition can also be seen at the website: <http://se2009.eu/biodiversity>.

Box:

The scientific background report concludes that halting biodiversity loss and sustaining ecosystem services for human well-being beyond 2010 requires recognition of the dynamic interplay between biodiversity, ecosystem services and human development in the context of rapid global environmental change. It calls for an improved knowledge base, increased use of adaptive management approaches in Europe, capacity building for such management and flexible institutions designed to deal with uncertainty and surprise.

The report can be down-loaded at www.stockholmresilience.org/download/18.235c0ace124479a1f73800013572/Tjarno_report_final.pdf

IPBES – a new platform for biodiversity and ecosystem services

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 policy-makers that would ultimately contribute to realizing the vision of the 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 SRC to make an effective contribution to the discussion, as the SRC 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, 5–9 October.

Centre researcher Lisen Schultz participated in 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, policy relevant and focused on ecosystem services. In the end, the views on what the IPBES should be were still too diverging for the Nairobi meeting to make 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.

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

Contributions to the UN climate conference in Copenhagen

The Stockholm Resilience Centre contributed to several side-events at the UN climate conference in Copenhagen in December, the COP-15.

As part of the EU side event on climate change, ecosystem services and biodiversity organized by the Swedish government and the Swedish Environment 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 the centre report on biodiversity, ecosystem services and resilience that the SRC prepared for the high-level meeting in Strömstad previously described (see page xx).

The planetary boundaries concept caught global interest when a group of 28 internationally renowned scientists proposed that global biophysical boundaries, identified on the basis of the 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 to the article on Planetary Boundaries, gave a presentation of the planetary boundaries concept, with a 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 Lambin's presentation.

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 it is grasping the windows of opportunity that opens when interesting researchers are visiting Stockholm. The lectures are open to a transdisciplinary audience and spans over 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 (Lägg i box)

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

Professor 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

Professor Kenneth Frank

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

May 14

Dr. Christian Valentin

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

April 30

100th Stockholm Seminar:

Climate, Ecosystems and Development

March 30

Prof. Steve Polasky

Mind the Gap: Building Bridges to Mainstream the Value of Nature in Everyday Decisions

March 23

Prof. Fikret Berkes

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

March 18

Prof. Daniel W. Bromley

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

March 3

Dr. Ismael Vaccaro

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

February 2

Prof. Charles Redman

Urban Origins and Sustainability Strategies

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 focuses on climate change and sustainable living. Organized by the Swedish Embassy in the US, a range of seminars, exhibitions and events with both Swedish and American participants was presented.

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.

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 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 curbs 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.

Schultz's thesis analyzes how the dedicated work of a few individuals has mobilized local farmers, bird watchers, entrepreneurs and politicians to join forces in rendering the wetland an asset for the district of Kristianstad. This case study has then been compared to similar UNESCO-designated experiences elsewhere in the world. Unlike the more well-known World Heritage, the Biosphere Reserves are meant to protect biodiversity and encourage local development at the same time, by sustaining ecosystem services for human well-being.

The results of her research 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 so called bridging organizations that connect actors across scales and sectors.

- Somehow they manage to combine a firm vision with a flexible and learning-oriented approach when realizing it. It has been very inspiring to see that projects such as the one in Kristianstad are actually possible all over the world, be it Sweden or Venezuela, says Lisen Schultz.

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 while 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 debate on the long-term agenda of the next European Commission and the coming presidencies.

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 for added campus space and the Albano area between Stockholm University, the Karolinska Institute and 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 a 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 can also work as a reference point in framing the concept of sustainable buildings.

With that in mind, researchers from Stockholm Resilience Centre joined forces with the Royal Institute of Technology (KTH) 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 building the science city 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 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 constitute a link for water wildlife to the park.

The Royal National Urban Park was originally established in January 1995. The park came about in order to preserve the unique natural and cultural landscape. In the Royal National Urban Park, nature, parks and developed areas intermingle; and it is a historical landscape with a close association to the history of the city of Stockholm.

The area itself has previously been protected due to royal influences. It received its Italian-sounding name from King Gustav the Third after a trip to Italy at the end of the 18th century. The industrialization of the area started by the end of the 19th century and a train station was established. Since then, the area has served for industrial purposes as well as storage and parking spaces. Today most industrial facilities are gone, the train station was demolished in 1968. During the 20th century the area slowly became surrounded by educational facilities.

About the Green urbanism at Albano conference

On 29 October 2009, Stockholm Resilience Centre organised the conference Green urbanism at Albano. The purpose of the conference was to give planning advice for development in an area shared by three major universities in Stockholm. The ambition was also to make it 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 cooperation between Akademiska Hus: land owner of the Albano area; Stockholm Resilience Centre: contributor with transdisciplinary knowledge; and Stockholm University: the main tenant in the area.

Urban Atlas: a new tool for future urban planning

The Urban Atlas is an open web tool for citizens, planners and scientists for visualizing ecosystems in cities, social-ecological connections and scenarios for climate change adaptation. It is an international collaboration with the aim to develop new tools for understanding the social-ecological capacities to sustain and provide access to ecosystem services under uncertainty and change.

In a first phase students (age 16-19) and teachers are invited to formulate questions for future urban planning, relevant for their city neighborhood. 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, policy-makers 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

Too many vessels, too little fish

Current fisheries policy is dangerously close to draining the Baltic Sea for fish. A new project has used fisheries management practices from Norway, USA and Canada to try and curb that trend.

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

Much to blame has been 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 1970's, the policy is scant of flatter. References to the 'blunt', 'remote', 'highly bureau-cratic' or 'top-down' nature of the Common Fisheries Policy (CFP) are common within literature and the EU is viewed as ineffective in its management of the fisheries sector.

A new project aimed to improve this management. Centre partner Baltic Nest together with Baltic Sea 2020 and the Institute for European Environmental Policy gathered internationally recognized scientist from natural, economic and social sciences to investigate known examples of successful management which could help the Baltic Sea back on 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.

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 a special emphasis on resilience. The courses are developed and promoted in collaboration with several departments at Stockholm University (SU). Courses are offered at all levels: first (Undergraduate), second (Master's) and third (PhD) levels.

Resilience Research School at the Stockholm Resilience Centre

This year a new Resilience Research School was established, with the aim to train the next generation of transdisciplinary thinkers and doers on social-ecological resilience and sustainable development. Launched in August, ten new PhD students joined the centre. Seven of the students are affiliated with the Department of Systems Ecology, while the others are hosted by Political Science, Economics, and Physical Geography and Quaternary Geology. These new students will follow the centre's own general study plan as well as the one from their host department. The twelve earlier enrolled PhD students 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.

The transdisciplinary PhD Group

Stockholm Resilience Centre also coordinated an interdisciplinary environmental PhD group. This was a cross faculty forum for PhD students from any department at Stockholm University. Students' academic backgrounds varied from law, human and physical geography, economic history, sociology, systems ecology and zoology. The group was an open forum where research students from different backgrounds could communicate and interact. This is a precondition for interdisciplinary research.

During the fall 2009 this group coordinated an interdisciplinary seminar serie / PhD course, 3 credits/ECTS, on International Climate Agreements. The seminar series dealt with past, current and future agreements and their impact on local and global environment. Extra attention was given to COP15 in Copenhagen. The final seminar was a role play on international environmental negotiations that highlighted some of the complex issues addressed during COP15.

Development of the Masters Programmes

The two Master's programmes at the Stockholm Resilience Centre – Ecosystems, Governance and Globalisation (EGG) and Sustainable Enterprising (SE) – are among the most popular at Stockholm University, including some 70 students from over 20 countries.

Box:

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; Methods for Transdisciplinary Environmental Research.

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; Academic Theory, Methods, and Writing for Transdisciplinary Research.

In order to attract top international and Swedish students and keep focus on our primary goal of research, the Centre decided to split the two programmes into one research-oriented Masters and one 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.

SRC 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

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 U.S.A. within the Swedish Program at SU.

Appendices

A. PUBLICATIONS 2009

Published articles

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- Rickinson, M., Lundholm, C. Exploring student learning and challenges in formal environmental education. In *Environmental Education: Learning, Culture and Agency*. Stevenson, Dillon (eds.). Sense Publishers, Rotterdam.
- Schultz, L., Lundholm, C. Learning for resilience? Exploring learning opportunities in Biosphere Reserves. Special issue, Resilience in Social-Ecological Systems: the Role of Learning and Education. *Environmental Education Research*,
- Simonsson, L., Klein, R., Gerger Swartling, Å., André, K., Wallgren, O. Perceptions of risk and limits to climate change adaptation - Case studies of two Swedish urban regions. In *Climate Change Adaptation in Developed Nations*. Ford, L., Ford, L.B. (eds.). Springer, Dordrecht.
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B. PRESENTATIONS 2009

Academic Conferences and Workshops

Duit A., Eckerberg K., Ebbesson J. and Galaz V., co-organizers of workshop “Governance, Resilience and Complexity”, Saltsjöbaden, Sweden, February.

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, Wessex Inst. of Tech.

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, Panel convenor, 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, Turkey, Istanbul Technical University, 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 in Göteborg, Environmental Economics Unit, Göteborg 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. Cross-national 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, “Ekosystemtjänster - ett verktyg för hållbar utveckling”, Kristianstad Vattenrike, Högskolan Kristianstad and Krinova, June

Elmqvist T., Keynote speaker, 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” at Aula Magna, 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, SRC 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, Sweden, Human Ecology, Lund University, May

Folke C., Organizer, Workshop, Ecosystem services in Africa, Nairobi, Kenya, Beijer, SRC, 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, Copenhagen, March

Folke C., Key note speaker, Conference, Earth System Governance Amsterdam, NL, 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, Resilience Alliance. September-October.

Galaz V. Key note speaker, Conference, Skoll Forum on Social Innovation, Oxford (UK), Skoll Forum, 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, Rotterdam, NL, Erasmus University, June

Galaz, V., Organizer, Conference, Earth System Governance, Amsterdam, NL, 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, Holland, 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, Said 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

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.

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, SRC, BalticSea 2020, January.

Österblom H., Keynote speaker, Drivers of regime shifts in marine and freshwater systems, University of Wageningen, Wageningen, Netherlands, September

Practice, Policy and Outreach

Boyd E., Convenor of public panel/debate 'Climate futures: transformations, politics and urgency', SRC, ECI, Reading University, June

Colding J., Information on urban commons in the built environment, Policy dialogue Meeting with Tyréns AB (Katarina Johansson & Anders Ling), Tyréns AB, February

Crépin A-S, Commentator on a lecture by Klas Eklund, Green Futures, Stockholms universitets studentkår, May

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 at Stockholm University, "Kina – ett land av städer", April

Elmqvist T., Meeting with representatives of the parties S, V and Mp on biodiversity and resilience, April

Elmqvist T., April 28. Meeting with officials at SIDA and discussion on development of their Urban agenda, April

Elmqvist T. (SRC) hosting a lunch at UN-head quarters, New York, repr. of UNESCO and UN-Habitat participated, discussing the Urban Biosphere Initiative., May

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 pane, Public lecture, Klimat och politik, Arbetarrörelsens tankesmedja, May

Galaz V., Interview Kulturnyhetera, SVT, December

Jansson Å., Keynote speaker, Seminar for environmental staff at Danderyd hospital, Stockholm. November

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., Lectures for high school students, Havsfåglar - En pusselbit i Östersjöns ekosystem, Stockholms Tekniska Institut, October

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, Att göra affärer i den globala miljökrisen, Grön Upphandling, MiljöAktuellt, March

Rockström J., Keynote speaker, Conference, Climate for Development in turbulent world, GLOBE Frukost Riksdagen, March

Rockström J., Lecture on Climate for Development in a turbulent world, Climate Change, Global Risks, Challenges and Decisions, Copenhagen University, March

Rockström J., Lecture on Den globala klimatförändringens drama: Vetenskapen bakom en växande oro och möjligheter till hållbara lösningar, Ekologiska Lantbrukare, Årsmöte, 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., Keynote speaker, Building Water Resilience in the Face of Global Environmental Change: The Need for a Green-blue Water Paradig, Ramboll, April

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., 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, New science to steer safe from catastrophic nature shocks, Nature Shocks – as Opportunity, Lund, July

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 6th Oct 2009

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, Confronting the water challenge in the face of rapid global environmental change, Nobel Lecture, Pune, 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. Varför vi behöver en ny grön revolution. Hur möter det ekologiska lantbruket klimatproblemen? KSLA, 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, 14/1 2009.

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., 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., "The Situation in the Seventies: The Backdrop of Goodman's Legacy", Gordon Goodman seminar, Royal Swedish Academy of Sciences, 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., 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. 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

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 of workshop, Policy dialogue, Best Practice in Fisheries Management, March

Österblom H., Co-Organizer, Policy dialogue, Scientific Background Meeting at Tjärnö, SRC, 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

Johan Rockström, Executive Director
Carl Folke, Science Director
Olof Olsson, Deputy Director

Kristina Hagqvist, Head Finance/Admin
Maria Nilsson, Finance Admin
Denise Kreppenhofer, Staff Admin
Johan Ahlenius, Course/Finance Admin
Lars Gustavsson, IT Assistent
Felicity Rolf, Office Manager
Anna Schmuki, Office Assistant

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Christina Schaffer

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Miriam Huitric, Programme Director
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Lisbeth Segerlund, Course leader
Albert Norström, Course leader
Markus Larsson, Course leader
David Langlet, Course leader
Johan Törnberg, Course leader
Olle Torpman, Course leader
Henrik Weinestedt, Course leader
Caroline Wåhlgren, Course leader
Helena Wintgren, Course leader

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Ann-Sophie Crepin, Researcher
Beatrice Crona, Researcher
Björn Nykvist, Researcher

Bonghi Hong, Researcher
Brian Walker, Researcher
Carole Crumley, Researcher
Cecilia Lundholm, Researcher
Elin Enfors, Researcher
Frank Thomalla, Researcher
Garry Peterson, Researcher
Henrik Ernstson, Researcher
Henrik Österblom, Researcher
Jennie Barron, Researcher
Jenny Beckman, Researcher
Jenny Grönwall, Researcher
Johan Colding, Researcher
Jon Norberg, Researcher
Jonas Ebbesson, Researcher
Karl-Göran Mäler, Researcher
Katarina Eckerberg, Researcher
Kevin Noone, Researcher
Line Gordon, Researcher
Lisa Deutsch, Researcher
Lisa Segnestam, Researcher
Lisen Schultz, Researcher
Louise Karlberg, Researcher
Magnus Nyström, Researcher
Maja Schlueter, Researcher
Malin Falkenmark, Researcher
Markku Pyykönen, Researcher
Max Troell, Researcher
Miguel Rodriguez-Medina, Researcher
Oonsie Biggs, Researcher
Per Olsson, Researcher
Regina Lindborg, Researcher
Siw Eriksson, Researcher
Susan Owen, Researcher
Sverker Sörlin, Researcher
Thomas Elmqvist, Researcher
Uno Svedin, Researcher
Victor Galaz, Researcher
Vikrom Mathur, Researcher
Will Steffen, Researcher
Åsa Persson, Researcher
Åsa Swartling, Researcher
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Gustav Engström, PhD Student

Jacob von Heland, PhD Student
Maria Bohn, PhD Student
Martina Kadin, PhD Student
Matilda Valman, PhD Student
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Alexander Sokolov, Researcher
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Christoph Humborg, Researcher
Erik Smedberg, Researcher
Fredrik Wulff, Researcher
Gertje Czub, Researcher
Magnus Mört, Researcher
Oleg Svachuck, Researcher
Thorsten Blenckner, Researcher
Dennis Swaney, Researcher
Marmar Nekoro, Communications officer

PhD Interdiscp. Group

Angelina Sandersen-Bellamy, PhD Student, Systems Ecology
Arvid Bring, PhD Student, Physical Geography and Quaternary Geology
Dan Wilhelmsson, PhD Student, Zoology
Hanna Corell (Kling) , PhD Student, Meteorology
Katrin Holmström, PhD Student, 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

Maja Schlüter, Princeton University, USA
Kaushal Garg , ICRISAT, India
Ciara Raudsepp-Hearne, McGill University, Canada
Joern Fischer, Australian National University, Australia
Kenneth Frank, Michigan State University, USA
Tim Daw, University of East Anglia, UK
Stefan Gelcich, Center for Advanced Studies in Ecology and Biodiversity, Chile
Elena Bennett, McGill University, Canada
Jeff Cardille, University of Montréal, Canada

Nicolas Houde, McGill University, Canada
Mike Hulme, University of East Anglia, UK
Graeme Cumming, University of Cape Town, South Africa
John van Breda, Stellenbosch University, South Africa
Jordi Bascompte, Spanish National Research Council
John Parker, Arizona State University, USA
Joshua Cinner, James Cook University, Australia
Vasilis Dakos, Wageningen University, The Netherlands
Terry Hughes , ARC Centre for Coral Reef Studies, Australia
Owen Petchey, University of Sheffield, UK
Jan Sendzimir, IIASA, Austria
Mahamane Larwanou, INERA, Burkina Faso