



GLOBAL ECONOMIC DYNAMICS AND THE BIOSPHERE

THE ROYAL SWEDISH ACADEMY OF SCIENCES

The Erling-Persson Family Academy Programme

REPORT 2016



CONTENTS

INTRODUCTION	3
RESEARCH ACHIEVEMENTS AND ACTIVITIES	4
(Macro)economy and the biosphere	4
Economic modelling and sustainability	4
Sustainable Development Goals and a safe and just operating space for humanity	4
Marine resource trade and its effects on social-ecological systems.....	6
Fisheries production and sustainable social-ecological marine systems.....	6
Seafood trade and sustainable supply chains	6
Looking to the future	7
Links between biosphere dynamics and the financial sector.....	8
Earth System Finance – how financial actors shape the Earth system.....	8
Tax havens, international financial flows and global sustainability....	8
Human-biosphere interactions and financial crises	9
Cross-cutting themes: Cross-scale dynamics and Systems transformation.....	9
Cross-scale dynamics.....	9
Systems transformation – Fighting anti-microbial resistance.....	10
COMMUNICATION AND IMPACT.....	11
NETWORKS AND INTERNATIONAL COLLABORATIONS	12
APPENDIX.....	13

INTRODUCTION

This is the annual report of the Global Economic Dynamics and the Biosphere programme (GEDB) for 2016. This five-year research programme at the Royal Swedish Academy of Sciences, funded by the Erling-Persson Family Foundation, is addressing the economic dynamics of global change in a biosphere context and its implications for a sustainable future.

The programme was set up to conduct research that integrates social, economic and ecological dimensions, perspectives and data to explore scientific frontiers that lie at the nexus between these academic disciplines. At the same time, it aims to provide the scientific rigour essential to ensure high-impact scientific work of relevance for practice, policy, business and society as a whole.

The focus and achievements of the programme so far have been of a highly emergent and innovative nature, combining methods and disciplines across hitherto largely unexplored domains to develop sustainability science. This differs from most other academic efforts in (at least) three ways by:

- connecting knowledge and competencies of researchers from disciplines that seldom interact
- combining whole areas of work that have previously not been combined
- enabling new forms of collaboration between science, practice and business for human wellbeing and biosphere stewardship.

The outcome is novel and surprising research findings, the emergence of unexplored areas and new fields of research, and informed collaborative platforms for solving problems and challenges of great relevance for actions towards sustainability.

These new discoveries and collaborations across diverse fields and actors that GEDB has achieved so far would not have been possible without the flexible funding provided by the Erling-Persson Family Foundation.

AIMS AND VISIONS

- To create a platform for interdisciplinary scientific collaboration on the challenges of global change and sustainability, with specific focus on how local-to-global, cross-scale interactions affect human wellbeing and the sustainable use of natural resources and ecosystems.
- To facilitate and promote collaboration between early career economists and scientists with other backgrounds focusing on sustainability science.
- To combine diverse knowledge systems and experiences, and conduct research for a broader understanding about the preconditions and opportunities for sustainable societal development in the new global context.

RESEARCH ACHIEVEMENTS AND ACTIVITIES

During 2016, several reviews and syntheses developed by GEDB (alone or in collaboration) have contributed to setting new research agendas or have shown how novel combinations of disciplines and/or methods are critical for better understanding the interplay between global environmental change and human affairs in the Anthropocene. They include work by Folke and colleagues that elaborates the significance of a healthy biosphere for human wellbeing with major implications for practice and policy. Other examples are two systemic overviews of marine human-environment systems, which significantly extend earlier perspectives and approaches to management and governance of these systems. There has also been collaborative work combining the challenges of sustainable food systems, human health and biosphere stewardship that have previously not been well integrated. The majority of the work of this programme has taken place within the three research frontier themes of GEDB, some carried out in close collaboration with Stockholm Resilience Centre and the Beijer Institute of Ecological Economics. All have involved new forms of knowledge interaction, and many also include collaboration with practice, policy and business.

(Macro)economy and the biosphere

This theme furthers cutting-edge work on economic models which recognise that the economic system is embedded in – and dependent on – the biosphere. The aim is to integrate the latest developments within economic theory with methods used in sustainability science, as well as create economic models that include many more environmental factors than existing models in use today do.

Economic modelling and sustainability

Johan Gars, together with Conny Olovsson at Sveriges Riksbank (Sweden's central bank), has built a model examining the role of fossil fuels for patterns of economic growth. This has allowed them to examine how fossil fuels have impacted upon the growth acceleration associated with the industrial revolution, and why some countries grow while others do not. The work is currently under review in "European Economic Review".

A key conclusion is that while trade flows do react in the expected direction to production shocks (e.g., a country experiencing a decrease in production of a crop increases its net imports of that crop), the changes in trade flows are much smaller than the changes in production. This suggests that something inhibits the use of international trade as a mechanism for coping with production volatility, and trade costs seem to be an important factor in this.

Together with Shon Ferguson at the Research Institute of Industrial Economics (Institutet för Näringslivsforskning), work has been conducted to measure the impact of agricultural production on international trade flows. As the volatility of agricultural production is expected to increase with climate change, this work aims to evaluate to what extent international trade is used to mitigate the effects of agricultural production shocks. This is done by empirically estimating how trade in agricultural products (in terms of both volumes and prices) is affected by production shocks driven by year-to-year variations in yield. Data used include information on agricultural crop yield and bilateral trade flows of agricultural products for a number of crops, countries and years.

Other work on trade (with Daniel Spiro, Oslo University) is examining the extent to which trade liberalisation increases the risk of collapse of renewable resources that are harvested when property rights are not well formulated or regulated. The main finding to date is that the standard way of modelling trade in products derived from renewable resources underestimates the risk of resource collapse and also misses an important mechanism through which increased trade openness increases the pressure on renewable resources. Work within the GEDB research theme *Seafood trade and sustainable supply chains*, reported in previous annual reports, has arrived at similar conclusions from empirical analysis. This illustrates how the work within GEDB is able to confirm findings using multiple methods and disciplines, and thus increase the robustness of the conclusions.

Sustainable Development Goals and a safe and just operating space for humanity

During 2016, Peter Søgaard Jørgensen, who joined GEDB in 2015 as a post-doc, obtained funding from the Swedish research



UN Sustainable Development Goal 10: Reduce inequality within and among countries.

council Formas for a four-year post-doc to continue the work on measuring the social-ecological performance of national economies in a world interconnected by trade, transport and travel. Preliminary results challenge the commonly assumed U-shaped relationship between economic development and social and ecological outcomes, sometimes referred to as the environmental Kuznets curve. This conventional assumption suggests that countries of low or high development are expected to show better environmental outcomes, while developing economies have higher degrees of environmental degradation. Søggaard Jørgensen's work instead shows a relationship of increasing intensification and increasingly high consumption-based footprint in high-income countries and developed economies, thus challenging the assumption that economic development will allow decoupling of economic growth and environmental degradation.

Several other manuscripts are in the final stages, including one which suggests that the main challenge of the Sustainable Development Goals (SDGs) for high-income countries is to lower consumption-based footprint in order to provide space low- and middle-income countries to have a fair opportunity for development. This work builds on a comprehensive network analysis of the SDGs, which is available as a working paper and will be submitted to a journal in the first half of 2017. Within this project, GEDB has also contributed to a report by the European Environment Agency (EEA) (through Søggaard Jørgensen), entitled *Operationalizing the concept of a safe operating space at the EU level – first steps and*

explorations, as part of a collaboration between EEA and several EU partners, entitled *Within the Limits of Our Planet*.

Activities

- * A workshop on the economic interlinkages between the so-called planetary boundaries (a set of nine processes that are critical to the functioning of the Earth system, launched as a concept by Rockström and colleagues in 2009), and the challenges this poses for designing policies for reducing the risk of crossing boundaries, was organised by Johan Gars, Gustav Engström and Chandra Kiran (Beijer Institute of Ecological Economics). This builds on the work to introduce non-linear Earth system processes into integrated assessment models as reported previously, and is receiving matching funding from the Ragnar Söderberg Foundation. Discussions from the workshop are currently being formalised in an economic model.
- * During 2016, GEDB also arranged a new seminar series: *The Stockholm Environmental and Resource Economics Seminar Series*, which was a collaborative effort between GEDB, the Beijer Institute and the Economics Department at the Stockholm School of Economics. It brought leading early career researchers from around the world to Stockholm to give a talk and it created a platform to engage with young researchers at the various departments involved. The series was co-organised by Chandra Kiran, Agneta Sundin and former GEDB post-doc Marc Sanctuary (now at the Stockholm School of Economics).

Marine resource trade and its effects on social- ecological systems

This research theme examines how existing and emergent markets affect the functioning of marine social-ecological systems at different scales. It looks at the economic, social and environmental components of fisheries and aquaculture production systems. Transitioning to sustainable fisheries and seafood production will involve changes in how seafood is produced, but equally important are the types and volumes of species demanded by markets, and how these market choices can help support more sustainable seafood production and consumption. Understanding how such a transformation can be achieved requires a focus both on the production of seafood and the market system, as well as the supply chains connecting production and consumption. Below are some examples of research that uncover important aspects for sustainable production, marketing and consumption, in a world of changing climate and increasingly globalised trade.

Fisheries production and sustainable social-ecological marine systems

Several projects have looked at various aspects of fishers' behaviour, in order to understand, for example, how fishers divide their effort and assets across various fisheries over time, or the economic conditions that allow sustainable fishery cooperatives to persist over time. The latter is important for understanding how policies can incentivise cooperative behaviour, instead of a race to fish that can result in overfishing and negative socio-economic impacts. The former can be used to construct networks of alternative income sources, which in turn can be used to characterise the economic resilience of fishing communities. Social and economic resilience of fishing communities around the world is an important global goal acknowledged by many leading development agencies, such as the World Bank (see e.g. the report *Fish to 2030*).

Another contribution to this field by GEDB researchers was an evaluation of fishers' adaptive capacity to various possible disturbances, such as market fluctuations, climate conditions and disease. This was done by examining the diverse range of connections that marine resource harvesters have to various fisheries via their licences, as opposed to the conventional practice of focusing policy and management attention on only one fishery at a time. The motivation was to elucidate



Photo: Alamy Stock Photo/Tetra Images

differences among fishermen of relevance for how they sustain their current livelihoods and how they are likely to respond to future change.

Complementary to this empirical work is research by affiliated Professor James Wilen using economic models to examine links between the fishing sector and local economies, to address the fact that most analyses of the tragedy of the commons ignore how a fishing sector fits into a local or regional economy. Results show that open fishery economies which are integrated with other economic sectors can mitigate shocks with changing imports and exports, whereas closed economies experience more dramatic local ripple effects from shocks to the fishing and other sectors.

Professor Wilen has also been working with biologists to develop a simulation model exploring the impact of fishing in a realistic trophic system. They have found that the pattern of exploitation depends upon both biological and economic mechanisms, and that the "fishing down the food chain" hypothesis is in fact only one of a number of plausible scenarios.

Seafood trade and sustainable supply chains

Van Holt has led an effort to establish a knowledge network of actors who have been working to change their supply chains to become more sustainable. Supported by matching funds from International Social Science Council (ISSC), this work has identified areas that are either barriers or opportunities for transformative change in their supply networks. It reveals that in global production networks, it is difficult for producers in the

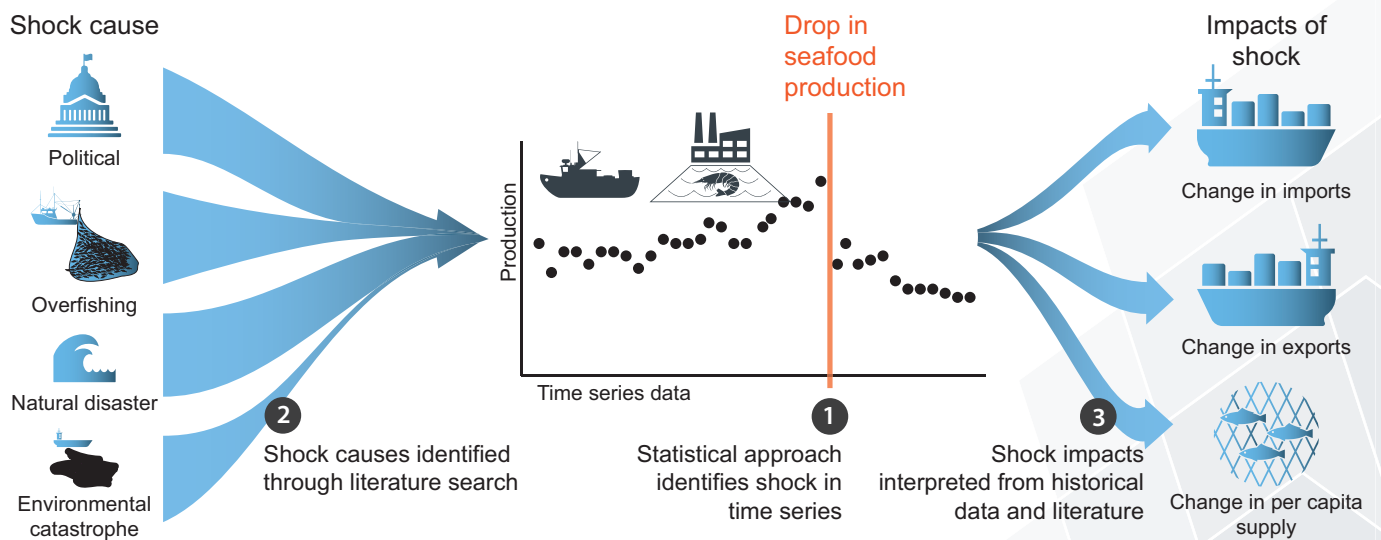


Figure 1. (Gephart et al. In press.) Historical examples can help identify potential risks and opportunities for building resilience in the global food system.

Global South who are trying to tap into regional and US markets to see the whole picture. Similarly, industry organisations in the US have a narrow understanding of the supply systems beyond large-scale processors.

The focus on seafood supply chains and their role in transformations towards sustainability was initiated (and reported on) already in 2015 under the MoU with the Sustainable Fisheries Partnership. This work has now borne fruit in the form of a systematic analysis across more than 40 Fisheries Improvement Projects (FIPs) aimed at evaluating which strategies appear to result in measurable change in policy or practice. The work shows that FIPs are focusing on policy dialogues, dialogues for changing practice or educational efforts. Actions aimed at policy influence are dominated by government agencies, research organisations and NGOs, while actions aimed at changing practices are more diverse and supply chain actors feature more prominently in these. Few FIPs have achieved both policy and practice outputs, suggesting that most FIPs are specialising and channelling their often limited resources towards one or the other. These findings will be fed back to the industry and value chain actors engaging in FIPs to initiate discussion around how FIP design and support can be improved, depending on desired outcomes.

Focusing on consumers, Troell and Crona worked with colleagues to investigate how eco-certification can reduce negative environmental impacts from fisheries and aquaculture. This was done by examining how the psychological characteristics of consumers and knowledge of eco-labelled seafood are

influencing consumer behaviour, and thus demand for eco-labelled seafood. Recognition of eco-labels was found to be generally low, and conditions surrounding seafood production were not generally something that triggered a deep emotional response among consumers. The study therefore concluded that spreading knowledge about key eco-labels and strengthening the emotional component of consumer decision making are essential.

Looking to the future

Understanding the future of fisheries and food production entails taking account of various known and anticipated drivers of change. Several GEDB researchers have been involved in research that aims to inform policy development for ensuring steady and sustainable seafood supplies in the future.

Based on data on shocks that occurred in global fisheries between 1976 and 2011, Troell and colleagues used data from 48 seafood production shocks identified worldwide. The aim was to show how such historical examples can help identify potential risks and opportunities for building resilience in the global food system, and thus inform policy considerations for future shock responses. See figure 1.

Another way of exploring the future of seafood production was investigated by Watson, who modelled changes in the spatial distribution of farming operations for three major farmed finfish species and found that climate change will most likely favour offshore aquaculture in the future. This can have implications for the planning of future aquaculture production.

Activities

- * A scoping workshop was held in Stockholm on 15–17 September with the aim of reviewing what is known about artisanal fisheries across a range of economic and social-ecological research areas, and setting a research agenda for future work. Issues discussed included the linkages between the fishing sector, employment opportunities and well-being in these fisheries; how globalisation and trade are likely to affect artisanal fisheries; and, given these interactions, fisheries policy reforms that might help alleviate poverty in fishing-dependent communities.
- * A modelling paper exploring the connections between international trade and small-scale fisheries dynamics, with the focus on small-scale traders, is under development with Marty Smith, Distinguished Professor of Environmental Economics at Duke University, and Matt Reimer, Assistant Professor of Economics, University of Alaska Anchorage. Another paper establishing the emergent research agenda at the nexus of social-ecological research and natural resource and fisheries economics is under development by Crona and Wilen.
- * As a continuation of the academic work conducted by GEDB and partners, which has identified the most influential actors in the seafood industry, a high-level dialogue was carried out with CEOs of eight of the world's largest seafood companies. Carl Folke and Jean-Baptiste Jouffray were part of the organising team and participated in the meeting. Read more under Communication and Impact below.

Links between biosphere dynamics and the financial sector

This theme has undergone significant development during the year and the intense efforts are now bearing fruit. Alice Dauriach was hired as a research assistant in January 2016 and this has allowed work in the theme to focus wholeheartedly on data collection and analysis. Work so far has developed under three topics, described below.

Earth System Finance – how financial actors shape the Earth system

This topic involves developing a methodology to explore and map the links between the financial system – i.e. financial actors and



Photo: Alamy Stock Photo/Sveve Taylor-ARPS

The Borneo rainforest is among the regions of critical importance for the stability of the global climate and is being used as a pilot study area by GEDB researchers exploring links between the financial system and the Earth system.

institutions, as well as financial flows and instruments – and the Earth system. Focusing on regions of critical importance for the stability and resilience of the biosphere and the global climate system, this work has honed in on the Amazon rainforest, boreal forests and the Borneo rainforest as a pilot. Forest loss or degradation has the potential to trigger abrupt change in these regions, which in turn can lead to disproportionately large global effects, both for climate and biodiversity. A paper on the pilot study, entitled “Earth System Finance – How financial actors shape the Earth system” is approaching completion. This work has attracted external funding from Vinnova and with their support it will be expanded in 2017 to include additional data analysis, outreach and visualisation activities. These will be done in collaboration with the international research network Future Earth, and two prominent UN initiatives: the UNEP Finance Initiative, and the UNEP Inquiry into the Design of a Sustainable Financial System. Together with established networks developed through the Mistra Financial Systems programme (reported in 2015) this will ensure that the theme's findings reach important actors in the financial sector, both in Sweden and internationally.

Tax havens, international financial flows and global sustainability

This project was launched in spring 2016, as tax havens were once again brought into the spotlight through the disclosure of the ‘Panama papers’. To address the effect of tax havens on the biosphere, this project is exploring how offshore jurisdictions subsidise environmental degradation and reduce transparency at a scale that has implications for the resilience of the Earth system. A paper on the subject is currently in review.

Human-biosphere interactions and financial crises

A collaboration was set up with Asgeir Torfason at the University of Iceland to examine whether there are general patterns in human-biosphere interactions leading up to, during, and immediately after financial crises. The ongoing collaboration is now in the phase of conducting a meta-analysis of five financial crises, the 2008 great recession, the Euro crisis, the 2001 Dot-com bubble, the 1997 South-East Asia crisis and the 1991 real-estate bubble in Japan. The research also feeds into synthesis work conducted by Garry Peterson at Stockholm Resilience Centre on commonly overlooked interlinkages between phenomena such as migration, inequality and financialisation that affect ecosystems.

Activities

- * Two workshops have been held on the topic of corporate accounting and finance in the seafood sector, in Groningen, Netherlands (June), and in Stockholm, Sweden (October) and members of the GEDB team co-organised and participated.
- * A seminar titled *Insurance, finance and the biosphere* was held on 6 April, at the Royal Swedish Academy of Sciences. This event was arranged as a follow-up to the publication by Victor Galaz et al. of the opinion article “Why ecologists should care about financial markets”¹ in *Trends in Ecology & Evolution* in May 2015, and to the subsequent letter by Birgit Müller and David Kreuer “Ecologists should care about insurance, too”². The seminar gathered around 20 scholars from ecology, economics and sustainability science, and insurance industry representatives. The aim was to open up a dialogue on innovations in insurance instruments and their potential and risks from a social-ecological perspective.
- * GEDB co-organised the 2016 Volvo Environmental Prize Seminar, at the Royal Swedish Academy of Sciences on 29 November celebrating Volvo Environment Prize laureate Professor Carlos Nobre’s work. Crona also highlighted work within the programme in an address on the topic: *The financial sector – a distal driver impacting the Amazon?*



Photo: Azote/Bent Christensen

Using one of the most comprehensive coral reef datasets available, Jean-Baptiste Jouffray and colleagues will try to identify the relative influence of anthropogenic and environmental stressors across the Hawaiian archipelago.

Cross-cutting themes: Cross-scale dynamics and Systems transformation

During the course of the GEDB programme, two additional, cross-cutting themes have emerged: *Cross-scale dynamics* and *Systems transformation*, initially highlighted in the Progress Report 2013–2015. The former can be seen as a red thread running throughout much of the ongoing work, both as an explicit research focus with targeted analysis such as in the *Marine trade and Financial markets* themes, and also more implicitly through the macroeconomic models employed in the *(Macro)economy and the Biosphere* theme.

The latter theme on transformation has developed through the recurring focus of several research efforts on factors that bolster or impede transformative change in a system. Most recently, this has been expanded and developed through the work on antimicrobial resistance elaborated below.

Cross-scale dynamics

GEDB PhD student Jean-Baptiste Jouffray and colleagues developed a new methodology for defining multiple reef regimes across the Hawaiian archipelago (see Annual Report 2014), now extended to identify the relative influence of anthropogenic and environmental stressors across the region. This is an important step towards developing indicators for effective

¹ Galaz, V., Gars, J., Moberg, F., Nykvist, B., & Repinski, C. (2015). Why ecologists should care about financial markets. *Trends in Ecology & Evolution*, 30(10), 571–580.

² Müller, B., & Kreuer, D. (2016). Ecologists Should Care about Insurance, too. *Trends in Ecology & Evolution*, 31(1), 1.



Antimicrobial resistance stems from overuse in both the human health sector and agriculture, where antibiotics are used to promote growth and prevent disease in livestock. Peter Søgaard Jørgensen and colleagues take a holistic view of the problem in their research.

coral reef management, and potentially also other coastal habitats. The project is a collaboration with researchers from Stanford University, the National Oceanic and Atmospheric Administration (NOAA) and Scripps Institute of Oceanography and Conservation International in the US.

Funding has been secured from Swedish research council Formas, by Crona and Van Holt, to build on the work on seafood supply chains (outlined above). The project will examine strategies for transformation towards sustainability in seafood supply chains across various seafood sectors and institutional contexts.

Systems transformation – Fighting anti-microbial resistance

Antimicrobial resistance, enhanced by overuse of antibiotics and other microbial drugs, is a serious problem for global public health as it threatens the effective prevention and treatment of a range of infections. The overuse stems from both the human health sector and agriculture, through the use of pesticides, and of antibiotics to promote growth and prevent disease in livestock.

So far, efforts to combat overuse in the two sectors have been pursued largely in isolation, even though the evolutionary responses of growing resistance share many common features. Furthermore, strategies to address antimicrobial resistance have been dominated by attempts to create economic incentives for pharmaceutical companies to develop new drugs, but to fully tackle the problem, social factors in this essentially social-ecological dilemma must also be understood.

GEDB researcher Peter Søgaard Jørgensen and colleagues have been granted funding from the National Socio-Environmental Synthesis Center (SESYNC) to address this by combining knowledge from the two sectors and from different disciplines. Two meetings were held in 2016 at SESYNC in Maryland, USA, and two more are planned for 2017. A full commentary has been published in *Nature*, laying out the argument for, and potential steps towards, an effort to build social-ecological resilience to antimicrobial resistance, and other manuscripts are in review. Moreover, a collaboration has been initiated with the leading international science policy expert network on antibiotic resistance, ReAct, to develop new, biosphere-literate approaches for dealing with the issue of antibiotic resistance.

Our food in the Anthropocene: The EAT Lancet Commission on Healthy Diets from Sustainable Food Systems

Obesity rates are rising in nearly every country in the world, while one in three people on Earth suffers from malnutrition. Overconsumption of unhealthy food is increasing, at the expense of human and ecosystem health. To address this, the EAT Lancet Commission was launched in 2016. It will investigate the connections between diet, human health and the state of the planet, in order to provide a basis for new evidence-based policies. Due for completion in 2017, it will be the first systematic analysis of the global food system and will help policy makers by providing a roadmap for how transformation of the food system can help attain the UN Sustainable Development Goals (SDGs) and meet the terms of the Paris Climate Agreement.

The EAT Lancet Commission consists of 20 world-renowned scientists and it is co-chaired by Walter Willett, Harvard University, and Johan Rockström, Stockholm Resilience Centre. GEDB researchers Crona and Troell have both contributed to several of the working groups under this commission.

COMMUNICATION AND IMPACT

In addition to academic work, GEDB also strives to achieve impact by delivering salient and credible information to various actors in non-academic environments. Some examples of such impact activities are highlighted below.

- A document outlining reflections on issues and possible improvements for progress reporting procedures for Fisheries Improvement Projects was delivered to the Sustainable Fisheries Partnership. The preliminary results of the systematic analysis of Fisheries Improvement Projects (FIPs) were presented and discussed with the Sustainable Fisheries Partnership (SFP). Over the year, GEDB has also developed a common database of FIPs, together with SFP.
- Several open editorials have been delivered by GEDB staff, including:

Have our oceans reached a tipping point? One of a series on Global Goals for Sustainable Development, in collaboration with Stockholm Resilience Centre. [Read](#)

Investors can help finance sustainable seafood by demanding transparency in fishing companies' product ranges. ESG Magazine – a magazine covering responsible investment and insurance, sustainable banking, impact investing

and social finance, corporate governance and sustainability, Issue 05, 2016.

World Economic Forum open editorial by Peter Søgaaard Jørgensen, *Antibiotic resistance is the next great global challenge – we must act now.* [Read](#)

- Two essays in the Swedish daily newspaper *Svenska Dagbladet* about financial systems and risks: One elaborating the role of algorithmic trade in financial markets *Robothandlarna har tagit över Wall Street* ([Read](#)), and the second the role of tax havens in the global economy *I skatteparadiserna är syndafallet konstant* ([Read](#)).
- GEDB (through Søgaaard Jørgensen) contributed to a report by the European Environment Agency, entitled *Operationalizing the concept of a safe and just operating space at the EU level – first steps and explorations*, which is part of a Knowledge Innovation Project between EEA and several EU partners, entitled *Within the Limits of Our Planet*.
- Coverage by Danish national television and radio on the *Nature* article *Use antimicrobials wisely* ([Read](#)).

Keystones Dialogues – connecting science with industry leaders for biosphere stewardship

In November 2016, the first Keystone dialogue between scientists and seafood business leaders was held, where eight of the world's largest seafood companies issued a ten-point statement committing to action on ocean stewardship. The commitments include improving transparency and traceability and reducing illegal, unreported and unregulated fishing, and slavery in their supply chains. Antibiotic use in aquaculture, greenhouse gas emissions and plastic pollution will also be prioritised. The statement is part of a new initiative - the Seafood Business for Ocean Stewardship – which, for the first time, connects wild capture fisheries to aquaculture businesses, European and North American companies to Asian companies, and the global seafood business to science.

The dialogue builds on the academic work conducted by GEDB, SRC and the Beijer Institute, which has identified a set of actors in the seafood industry which together control between 19–40% of the largest and most commercially valuable fish stocks in the world (Österblom et al. 2015). The small concentration of multinational companies means that the

CEOs represent potentially significant leverage points for transforming the entire seafood sector towards more sustainable practices.

The keystone dialogue was initiated by Stockholm Resilience Centre (SRC), with GEDB director Carl Folke and GEDB/SRC/Beijer PhD student Jean-Baptiste Jouffray in the organising team. It took place on 11–13 November at the Soneva Fushi Resort in the Maldives, under the patronage of HRH Crown Princess Victoria of Sweden, who is an advocate for the UN Sustainable Development Goals (SDGs).

Selected media coverage

National Geographic [Read](#)

Reuters [Read](#)

Sveriges Radio [Read](#)

Undercurrent News [Read](#)



HRH Crown Princess Victoria of Sweden acted as patron for the first Keystone dialogue within the Seafood Business for Ocean Stewardship and played an active part in the meeting.

NETWORKS AND INTERNATIONAL COLLABORATIONS

Much of the work under GEDB is conducted in collaboration with researchers at various international universities and institutes, many of which are exemplified in the text. Below we highlight a few, focusing primarily on institutional collaborations.

Stockholm Resilience Centre (SRC) and the **Beijer Institute of Ecological Economics**. There are strong links between GEDB and both SRC and the Beijer Institute, exemplified through ongoing collaborations and co-publications throughout this report.

UNEP Finance Initiative, and UNEP Inquiry into the Design of a Sustainable Financial System. Both organisations are members of the funded Vinnova proposal to extend the Earth System Finance work stream during 2017.

Sustainable Fisheries Partnership. An ongoing collaboration to evaluate data on Fisheries Improvement Projects, to understand which supply chain strategies lead to more sustainable use of marine resources in specific cultural/political contexts.

Future Earth. GEDB is part of the scientific committee for the 2017 International Conference on Sustainability Science in Stockholm, sponsored by Future Earth. GEDB is involved

in the development of Future Earth's 'Finance' Knowledge Action Network (KAN), and has taken part in their Oceans KAN. Future Earth is also a member of the funded Vinnova proposal on Earth System Finance.

ReAct. A global network dedicated to the problem of antibiotic resistance. Members have backgrounds ranging from global health, microbiology and healthcare professionals to journalists and communication experts. Collaborations are being initiated to introduce biosphere-literate approaches for dealing with the issue of antibiotic resistance.

Early Career Researchers Network of Networks. GEDB is (through Sogaard Jørgensen) part of the executive committee of a new international effort to connect early career researchers across 17 early career researcher networks, in collaboration with Future Earth.

Princeton University. Collaboration through various research projects, particularly in the domain of fisheries, trade and complex systems.

APPENDIX

STAFF:

Director	Carl Folke
Executive Director	Beatrice Crona
Senior Academy Researchers	Victor Galaz Max Troell Tracy Van Holt
Early Career Academy Researchers	Eny Buchary Gustav Engström Johan Gars Peter Sogaard Jørgensen James Watson
PhD Candidates	Ami Golland Jean-Baptiste Jouffray
Science Impact Advisor	Cecilia Repinski
Visiting Professor	James Wilen
Research Assistants	Alice Dauriach Sofia Käll Emmy Wassenius
Finance and HR Administration	Sofia-Kristin Kokinelis
Communications Officer	Agneta Sundin

ADVISORY BOARD

GEDB has an advisory board comprising a list of prominent academics. The role of the advisory board is to advise on strategically important research directions and decisions, and to provide guidance, suggestions, contacts and networks for collaboration. From time to time, members of the advisory board are also invited to participate in specific research endeavours in the form of working groups/workshops designed with a specific thematic focus.

Advisory board members:

Neil Adger	University of Exeter
Kenneth Arrow	Stanford University
Scott Barrett	Columbia University
Steve Carpenter	University of Wisconsin
Jane Lubchenko	Oregon State University
Bonnie McCay	Rutgers University
Stephen Polasky	University of Minnesota

FUNDING:

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Wedding, L.M., J. Lecky, J.M. Gove, H.R. Walecka, M.K. Donovan, G.J. Williams, J-B. Jouffray et al. Advancing the integration of spatial data to map human and natural drivers on coral reefs. In review at *PLOS ONE*.

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SELECTED ACTIVITIES FEATURING GEDB RESEARCH:

Människan och biosfären (Man and the Biosphere), presentation for Swedish insurance company Länsförsäkringar, Stockholm, 3 February (Folke).

Insurance, Finance and the Biosphere. Half-day seminar organised by GEDB, Royal Swedish Academy of Sciences, Stockholm, 6 April (Galaz and Crona).

Living with Resistance: Social-ecological Governance of Resistance Evolution. Two workshops organised by GEDB in cooperation with SESYNC, University of Maryland, USA, April and September (Søgaard Jørgensen).

Global Resilience Partnership, conference organised by USAID, Sida, Rockefeller Foundation, Venice, Italy, 15–16 May, keynote speaker (Folke).

Ocean and Atmospheric Sciences Departmental Seminar. Oregon State University, USA, 19 May. Presentation: *Complex adaptive marine systems* (Watson).

Interdepartmental Marine Sciences Program seminar. University of California Santa Barbara, USA, 25 May. Presentation: *Understanding the complexity and adaptive nature of marine systems* (Watson).

Environmental Realities, Rethinking the Options. Royal Colloquium hosted by His Majesty King Carl-Gustaf, Rosersbergs Castle, Sweden 22–25 May, Participant (Folke).

The 13th International Coral Reef Symposium, Honolulu, Hawaii, USA, June. Presentation: *Disentangling the role of human and natural drivers of multiple reef regimes across the Hawaiian Archipelago* (Jouffray).


International Society of Ecological Economics (ISEE) Conference – Transforming the Economy: Sustaining Food, Water, Energy and Justice, Washington DC, June. Presentation: *Operationalizing the safe and just operating space for humanity in national economies* (Søgaard Jørgensen).

Annual Meeting of the Society for Mathematical Biology. Nottingham, UK, 11 July. Presentation: *Cooperation in coupled natural-human systems: Its emergence and importance* (Watson).

International Institute of Fisheries Economics and Trade: The 18th Biennial IIFET Conference, July 2016, Aberdeen, Scotland. Presentation: *Fishery Improvement Projects: A preliminary analysis of strategies and outputs, and Small-scale developing country fish value chains: How can they inform strategies for poverty alleviation and sustainability?* (Crona).

Who Owns the Planet? Seminar in honour of His Majesty the King Carl-Gustaf's 70th birthday. Organised by Stockholm Environment Institute, Stockholm Resilience Centre and WWF, Ulriksdal's Castle, Stockholm, 19 October. Presentation: *Challenges and opportunities related to ownership of land, water and biodiversity* (Crona).

The Amazon in the New Globalized Context. Half-day seminar organised by GEDB in collaboration with Future Earth and Volvo Environment Prize, to celebrate Volvo Environment Prize laureate Carlos Nobre's work. Royal Swedish Academy of Sciences, Stockholm, 29 November. Executive Director Crona also held a presentation: *The financial sector – a distal driver impacting the Amazon?*



GLOBAL ECONOMIC DYNAMICS AND THE BIOSPHERE
THE ROYAL SWEDISH ACADEMY OF SCIENCES
BOX 50005 SE-104 05 STOCKHOLM, SWEDEN
VISITING ADDRESS LILLA FRESCATIVÄGEN 4A STOCKHOLM, SWEDEN
WEBSITE www.gedb.se