



Draft initial design report

17th April 2013

This report sets out the initial design of Future Earth, comprising a research framework and governance structure, preliminary reflections on communication and engagement, and capacity building and education strategies, and implementation guidelines.

This report was developed by the Future Earth Transition Team, a group of more than 30 researchers and experts from many countries and representative of the natural sciences, social sciences, and humanities, as well as from international organisations, research funders and business. Earlier drafts of its main sections have been circulated and presented for consultation in the process of designing Future Earth. Future Earth is expected to develop and evolve through a wider consultation process as the transition is made to its fully operational phase.

These recommendations suggest a direction for the Alliance of sponsors and the initial governance bodies of Future Earth to take the design and implementation forward.

*The following document is an excerpt of the Future Earth Draft initial design report
Pages 37 to 41*

Theme 3: Transformation towards Sustainability

Understanding transformation processes and options, assessing how these relate to human values and behaviour, emerging technologies and social and economic development pathways, and evaluating strategies for governing and managing the global environment across sectors and scales.

The proposed theme on Transformation towards Sustainability goes beyond assessing and implementing current responses to global change and meeting gaps in development needs to consider the more fundamental and innovative long-term transformations that are needed to move towards a sustainable future. There are major knowledge gaps in this area, in particular as to how such transformations can be developed, designed and achieved.

Future Earth will develop knowledge to understand, implement and evaluate these transformations which might include significant shifts in political, economic and cultural values, changes in institutional structures and individual behaviours, large-scale systems changes and technological innovations that reduce the rate, scale and magnitude of global environmental change and its consequences. In selecting this major research theme Future Earth signals the need and willingness of the global environmental change research community to engage with the challenges of innovation, new technologies, global governance and alternative solutions that will bring society and the Earth system towards more sustainable futures.

Understanding the many feedbacks from human responses and governance to Earth system processes requires close collaboration between natural and social scientists, economists and engineers in, for example, projecting the impacts of energy policy or ecosystem management on biogeochemical cycles and biodiversity or understanding how policy and international agreements shape demands for on-going monitoring of greenhouse gas emissions or species. Assessing the costs or benefits of different management and governance choices is another important arena for international collaboration and also an important opportunity to partner with the private sector. Another research challenge is to connect trends and policies in engineering, technology and business to their impacts on efforts to foster more sustainable individual and institutional behaviours through innovation and consumption choices. Identifying the social and cultural consequences of different response strategies, including real or perceived winners and losers and how these change over time, is an important focus. Evaluating the potential and risks of new technologies and approaches from developments in areas such as synthetic biology, geo-engineering, analysis of massive datasets, or new energy systems is another important area for research.

The GEC research community has a number of past and on-going projects that have addressed issues of transformation and governance for a sustainable earth system. For example, the Industrial Transformation (IT) project studied interactions between technology, society and industry as they related to the causes of environmental change and alternative solutions (e.g. Berkhout et al 2012; Elzen et al 2004). The Institutional Dimensions of Global Environmental Change (IDGEC) sought insights into the multi-scale governance of the environment with work continuing within the Earth System Governance (ESG) project to explore political solutions and novel, more effective governance systems to cope with the current transitions in the biogeochemical systems of our planet (Young et al 2008, Biermann et al 2010). The Global Environmental Change and Human Security project (GECHS) examined how diverse social processes such as globalization, poverty, disease, and conflict combine with global environmental change to affect human security (Matthew et al 2009). These projects show how responding to global environmental change is not just a matter for national governments but also for local governments and international organizations, civil society, the private sector, and individuals. Building on this experience and combining it with the work of other projects and institutions across the globe, Future Earth will have major emphasis on developing transdisciplinary insights for solutions.

What types of research questions and projects can contribute to the Transformation towards Sustainability research theme? The Future Earth transition team identified the following over-arching questions to illustrate potential research priorities that can be addressed by current, updated or new collaborative international efforts:

- How can governance and decision-making be aligned across different levels, issues, and places to manage global environmental change and promote sustainable development? What is known about the successes and failures of different actors in managing global environmental change, at different scales, and using different strategies?
- Can technologies provide viable solutions to global environmental change and promote sustainable development? What are the opportunities, risks and perceptions associated with emerging technologies such as geo-engineering or synthetic biology? How can technology and infrastructure choices be combined with changes in institutions and behaviours to achieve low carbon transitions, food security and safe water?
- How do values, beliefs and worldviews influence individual and collective behaviour to more sustainable and mindful lifestyles, patterns of trade, production and consumption? What triggers and facilitates deliberate transformations at the individual, organizational, and systems levels; what socio-political and ecological risks does it entail?
- What do we know about past transformations of the Earth System, as well as in ideas, technology and economy and how can the knowledge and lessons learned guide future choices?
- What are the longer-term pathways towards sustainable urban futures and landscapes, successful and sustainable 'blue societies, and a green economy?
- What are the implications of global environmental change for conservation of species and landscapes including the possibilities for restoration, reversal of degradation and relocation?
- How can the Earth and social system adapt to environmental changes that could include warming of more than 4°C over the next century?
- Can our present economic systems, ideas and development practices provide the necessary framework to achieve global sustainability and if not, what can be done to transform economic systems, measures, goals and development policies for global sustainability?
- What are the implications of efforts to govern and manage the Earth system for sustainability for scientific observations, monitoring, indicators and analysis? What science is needed to evaluate and assess policies and facilitate and legitimise transformation?
- How can the massive volume of new geophysical, biological, and social data, including local knowledge and social media be managed and analysed so as to provide new insights into the causes, nature and consequences of global environmental change and to facilitate the identification and diffusion of solutions?

Research projects under this theme might examine the ethical and environmental implications and

technical challenges of new economic models, species relocation or climate engineering and could investigate new approaches to deliberative decision-making, participation, economic valuation and business management. Insights into past transformations, such as mass extinctions or the industrial and green revolutions and how and why notions of a successful, good, ethical and sustainable life have developed over time and across cultures are also relevant research areas. These activities can draw on existing and former GEC projects that have studied past transformations and abrupt changes or proposed new approaches to economic thinking (e.g. Past Global Change - PAGES, Integrated History of People on Earth- IHOPE, Industrial Transformation – IT, IHDP Inclusive Wealth). Research into innovation pathways, from institutional and engineering design options to strategies for stimulating growth of new ideas in support of global sustainability, will also be central to this theme.

Under this theme Future Earth can investigate the effectiveness and risks of new technologies that are designed to provide solutions to global sustainability, such as geo-engineering and new energy sources. It aims to engage with researchers who are rethinking economic systems and indicators in the context of sustainability, who are contributing to new thinking on politics and approaches to democracy, and who are exploring the links between social practices and human behaviour. Research on the communication of change and the development of new narratives and cultural stories can contribute to improved understandings of transformation. Pathways to transformation can benefit also from scenario and visioning exercises that provide understandings of alternative futures, as well as the trade-offs and co-benefits involved in different choices. Scenarios work can make important contributions to assessments such as the IPCC together with research that uses models to investigate longer term futures. Imagining possible futures can also engage the humanities and arts in shaping cultural responses to global environmental change (Robinson K. S., 2012).

The Transition Team discussed several areas where research into transformation for sustainability is particularly timely and urgent, and the clustering of existing with new projects could be particularly beneficial. These areas include:

- *Transition to a low carbon society.* Future Earth has the opportunity to provide more integrated approaches to energy and climate assessments such as IPCC, through research on the interactions between energy, land and climate systems, the implications of policy choices and alternative scenarios for greenhouse gas emissions, and the co-benefits and trade-offs between different energy and land use options such as biofuels and between climate change mitigation and adaptation.
- *Sustainable ‘blue’ societies.* Future Earth could advance integrated research on the urgent challenges of understanding global change and the oceans including the dynamics of oceans within the Earth system, the impact of humans on coastal and marine ecosystems, and the dependence of global and regional societies on ocean resources. How can “blue societies” live in greater harmony with oceans and achieve transformations that support ocean sustainability?

- *New media and sustainable transformations.* The explosion of new forms of communication, networking and amount of information associated with computing, the Internet and new media is one of the biggest contemporary transformations in information, technology and scientific research. How this wealth of information and new options for collaboration can be harnessed in monitoring and seeking pathways to sustainability is a research priority. For example, understanding how to analyse and share this mass of data and information to improve our understanding of society, to provide observations of environmental change, and to identify, scale up and communicate solutions will be critical to transformation processes.

Other examples of areas where new collaborations are needed include: the development of new approaches to economics that incorporate broader measures of sustainability and wealth; research that analyses proposals for a 'green economy'; research needed to support the design of cities and infrastructure that reduces the risks of global environmental change while adapting to the changes that cannot be avoided; research to understand geo-engineering solutions to global change, research around consumption patterns and production systems and how changes could affect or contribute to global sustainability.

The Transformations for Sustainability research theme will require partnerships that engage a wide range of stakeholders who are working on sustainable futures, including communities, businesses, humanitarian and conservation groups, spiritual and cultural leaders, and citizens who are re-evaluating their lifestyles and legacies for their descendants.