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World Social Science Report

2013

Changing Global Environments

Summary

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Human Elephant Foundation

The artist and creator of the elephants in this Report, Andries Botha, formed the Human Elephant Foundation which initiates and facilitates discussion and innovative problem solving for a more respectful and sustainable world.

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You can buy my heart and my soul, 2006 by Andries Botha
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Introduction
Social sciences in a changing global environment

The International Social Science Council (ISSC) is proud to present the *World Social Science Report 2013*. The issue this Report confronts is global environmental change, a phenomenon that encompasses all the biophysical changes happening on the planet's land and in its oceans, atmosphere and cryosphere. Many of these changes are driven by human activities such as fossil fuel consumption, deforestation, agricultural intensification, urbanization, over-exploitation of fisheries, and waste production. By far the most discussed global environmental change is climate change, one of the biggest global challenges that humanity faces. These challenges are intimately connected to accelerating production and consumption, population growth, socio-economic and cultural globalization, and widespread patterns of inequality. Together they comprise a major feature of contemporary life, and require innovative policy and social transformation.

Why a social science report on global environmental change?

Global environmental changes have potentially grave consequences for the well-being and security of people all over the world. Many already recognize the urgency of environmental changes as they interact with and exacerbate other social, economic and political crises. Poverty, inequality and sociopolitical discontent create uneven vulnerabilities, and unequal options for response to environmental change. The challenge that society now confronts is to secure a sustainable world through effective responses to today's interacting processes of environmental and social change.

Global sustainability requires concerted action to protect the planet's bounty and, simultaneously, to safeguard social equity, human dignity and well-being for all.

The *World Social Science Report 2013* picks up this challenge by showing the essential contributions that the social sciences can and must make to the integrated thinking and responses it requires. The Report issues an urgent and decisive appeal to the social sciences[1] to intensify research on the human causes, vulnerabilities and impacts of environmental change, and to inform responses to the sustainability crisis. It urges social scientists to work more closely with each other, with colleagues from other scientific fields, and with multiple stakeholders and users

1. *Throughout this Report, and in line with the ISSC's scientific membership base, reference to the 'social sciences' should be understood as including the social, behavioural and economic sciences.*

of science to deliver credible and legitimate knowledge for real-world problem solving.

There are three defining attributes of today's changing global realities that require the social sciences to rethink how we understand and address the problem of global environmental change.

The inseparability of social and environmental systems and problems

Environmental problems cannot be separated from the other risks and crises that comprise current global realities. They are not disconnected challenges; they do not occur in discrete, autonomous systems rooted in the environment on the one hand, or in society on the other. Instead, they are part of a single complex system. Global environmental change is simultaneously an environmental and a social problem. Social science research helps us to comprehend the complex dynamics of 'social-ecological' or 'coupled human–natural' systems, and can help explain how these systems unfold and interconnect across space, from the local to the global, and in time, from the past and present into the future.

A human condition without precedent

Humans are living at a time when the Earth's land surface and climate, its elemental cycles, oceans, fresh water, ice, air and ecosystems, have all been altered fundamentally from the state they were in even just a few centuries ago. Scientists now know with great confidence that these changes are attributable primarily to human activity. Indeed, the 'Anthropocene' is increasingly regarded as a new geological era in Earth's history, one in which people take centre stage as the defining geological force. This makes the causes, consequences and responses to global environmental change fundamentally social in nature. Global environmental change is about humans changing global environments, and about humans, individually and collectively, shaping the direction of planetary and social evolution. The social sciences therefore have a vital role in enriching society's understanding of what it means to live – and maybe thrive – in the Anthropocene, and in raising awareness of the opportunities, accountabilities and responsibilities this brings with it.

Urgent and fundamental social transformation

Given that planet's systems are under rapidly growing and unsustainable pressures, and that human systems are inextricably linked to their fate, human security is clearly at stake. If societies are to maintain or establish such security, and successfully pursue together the larger quest for global sustainability, deep social transformation is needed. The social sciences are uniquely placed to clarify what this means, and what role science can play in finding solutions. Through engaged research, they can help society as a whole understand the changes required at individual, organizational and systemic levels, and how such changes could be realized in politically feasible and culturally acceptable ways.

Given these features of today's global realities, the case for greater engagement by, and attention to, the social sciences is clear. Their knowledge is indispensable in the search for a clearer understanding of the causes and consequences of global environmental change, and for informing more effective, equitable and durable solutions to today's sustainability challenges. This is what makes the *World Social Science Report 2013* on global environmental change both relevant and timely.

The social sciences provide indispensable knowledge of the causes and consequences of global environmental change, and of more effective, equitable and durable solutions to today's sustainability challenges.

Objectives of the Report

The Report has five specific objectives:

- To develop a social science framing of global environmental change and sustainability;
- To showcase some unique contributions that the social sciences can make, taking different disciplinary and interdisciplinary perspectives into account, and writing from or about different regions of the world;
- To explore and assess how well social science knowledge about changing global environments is linked to policy and action;
- To influence research programming, science policy making and funding, at national, regional and international levels; and
- To mobilize the wider social science community to engage more effectively, and take the lead in developing a more integrated and transformative science of global change and sustainability.

The more than 150 authors of this Report, drawn from across the globe and representing a wide range of disciplinary and interdisciplinary perspectives, all speak in their own voices to these objectives.

The context for the Report: a changing environment for global environmental change research

Systematic research on global environmental change by social, behavioural and economic scientists dates back to the 1950s. Today environmental problems, particularly climate change, are acknowledged research domains in most social science disciplines. But despite these efforts, the social sciences have remained marginal to global environmental change research in the post-war era. The field continues to be dominated by the natural sciences.

Today, environmental change research aims more than ever to integrate the social, natural, human, engineering and health sciences. In this context, integration does not imply the loss of disciplinary strength or identity. On the contrary, it means being confident in one's disciplinary base and engaging with colleagues from other disciplines and fields in the joint, reciprocal framing of problems, and in the collaborative design, performance and application of research.

The call for more integrated science is dictated by the complexity of the environmental and sustainability challenges that society faces, and the inability of any single discipline or scientific domain to understand, let alone address, this complexity. Despite the progress made by many academic groups and scientific institutions across the world, the task of bringing the different sciences together in integrated global change research remains difficult. Much work remains to be done to clarify what integration means in practice, find effective ways of realizing it, and adjust institutional practices to support it.

No single discipline or scientific domain can understand, let alone address, the complex challenges involved in environmental change and sustainability.

Such work is now being undertaken by Future Earth,[2] an ambitious new international programme of research for global sustainability that has been established by an alliance of international organizations including the ISSC.[3] Future Earth provides a unique and robust institutional basis for accomplishing something that has long been called for: research that brings the various scientific fields together on complex, multi-faceted problems. In addition, Future Earth fosters knowledge production, guided by a vision of science working with society to find solutions for global sustainability. This approach defines the context within which the *World Social Science Report 2013* has been prepared, and within which the challenges it poses to the social sciences must be understood.

The framework for the Report: transformative cornerstones of social science research for global change

What do the social sciences bring to integrated global environmental change research? What unique contributions can and must they make to delivering solutions-oriented knowledge for global sustainability?

In 2012 the ISSC developed a research framework comprising six transformative cornerstones of social science research for global change.[4] Each cornerstone articulates a set of social science questions that have to be answered if research on concrete environmental problems is to inform actions that result in ethical and equitable transformations to sustainability. Together, they provide tools for understanding climate and other environmental changes as social processes, embedded in specific social systems, and for critically questioning and rethinking those processes and systems through time.

The six transformative cornerstones (see Figure 1) form the thematic framework for the *World Social Science Report 2013*.

Figure 1 • The transformative cornerstones of social science research for global change

Source: Adapted from Hackmann, H. and A.L. St. Clair (2012), Transformative Cornerstones of Social Science Research for Global Change. *International Social Science Council (p21).*

2. *www.futureearth.info/*
3. *www.stalliance.org/*
4. *www.worldsocialscience.org/documents/transformative-cornerstones.pdf*

Structure of the Report

This framework is also reflected in the structure of the Report. Part 1 sets the stage by introducing social science perspectives on the big-picture complexities of global environmental change and sustainability. Part 2 augments this with a review of social science capacity and research in different regions of the world. Parts 3 to 4 then take on each of the cornerstones in turn. Part 3 to 7 highlights selected consequences of global environmental change while Part 4 focuses on visions and conditions for change and on sense-making. Part 5 picks up the difficult topic of ethics and responsibilities, and is followed by Part 6 which addresses the important issue of governance and decision-making. Part 7 provides an overview of the contributions made to global environmental change research by ISSC members, programmes and partners. These many and varied contributions are not further synthesized here in this Summary, but offer important examples of how multidisciplinary teams can advance the knowledge base in important ways. They should be seen as important inputs to, and foundations for, the efforts expected under Future Earth. The final part discusses the wider findings and messages of the contributions to this Report, and identifies priority actions for responding to the challenges that it identifies.

Development of the Report

The ISSC developed this Report as part of its strategic partnership with UNESCO and under the guidance of a Scientific Advisory Committee composed of renowned scholars from different scientific disciplines and from all parts of the world. Contributions were solicited via a global call, and some were commissioned by the Report's Editorial Team to cover gaps in coverage. The ISSC also invited its regional social science councils and professional disciplinary associations, unions and cosponsored programmes, as well as UNESCO and the Organisation for Economic Co-operation and Development (OECD), to prepare brief overviews of their contributions and accomplishments in global environmental change research.

All commissioned and invited contributions were submitted for external peer review. Throughout the selection and commissioning process, attention was paid to the geographical, gender and disciplinary distribution of the more than 150 authors of this Report.

Audiences for the Report

The Report has been prepared with multiple audiences in mind. Social scientists themselves are the first audience. So are colleagues in the natural, engineering, medical and human sciences concerned with global environmental change and sustainability. Both need to reach out to the other, and this in turn will be easier if they find support from the other intended audiences of the Report. These include international science councils such as the ISSC and the International Council for Science (ICSU), the professional associations they bring together, global programmes, especially Future Earth, and international organizations including UNESCO and other relevant UN agencies. Then there are universities and academies in all fields of science, and the agencies and foundations that finance and evaluate research at the international, regional and national levels, both in the public and private sectors. This Report also aims to speak to those who might look towards and work with the social sciences to produce more usable knowledge and new insights: decision makers, policy shapers, practitioners, civil society organizations, and the media and other communicators of science.

Moving forward

The Report does not represent a single, unified social science voice, nor should it. And while it makes an effort to discuss some of the biggest problems of global environmental change and the challenges it raises for contemporary society, it cannot cover everything. The contributions reflect current preoccupations and trends in a constantly changing and expanding area of work, and social scientists' existing and growing capacities to pursue them. It is indicative of past accomplishments but does not limit future possibilities. The field is growing, wide open, and rife with opportunity to broaden and deepen what social scientists can contribute to the topic of global environmental change and sustainability.

Nomkhubulwane, 2009 by Andries Botha
© Photographer, Katrin Feldbauer

Part 1
The complexity and urgency of global environmental change and social transformation

Society has an abundance of scientific data and knowledge about the gravity of current environmental changes, and on possible future scenarios should those changes be left unmitigated. Yet societal responses remain frustratingly slow and inadequate. There is a tendency to see the environment as one of a larger set of discrete and disconnected global problems. From this perspective, environmental concerns compete for attention with other issues, and too often lose out in the priority rankings.

From a broader systems point of view, environmental change is connected in complex ways to the multitude of other social crises, risks and vulnerabilities confronting society today. For example, some believe that policy makers need to solve the poverty problem before worrying about environmental issues, including climate change. Yet poverty and environmental problems are both integral to the sustainability challenge that society now faces: to protect human well-being and life-supporting ecosystems simultaneously and in ways that are socially inclusive and equitable.

Understanding action within complex social-ecological systems

Approaching global environmental change from a systems perspective draws attention to nonlinear relationships and the potential for irreversible changes and surprises. Social scientists have contributed to the social-ecological systems perspective on global environmental change by bringing the social and human dimensions into natural science-based conceptions of the Earth system. Much work remains to be done on this front. The authors of Part 1 contribute to that effort in important ways.

Deepening our understanding of the role of humans

Critical to a social-ecological systems perspective is the role of humans as reflexive and creative agents of deliberate change. Understanding how values, attitudes, worldviews, beliefs and visions of the future influence system structures and processes is crucial. It challenges the idea that catastrophic global environmental change is inevitable, and directs attention to possibilities for acting in response to such change.

When a central part of the system becomes sufficiently aware that it is changing that system, the capacity for response may no longer follow linear, deterministic trajectories. (O'Brien)

Identifying a safe and just operating space for humanity

In terms of acting in response to global environmental change, it is imperative to understand the need for a 'safe and just space' towards and within which pathways to sustainability must be steered. This space is defined by the planetary and social boundaries within which humanity can thrive without endangering the ecological resilience of the planet, or the well-being and security of its current and future inhabitants.

An effective approach to evaluating sustainability policy choices in different contexts may be to focus on direction (what and who drives action); diversity (nurturing multiple solutions); and distribution (safeguarding equitable sharing of the just and safe space).

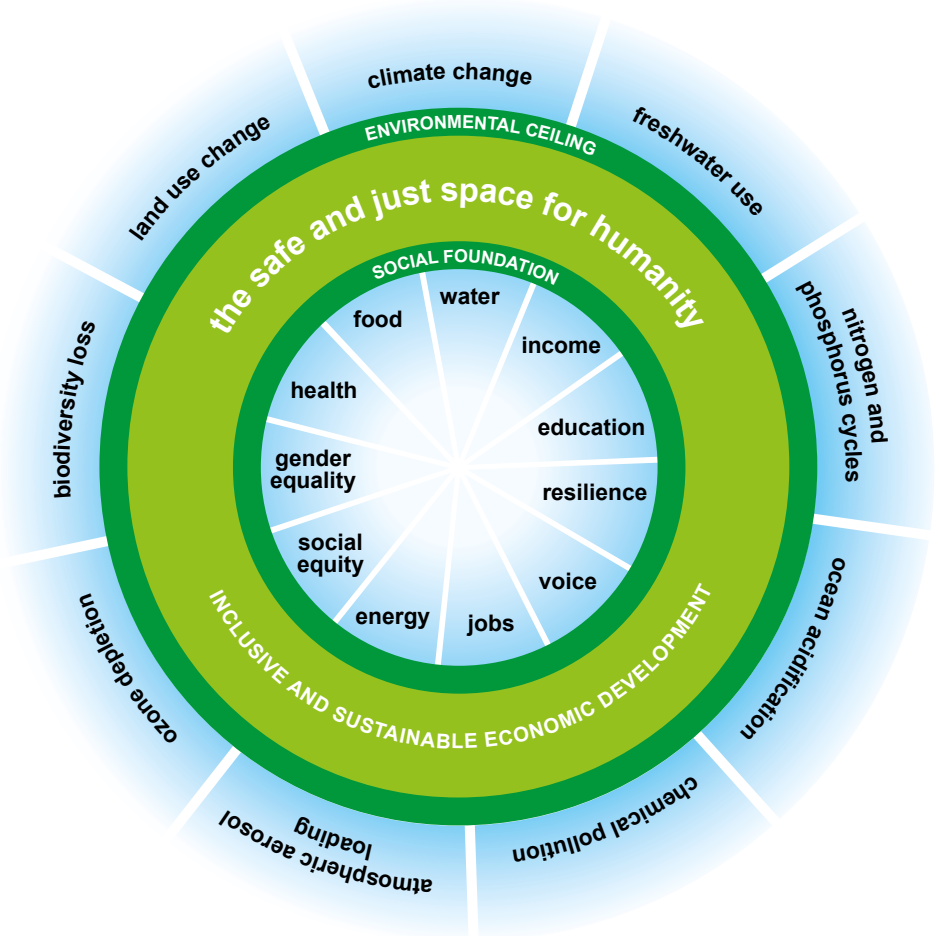
Understanding well-being, finding new measures for growth

Dominant conceptions of human well-being and societal development focus on material wealth and use gross domestic product to track progress. From a social-ecological systems point of view, this approach is inadequate. The importance of social and ecological factors such as education, health and stable ecosystems in contributing to human well-being cannot be overestimated. This broader conception of well-being underlies the Inclusive Wealth Index – a theoretical framework for sustainable development that provides a comprehensive measure of economies' manufactured, human and natural capital.

Understanding the difference that gender makes

The drivers and impacts of change vary between different regional, cultural and socio-economic settings. Personal

Figure 2 • Social and planetary boundaries



Source: K. Raworth (2012), "A safe and just space for humanity: Can we live within the doughnut?" discussion paper, Oxfam, Oxford, based on Rockström et al. (2009), "A safe operating space for humanity", Nature, *No. 461, pp. 472-475. See Leach, Raworth and Rockström, Figure 6.1, in the main Report.*

identities also contribute to the contextual complexity of global environmental change. Analysing processes of environmental degradation and regeneration through a gender lens reveals the different vulnerability of men and women to environmental degradation, as well as the positive effects of women's involvement in environmental governance. Gender differences in interests, preferences, and knowledge of local ecosystems are of particular relevance in this regard.

A rigorous gender analysis can lead to more relevant and effective solutions. (Agarwal)

Moving towards transformation

Research on global sustainability increasingly goes hand in hand with calls for profound social transformation, and for the production of relevant knowledge to help deliver it. Yet despite the urgency of both processes, researchers are far from agreeing – or even fully understanding – what either of them entails, conceptually and practically.

Understanding the meaning of transformation

An overview of current research on social transformation reveals a picture of diversity, ambiguity, fragmentation and often contestation. Nonetheless, transformation can be seen as a process of change, whether deliberate or unplanned, in the fundamental attributes of a system. It constitutes change that is multidimensional, occurs at different rates and different scales, and involves multiple actors.

Increasing futures literacy

The complexity of these processes of transformation raises a number of questions, most notably about people's capacity to imagine futures that are not based on hidden, unexamined and sometimes flawed assumptions about present and past systems. 'Futures literacy' offers an approach that systematically exposes such blind spots, allowing us to experiment with novel frames for imagining the unknowable future, and on that basis, enabling us to critically reassess actions designed in the present.

In imagining alternative futures, and pathways toward sustainability, what is the role of the social and other sciences? Can they do any more than investigate, monitor and document rapidly changing global environments?

Designing and participating in open knowledge systems

New approaches to understanding transformative knowledge production emphasize the importance of open information and knowledge systems that facilitate collaborative learning and problem solving, around concrete challenges and in specific social-ecological contexts. In such systems, multiple sources of expertise are mobilized: scientists work with non-academic knowledge holders to co-design, co-produce and co-implement new knowledge, new priorities and mutual learning processes. In this way, open knowledge systems are arenas for the democratization of science, a process increasingly facilitated by cyberspace and new digital technologies.

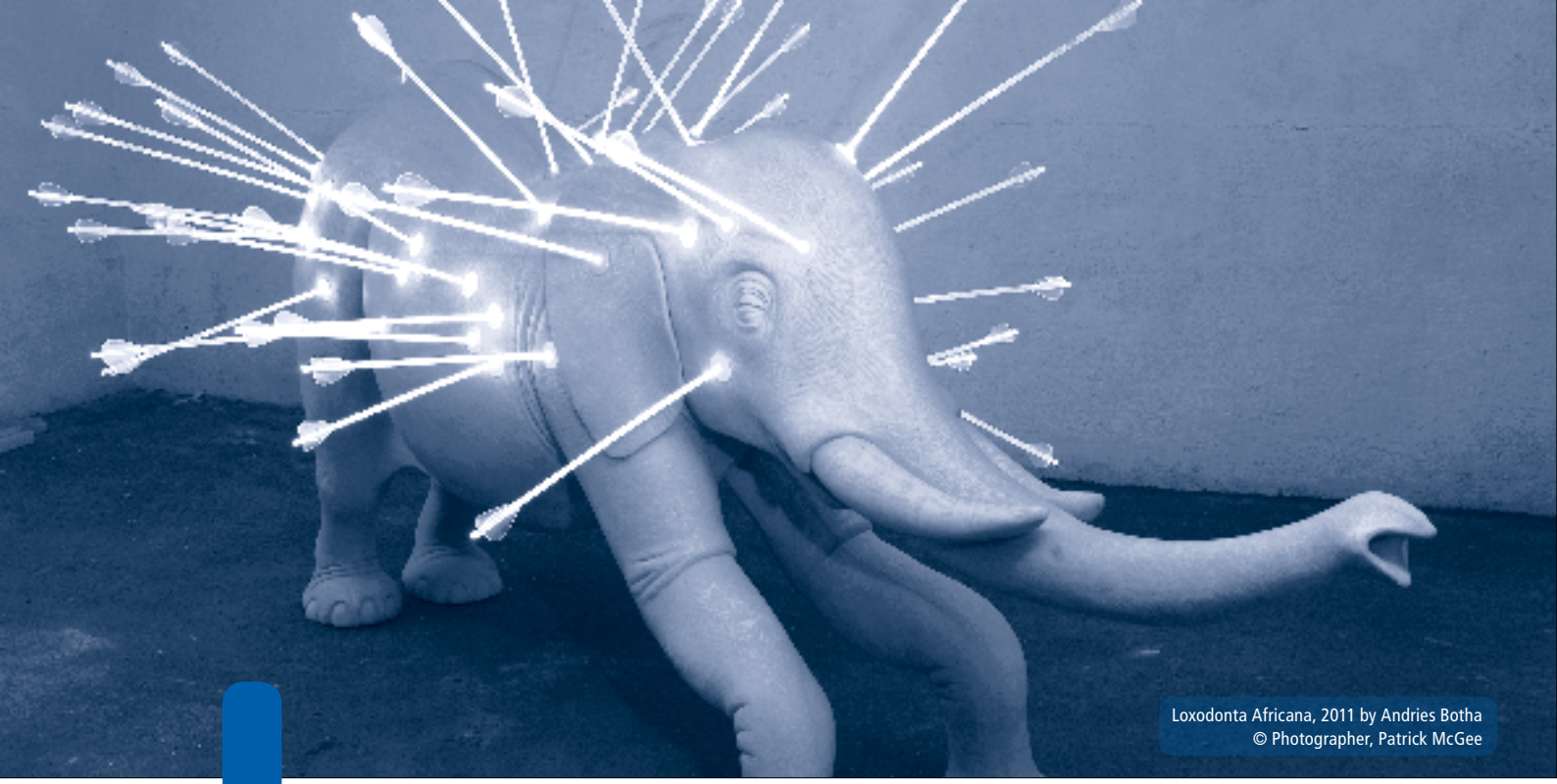
The realization of such transdisciplinary, open knowledge processes involves significant challenges and opportunities for the scientific community, and for those responsible for organizing, funding, evaluating and rewarding research. It calls for a fundamental transformation of the institutions and practices of science itself.

The social sciences and universities have a moral and practical imperative to take on the problem-solving mantle more actively. Universities are critical and unique aggregations of the cross-disciplinary knowledge needed for sustainable development solutions .... Many have started down that path, often organizing multidisciplinary teaching and training initiatives on sustainable development. Much more can and should be done in this regard. (Sachs)

Conclusion: elevating complexity, context and culture

Part 1 of the *World Social Science Report 2013* provides integrative perspectives on the complexity and urgency of global environmental change, through a social science lens. It looks at its multiple drivers, its variable outcomes, its roots in the worldviews and value systems underlying individual behaviour and social practices, and at its connectedness to a host of other social problems. The contributions here open up possibilities for steering society away from the disastrous future scenarios that many assume to be inevitable.

This change in direction towards global sustainability involves research and actions that are a shared responsibility in which all the sciences have a key role to play. The insights of traditional social sciences have often been dismissed as value-laden, contextual, and therefore unreliable. Yet attention to context and values may be precisely what is needed to lead humanity out of its current predicament. The growing engagement of the social sciences in global change research is a sign of their readiness to deliver. This engagement now needs to be accelerated.



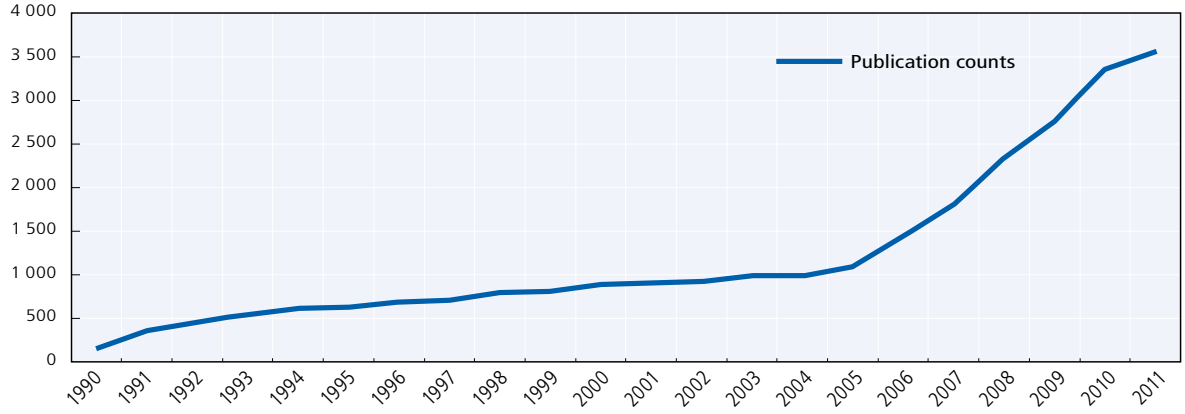
Loxodonta Africana, 2011 by Andries Botha
© Photographer, Patrick McGee

Part 2
Social science capacity in global environmental change research

The social sciences are increasingly expected to play a role in analysing the urgent problems of global environmental change, and in suggesting solutions. But do they have the capacity to do so? Part 2 analyses the state of social science research on global environmental change in different parts of the world, and its capacity to address the many complex issues that environmental change raises.

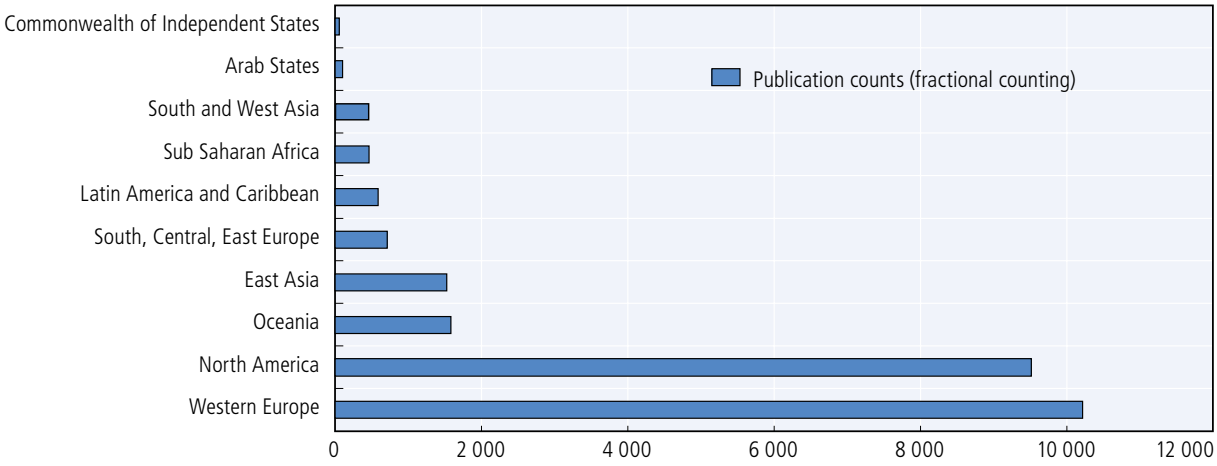
Social scientists in the United States and Europe have been studying global environmental change for several decades. But the emergence of climate change as a global issue in the 1990s – before and after the Rio Earth Summit of 1992 – stimulated rapid growth in this area throughout the world (Figure 3). Since 2005, the number of publications on climate change and global environmental change in social science journals indexed in the Web of Science (WoS) has increased rapidly. Researchers in environmental studies, economics and geography published most on these themes during the period 1990-2011, while other

Figure 3 • Number of social science publications on global environmental change over the years 1990-2011



Source: Web of Science. See Caillods (Figure 13.1) and Waltman, for information on methodology used and definitions in World Social Science Report 2013.

Figure 4 • Number of social science publications on global environmental change per region 1990-2011



Source: Web of Science. See Caillods (Figure 13.2) and Waltman, for information on methodology used and definitions in World Social Science Report 2013.

social sciences such as political science, sociology and psychology have lagged behind.

A regional divide at least as big as for the social sciences overall

Regional disparities in the volume and visibility of social science research, as highlighted by the number of publications registered in the WoS, are formidable. Europe – particularly Western Europe – produces the most publications, followed closely by North America (Figure 4). Far behind, yet with a significant production, come Oceania and East Asia. Further behind still are Latin America, sub-Saharan Africa, and South and West Asia. The figures for two regions are particularly low: the Arab States and the Commonwealth of Independent States. These two regions are strongly affected by global environmental change, but their economies are highly dependent on the sale of oil and gas.

> *Most of the progress in [US social science on global environmental change] has been brought about not by top-level interventions [such as the Congressionally mandated America's Climate Choices study, 2009-2011] but through bottom-up achievements in social science and multidisciplinary scholarship. (Wilbanks, Dietz, Moss and Stern)*

Even within regions, considerable differences exist between countries. The countries producing the largest number of publications on global environmental change are the United States (by far) and then the United Kingdom. Next – but far behind – are Australia, Canada, Germany and the Netherlands.

Outside Europe and North America, we find that Australia, the People's Republic of China, India, Brazil and South Africa are the most prolific centres of research on global environmental change in their regions. This is not a surprise since these countries generally have the best-resourced science systems in their regions. It is worth noting that in the past 20 years, China has seen the fastest growth in social science research on global environmental change.

Explaining the disparities in social science capacity between regions and countries

Four factors seem to explain the wide regional differences in the number of social science publications on global environmental change.

- **A lack of funding** for social science research in general and social science research on global environmental change in particular, especially in Southern countries;
- **A lack of institutional support** for social science research on global environmental change. In most Southern and emerging countries it enjoys virtually no dedicated funding, and institutional support is limited. Russia and India invest heavily in science and technology research, but devote far fewer resources to the social sciences. Even China, which has recently changed its policy in this respect, supports only a limited number of social science research projects on climate change. Bilateral and multilateral development agencies make up for this shortfall to a limited degree through specific and short-term project funding in South Asia, the Arab States and Africa. While capacity building is the main reason for such support, it also

allows them to influence research agendas in these countries. In Europe, on the other hand, and to a lesser extent in the United States, there is a diverse and layered structure of funding schemes at regional and national levels, from public and private sources;

Until two years ago, there were relatively few local initiatives to study the likely impacts of global environmental change; any that did exist were undertaken by natural scientists, and had scant impact on public opinion or governments. (Serageldin)

- **A lack of incentives to do research** encourages African, Indian or Latin American scholars to seek better opportunities elsewhere. This problem is not specific to global environmental change;
- **A lack of interest among social scientists themselves** in global environmental change, a subject which is often considered a biophysical science issue. Many social scientists prefer to study topics such as economic growth and development, poverty alleviation and the reduction of inequality, which are considered more central to the core of the traditional social sciences.

Global environmental change is low on the list of priorities for policy makers in Latin America and the Caribbean ….. [S]ocial science research on global environmental change in the region is still in its infancy. (Postigo, Blanco Wells and Chacón Cancino)

Topical interests of social scientists

The variety of global environmental change issues investigated by social scientists in the United States and Europe is considerable. They include the causes and effects of global environmental change on communities, as well as societal responses to such change. Researchers work at local, national and global levels, and deal with both specific and cross-cutting issues. They devise new theoretical frameworks and paradigms as well as new methodologies. The scale and diversity of this knowledge production underlines the domination of North Atlantic research in this area. In Southern countries, the topics researched reflect the environmental problems encountered in different regions. These include the effect of glacier melting and permafrost thawing, hurricanes, the consequences of sea level rise, land ownership, land grabbing and land use, desertification, drought and food security.

Notwithstanding [a] strong development focus, there seem to be few detailed, nuanced in-depth studies of global environmental change in sub-Saharan Africa from African social science perspectives that include local knowledge, local 'framings' of climate change and variability, power and justice. (Vogel)

Conclusion: building capacity and accelerating the move toward interdisciplinary research

The social sciences have grown beyond traditional disciplinary boundaries in most developed countries. Interdisciplinary research is increasing across the social sciences and with the natural sciences, and is encouraged by funding agencies. In Japan, for example, interdisciplinary research has been very much promoted since the triple Fukushima disaster, which cast doubt on natural science's capacity to anticipate or solve problems. Outside developed countries, however, interdisciplinary research is still rare.

The social and biophysical sciences have not built shared research questions, common methodologies or epistemologies, so disciplinary barriers are prevalent. Universities do not create interdisciplinary programmes … or train students to engage in multidisciplinary research. (Revi and Sami)

However, research involving local people and non-academic stakeholders has been practised in Latin America and Africa for some time. Researchers in the North could learn from these practices as they seek to engage at the science–policy–practice interface.

The articles in Part 2 highlight the many barriers to increasing social science knowledge on global environmental change. Some are common to social science research in general, while others are not. Disciplinary associations, universities and funding agencies should take up the challenge and promote social science research on global environmental change more actively.

Three Elephants, 2010 by Andries Botha
© Photographer, Patrick McGee

Part 3
The consequences of global environmental change for society

Part 3 identifies the current and future consequences of global environmental change for people and communities, paying special attention to the poorest and most vulnerable. Understanding how global environmental change will impact different groups and sectors within societies is essential to improving current policy measures and designing effective solutions.

What are the consequences of global environmental change?

For many, global environmental change is still an impenetrable and distant idea. For others it is already a lived reality. Droughts are killing crops and undermine farmers' livelihoods; storms wipe out homes occupied by families for generations; and biodiversity has been destroyed, leading to the loss of food, clean water, medicines and beauty.

Part 3 gives examples of global environmental change impacts from around the world, including droughts in China and North Africa, floods in Nigeria, and biodiversity loss, coral bleaching, extreme events and disasters more generally. These contributions illustrate how the consequences of climate and environmental change for society can be both direct and indirect. Direct impacts may entail familiar hazards becoming more frequent or severe. But there are also challenges that are new, or that appear in previously unaffected regions. Indirect impacts include changes to underlying biophysical systems which alter the provision of environmental benefits to society (so-called ecosystem services), affecting the basis of social and economic activities.

Vulnerability and adaptive responses to environmental change

Contemporary analysis of the consequences of climate and environmental change is concerned with the factors underpinning risk, vulnerability and human resilience, and how these are perceived, framed and managed in different social contexts. Rooted in the longstanding fields of environmental and natural resource management, and hazard and disaster risk management, social science insists that people cannot understand the risks and benefits that arise from the environment without understanding their own role in causing, making sense of and responding to them. Part 3 highlights insights and challenges for social science and integrative research on the consequences of environmental change.

The importance of choice and capacity

People's choices are important in responding to global environmental change and in building capacity to moderate their experience of hazardous events. However, environmental change can itself impinge on people's ability to respond. Migration is a good example of an adaptive response that could moderate the consequences of global change. While it could help people escape environmental degradation and associated risks, it also alters the location of economic activities. At the same time, migration will itself contribute to environmental change, which in turn affects the spatial distribution of environmental risks and thus feeds back into the motivation to migrate. In addition, vulnerable populations might not have the resources, legal rights, networks or information needed to migrate, and may face greater exposure than others to the consequences of global environmental change.

Unequal access to migration as an adaptive strategy raises wider empirical questions about how issues of poverty, marginalisation and inequality affect adaptive strategies, such as migration. (Baldwin and Gemenne)

Building adaptive capacity

Adaptation is the proactive or reactive, planned or ad hoc, attempt to minimize the harm or maximize the benefit arising from climate change. It is needed most, and is most cost-effective, where risks associated with climate change result in economic vulnerability, even in the short term. Women and indigenous peoples are often particularly vulnerable to change, but can also play essential roles in adaptation. Higher levels of economic development are often crucial to ensure higher adaptive capacity.

Improving vulnerability assessments: absolute and context-sensitive indicators

By exploring the linkages between biophysical, social and economic systems, the social sciences offer an essential contribution to our understanding of vulnerability and of people's capacity to cope and respond to risk and change. In the quest for more reliable interventions to reduce risk and vulnerability, many researchers attempt to define them absolutely, for instance as a basis for standard setting. Such studies often use relatively common, geo-referenced socio-demographic information to identify the most vulnerable groups. Others contend that such data are inconclusive, and instead, focus greater attention on the extent to which risk, vulnerability and resilience are shaped by the social relations and context in which they emerge.

Despite the recognized importance of women in responding to climate change consequences, they are largely absent from decision-making processes on climate change adaptation and disaster risk reduction. (Chimanikire)

Understanding scale dependency of risks and policy interventions

The ways in which social and environmental factors interact to create risk, vulnerability and resilience are specific to place and context. Social and economic change itself is often an important driver of vulnerability and resilience, with climate and environmental change playing not a leading but a reinforcing role. Because of societies' variable social basis, and because climate and environmental change are not uniform, risk, vulnerability and resilience are highly differentiated on social, spatial and temporal scales. It remains difficult for scientists to aggregate countless case studies into overarching conclusions, just as it remains problematic for policy makers to design effective, context-sensitive interventions on the basis of overall indicators of risk, vulnerability or resilience.

Conclusion: improving understandings of the consequences of environmental changes in diverse social contexts

With more than 7 billion people on the Earth already, humanity has the economic and technological power to alter the planet, and in turn is being impacted by these changes in myriad and complex ways. Much remains to be understood about the consequences of environmental change as they unfold in the specific social, economic, political and cultural contexts in which people live. A few degrees of warming will affect wealthy developed communities differently than poor or indigenous ones. The social sciences must help untangle the processes by which global environmental change affects societies, and thus help them to respond to it in context-sensitive ways.

Nomkhubulwane, 2009 by Andries Botha
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Part 4
Conditions and visions for change and sense making in a rapidly changing world

Part 4 focuses on understanding the conditions that drive or support social change in response to environmental change, and on how individuals and societies make sense of change around them. It shows the important progress made by the social sciences, but also points to the challenges that remain in understanding social change and in making this knowledge useful and actionable for decision makers.

Visions of change

Part 4 begins by looking at visions of change: the images and stories of a future we may want to strive for and that may inspire and guide us. Some may be apocalyptic and motivate through fear. Others are positive, maybe utopian. The ones offered here are positive visions that do not break with past paradigms and dominant beliefs, but which instead represent continuations and evolutionary enhancements. Such cultural narratives are seductive, socially reinforced and powerful, especially in a time where many trends are not encouraging.

Fostering a green economy

The green economy, for example, potentially provides an inspiring, positive vision of the future that is inclusive of North and South. It describes a future in which people benefit economically from transitioning to a low-carbon, efficient economy without degrading environmental and social conditions. Yet how incremental or radical a socially emancipatory green economy really is will depend on nations' interests, willingness, and commitment to making the necessary tough choices.

> *Will the scale of change from business as usual be sufficient to prevent excessive global warming and other environmental catastrophes, bearing in mind continuing population growth and pressures to increase consumption? (Turok)*

Promising changes in technology

Nanotechnology also promises technological advancements that create a better future, but it is important to take a critical look at the possibilities it offers. Green chemistry, another example discussed here, is a design philoso-

phy in which the production, use and disposal of chemical substances no longer results in toxic hazards.

The social sciences could help economists, engineers, chemists and other scientists, and the policy makers who shape their action space, to become more reflexive about the opportunities and risks embedded in these visions. They can help produce more socially robust knowledge, superior technological design, more effective communication between industry and citizens, and greater policy support among stakeholders. They can help subject economic policies, technologies and related social interventions to critical social analysis.

Conditions for change

What motivates behavioural and social change, what are the barriers, and how does change happen? Perspectives in this part of the Report range from the individual, household and local levels to the national, international and global or systemic levels. They suggest that the social sciences actually do understand much about how complex and embedded human behaviours and practices are, and why and how they can be changed.

Environmental issues are not the top concern [for people surveyed] in any country/region … Many people believe climate change will have impacts in the future rather than today, while others believe the effects are mostly happening elsewhere. (Smith)

Facilitating behaviour change

Evolutionary psychology looks at the deepest causes of human behaviour, adding considerable explanatory power to our understanding of why humans think and act the way they do, and how interventions to change behaviour can be made more effective. Equally important is an understanding of household dynamics, everyday practices, and linkages between individuals and wider influences. These insights uncover possibilities for more effective behaviour-change interventions. The individual, structural and cultural obstacles to behaviour change at the neighbourhood and community levels (for instance, in household recycling in China) are critical, as are the social and economic benefits that can motivate behaviour change and support empowerment and social change (as shown in waste recovery efforts in Brazil).

Working against evolved human nature guarantees low effectiveness, while working with it increases the likelihood of intervention success. (Vugt)

Addressing path dependencies in sociotechnical systems

A systems perspective on the carbon-intensive sociotechnical systems that underlie the 'Western lifestyle', and on the potential to halt and reverse their environmentally destructive momentum, shows how the path dependencies in these systems constrain the options and effectiveness of individual behavioural choices. The way out of such system lock-ins may be to develop a vision of feasible and attractive low-carbon lifestyles, and make examples of them visible, to assist the replacement of outdated behavioural models with more sustainable ones.

Social scientists' insights suggest that there is no single all-determining independent driver or scale on which to initiate social change. Nor is there any monopolistic constraint on change. Instead, change is always the result of complex interactions. It is influenced by multifaceted motivations and barriers, as well as direct and indirect feedbacks from the social and natural environment. No single intervention, and certainly not the provision of scientific information alone, will suffice to bring it about.

Making sense of change

Sense making takes place as each of us is embedded and steeped in social and cultural environments that reinforce some values and worldviews, and contest or reject others. Much remains to be learned about how rapid environmental and sociotechnical change will affect our ways of sense making, and how these social processes interact with personalized experiences and psychologies.

Sense making through cultural filters

How individuals perceive, understand and interpret what is happening in their environment is strongly conditioned by the values, beliefs and worldviews they hold. These personal and collective values, beliefs and worldviews also underlie people's experiences of global environmental change and their response – or lack of response – to it. Existing and emerging social science research on the psychological and social processes that shape and change cultural values and worldviews on the environment is critical to a better understanding of these processes of sense making.

Changing attitudes toward environmental change and policy

Cross-national surveys of opinions and attitudes toward environmental issues, including climate change, show limited concern for environmental issues in general. The exception is climate change, which has risen to the top of concerns in many countries. Many studies have shown that positive attitudes and concerns are essential but insufficient to guarantee political or behavioural engagement, given the barriers that exist and the common observation that individuals tend to pass on responsibility for tackling climate change to policy-makers.

Banking on social discontent, aspirations and education

Some surveys point to 'useful' social discontent, particularly among youth, and to the importance of education in shaping the values of future generations from an early age. Both can help redirect preferences and inclinations, while instilling empowering skills to enact them. It is important to understand young people's concerns, interests, aspirations, fears and hopes for the future, and the barriers they face to living more sustainable lives. UNESCO's educational efforts hint at the possibilities of affecting young people's abilities and aspirations.

> *We need to understand the youthful visions of more sustainable lives, and the challenges that confront this rising urban generation. (Abbas et al.)*

Conclusion: integrating explanations of social and behavioural change across scales and disciplines

Insights into the visions and conditions of change show that no single discipline or level of investigation can capture the complexity of how social change occurs. The story emerging from the contributions here is one of individuals richly and dynamically embedded in households, communities, sociotechnical systems, economies and cultures. It goes a long way toward explaining the paradox of how the social drivers of global environmental change persist, or at least change only slowly, while environmental crises continue to unfold rapidly. Nonetheless, more research is needed on the power and embeddedness of individuals, and on the cross-scale connections between them in processes of social change.

Similarly, there is a need to better understand how both deliberate and unintended social changes unfold. For example, the power of participation, social capital and community engagement at small scales is well established, but why is there not more investment in proven ways of empowerment and social capital building? How can they be scaled up? Is there a social tipping point beyond which transformational change can occur? Is an overarching theoretical framework for social change useful, showing ways in which change processes at different levels of social organization are linked together?

There are important knowledge gaps to close through closer collaboration and integration of the mainstream social sciences with subdisciplines which are currently considered marginal to the core. Such integration could reveal deeper drivers of change and sense making, as well as the inadequately considered power dynamics of everyday life and big-stage politics. Finally, there is significant opportunity in the social sciences working more closely with the humanities, for example to better understand historical social change processes and the power of cultural narratives in motivating, blocking and interpreting social transformation.

You can buy my heart and my soul, 2006 by Andries Botha
© Photographer, Jean Debras

Part 5
The responsibilities and ethical challenges in tackling global environmental change

Part 5 illustrates how global environmental change threatens fundamental values, and how action (or inaction) to address it raises serious concerns over ethics and responsibility.

Ethical challenges of global environmental change

Global environmental change raises deep challenges to ethics and equity. It is inextricably linked to underlying differences in socio-economic conditions, making it especially dangerous for those who are already overwhelmed by existing economic and social problems and who have only limited capacity to defend themselves against the losses and harm that environmental change may bring. There are several reasons to consider that global environmental change should be a matter of ethical responsibility:

- Different segments of society vary in the extent to which they have contributed to environmental change and degradation, and in their reasons for doing so. This raises the issue of fulfilling basic needs as opposed to meeting luxury expectations;
- The consequences of global environmental change are unevenly and often unfairly distributed;
- The capacities to respond to the consequences of environmental change are unevenly distributed;
- Assuming responsibility for harm caused may derive from a 'polluter pays' principle, a commitment to general harm prevention, or from humanitarian solidarity with the most vulnerable;
- Greenhouse gas emissions remain in the atmosphere for years to centuries, creating problems for future generations. This raises issues of intergenerational justice;
- The mitigation of greenhouse gas emissions might require the adoption of technological interventions and market mechanisms that affect the environment or the economy and involve unequal burden sharing within societies. Examples of technological interventions to mitigate climate change that raise ethical issues include geo-engineering and nuclear energy.

Poor people are the most vulnerable to climatic change and contribute relatively little per capita to greenhouse gas emissions. Similarly, future generations have not yet contributed to climate change but are expected to suffer from its effects. (Vanderheiden)

Equity issues

Many argue that the uncertainties that surround global environmental change should not eliminate the ethical obligation to act sooner rather than later, especially because the potential costs or losses may not be fairly compensated by subsequent responses. Others argue that future societies will be richer and thus more capable of dealing with environmental challenges if and when they unfold. Practitioners and policy makers may be tempted to postpone politically inconvenient and possibly expensive action, but will also need to understand the ethical implications of their choices.

Two main types of equity are discussed through a variety of examples in Part 5:

Confronting distributional equity

Distributional equity refers to how fairly the impacts of environmental change are distributed, spatially, temporally and between social groups. The concept can also be applied to a particular project or set of activities undertaken in response to environmental change, or indeed to entire developmental paths. Some authors who focus on distributional equity are concerned with the harms associated with large-scale landscape modification and resource extraction in different parts of the world. Others are concerned with intergenerational equity, discussing the relation between the increase in greenhouse gas emissions and the problems this will cause for future generations, including problems caused by efforts to mitigate climate change. Sustainable development is also concerned with intergenerational equity, given the common notion of meeting present needs without undermining the ability of future generations to do the same. Some therefore suggest that ethics should be the core driver of sustainability.

Integrating procedural equity into decision making

Procedural equity refers to the fairness of the procedures used for policy and decision making, in this case in the context of global environmental change. The critical issues here are the determination of legitimate interests, the process by which they are considered, and the allocation of rights and responsibilities among relevant parties.

In relation to procedural equity, authors in Part 5 stress the importance of effective public engagement in decision making. Involving previously under-represented groups such as indigenous peoples and women in research and decision-making improves procedural equity, and in many instances enhances buy-in and policy outcomes. Decision-making procedures for technocratic solutions such as geo-engineering are another good example in which procedural equity comes to the fore.

Solving the climate crisis calls for an iterative learning process where new co-created knowledge is constantly being fed into policy processes and tested. (St. Clair)

Conclusion: addressing the ethical challenges of global environmental change

Global environmental change raises many challenging ethical issues, especially those concerned with fairly sharing the benefits and burdens of climate change, and with related policy responses. Social scientists can offer methods and evaluative systems to help identify the values underlying such choices, and can help to understand the trade-offs and identify policy mechanisms for sharing rights and responsibilities fairly. They can also help identify opportunities for safeguarding the most vulnerable from serious risks, and ways to stimulate intergenerational solidarity and justice.

Social science research can foster public engagement in decision making, build scenarios for alternative futures under incomplete information conditions, improve understanding of the social impacts of natural resource exploitation, and assess the effectiveness of cooperation between different stakeholders. In this way, social scientists can help policy makers and the public grasp the ethical dimensions of global environmental change, and so assist in the development of more equitable and just solutions to environmental change and sustainability challenges.

You can buy my heart and my soul, 2006 by Andries Botha
© Photographer, Mich de Mey

Part 6
New approaches to governance and decision making

Part 6 presents key challenges in environmental governance and decision making. The contributions examine the role of the social sciences and other types of knowledge in the governance of environmental change and sustainability.

The central problem of environmental governance

The question of how societies manage, or fail to manage, the imbalance between private goods and public 'bads' is the central problem for environmental and sustainability governance. Over time, sustainability governance issues have expanded from the local, tangible and immediate (such as urban water pollution) to the distant, intangible and delayed (such as stratospheric ozone depletion and climate change). Such complex, systemic problems are always imperfectly understood and have no easy solutions.

Authors in Part 6 discuss how to co-design and co-produce knowledge and policy to address such 'wicked' problems; where decision-making power should reside for problems that are at once local, regional and even global; and the conundrum by which the scope, scale and speed of governance may not match the pace and complexity of environmental change. This gap may leave society with inadequate, incremental responses to a situation where transformative change is needed.

Co-designing and co-producing knowledge and policy

The natural sciences, and increasingly the social sciences, have played an important role in defining sustainability problems and environmental risks. Yet science alone cannot adequately define these problems or the solutions to them, partly because they mean different things to different people, and partly because science does not have universally accepted legitimacy for doing so. To make the knowledge claims underpinning environmental governance more salient and legitimate, social scientists have brought greater attention to the need for co-production of knowledge by scientists and the users of knowledge.

The co-design and co-production of science and policy calls for new procedures. This task needs to be undertaken in ways that facilitate the development of more appropriate problem framings and the production of robust knowledge claims, while also supporting mutual learning and problem solving. Effective leadership, and adequate resources for the facilitation of inclusive and participatory processes, are essential.

Including indigenous and local knowledge in policy making

In engaging with public debates about climate and environmental change, science and scientists have become entangled in social controversies. Disagreement is fed by

the complexity of the causal mechanisms involved and by a lack of consensus about the scientific evidence base for many of these problems and their solutions. These disagreements point to the fact that other sources of knowledge and experience are essential for policy making and action. These include knowledge systems embedded in the cultural traditions of indigenous, traditional or local communities. Several authors underline the importance of indigenous knowledge and local communities in the co-design of research and policy.

Part 6 presents several cases of local communities becoming increasingly involved in joint investigations with social and natural scientists to analyse the implications of environmental change and in the design and negotiation of acceptable solutions.

> *It is ... important to go beyond the seeing is believing attitude typical of current evidence-based approaches to policy making. The accounts of the people who face environmental problems directly should also be accepted as valid. (Rajao)*

Balancing top-down and bottom-up governance

While the state has traditionally been seen as the guarantor of public and collective goods, there is now a growing role for the private sector, civil society, citizens and consumers. This shift from government to governance is important for social science's understanding of who governs and how governance happens. As the role of government is redefined, there are new practical questions about how the vitality and capacity of various groups in society can be aligned to achieve sustainability goals, while ensuring openness and equity in the distribution of environmental goods and bads.

Top-down governance processes can set overarching policy directions and address large-scale drivers of environmental change, but they often fail because they are ignorant of realities on the ground and are not sensitive to local capabilities, perceptions and interests. Bottom-up, participatory approaches, by contrast, are intended to lead to legitimate and effective decisions, but can get stuck because they do not have the power, legitimacy or scope needed to achieve change. This dichotomy has become particularly acute in the context of sustainability, where problems and solutions must often span different scales of governance. It remains a challenge to find the right combination of top-down and bottom-up governance, and the right public, private and public–private arrangements to go with them.

Recognizing the role of grassroots organizations and social movements in governance

Non-governmental organizations and social movements are crucial actors in governance through their role in shaping policy agendas, raising public consciousness about environmental problems, monitoring environmental quality, and exposing bad government and business practices. Grassroots organizations and social movements have called attention to environmental problems, informed policy agendas through analysis and outreach, used law, and influenced governance to create greater environmental and climate justice.

> *Existing decision-making systems are reluctant to recognize that those social groups with less political influence are likely to feel the effects of anthropogenic climate change most intensely. (Ioris)*

Effective and fair responses to anthropogenic climate change require the organized reaction of marginalized communities and social groups. Social science research suggests that their participation in policy making, and alliances with other movements around the world, can foster creative social learning and contribute to substantive political and economic transformation.

Matching the speed of governance with the pace of environmental change

Part 6 is also concerned with the pace and scope of governance. Many social organizations, including governments, favour incremental change. But many of the greatest challenges now call for a more fundamental and farreaching transformation of social systems. The prospect of global environmental change – and the major, long-term risks associated with it – has generated a new debate about how to stimulate and govern radical social and economic transformations over the longer term.

Conclusion: understanding and supporting effective environmental governance and transformation

Understanding how to encourage radical novelty, build transformative capacity, remove obstacles to transformation, dismantle old systems, and create and embed sustainable forms of governance of environmental challenges is both a huge research and major social challenge. Social science can contribute to a better understanding of crisis and strategic responses to it; of normative perceptions; and of profound societal changes from the local to the global scale. This understanding can help strengthen the possibility of an intentional and broadly acceptable transformation to low-carbon, sustainable and just societies. While much is to be learned from history, it is not easy to understand and shape transformative change while society is in the midst of it. The social sciences can assist in this task by simultaneously engaging with, and standing back from, change as it happens, to provide insights, impetus and perspective.

Wounded elephant, 2008 by Andries Botha
© Photographer, Jimmy James

Key messages and recommendations
Global environmental change changes everything

The reality that emerges from this *World Social Science Report 2013* is that global environmental change changes everything. It is the 'elephant in the room' that can no longer be overlooked. Global environmental change alters our life support systems, the very basis of life that humans depend on. In myriad, differentiated ways, it affects humanity's chances of survival, people's livelihoods, ways of life, and their actions and interactions. It changes everything for those making decisions about the human-made and natural environment, and for those trying to understand, scientifically or otherwise, the profound changes unfolding around us.

Given this reality, current demands for scientific relevance are unprecedented and relentless. Science is expected to provide better understanding and more precise predictions of the challenges societies face, and to accelerate the delivery of relevant, credible and legitimate knowledge that can inform solutions to the world's accumulating sustainability crises.

Transformative knowledge for global sustainability: a new charter for the social sciences

The call on science to make a difference speaks to the social sciences no less than to the natural, physical, human or engineering sciences. The concrete environmental challenges that societies face – water scarcity, the loss of biodiversity, the transition to a low-carbon society, food security, or greater preparedness for extreme events – are shared challenges, requiring joint scientific effort and priority setting.

The Report uses the framework of transformative cornerstones of social science research for global change, and provides a rich set of examples of social science work on different environmental challenges, from different parts of the world and from different disciplines. It shows what the social sciences are already contributing, but also highlights where and how social science research needs to be strengthened and accelerated.

For many social scientists that need is self-evident; for others it remains difficult. Many in the social sciences still consider environmental issues – even those that threaten the very foundation of modern society – marginal to the core of their disciplines. Others prefer to stay away from what they see as policy-relevant and sometimes politicized issues and subjects. Meanwhile, many in the physical, natural and engineering sciences still cannot see the importance of social science insights to real-world solutions. And many decision makers do not know what the social sciences could bring to help solve their day-to-day challenges.

What then is needed? From the Report's many and varied contributions emerges a call for a new kind of social

science for sustainability, one that must draw on the well-honed traditions of classic social science research while also striving to transform itself to be:

- **bolder** in reframing and reinterpreting global environmental change as a fundamentally social process;
- **better** at infusing social science insights into real-world problem-solving;
- **bigger**, in terms of having more social scientists to address the challenges of the Anthropocene head on; and
- **different**, in the sense of reflecting upon and changing its own ways of thinking and doing science – its theories, assumptions, methodologies, institutions, norms and incentives – in order to contribute more effectively to meeting the vexing interdisciplinary and cross-sector challenges that society faces.

The Report issues an urgent call to action to the social sciences, and to their supporters, funders, collaborators and users, to make this bigger, better, bolder and different social science a reality.

What this would require is crystallized into four key messages, accompanied by a set of high-priority actions for social scientists and their stakeholders.

Frame the change

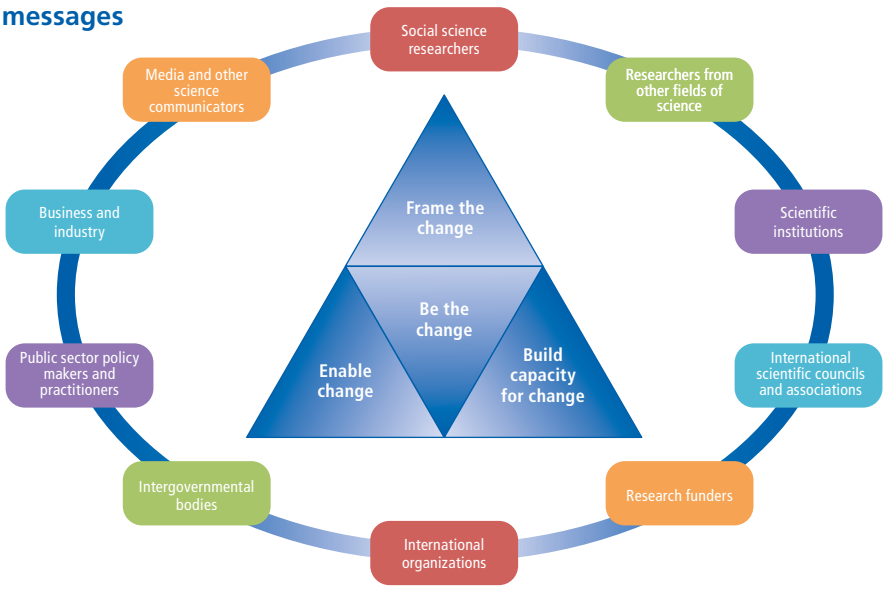
For the past few decades, the physical and natural sciences have led the way in detecting, diagnosing and framing the challenges and solutions for every type of global environmental change. They have provided a particular lens through which to view and understand the problem, and have shaped the ways in which policy makers and society at large think about its causes, consequences and solutions. Yet these frames obscure the social, economic, political, cultural and ethical nature of the issues at hand, and the role of people, behaviours, practices and institutions. They also limit which analyses and solutions are deemed possible and relevant.

The social sciences must help to fundamentally reframe climate and global environmental change from a physical into a social problem.

An important first step for the social sciences is to claim the space of the problem framers. Authors in this Report find repeatedly that the problems raised by global environmental change cannot fully be grasped without understanding the human drivers of change. Nor can the importance of such problems be judged without understanding what they mean for people and in what contexts they unfold. For example, sustainability challenges, including the eradication of poverty, cannot be solved without understanding human aspirations, institutional constraints, social conflicts, value choices and power dynamics. Likewise, the resilience or collapse of systems cannot be understood by measuring temperature increases, predicting earthquakes or tracking tropical storms alone.

For social scientists, claiming the right to frame these issues through a social lens will involve transdisciplinary approaches that engage stakeholders, decision makers and other scientists. This approach will allow them to show that this refocusing makes broader and more effective solutions possible, and will ensure that the implications of global environmental change are meaningful to affected communities.

Figure 5 • The four main messages



Source: Figure 2.1. See Susanne Moser, Heide Hackmann and Françoise Caillods in World Social Science Report 2013.

Priority action steps

- **Redefining global environmental change as a social problem.** The broader social science community, including researchers, the institutions in which they work, international scientific councils and associations, and research funders, should promote the understanding that global environmental change is a priority domain par excellence for the social sciences, and that more social science is required, as well as more integrated research that includes the social sciences;
- **A proactive effort to meet growing demands for social science knowledge.** Social scientists in academic institutions, civil society organizations, government or business should strive to meet the ever-growing demand for social science knowledge on global change and sustainability, and take the lead in deepening understanding of global environmental change as a social problem requiring social responses;
- **Critical assessment and reshaping of social science approaches.** Social scientists need to develop new concepts, tools and methods, and modify their existing ones, to better understand the dynamics of complex social-ecological systems, and to reveal the connections between environmental, socio-political, economic and cultural vulnerabilities and crises;
- **Inclusive development of research agendas and projects.** Everyone concerned with designing and delivering research agendas, programmes and projects needs to ensure that social scientists are included from the beginning to identify socio-environmental priorities and ensure the success of a solutions-oriented, integrated science of global change for sustainability;
- **More social science advisors.** Decision makers at all levels, in the public and private sectors, and in international, intergovernmental and civil society organizations, should prioritize the appointment of social scientists from all disciplines to scientific advisory bodies, expert committees and working groups intended to provide counsel on global environmental change and policy responses to it.

Enable change

The pace of global environmental change is rapid and accelerating, yet societal responses remain sluggish. The Report suggests a widening disconnect between the pace at which environmental conditions worsen and the speed at which society tries to slow, halt and reverse these trends, or merely attempts to keep up with them in preparing for a radically different, more dynamic and less predictable world. This gap must be closed if society wishes to avoid an increasing risk of serious disruptions. The social sciences can and must respond to this call through solutions-oriented research.

A solutions-oriented social science would help society rethink the shape and course of social systems, to contest them, to connect disparate insights on levers for change, and inform and provoke action for deliberate transformation.

The contributors to this Report begin to point the way. Here social scientists reveal the range of forces and historical dynamics that are at play at different levels of social organization to create vulnerability. They help represent the voices of unheard groups and individuals, and offer social diagnoses of situations that account for the subjective, systemic and cultural dimensions of human behaviour. The social sciences dissect seemingly intractable political dilemmas and help discern how people make sense of the world around them. They inform behaviour-change campaigns and help design effective educational and empowerment programmes. Social scientists also bring to light opportunities for engagement with youth, and ways to break vicious cycles of poverty, marginalization and environmental degradation.

The Report makes the case that social science's engagement in solving global problems should go beyond what has been achieved to date, and that social scientists should be leading the engagement with decision makers more than at present. While engineers and biologists, public health experts and hydrologists will continue to be needed, social scientists have to become central players in the quest for solutions that work for people and the planet.

Priority action steps

- **Identifying strategic opportunities for science–policy–practice engagement.** Working with their colleagues in the natural, engineering and human sciences, social scientists must become better at identifying strategic opportunities to align research with knowledge needs in global change and sustainability. International scientific councils such as the ISSC, and organizations such as UNESCO, should combine their scientific and political convening powers more effectively to create and facilitate such opportunities;
- **Leadership in transformative research.** Social scientists should take on the challenge of getting involved in and leading research, development and demonstration projects and programmes that focus on social transformation and innovative sustainable development. This

will include the conception, design and assessment of new technologies, programmes and policies before their implementation, to minimize the risk of unsustainable path dependencies and maladaptation;

- **Working with society.** Collaboration between scientists, policy makers and practitioners, community and business representatives, civil society organizations and the media throughout the research process is crucial to fostering solutions-oriented social science. These processes should be championed by international scientific councils and organizations, and need to be factored into the funding, management and evaluation practices of research funders and scientific institutions;
- **Promoting the use of context-sensitive evidence.** Decision makers engaged in evidence-based policy making must recognize that information derived from natural science and economics contains many uncertainties and is often based on flawed assumptions about people and societies. Evidence must include context-sensitive and qualitative social science knowledge about the human world, including its cultural, socio-economic and intellectual diversity;
- **Social observation systems.** Global systems for monitoring, analysing and sharing social science information must be developed and funded sustainably through the joint efforts of scientific institutions, funders, and international scientific councils and organizations. This will allow small-scale, place-based social science studies of people's experiences of and responses to environmental change to be used on the national, regional and global scale for comparative research and policy purposes.

Build capacity for change

Calls for the social sciences to help meet the challenges of global environmental change and social transformation do not ask only for the production of new knowledge. They also raise the challenge of bringing existing social science knowledge into the decision-making process. Communications issues and limitations of human capital and institutional resources all need to be addressed to bridge this gap. Success here will go a long way to meeting growing knowledge needs, building society's ability to use what is already known, and showing that when that knowledge is used in policy and practice, it makes a positive difference.

The global challenges that society faces are too big, too numerous, too complex and too difficult to be addressed by a cottage industry of engaged social scientists skilled in interdisciplinary and transdisciplinary approaches. They cannot be addressed adequately if most social scientists learn, teach and research in different socio-economic, cultural and epistemic contexts from those in which most of the world's population live, struggle and suffer. Greater capacity is needed at several levels: capacity for social science research, capacity for international collaboration, and capacity for engagement in solutions-oriented global change research.

To meet the diverse and complex challenges of global environmental change and societal transformation, social science capacity needs to grow radically across the world.

Priority action steps

- **Targeted policies and support for social science capacity building.** Funders, national and international scientific councils, and associations and organizations should help build capacity for social science research on environmental change, by assisting in the development of national and regional science policies that prioritize global change and sustainability as a grand challenge, and that allocate appropriate levels of funding to it;
- **Enabling environments for engaged, solutions-oriented research.** Universities and other scientific institutions in which social scientists work should develop better support mechanisms, incentive structures, rewards and evaluation systems, to provide enabling conditions for the pursuit of engaged, solutions-oriented research for global sustainability;
- **Support for young and early-career researchers.** A special focus on young or early-career researchers should be central to capacity building. Funders, scientific institutions and international organizations should work together to develop educational approaches, from primary education to postdoctoral levels, that prepare students for interdisciplinary and transdisciplinary research. Such approaches should train people to communicate across disciplines and fields of science, and between science and other sectors of society;
- **Global networking and collaboration.** National and international funders, scientific institutions, councils and associations must multiply and sustain mechanisms that support truly global networking and collaboration between social scientists engaged in global change research for sustainability;
- **Building critical mass and communities of practice.** Funders, scientific institutions, councils and associations should support the development and maintenance of structures such as centres of excellence and graduate schools at national or regional level.

This will help build the critical mass and communities of practice needed to reduce the isolation that social scientists experience in some parts of the world.

Be the change

The final and central message is that the social sciences must be the change. The challenges that global environmental change poses call for transformative social change, and to support it effectively, the social sciences themselves must change. Most contributions to this Report show it is not enough to offer partial answers from the narrow window of any single discipline; nor does it suffice to stay outside the social and political processes that scientists may wish to inform.

If the social sciences are serious about wanting their science to make a difference, they themselves must change.

Contributions offer a number of examples where practitioners, policy makers and decision makers, civil society and private sector actors are brought together with academic researchers in the co-design, co-production and co-delivery of knowledge and action. Assuming that relevant and robust knowledge lies only in the hands of scientific experts imposes limitations on the possibilities for innovation, and on the acceptability and realization of better solutions. Being the change means transforming the ways in which knowledge is produced and used. It implies that social scientists welcome contributions from other disciplines and other fields of science to deepen understanding, rather than rejecting them as a dilution of fragile, partial knowledge. It also implies that the social sciences need to become expert at integrating across scales and across different forms of knowledge. Engaged social scientists must be willing to test their understanding of the human dimensions of environmental change in transdisciplinary efforts and teams.

Priority action steps

- **Platforms for dialogue and the co-creation of research.** Universities and other scientific institutions should do more to provide creative platforms for dialogue, and for the co-framing of research projects involving the social, natural and human sciences before projects are fixed and teams apply for funding;
- **Regular transdisciplinary interaction throughout the research process.** Organizations that want social scientists to contribute to global change policies and management solutions should invest in processes that enable regular interaction, throughout the research process, between researchers and decision-makers, practitioners, civil society and private-sector representatives, the media and other science communicators;
- **Innovative funding mechanisms.** Research funders should develop innovative funding practices that support safe spaces for experimentation with open and inclusive co-design, co-production and co-delivery of knowledge;
- **Recognizing and rewarding participation in open knowledge systems.** Scientific institutions, councils and associations can motivate social scientists to engage in open knowledge processes through recognition and incentive mechanisms. Equally important is training in communication and engagement, practical and systemic outlooks, ethical sensibilities, strategic and cross-disciplinary thinking, and the effective management of the partnerships which this approach involves;
- **Monitoring and evaluation of transdisciplinary processes.** Stakeholders including funders, science policy makers in international scientific organizations, knowledge users and the scientific community itself must support ways of monitoring and evaluating processes of knowledge co-design, co-production and co-delivery. Social scientists themselves have a particularly important contribution to make in understanding their implications, usefulness, effectiveness and ethics, and in developing appropriate guidelines and training modules for transdisciplinary work.

Conclusions

The action steps proposed in the *World Social Science Report 2013* are broadly formulated, but if taken seriously and applied in specific contexts, can contribute to realizing a bolder, better, bigger and different social science. Such a transformative change will allow the social sciences to help develop a new, solutions-oriented science of global change and sustainability. The Report itself is intended as a vehicle for mobilization: a starting point for rallying the engagement of social scientists in all disciplines, in different sectors, and in all parts of the world. And it is intended as a basis for the discussion and development, by the ISSC and its members and partners, of a longer-term strategy to strengthen the visibility of social science knowledge, sharpen the social science knowledge base for sustainability, and support social science leadership in integrated research on global change and social transformation. Now is not the time to stay on the sidelines, as climate and global environmental change force society to face staggering human-made crises, and as the world struggles to find a path towards a more secure and sustainable future.

Contents of the Report

Changing Global Environments

2013

World Social Science Report

Global environmental changes, including climate change, are intricately linked to other social, political and economic crises, from poverty and inequality to social discontent. The consequences of these interacting changes are rapidly unfolding across the world and already affect our life support systems, livelihoods and lifestyles. Society must now find ways to simultaneously protect the planet's bounty and safeguard social equity and well-being for all. In this urgent quest, social science knowledge is indispensable for understanding the causes and consequences of global environmental change and informing more effective, equitable and durable solutions for a sustainable future.

In this third edition of the *World Social Science Report* 150 authors from all over the world and a wide range of disciplines offer insights that help us understand the challenges before us. The report issues an urgent call to action to the international social science community to collaborate more effectively with each other, with colleagues from other fields of science, and with the users of research to deliver solutions-oriented knowledge on today's most pressing environmental problems. It calls for a transformative social science that is:

- **bolder** in reframing and reinterpreting global environmental change as a social problem;
- **better** at infusing social science insights into real-world problem-solving;
- **bigger** in terms of having more social scientists to focus on global environmental change; and
- **different** in the way it thinks about and does research that helps meet the vexing sustainability challenges faced today.

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