



Part 6

New approaches to governance and decision-making

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70. Dealing with wicked environmental problems: Introduction to Part 6

by

Diana Feliciano and Frans Berkhout

This section presents key debates about environmental governance and decision-making. Wicked problems become more pressing to resolve as the pace and scale of global environmental challenges and the underlying social problems become more apparent. The contributions examine the role of the social sciences and other types of knowledge in the governance of environmental change and sustainability.

How shall we govern the distribution of risks and benefits arising from global environmental change? How do we best reduce the causes of risk and hazard, while enabling groups and societies to pursue more sustainable development paths? And how do we protect the interests of those suffering the impacts but not the benefits of resource use? The question of how societies manage (or fail to manage) this imbalance between private goods and public “bads” forms the central problem for environmental and sustainability governance.

Over time, sustainability governance issues have expanded from the local, tangible and immediate (urban water pollution) to the distant, intangible and delayed (stratospheric ozone depletion and climate change). Such complex, systemic problems, which are always imperfectly understood and have no easy solutions, are characterized as “wicked problems” (Rittel and Webber, 1973).

Some contributions address the challenge of co-design and co-production of knowledge and policy; others question where decision-making power should reside for problems that are at once local, regional and even global; and a third group address the conundrum by which the scope, scale and speed of governance may not match the pace and complexity of environmental change. This threatens to leave us with inadequate and incremental responses, when transformative change is needed.

Co-design and co-production of knowledge and policy

The natural sciences, and increasingly too the social sciences, have played an important role in defining sustainability problems and risks at all scales. Yet science alone cannot adequately define all sustainability problems or provide solutions to them, partly because

they mean different things to different people, and neither does it have universally accepted legitimacy for doing so. One way of making the knowledge claims underpinning environmental governance more salient and legitimate has been to pay greater attention to the co-production of knowledge by the users and producers of knowledge claims.

The co-design and co-production of science and policy call for new procedures. They need to be undertaken in ways that facilitate the production of robust knowledge claims, while supporting mutual learning and problem-solving (see Tàbara, Part II). More attention needs to be focused on the learning benefits of these processes in different social settings. For this to be assured, effective leadership and adequate resources in the facilitation of inclusive and participatory processes are essential.

On this first theme, several authors contribute insights. Beck asks whether the Intergovernmental Panel on Climate Change (IPCC) has proven to be effective in enabling learning at the science–policy interface. Since its inception, the IPCC and similar global assessments have been influential in the international political process. Within the scientific community, the IPCC is seen as a model for successful work at the boundary between science and policy. This has increased public scrutiny of its activities, leading to strong critiques of the procedures it has adopted to secure scientific quality and internal transparency. But questions of public trust and expert credibility remain. These are serious challenges for science, particularly when there are increasing calls for more open knowledge systems and the democratisation of science amidst great cultural uncertainty and anxiety about the future. For Guimarães, who reflects on failures in translating international environmental agreements into action, the lens of politics shows the tenuous linkages between science, public debate, policy and practice, as well as the defining role that power and economic interests play in facilitating or impeding knowledge claims in policy debates.

Lavell, Brenes and Girot present the successful case of a network for the study of disaster prevention and management, LA RED,¹ in Latin America, which has helped establish an understanding of the social construction of disaster risk in science, policy and public awareness. Community resilience in the face of extreme events and disasters is based on the social capital and community identity that exists and how it can be rebuilt in the period of recovery after a disaster. While much progress in research and policy has been made in Latin America, Fra Paleo argues that the experience of major disasters elsewhere in the 20th and 21st centuries (such as the Chernobyl nuclear disaster in Ukraine and Hurricane Katrina in the United States) has not yet been translated into effective risk-management strategies by policy makers in these regions.

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. Other sources of knowledge and experience are essential for sense making and action by citizens and policy makers. These might include knowledge systems embedded in the cultural traditions of indigenous, traditional or local communities. Evidence from conventional natural and social science complements these other forms of knowledge in understanding and responding to environmental change. Sanchez and Reusser emphasise that both natural and social scientists need to use and integrate available scientific evidence on global environmental change to propose a set of practicable solutions to the pressing questions.

Several authors underline the importance of indigenous knowledge and local communities in the co-design of research and policy. In the cases presented, local communities are increasingly involved in joint investigations with social and natural scientists to analyse and respond to climate change. Srang-iam and Borja describe successful cases where the integration of indigenous knowledge in research and policy-making has taken place. Rajão, Godwin and Jordan recommend taking indigenous knowledge into account in the design of Amazonian environmental policies, in the development of adaptation programmes in Nigeria, and in natural resource management policies in Canada respectively. In the Mercosur² countries, policies that engage citizens in water management are proving effective by building on the local knowledge and interests of stakeholders (Gugliano and Carbonai).

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 other groups in society can be aligned and coordinated to achieve sustainability goals, while ensuring openness and equity in the distribution of environmental goods and bads.

Combining top-down and bottom-up decision-making processes

Top-down decision-making processes 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. Many sustainability problems and solutions span different scales of governance. It remains a challenge to find the right combination of top-down and bottom-up governance, along with public, private and public-private arrangements appropriate to go with them. The problem is especially acute at a time when the focus is on learning and adaptation in the face of uncertainty.

In addition, the increasingly regional and global character of many environmental problems intensifies the need for political and economic coordination to manage global change. International coordination of nation states through treaties requires very different institutions, capabilities and instruments from the management of local commons. This is made even more difficult in regions already experiencing political tensions or even military conflicts. Jagerskog gives the example of three states in the Jordan River basin (Israel, Palestine and Jordan) where ongoing conflicts are undermining cooperation in transboundary water management, and the just and equitable sharing of resources.

Non-governmental organisations and social movements are crucial actors in governance through their roles in influencing the policy agenda, raising public consciousness about the management of environmental problems, monitoring environmental quality, and exposing bad government and corporate practices (Martinelli). Grassroots organisations have repeatedly called attention to climate change hazards, and have shown that they are linked to the erosion of social and economic rights. For social movements, there are opportunities to use international law and governance to turn emerging economic, legal and cultural norms toward creating climate justice (Ioris). An example of the creation of justice from

bottom-up decision-making processes is given by Sood. Indian national policies aimed at protecting informal workers, for example in the reuse and recycling sector in urban areas, have not been implemented successfully because of a fragmentation of national and city-level jurisdictions. In Pune, India, a city-level initiative called Solid Waste Collection and Handling emerged to ensure that informal workers are less exposed to health and safety risks in waste handling and collection.

Incremental versus transformative change

The final challenge taken up in this chapter concerns the pace and scope of governance. Many social organizations, including governments, favour incremental changes. But many of the greatest challenges now call for a more fundamental and far-reaching transformation of social systems (see also Parts III and IV).

The prospect of global environmental change associated with major long-term risks has generated a new debate about how to stimulate, and govern, radical social and economic transformations over the longer term. According to Brand, Brunnengraber and colleagues, social science can contribute to our understanding of crisis strategies, normative perceptions, and profound societal changes from the local to the global scale. This can help strengthen the possibility of an intentional and consensual transformation towards low-carbon, sustainable and just societies (see Part VI).

Conclusion: Struggling and negotiating together

Much remains to be explored and learned about how to govern global environmental change and deal with its social consequences. As Future Earth gets underway, the co-design and co-production of knowledge is a central design feature of the new research programme. Those searching for adequate and acceptable responses to global environmental change the world over are struggling to find new forms of governance that engage interested parties appropriately and effectively while avoiding fatigue, stalemate and disenfranchisement. Understanding how to encourage radical novelty (see Miller, Part II), remove obstacles to transformation, dismantle old systems, and create and embed new, more sustainable forms of provision (see Sachs, Part II) is a huge research and social challenge. While much is to be learned from history, transformative change is not easily understood and shaped while society is in the midst of it. Barriers to transformative change include uncertainties about global environmental change, the high costs of transformational actions, and institutional and behavioural inertia that tend to maintain the incumbent resource systems and policies.

Notes

1. Red de Cambio Climático y Gestión del Riesgo de Desastres (Network for Climate Change and Management of Disaster Risk).
2. *Mercado Común del Sur* (Southern Common Market). Economic and political agreement between Argentina, Brazil, Paraguay, Uruguay and Venezuela. Bolivia, Chile, Colombia, Ecuador, and Peru are associate members; Mexico and New Zealand are observers.

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Diana Feliciano is an early career researcher with a Ph.D. in geography from the University of Aberdeen, Scotland. She works on climate change mitigation, forestry policy and economics, and rural development. She has taught global environmental change at the University of Aberdeen and is on the *World Social Science Report 2013* editorial team.

Frans Berkhout is professor of environment, society and climate in the Department of Geography, King's College London and Interim Director of the Future Earth Programme, based at the International Council for Science in Paris. He is also a Senior Editorial Adviser to the *World Social Science Report 2013*.

71. Is the IPCC a learning organisation?

by
Silke Beck

The Intergovernmental Panel on Climate Change (IPCC) provides the scientific basis for climate policies globally, and has raised political and public awareness of climate change. An independent evaluation in 2010 resulted in changes to IPCC procedures, processes and governance structure. But what has it learned, and how can it maintain political relevance and scientific integrity in the face of intense political pressure and an evolving, multidisciplinary scientific field?

Introduction

What can we learn from the Intergovernmental Panel on Climate Change (IPCC) in terms of designing global environmental assessments? Is it an adaptive and learning organisation? How has it adjusted its governance processes and structures to meet novel challenges? Here we reconstruct the processes and institutional arrangements that are instrumental (input performance) to improving the organisation's reflexivity and adaptive capacity (output performance).

IPCC achievements

The IPCC was established in 1988 by the World Meteorological Organization in cooperation with the United Nations Environment Programme (UNEP).¹ Its mandate is to provide policy-relevant information to decision makers involved in the conferences of the UN Framework Convention on Climate Change (UNFCCC). Between 1990 and 2007 it produced four assessment reports (AR), and several specific reports (for instance on scenarios, renewable energy and extreme events). The 2007 AR4 demonstrated that the scientific evidence for global warming is overwhelming, even if scientific projections of future climatic changes are uncertain. The IPCC has brought together more than 3 000 scientists and referenced over 40 000 publications. In recognition of its work, the IPCC (jointly with Al Gore), was awarded the 2007 Nobel Peace Prize:

“The IPCC's 2007 Nobel Peace Prize is a tribute to what is the largest and most complex orchestration of sustained international scientific co-operation the world has ever seen” (Royal Society, 2011: 80).

The IPCC is regarded as the most significant expert body on global climate change, and the Nobel Prize was seen primarily as an acknowledgment of its political achievements. It has played a key role in providing the epistemological foundations for climate policies and in raising political and public awareness of climate change (Hajer, 2012). It has also influenced the science agendas of many nations (IAC, 2010: 63) and has prompted calls for comparable global environmental assessment institutions to be established in other areas, the most recent being the Intergovernmental Panel on Biodiversity and Ecosystem Services.²

Under the public microscope

During the 15th UNFCCC conference in 2009, more than 1 000 private emails were leaked from the University of East Anglia in Norwich, UK, including emails from climate scientists at leading science institutions.³ Allegations of errors in the 2007 IPCC *Fourth Assessment Report* surfaced in 2010, focusing on the Working Group II analysis of the potential impacts of global warming. The IPCC then corrected a controversial statement that the Himalayan glaciers might disappear by 2035. However, subsequent reviews have upheld the core science behind global warming. The controversies received lots of attention, in the blogosphere and in the UK and US media in particular (Schiermeier, 2010). In response, evaluations were undertaken of the IPCC's procedures and governance structure (PBL, 2010; IAC, 2010).

The InterAcademy Panel Council (IAC) in its independent evaluation identified various problems:

- There has been a lack of access to data.
- There is a lack of transparency “in several stages of the IPCC assessment process, including scoping and the selection of authors and reviewers, as well as in the selection of scientific and technical information considered in the chapters” (IAC, 2010: 65).
- There are problems with the way scientific uncertainty was handled, and the IAC recommended that procedures for using and labelling “grey literature” that has not been peer reviewed should be clarified (Tollefson, 2010b).
- The IPCC operates under a public “microscope”, and intense scrutiny from policy makers and the public is likely to continue. Consequently, “accountability and transparency must be considered as a growing obligation” (Shapiro, 2010; PBL, 2010: 32).

The IAC evaluation focused on processes of assessment and quality assurance rather than on the content and quality of the IPCC reports. The discovery of some errors and other problems raised important questions about the transparency of IPCC processes but did not seriously challenge the substance of that knowledge (Hulme, 2010). Evaluating the IPCC's processes and management structure, the IAC report concluded that “The IPCC has succeeded time and again by adjusting the processes and procedures surrounding its assessments both in response to scientific developments and as a result of lessons learned over the years” (IAC, 2010: viii). Nevertheless, it acknowledged that some fundamental changes to these systems were essential to ensure its continued success. The IAC found that the IPCC lacked the organisational capacity to cope with the complexity and scope of the assessment task, along with new demands for increased transparency and accountability (IAC, 2010: 63). Its organisational capacities have remained largely unchanged and are very rudimentary (IAC, 2010: 39).

Procedural adjustments and adaptive capacity

In order to evaluate the performance of the IPCC as a learning organisation, we need to consider the nature of the tasks facing the IPCC as a hybrid organization. It includes scientists and experts, and representatives from other areas of society – politics, business and global civil society – all of whom play different roles within it. It is accountable to rather different communities in each sphere, and needs to maintain credibility, trust and legitimacy for all. The IPCC also has to maintain political relevance and scientific integrity in the face of intense political pressures, tight deadlines and a continually evolving, multidisciplinary scientific field. It has to reconcile political demands (relevance, legitimacy, geopolitical representation) with the need for expert decision making, such as integrity and the relative autonomy of scientific self-organisation.

When the IPCC was created in 1988, ozone and acid rain assessments were already under way. Atmospheric science assessment panels on stratospheric ozone played a particular role in establishing international agreements in this field. Climate change was seen as a new type of environmental problem, more complex and controversial than ozone depletion and acid rain. While some of the design features of existing assessments could be applied (Dessler and Parson, 2010), the complexity of climate issues also required experiment with novel processes and design features (Hulme, 2010). The IPCC has had to make numerous choices about selecting and organizing scientific advice, establishing criteria for legitimising scientific evidence, selecting experts, organising review procedures and specifying its own mandate.

The formal work of the IPCC is governed by its rules of procedure. These are critical for the governance of the expert panels. They are designed to ensure that its reports include the best scientific knowledge available, and that it is represented fairly and accurately. The rules of procedure also define how expert authors and reviewers are to be recruited and how government and non-government experts are to be integrated into the assessment and review processes. The IPCC has become a pioneer in developing rules of procedure for producing and evaluating policy-relevant knowledge at the global level (Beck, 2012).

The IPCC maintains its scientific credibility and political relevance and legitimacy partly through its capacity to enact and adapt procedures to respond to different challenges (Beck, 2012; Gupta et al., 2012). It has revised its rules three times, in 1993, 1999 and 2010). Despite its cumbersome size, political and institutional constraints and its highly politicised context, the IPCC has readjusted its processes and governance structure to the specific needs of its collaborations. How?

First, the IPCC decided to speak “with one voice” on behalf of the global scientific community, delivering unequivocal statements to political leaders and the public (Agrawala, 1998). It is conducting one of the most complex and inclusive exercises in international scientific consensus building ever undertaken. Its active consultation process has done much to iron out differences, distil common understanding and marginalise opposition.

Second, the IPCC responds to calls to improve its political relevance and legitimacy by involving experts from all relevant stakeholder groups and countries in the assessment process (scoping, preparation, peer review, and outreach and communication). Participation and inclusion enhance the legitimacy of its processes and the political salience of its policy conclusions. Early on conflicts arose, and were resolved, regarding the initially low number of experts from developing countries, the extent to which non-English and non-traditional publications were included. and the inclusion of experts from advocacy or private sector

organisations. Innovative procedures have helped enhance its legitimacy across the world. Studies show that there is still a notable bias towards Western and other developed countries (Vasileiadou, Heimeriks and Petersen, 2011). However, if most knowledge originates from a small number of nations, that knowledge will be limited in geographical scope and political legitimacy.

Next, peer review became a fundamental formal principle of IPCC self-governance and a basic informal principle of its consensus-building process. It forms the backbone of all IPCC processes (Edwards and Schneider, 2001). Over time, the IPCC has developed a widely inclusive, extremely intensive and differentiated peer review process.

Recent IPCC reforms: improving the quality of science

In October 2010, the IPCC initiated steps to implement the IAC recommendations. The latest revisions, following the November 2011 plenary session, endeavour to ensure that IPCC internal procedures are more transparent to parties already participating in the organisation, such as contributing scientists and national governments. As a result, the IPCC processes – ranging from intergovernmental negotiations and review procedures to government approvals – remain confidential and are not opened to the public. Current reform efforts do not make the IPCC democratically accountable (see Hulme, 2010).

Are these revisions sufficient to maintain public trust and expert credibility, even though their focus is on improving scientific quality and internal transparency (Hajer, 2012; PBL, 2010; Shapiro, 2010)? Are IPCC policies and procedures appropriate and robust enough? Public attention is likely to increase given that the organisation is advising on highly contested issues, such as alternative energy supplies and geo-engineering, which may affect stakeholders differently across the world. These are empirically open questions, but it is fair to assume that the IPCC's future performance will depend on how thoroughly it responds to demands for increased transparency and accountability from those affected by its advice (Revkin, 2012).

Notes

1. www.ipcc.ch/organization/organization.shtml.
2. www.ipbes.net.
3. http://e360.yale.edu/feature/climategate_anatomy_of_a_public_relations_disaster/2221/.

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Silke Beck is senior researcher at the Department of Environmental Politics, Helmholtz Centre for Environmental Research, Leipzig, Germany. Her research focuses on the relationship between science and governance in global environmental change.

Viewpoint

72. Failing to translate into policy? From Stockholm 72 to Rio+20

by
Roberto P. Guimarães

Since the 1972 UN Conference on the Human Environment in Stockholm, there has been a clear failure to put the international environmental agenda into practice, particularly in areas such as climate change. Science is not produced in a policy vacuum, nor does policy operate in a void of knowledge, which is precisely why politics is embedded in this interplay from the outset.

An adequate understanding of the process by which decisions based on scientific findings bear fruit requires three things. First is an understanding of how social concerns are incorporated into the agenda of public decisions. Second, once societal challenges are fully integrated into political discourse, an understanding of how policies change is required, so that scientific knowledge feeds into concrete actions. Third, we must pose the question how policy results change the scientific agenda by identifying new knowledge gaps that require further research.

The belief that science speaks for itself is problematic. Assuming that science does respond to real challenges faced by society, we might mistakenly expect that due to their intrinsic value for the common good, research findings require no more than powerful and brilliant breakthroughs to be translated into action, as most decisions adopted since the Stockholm conference indicate. Nothing could be further from reality. As Francis M. Cornford (1908) indicated in his razor-sharp *Microscopographia Academica: Being a Guide for the Young Academic Politician* in 1908:

You think (do you not?) that you have only to state a reasonable case, and people must listen to reason and act upon it? At once. It is just this conviction that makes you so unpleasant. There is little hope of dissuading you; but has it occurred to you that nothing is ever done until everyone is convinced that it ought to be done, and has been convinced for so long that it is now time to do something else?

This view later became prominent in the literature on public policy formulation and implementation (Lindblom, 1980).

Any issue can only be incorporated into political processes if it is firmly connected to the dominant public debate and social context (Guimarães, 2004). For example, research existed in areas such as environmental change and racial and gender discrimination long before these became concerns for public policy, thanks to their association with demands for human rights, democratisation and social equality. It was no historical coincidence that environment and gender policies gained strength in the late 1960s. They were part of the anti-war, pro-freedom of expression counter-culture movement in most Western countries at that time. Conversely, it should be no surprise that, even after environmental issues gained legitimacy through four World Summits, internationally adopted decisions in areas such as climate change have been the hardest to translate into action. Why is this? Is it due to a lack of scientific data? Of course not. Climate change has so far been the only issue to benefit from an institutionalised channel through which the world's science community can "communicate" with policy: the Intergovernmental Panel on Climate Change (IPCC), created in 1988. The answer to this paradox does not lie in the failure of science to convey the gravity of climate change to policy. Rather, it can be found in the fact that the actions proposed by the scientific community run against the dominant economic yardstick for public policy (Mooney, 2005; Fredenburg et al., 2008).

The more scientists, governments and others accepted climate change as an established scientific fact, the more the Washington Consensus¹ spread its wings throughout the world (Williamson, 1990). From a political perspective, this cannot be ascribed to pure chance. Barely one year after the IPCC came into being, two of the ten commandments of neoliberal economics prescribed privatisation and deregulation as a cure-all recipe to solve the profound external debt crises of the 1980s. Thus, science did not fail, as Aaron Wildavsky (1987) maintained in his book *Speaking Truth to Power*. It was, and remains, a fact that power is not willing to listen to a policy challenge which requires government intervention and more regulatory mechanisms to correct the failure of the market's addiction to fossil fuels. The world had to wait for the increased occurrence and severity of "natural" disasters, the corresponding economic loss and the awakening of insurance companies to take action. The actual increase of a couple of degrees in mean temperatures is having more policy effect than all the scientific evidence, particularly now that the Washington Consensus is apparently receding at a faster pace than the glaciers.

However, the fact that an issue is successfully incorporated into the policy discourse does not guarantee real policy change. Decisions that require societal responses, such as climate change, involve much more than the simple organisation of public action in one area. It is the very concept of development itself that is being called into question. This means that issues which are often regarded as technical and scientific (standards, regulations, norms) will have to be negotiated politically. The Kyoto Protocol is a perfect illustration of this predicament.

It is therefore easy to summarise the limits within which environmental conflicts can be negotiated. National leaders do not acknowledge that a nation's security depends on an environmentally sound development strategy. Instead, environmental decisions are consistently subsumed either by national security interests or by economic criteria, and economic growth enjoys priority over conservation. On top of that, the techno-bureaucracy and the corporate elite share an ideological orientation towards the private allocation of natural resources and of the "commons"² in general.

Economic elites and their proxies in government have also learned the lessons of coping with the institutional and policy innovations posed by global change. Faced with this new challenge, markets and governments have continually adopted what Donald Schon, in his brilliant *Beyond the Stable State* (1973), calls “dynamic conservatism”. First, people accept a discourse that incorporates the new issue. This principle has been demonstrated successfully from Stockholm 1972 to Rio+20. Then follows the institutional stage of “containment and isolation”, when people literally throw the discourse into a bureaucratic box in the governmental structure or in an internationally adopted agreement. Care should be taken not to provide adequate resources to this new national or international agency. Just enough people should be employed to give the impression that something major is being done, and to serve as scapegoats when things do not get done, as we know they will not. Just enough resources should be allocated for a couple of works to be built and, it should not be forgotten, for studies: dozens and dozens of scientific studies.

In short, people should promote the minimum change possible to guarantee that nothing major will actually change, as the lack of implementation of international decisions on the environment shows. This is dynamic conservatism, and is termed dynamic because it is not the result of a carefully conceived scheme of overt resistance. There is no conspiracy theory at work here. This brand of societal conservatism develops out of the synergistic effect of special interests. The individual, group or class is able to establish a connection between their special interests and the inertial interests of the social system as a whole. Because the hard policy choices needed to respond to global change are bound to affect everyone, there is no need to conspire against taking them seriously. It is simply a question of letting the bureaucratic process run its course.

Many proposals can be put forward to address the failings of science in its attempts to speak truth to policy since Stockholm 1972. Among these is the much-needed involvement of policy makers early on in the endeavours of the science community. More should also be done to disseminate science and build capacity. Yet if I had to derive a single proposal, it would simply be to suggest that the scientific community take a hard look at its own faults before scrutinising those of policy makers. Instead of hiding behind science, it would do no harm to translate relevant findings into the political and bureaucratic logic of those whose attention is needed. In other words, whatever research projects produce, their findings should be expressed in entirely different terms depending on whether the audience is the United Nations or another intergovernmental body; an industrialised country such as the United States or Japan; a resource-rich and socio-economically unequal country such as Brazil or Mexico, a poverty-stricken country such as Haiti; or a “post-material” nation such as Norway. Finally, decisions on the environment adopted at world summits should have enforcement mechanisms to put teeth into the resulting agreements if the world wants to overcome their blatant lack of implementation so far. The future of sustainable development lies in politics working hand in hand with science. Neither can bring it to fruition alone.

Notes

1. The term “Washington Consensus” refers to a strong market-based approach, market fundamentalism or neoliberalism.
2. Natural resources and public goods which are shared, used and enjoyed by all.

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Roberto P. Guimarães is coordinator of the MBA programmes on environmental management of the Getulio Vargas Foundation in Brazil, and visiting professor on the doctoral programme on environment and society at the State University of Campinas, Brazil.

73. The role of la red in disaster risk management in Latin America

by

Allan Lavell, Alonso Brenes and Pascal Girot

LA RED, the Network for Social Studies on Disaster Prevention in Latin America, has played a central role in the shift from physical to social interpretations of disaster risk in Latin America and elsewhere. Since 1990, the notion that disaster risk is socially constructed has been recognised increasingly by academics and practitioners around the world. LA RED, through its robust cross-disciplinary and integrated approach to research, has contributed significantly to this paradigm shift.

Introduction

La Red de Estudios Sociales en Prevención de Desastres en América Latina (LA RED) is a network comprising researchers from multiple scientific and professional backgrounds. Using different modalities to integrate research and practice, co-operation and political advocacy, LA RED has been successful in promoting a development-based, vulnerability-linked paradigm for disaster risk.¹ The network was established in 1992 and has striven to place human and social vulnerability at the centre of its analysis of disaster risk over the past 21 years. It regards disasters as an extension of everyday life, and places disaster risks along a continuum from small to medium to large disasters. Prioritising human welfare and seeking to understand the impact that disaster has on people is paramount for LA RED. This approach has led to a paradigm shift from physical² to social-based interpretations of risk, and from technocratic, centralised views of risk management, to more participatory, local and community-based approaches. This article seeks to portray LA RED's distinct contribution to this change, particularly in Latin America.

Over 20 years ago, LA RED introduced new social science concepts and insights on disaster risk to countries in Latin America. These have influenced practitioners and researchers around the world. They include:³

- that disasters are not natural (Maskrey, 1993)
- risk as a social construction (Maskrey, 1993; Mansilla, 1996)
- that small and medium-scale disasters are important (Lavell, 1994; ISDR, 2009)
- extensive and intensive risks (ISDR, 2009)
- socio-natural hazards⁴ (Fernandez, 1996)

- corrective, prospective and compensatory risk management (Lavell and Franco, 1996).
- the intrinsic relationship between risk, development and the environment (Maskrey, 1993; Fernandez, 1996)
- the importance of local-level risk management (Wilchez-Chaux, 1998; Lavell, 2003).

Shifting paradigms

Before 1990, a physical notion of disaster risk dominated global discourse on hazards and disasters. Disasters were seen as a direct product of adverse physical conditions, and were regarded as being virtually inevitable and unmanageable. However, the idea that disaster risk is socially constructed, and that human activity (cultural and social) can influence the way it is perceived or defined, has gained ground since its early beginnings in writing produced in the 1970s and 1980s, and particularly since the 1990s. Academics and practitioners in Latin America and elsewhere are increasingly recognising this idea.

This shift in the conceptual understanding of risk and disaster grew out of the increased involvement of social scientists working on disaster risk, and the impacts that their involvement has had on public and policy understanding. Hurricane Mitch in Central America (October 1998), for example, revealed the huge significance that poverty, environmental degradation and inadequate land-use practices have on levels of damage and loss.

Building on work by social scientists from developed countries,⁵ the founding members of LA RED brought new ideas and a collective approach to the concept of risk. LA RED membership was characterised from the start by an eclectic mix of academics and non-academics, including government officials, practitioners and consultants. It avoided the traditional rigid boundaries between science, policy and practice that still exist in similar initiatives elsewhere in the world.⁶ This collective, participatory approach played a significant, if not catalytic, role in transforming the concept of risk. Openness to new ideas allowed different methods, forms of enquiry and data (quantitative and qualitative) to flourish. This resulted in a more holistic perspective for analyses of the relationship between society and development.

LA RED activities

In the 2000s, LA RED promoted new approaches to disaster risk reduction and to helping to identify intervention options in Latin America, based on conceptual and methodological developments in the 1990s (Cardona, 2007). They were shaped by social scientists, and included land use and environmental planning schemes, local-level risk management, public investment decisions informed by disaster risk analysis, insurance for poor and vulnerable communities, and disaster risk and risk management indexes designed to help governments and international organisations prioritise their interventions. More recently, innovations in governing disaster risk management were introduced, with instruments such as the Central American Integral Policy for Disaster Risk Management in 2010 and new laws on disaster risk management in Peru in 2011 and in Colombia in 2012.

LA RED also created DesInventar,⁷ an innovative disaster information management system for analysing disaster trends. DesInventar allows the capture, analysis and graphic representation of information on disaster occurrence as well as on economic and social loss. It has been developed and improved continuously, both methodologically and data-wise, since its inception in 1993. It allows users to visualise disaster impacts at the local (town or equivalent) level, and facilitates dialogue between individuals, institutions and

provincial and national governments on risk management approaches and issues. National emergency agencies use DesInventar for risk analysis, mitigation and to formulate early warning systems. It can also record and help assess the success and development of an area's preparedness and its mitigation plans over time. It is now the basis of the United Nations Office for Disaster Risk Reduction's (UNISDR) analysis of extensive risk patterns in over 35 countries. DesInventar now has several international partners including the European Commission.

LA RED has organised many conferences, workshops and meetings over the years, allowing wide dissemination of its new ideas. It has also developed methodologies for local-level risk management training schemes (Wilches-Chaux, 1998; Zilbert, 1998), which, together with DesInventar, have translated new concepts and views of risk into practical instruments. LA RED has produced 15 books, and nine volumes of the first-ever social science journal on disaster in the region, *Desastres y Sociedad*, which it launched over 20 years ago.

The Impact of LA RED

The success of LA RED can mostly be explained part by three factors: cross-continental integration, co-operation, and political action and advocacy.

Cross-continental integration

First, LA RED's work on disaster response and reconstruction (Maskrey, 1996), urban risk (Lavell, 1994; Fernandez, 1996), historical and social processes (Mansilla, 1996; Garcia Acosta, 1997) and institutional development (Lavell and Franco, 1996) is comparative between and within countries and regions, moving beyond the traditional approach of examining a single country or region. This has helped identify common topics and social processes, unearthed new issues, and initiated new debates across Latin America.

Second, LA RED's emphasis on the social dimensions of risk does not contradict the physical facts of risk or the relevance of disciplines such as engineering, geology or climate science. LA RED follows an integrative approach that includes academic, practitioner, policy and activist perspectives, building bridges across disciplines and co-producing knowledge in joint projects and initiatives across Latin America. This mostly happens in an ad hoc fashion by sharing different approaches and practical knowledge gained through projects and initiatives managed by members of LA RED. Scientific communities from different countries worked together with new methodologies, leading to a more robust, holistic approach towards risk management.

Third, the original core group of LA RED has been strengthened continuously over the years by the collaboration and presence of young, early career scientists and professionals who have contributed to different initiatives and projects, an essential part of LA RED's agenda.

Co-operation

LA RED uses projects to create a culture of co-operation between scientific networks, individuals and institutions, in order to ensure sustainability, and the completion of structural changes in how society faces risk. Co-operation is an important and practical way of coping with regional constraints in science funding and institutional modernization. For instance, several members of LA RED were involved in the recent Special Report on *Extreme*

Events and Disasters for the IPCC (IPCC, 2011). This enabled them to pool their regional knowledge and contribute to an influential global risk assessment report.

Political action, advocacy and education

Political action and commitment to the development agenda have been important drivers of LA RED's work. Its practice of sharing its research and theoretical framework means that LA RED has influenced political and regulatory instruments across Latin America, as well as research, consultancy and practice. Communicating research findings to broader audiences (through the LA RED journal publications) has been regarded as critical since the early days. LA RED has supported formal and in formal education and training initiatives, especially at the local and community levels.

The role of the social sciences in disaster risk management

The physicalist approach to disasters still survives despite the advances described above. Much global debate on climate change (in many ways an extension of disaster risk concerns) focuses on extreme physical events and impacts, which explains why most climate research funding goes to climate modelling and scenario building. More recently, the social sciences have become more visible and vocal in global programmes and initiatives such as the Intergovernmental Panel on Climate Change and Future Earth, a new international programme on research for global sustainability.

LA RED is an important platform to present disaster risk research undertaken in Latin America, and strongly shaped by the social sciences, to a wider audience and debate it with them. The important contributions that Latin American countries make to global discussions of this nature are often not recognised adequately, partly because of the dominance of English as the international language of science. Despite these language barriers, LA RED influenced the formulation of the Yokohama Strategy at the first UN Conference on Disaster in 1994⁸ and has continued to have global influence. Apart from its conceptual and practical contributions to non-governmental organisations, international development agencies and governments, and its development of the DesInventar database, LA RED has influenced key documents such as the UNISDR Global Assessment Reports in 2009 and 2011, and will influence the next one in 2015.⁹

Greater awareness of socially informed disaster risk research, including that of LA RED, will help us understand better the challenges of adapting to climate change, and avoid having to reinvent well-established risk construction principles which already exist.

Notes

1. www.desenredando.org.
2. The physicalist paradigm was a term coined by Hewitt in *Interpretations of Calamity: From the Viewpoint of Human Ecology*, 1983.
3. The authors are all LA RED members.
4. For example, landslides, flooding, land subsidence and drought that arise from the interaction between natural hazards and overexploited or degraded land and environmental resources.
5. See the works of Wisner, O'Keefe, Davis Cuny, Hewitt, Oliver-Smith, Woodrow and Anderson, amongst others, between 1974 and 1989. See Wisner et al. (2003) for a summary of the work of these authors.
6. The idea of "epistemic communities" – developed by Peter Haas (1992) – probably captures the concept and nature of LA RED best.

7. Sistema de Inventario de Desastres or Disaster Inventory System: www.desinventar.net.
8. The Yokohama Strategy for a Safer World: Guidelines for Natural Disaster Prevention, Preparedness and Mitigation and its Plan of Action ("Yokohama Strategy") was adopted in 1994 and provides landmark guidance on reducing disaster risk and the impacts of disasters.
9. www.unisdr.org/we/inform/publications/19846.

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Allan Lavell is a founding member of LA RED and co-ordinates the Programme for the Social Study of Disaster Risk at the Secretariat General Office of the Latin American Social Science Faculty, Costa Rica.

Alonso Brenes is a specialist in disaster risk reduction and management with over ten years' experience in Central America.

Pascal Girot is senior climate change advisor for Latin America and the Caribbean with CARE International's Poverty, Environment and Climate Change Network.

74. A functional risk society? Progressing from management to governance while learning from disasters

by
Urbano Fra.Paleo

The intensive use of technology, accelerated urbanisation, and use of natural resources and ecosystems services with disregard of the dynamics of extreme natural processes are leading to recurrent and increasingly costly disasters. These need to be understood as the result of past decisions combining multiple interests, the consequences of exposure in hazard-prone areas, and of vulnerability in human settlements and activity. The concept of risk society provides a framework for understanding the complex links between contemporary society and risk.

Risk as change

Change is intrinsic to human and natural systems. However, its occurrence is confusing when hazards suddenly alter everyday life and business, and demand further adjustment in behaviour. Such new conditions are the effect of past human actions, recent or ancient, of processes in the natural environment, or a combination of both. Slow change allows for gradual adaptation. However, when change is abrupt, the social structure and production system do not adapt easily, particularly when such events do not occur frequently, because memory decays and risk perception weakens. However, policy leaps may occur.

This change is better understood in the context of socio-ecological systems (Berkes and Folke, 1998), where the bidirectional and complex interactions between human and natural systems are recognised. This approach acknowledges that society cannot develop in isolation without considering the limits that the natural environment defines or the diversity of exchanges.

Risk society

The increasing exposure of populations, urban areas, economic activity, food systems and infrastructures to rapid or slow-onset environmental processes leads to risk playing an increasing role in daily life, as does the emergence of new risks caused by the endless

development of advanced technologies. This led to the notion of risk society (Beck, 1992). Not surprisingly, human development commonly leads to an increasing risk from technological hazards and higher economic costs of disasters.

Every disaster brings losses but also gains. Particularly notable is the improved understanding of the processes involved. This advances our awareness of the interactions between human and ecological systems, and the effects of past decision-making processes. Ultimately, it allows us to examine how risk society unfolds. Table 74.1 describes the knowledge and awareness gained after different kinds of major global events in the 20th and early 21st century. Each learning has been translated to risk theory, but apparently not sufficiently transferred to policy-making practice.

Table 74.1 **Principal lessons from major selected disasters**

Major event ¹	Nature of learning
Kobe earthquake 1995	Megacities are highly vulnerable and develop mega-risks in some hotspots. The loss is predominantly economic in developed regions.
Indian Ocean tsunami 2004	Disasters in less-developed regions claim high losses in human lives. Monitoring is critical to activate early warning and to avoid major losses.
Hurricane Katrina, New Orleans 2005	Certain cities have a reduced range of options for mitigation and thus need to better adapt and develop better resilience.
Haiti earthquake 2010	Weak governance in poor countries and cities leads to an absolute lack of response capacity and diminished resilience after major disasters.
Black Saturday bushfires, Australia 2009 California wildfires 2007-2010	The interface between cities and rural areas has become blurred by urban sprawl. This increases the vulnerability of suburbs in particular and urban areas in general.
European heat wave 2003	Silent low-onset disasters are difficult to identify, monitor and address, and may cause a very large number of victims.
Influenza pandemic 1918	Pandemics are one of the most threatening natural hazards on a global scale.
Influenza pandemic 2009	The risk perception of different social groups differs. While the precautionary principle is a useful instrument to deal with uncertainty, it may lead to decision makers over-reacting.
San Francisco earthquake and fire 1906 T hoku tsunami and Fukushima nuclear accident 2011	The interaction between the natural and technological dimensions of disasters seems to be apparent when they develop into complex natural and technological disasters.
Chernobyl disaster 1986	Mismanagement of technology may lead to critical failures and threaten the survival of humans.
Ozone-depleting substances, since mid-20th century	Generalised and diffuse use of a technology may lead to dramatic changes in the global environment. The Montreal Protocol (1989) is an example of the successful governance of a global risk.

1. From natural to technological disasters.

The knowns and unknowns

Uncertainty is the lack of reliability and validity in the causal relationships between the agent and the effect (Renn, 2008). It is also an inherent property of risk. This is due to the elusive spatial or temporal dimensions of all types of hazard, despite past monitoring and the fragmentary understanding it has yielded. But it is also due to the unpredictable consequences of any event. In some instances, we can estimate some dimensions – such as the spatial pattern or the time frame – but we cannot anticipate the timing of a specific hazardous event. In others instances – such as earthquakes – we are unable to forecast at all. Managing known knowns seems straightforward, but societies have to deal with recognised known unknowns, intangible unknown unknowns, and even concealed unknown knowns (Zizek, 2008). Do societies have appropriate policy instruments to confront risks by adopting integrated and adaptive strategies? Probably not. Current risk

governance usually tackles the first two types, but for differing reasons of uncertainty or choice, has made little progress in dealing with the last two.

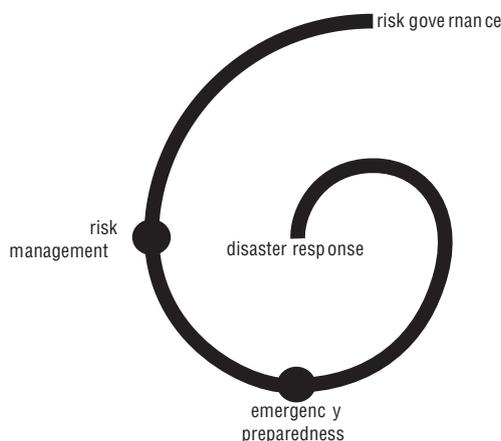
Risk governance as an unfolding approach

Various approaches have been developed to dealing with uncertainty. Disaster response provides a very limited level of certainty, since it involves community action that only manages to relieve the impact of disaster and facilitate return to normal life. The possible recurrence of disasters is usually disregarded during recovery. Further, emergency management policy anticipates the unknown by focusing its planning on prior and ulterior actions, and by making human and material resources accessible when disaster strikes. But have the specificity of hazards and the nature of vulnerability been considered? Plans have often been hazard-specific, but also redundant. They have not taken the interactions between diverse risks into consideration.

Risk management has addressed these weaknesses through detailed risk analysis and assessment to identify and deal with known knowns and unknowns. The Hyogo Framework for Action (ISDR, 2005) was a major step towards managing risk globally through principles agreed by policy makers, practitioners and experts. It emphasises transition at the local scale, exemplified by the Making Cities Resilient (ISDR, 2010) campaign. But what about the complexity of governing a complete society and its uncertainties?

Risk governance (Renn, 2008) is a conceptual framework that focuses on examining the components, interactions and structure of a decision-making system – and not just that of the government, which excludes social and private actors. This approach may contribute to the conventional governance mode being reformulated. It needs to adapt to continuous social, economic and environmental change. Risk governance should therefore be multilevel, cross-sectoral and participatory to deal with the challenges of a risk society. This evolution towards a greater integration of the interactions and interferences between risk management and other sectoral policies is illustrated in Figure 74.1. But how can risk governance become an operational reality?

Figure 74.1 The unfolding of risk governance



Source: Fra.Paleo, Urbano (forthcoming 2013)

Functional risk governance

Risk theories, paradigms and approaches have been developing complementarily or dialectically (for examples, see Table 74.2) since the pioneering study of adjustment to floods by Gilbert F. White (1945), and are increasingly uniting in a new concept. Simultaneously, the social sciences have gained growing relevance with the shift from the early study of hazards to the interest in disasters (see for example Quarantelli, 1998), the development of the notion of vulnerability, and particularly with the formulation of the theory of risk society. The previously dominant paradigm of vulnerability has been replaced by resilience, which is shaping contemporary policy making (National Academies, 2012). This also illustrates the relentless evolution of the field.

Table 74.2 **Some dialectic approaches in risk governance and convergence**

Approach A	Approach B	Convergent approach
Risks from natural hazards	Risks from technological hazards	Natural and technological risks Socio-ecological systems
Reactive	Proactive	Integrated cycle of risk
Risk aversion	Risk propensity	Societies demonstrate combined or contingency-related attitudes
Command	Co-operate	Participatory governance
Vulnerability	Resilience	Resilience as a component of coping capacity
Mitigation	Adaptation	Mitigation as a human adaptation strategy
Insurance-based	Plan-based	Integrated mode of societal risk transfer

Making separate studies of natural and technological hazards seems an unsuitable approach to examining either the earthquake and urban fire in San Francisco (1906) or the 2011 Tōhoku tsunami and nuclear disaster. A comprehensive approach that considers the complex interactions between the natural and the human systems is more appropriate in addressing disaster risk and human development. In particular, spatial planning seems to be the most appropriate comprehensive policy instrument with which to gain influence on exposure to hazards (Fra Paleo, 2009), as it can integrate the social, economic and environmental dimensions.

Accordingly, policy making should focus on the systemic integration of the different phases of the risk cycle of response–recovery–monitoring–assessment–mitigation–preparedness–response, and not on its individual constituents separately. Simultaneously, citizens and decision makers’ knowledge and interests should be combined (Burby and May, 2009), and incorporated into the processes of policy design and evaluation in order to overcome the persistent implementation gap. This requires the integration of the vertical (levels of government) and the horizontal (sectoral) components; formal and informal norms, institutions and settings; and formal, scientific knowledge with local knowledge.

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Urbano Fra Paleo is professor of human geography at the University of Extremadura (Spain) and visiting professor at the United Nations-mandated University for Peace, Costa Rica. His main research interests are risk governance, mitigation, and adaptation to natural hazard risks.

Viewpoint

75. Transition to sustainable societies, was rio+20 a missed opportunity?

by

Diana Sanchez Betancourt and Dominik Reusser

Six talented early-career scientists participated in the UN Conference on Sustainable Development in June 2012 with a grant from the International Social Science Council, supported by the Swedish International Development Agency. Two of them, Diana Sanchez from the Human Sciences Research Council of South Africa and Dominik Reusser from the Potsdam Institute for Climate Impact Research in Germany, share their view on the outcome of Rio+20.

Finding solutions to climate and global environmental change is a shared responsibility among the world's people, and it was the topic at the Rio+ 20 conference. However, the complex discussions among global leaders, scientists and civil society illustrate the challenges posed by our fragmented realities and the poor understanding of our planetary boundaries. It was apparent that there was a lack of political will to address some of the fundamental questions facing humanity to make sustainable development possible in the Anthropocene era, such as reducing consumption and pollution, addressing wealth concentration and inequalities, and interrogating economic and social systems.

While at the first Sustainable Development meeting in 1992, technology was seen as crucial to solving environmental problems; at Rio+20 country leaders and the major groups realised the need to adapt lifestyles and knowledge production systems to address global environmental change. Technology offers no lasting solutions without fundamental social, political and economic changes.

Rio+20 failed to discuss ways in which human beings' extractive relationship with the Earth, and with each other, could be transformed through localised solutions linked to global processes. Although *The Future We Want* outcome document (United Nations, 2012) is an important attempt to establish an agenda for sustainable development, this was a missed opportunity to move away from technology as the alleged pre-eminent solution and seriously interrogate the limitations of the predominating development paths. The challenges posed by current forms of unrestricted capitalism were not addressed. This was the elephant in the room.

While the evidence of global warming served as a reminder of the necessity to act on issues of consumption and the urgency to implement strategies such as the ten-year Framework of Programmes (10YFP) on sustainable consumption and production (SCP), such programmes remained voluntary while issues of wealth concentration and inequality were ignored. Furthermore, although issues of access and distribution of resources such as water, land, fossil fuels and carbon sinks were raised, equally important questions concerning wealth and power redistribution were completely absent. Instead, a new “green growth” path was (im)posed as the most radical solution. This was disappointing; global environmental change cannot be addressed by only greening technology, and not addressing underlying drivers like high levels of consumption, poverty and wealth concentration.

We need to find alternative solutions grounded in local initiatives that go beyond “greening” our current system and are linked to international dynamics. Social and natural scientists have a major role to play, as societies embark in this journey. Scientific communities need to join together as one, building on the strength of their diversity, and knowledge production systems need to provide incentives to ensure young scientists in particular, can follow this path. Both natural and social scientists need to use and integrate available scientific evidence on climate and environmental change to quickly propose a set of practicable solutions to the pressing questions. Emerging scientists need to be more engaged in ensuring that scientific progress is rooted in the real social world of people, that questions are relevant to humanity, and that they are able to co-produce knowledge with different stakeholders, using tools such as backwards planning, and trans-disciplinary research methods.

The *Transformative Cornerstones* report (Hackmann and St Clair, 2012) provides valuable ideas on how to re-energize the knowledge production system. With scientists, citizens, policy makers and the private sector finding better ways to communicate and work together, we will be better placed to develop shared solutions. The enthusiastic participation of (young) scientists at Rio+20 showed we are ready to contribute to make the transition to sustainable societies a reality. However, science cannot do this on its own. Let’s not wait until Rio+40. Join us now!

Acknowledgement

The authors would like to thank Stéphanie Dos Santos, Liu Jing, Julio Postigo MacDowall and Herbert Docena for their contributions to early drafts of this piece.

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Diana Sanchez Betancourt is a researcher with the democracy and governance research programme at the Human Sciences Research Council, South Africa. Her research interests include socio-economic transformation, conflict resolution, international cooperation and political economy.

Dominik Reusser is a researcher on the North-South Project at the Potsdam Institute for Climate Impact Research in Germany. His research interests include models as learning tools, communicating scientific results and uncertainties with decision makers, efficient information processing and knowledge management.

76. Social learning and climate change adaptation in Thailand

by
Witchuda Srang-iam

The Community Climate Center in Thailand aims to bridge the awareness gap between local people, especially farmers, and experts such as climate scientists, helping them to understand each other's view of the weather and how it is changing. The results include better farming practices, and more understanding by scientists of how climate information is appreciated and used.

Global climate change is often associated with unexpected and extreme events in locally managed socio-ecological systems. Social learning can help us cope with uncertainties, build resilience, and ensure a system's ability to retain its functions when faced with shocks and disturbances (Holling, 1973). Under such complex conditions, the ability of a system to adapt depends partly on access to resources (Smit and Wandel, 2006), but also on its understanding of information: this case, on the climate and related subjects (Folke et al., 2005). Of particular importance – mostly not addressed in the literature – is the role of cognitive and cultural factors that underpin individual and societal adaptation to climate change (Grothmann and Patt, 2005; Strauss and Orlove, 2003).

The emphasis on human cognition and culture in social learning assumes that social groups vary in their appreciation of what is happening to the climate and themselves. Climate scientists model climate, taking a long-term, globally dynamic, essentially objective perspective. Farmers, on the other hand, conceptualise local weather subjectively and adapt to it within a shorter seasonal or annual timeframe (Hansen, Marx and Weber, 2004). This is why integrating science with local knowledge through social learning is viewed as a valuable exercise (Raymond et al., 2010). However, the cross-cultural differences in perceptions of uncertainty (Wynne, 1992) could themselves shape social learning processes and outcomes. The following sections elaborate on this argument by examining the link between cognition, culture and climate adaptation as they unfold in the Community Climate Center initiative in Thailand.

Community Climate Center: A platform for social learning

Since 2011, the Community Climate Center has served as a platform for collaborative learning between scientists and farmers, and informs their individual and collective

responses to climate change. It enables three stages of social learning: generating and verifying local weather information from general circulation models, interpreting and disseminating weather data to farmers, and adapting this information and hybridising it with local systems and practices.

Inverse modelling, perverse learning

Climate scientists have long struggled to provide predictions of climate change at higher resolution, to inform adaptation at the local level. The Center of Excellence for Climate Change Knowledge Management (CCKM) – an expert climate-modelling organisation in Thailand – has generated local weather forecasts based on weather research and forecasting models. These models use local geographical data to localise the low-resolution forecast data from general circulation models. In addition, the scientists have used the inverse modelling technique to incorporate local data into their weather research and forecasting (WRF) models, yielding better local estimates. The model forecasts are distributed to the local farmers yearly and weekly via text messages, along with news of special weather events. In return, selected farmers have provided the scientists with information such as weather observations and their level of satisfaction. This information is used as feedback to verify predictions and improve the communication of the modelling results.

Through its interactions with farmers, the CCKM has established practices that differ from scientific norms in a number of ways. The scientists have experimented with various data sources and specifications for climate models, and chose between them on the basis of the farmers' evaluation. For instance, they adopted a 10 km resolution that received the highest satisfaction score from the farmers, although the models allow more accurate predictions at higher resolution. Moreover, the scientists have recently changed from the inverse model, which local observations verified, back to the old downscaled model. This is because the farmers found the inverse model's estimations less accurate. According to the scientists, the inaccuracy in these forecasts resulted from errors in the initial observational data.

When communicating with the farmers, the scientists have chosen simplified and deterministic predictions instead of conventional probabilistic terms. For instance, "heavy rainfall expected at the weekend" replaced "60 per cent chance of moderate to heavy rain, a high of 28-30 degrees Celsius expected at the end of the week". However, the scientists run the risk of providing incorrect predictions by specifying levels of uncertainty. If there are too many failed forecasts, the farmers' trust could be undermined. In order to minimise this risk, the scientists have learned, for example, not to use the "moderate" category in predictions, because the farmers only recognise "light" and "heavy" rainfall.

Perverse learning, adverse adaptation

Farmers have long experienced and adapted to climate change, even without knowing how the climate will change. For example, an increase in buffers against climate change, such as the available water and seed, has allowed rice farming to continue despite unusually dry weather. In rice-based farming communities in north-eastern Thailand, farmers also make short-term weather predictions based on natural weather indicators such as ground lizards and dragonflies. However, the changing landscape of modern agriculture makes it increasingly difficult for farmers to rely on their conventional knowledge. Climate models'

predictions have therefore impressed farmers and changed their ways of adapting. They use the annual weather summaries to plan their rice cultivation cycle, and the weekly forecasts to confirm their planned activities. However, not all farmers have access to the forecast data. Their lack of knowledge of mobile short message service (SMS) technology and the disorganisation of the farmer networks have prevented the majority of them from obtaining this information about the weather.

The introduction of climate-related information has led to the resurrection of farmers' knowledge about weather predictions in a new form. This knowledge relies on their objective understanding of climate change by means of observations on a longer timescale and in a restricted, private domain. Those farmers whose task it is to observe and record weather data have started to deduce information from their own graphical representation of the annual rainfall patterns or by collecting figures on these patterns. This is information that they believe is accurate. Their predictions also involve different observations, such as the first day of rain or winter wind in the year, which farmers believe occur in predictable, cyclical patterns over a long period of time.

Information-based learning has also contributed to reducing the adaptability of these cultivation systems. Because the farmers observe that there is a high degree of informational certainty, they follow a specific adaptation that optimises the trade-off between production and survival. Such a planned adaptation diverts their attention from improving their systems' resilience, and away from coping with the remaining uncertainty. This has the consequence that incorrect predictions have caused great damage to their production. An example is the unexpected November 2012 rainfall, which decreased the quality of the harvested rice. Similarly, unpredicted long droughts have caused farmers to bear unnecessary losses from transplanted seedlings.

Conclusion

The example of the Community Climate Center reveals important phenomena whereby science and local knowledge have been integrated through social learning and adaptation. The co-production of knowledge has perversely altered both scientists' and farmers' learning practices, and their perceptions of uncertainty. This has resulted in adaptations that increase their vulnerability to climate change.

Scientists have ignored uncertainty in probabilistic decision making in order to obtain socially desirable results. Their focus on the subjective accuracy of weather prediction has resulted in the climate information that they provide to farmers being increasingly uncertain. Farmers have not taken this informational uncertainty into consideration in their decision making. Instead they have shifted to planned adaptation, making them even more vulnerable to the effects of climate change.

Through their planned adaptation, the farmers have inevitably underestimated the risk associated with uncertain information and overestimated their adaptive capacity. The more accurate predictions become, the more inaccurately farmers perceive their risk and adaptive capacity, choosing to depend instead on the highest-probability prediction, and the more adversely they are affected by unexpected climate events.

These findings emphasise the cognitive and cultural gaps in social learning at the interface between scientists and local communities. In facilitating social learning for climate change adaptation, the main challenge is to manage perceived uncertainties in scientific and other learning systems. For example, scientists and farming communities could work

mutually to interpret the results derived from climate models. Mutual understanding, rather than the linear communication of climate-related information, is necessary to close these perception gaps and facilitate social learning for climate change adaptation.

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Witchuda Srang-iam is assistant professor at the School of Social and Environmental Development, National Institute of Development Administration, Thailand. Her main research interests are environmental politics and governance including biodiversity, climate change and ecosystem services.

77. Indigenous groups and climate change in Colombia

by
Miguel Borja

Indigenous groups in Colombia contribute to solving the problems of climate change and create new perspectives for social sciences. If their knowledge, practices and experience were fully considered at the national governance level, real change in terms of ecological practices would be possible.

Introduction

Latin America's social science contributions to climate change research are often neglected, even though they frequently include indigenous knowledge, traditional practices and ways of managing natural resources. New approaches to social science, however, recognise the value of these sources for devising solutions to environmental challenges.

Indigenous knowledge is key to orienting the social sciences towards addressing climate change challenges. This article discusses indigenous peoples' proposals for restoring their territories and traditions, as well as their leadership in conservation practice. Indigenous communities are involved in government activities, climate change adaptation programmes, and in developing a new social science based on the participatory research action methodology.

Indigenous proposals and action

According to the United Nations High Commissioner for Refugees, there are 87 indigenous communities in Colombia, distributed mainly in Amazonas, the Eastern Plains, Guajira, Sierra Nevada de Santa Marta and the Pacific Coast (ACNUR, 2013). Their main aim is to restore their ancestral territories, so that they can preserve their traditional habitat practices, including respect for the environment and the sustainable use of natural resources. They are seeking the right to govern their own territories and create a platform for the preservation of the ecosystem and biodiversity of their land, and to protect it from being plundered by settlers and agricultural entrepreneurs.

They also propose returning to sustainable economies, for example as practised in the past by the inhabitants of Sierra Nevada de Santa Martha. Today, local people are working to rehabilitate this territory and preserve the soil fertility using crop rotation,

forest preservation techniques and organic fertilisers (Herrera, 1985). Some communities also propose returning to their indigenous roots and practising swidden agriculture (slash and burn), fishing, hunting and gathering wild fruits and other materials (Echeverry, 2009: 15). They believe they can mitigate climate change using their own models of production, distribution, exchange and consumption, as determined by the cycles of nature.

Further suggestions include legal measures to prevent the exploitation of natural resources from affecting their culture, economy and livelihoods. Examples of such action include the long struggle the Uwa1 waged against Shell and Oxy to prevent energy projects in their territories; the opposition of the indigenous inhabitants of the Sierra Nevada de Santa Marta to building hotels and docks in their area; the Embera Katío in northern Colombia who opposed the construction of hydropower plants; and finally, indigenous communities in the Amazon who have succeeded temporarily in stopping mining projects.

Indigenous peoples, society and government

Over the past 25 years, indigenous peoples have become active and visible, political actors in Colombia. Their presence and voice are recognised in governance and Colombian public administration (Laurent, 2001). They have made valuable contributions to the discussion and implementation of public policies in the search for new styles of economic development and better government at the national level. Their contributions range from the guidance they have provided to environmental institutions to their role in safeguarding nature reserve areas.

Indigenous people played a leading role in developing the 1991 Colombian Constitution and in drafting the Indian Law. Their ability to participate in these activities has been promoted by a new and welcoming attitude from other sectors of society, by new policies, and by indigenous people's own struggles to become accepted in national politics. Indigenous groups and communities, such as the Colombian Indigenous National Organization, the Indigenous Regional Council of Cauca, and the Indigenous Authorities of Colombia, are now considered an integral part of society and the state. Their role as leaders and rulers of the ecosystems and biodiversity in their areas is legally recognised (Constitutional Court of Colombia, 2012).

Indigenous perspectives

For indigenous communities, fighting climate change is about achieving sustainable economies and opposing unsustainable ones (especially mining, hydro-electric power and drilling for oil). Their main objectives are to recover their land and culture, and protect their ecosystems and biodiversity through political action and community practices that follow sustainable development practices.

The location of indigenous groups in the mountains, deserts, forests, jungles and plains, and their knowledge of the natural environment, means that they are crucial participants in action-led research to mitigate against climate change. An example is the Amazon Consolidation Programme, which supports indigenous peoples to take the lead in preserving the Amazon.² Similarly, the UN programme on the Integration of Ecosystems and Adaptation to Climate Change in the Colombian Massif is an indigenous initiative (Monje, 2011). The importance of indigenous communities is recognised in other projects

undertaken by the United Nations and others, which seek to consolidate indigenous environmental practices in the Sierra Nevada de Santa Marta and help reduce the impacts of climate change (Pabón, 2008: 10).

These activities between indigenous communities, scholars and policy makers have brought together different types of knowledge and resources, and have created political relations to manage the environmental resources of the country.

Conclusions

Social scientists and policy makers worldwide find that indigenous communities produce creative proposals to solve the problems associated with climate change, including changed weather cycles, flooding, the drying-up of rivers and increased temperatures (Echeverry, 2009: 15). These proposals will result in lifestyles that are in harmony with the environment and which mean effective action to mitigate global warming.

Indigenous people's efforts to preserve their ecosystems and biodiversity include important strategies for dealing with environmental challenges. Recovering degraded areas, protecting water sources and forests, and generating only low levels of waste will go a long way towards solving the environmental challenges for Colombia.

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Miguel Borja is associate professor of sociology at the National University of Colombia and researcher at the Superior School of Public Administration.

78. Fighting to include local voices in environmental policy making in Brazil

by
Raoni Rajão

Local voices and opinions are seen as important in formulating environmental policies, but in reality oral accounts, metaphors and symbols play only a marginal role, while scientific representations still dominate. This problem is deeply rooted in governance discourses that value satellite imagery and other scientific data above local views and experience. This paper focuses on policy-making in Brazil in relation to deforestation in the Amazon rainforest.

Introduction

The entities involved in formulating environmental policies, such as land, people, pollution and biodiversity, cannot be physically present at the discussion. In facing this challenge, policy processes need to create and use representations – words, utterances, symbols or images – to stand in for what cannot be brought into the room (Brown, 2009). Historically, the task of creating representations in environmental policy making has largely been left to scientists (Peet and Watts, 1996). Re-evaluating indigenous and other forms of local knowledge to construct effective environmental governance systems has been an important social science contribution to policy debates in recent decades (Agrawal, 1995; Harris et al., 1995). But despite the recognised need for these contributions, local representations still play only an insignificant role in formulating and enforcing environmental policies.

This article aims to explore the challenges involved in including local representations of reality in environmental policy making. It does so by examining the relation between satellite imagery – as a type of scientific representation – and local accounts of deforestation in formulating environmental policies in the Brazilian Amazon rainforest. In order to capture this relation, this article pays particular attention to the governmental discourses that policy makers and scientists in Brazil use.

Michel Foucault suggested that discourses are statements that “define, describe, and delimit what is possible to say and not possible to say (and by extension—what to do or not to do)” (Hajer, 1995; Kress, 1985: 7). This implies that in a specific policy context, only the

statements that conform with established discourses are deemed “truthful”. Representations rely on the dominant discourses to become valid, while the representations that do not fit are silenced (Foucault, 2002). By expanding the understanding of how the state uses discourses, Foucault proposed the notion of governmentality: that is, “the ensemble formed by institutions, procedures, analyses and reflections, calculations, and tactics that allow the exercise of this very specific, albeit very complex, power” (Foucault, 2007: 144).

The characterisation of a specific governmentality and the delineation of its relationship to different discourses and representations are not trivial tasks. They often require the adoption of different research methods. The data for this analysis come from textual sources (such as news articles, government reports, historical accounts and scientific studies) and from 85 interviews conducted with governmental officials, scientists and local groups in Brazil between June 2007 and August 2009. The next section of this article outlines the main finding of the study (for a more extensive version of this chapter see Rajão, 2012).

Governmental discourses and representations

The 1980s was an intense period for environmental activism in the Amazon. An alliance between grassroots movements, scientists, politicians, journalists and celebrities made globally important an issue which had previously been largely invisible. Local representations of deforestation led the activism. Examples include striking images of burned fields and the voices of prominent local activists such as the Indian chief Raoni Metuktire and the rubber tapper Chico Mendes. Three decades later, the situation could not be more different. Instead of local representations, distant and objective assessments in the form of satellite images, maps and graphs now dominate news reports and policy documents. This prompts us to question why representations of the Amazon featuring local voices and images have been sidelined in recent decades in favour of remotely sensed and numeric representations.

We have examined the ways in which policy makers referred to local and scientific representations in their discourses. It emerges that governance in Brazil reflects partially overlapping discourses that shape the relationship between representation and policy making.

Within the Brazilian government, the first discourse that helps explain the diffusion of scientific representations at the cost of local ones can be defined as the visibility discourse. This discourse is dominated by policy makers’ pronouncements which privilege the sense of sight over other ways of representing and knowing the Amazon. It incorporates the idea that it is crucial to “see” the territory in order to govern it. The influence of the visibility discourse are particularly evident when we consider that government officials disqualified the nonvisual local representation of the Amazon after the introduction of satellite-based remote sensing technology.

The local inhabitants of the Amazon have for centuries found ways to represent their territory through the use of oral accounts that highlight the characteristics of the landscape as they see and live it. For instance, while referring to the scarcity of bush meat in nearby forests and the location of his current hunting grounds, a native Indian would use references such as the names of rivers (such as Rio do Sangue, Blood River), aspects of the landscape (such as *mata fechada*, dense forest) and talk about distances in terms of

walking days. Nonetheless, policy makers and scientists insist that only with the arrival of satellite imagery has the Amazon became knowable. Pereira (1971) commented that the use of remote sensing technology in the Amazon was essential for “separating the legend from reality [...and revealing] the secrets that nobody knows”. It is possible that Brazilian policy makers excluded local representations not because of their inability to represent the territory, but because they conflict with a visibility discourse that seeks favour the government. This aims to know and control the Amazon in a centralised way, without the need for local, background knowledge that would otherwise be required to interpret local, culturally bound representations.

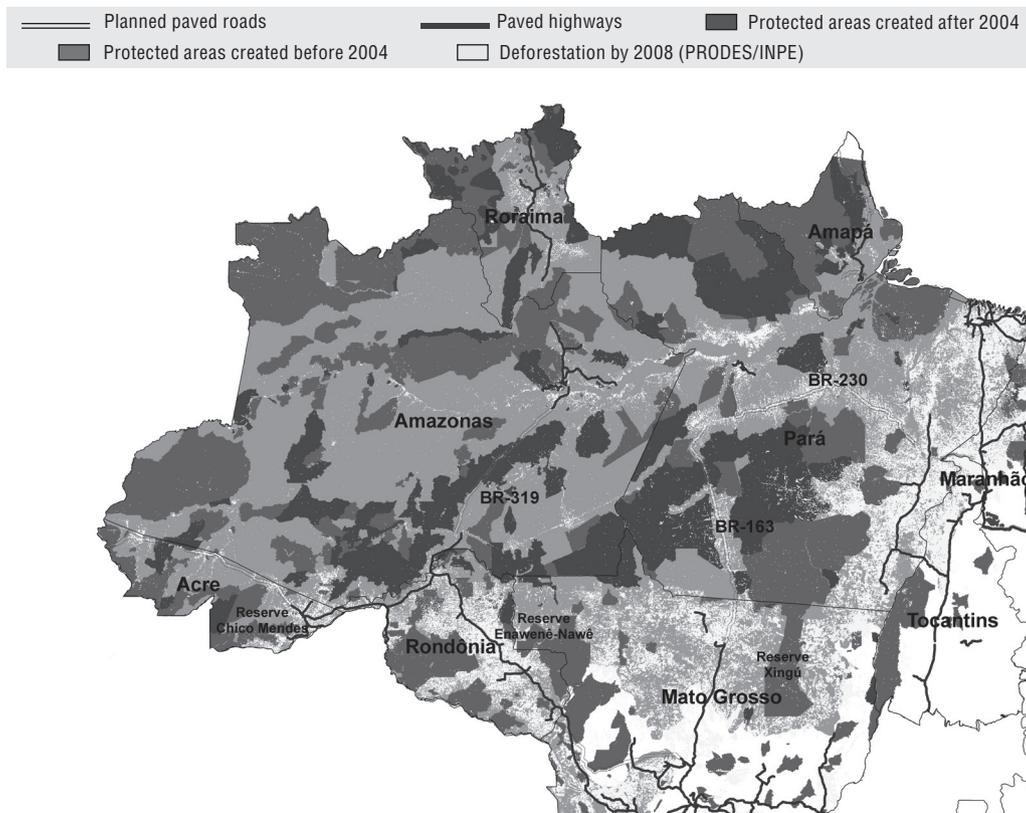
The perceived importance of a comprehensive understanding of the territory reveals another way in which scientific representation is valued above local representation. The so-called comprehensiveness discourse describes the tendency of officials and scientists to refer to the entire legal entity of the Amazon, the largest socio-geographic division of Brazil, rather than to specific areas or populations. In addition, despite recent efforts to allow state governments to get involved, key policy decisions concerning the Amazon are still made by the federal government, in a way that tends to treat the region as a homogeneous whole. Here, scientific representations such as satellite images play a key role due to their ability to show the entire picture, while local representations are sidelined for their limited geographical range.

During the 1970s and 1980s, local representations helped create protected areas (see below), yet they were unable to stop the expansion of Brazilian colonisation policies in the early 1980s. This may be because they only focused on deforestation in a restricted portion of the Amazon. Policy makers and scientists consequently dismissed the relevance of these representations by claiming that they were “speculative [...] excessive and misdirected” (Clayton, 1982: 2). They did not feel a need to change policies that applied to the whole of the Amazon.

A third discourse that helps explain the success of satellite technology and related scientific representations in Brazil concerns the search for deterministic statements, representations that can simultaneously explain reality and mathematically control the outcome of policies. This we term the determinacy discourse. It was evident in the importance that policy makers have attached to mathematical models that could generate future deforestation scenarios for the Amazon. The positivist underpinnings of scientific representation match the deterministic discourse closely, whereas local representations mostly rely on contextual and experience-based presumptions about the future. So they are deemed unfit, and excluded from policy making.

This helps explain why prediction models that promise specific results in terms of reducing deforestation (see Figure 78.1) have increasingly guided the creation of new protected areas since 2004, rather than demands from local groups based on oral accounts of the cultural significance of the territory. An ex-director of the Ministry of the Environment has suggested that local representations were often used only to justify a decision that had already been taken, based mainly on deterministic representations of satellite images and mathematical models.

Figure 78.1 **Map showing deforestation patterns, main roads and protected areas in the Amazon. It illustrates the ability of scientific representations to provide visual, comprehensive and deterministic accounts of the Amazon.**



Source: Rajao 2013

Conclusion

To include local representations in environmental policy making, we must be ready to challenge some of the assumptions embedded in current government practices. An intervention can only be successful if it is aimed at revaluing local representations. It should challenge not only the inherent superiority of science, but also the discourses that support the exclusive use of scientific representations. To position local representations at the heart of environmental policy making, we need to challenge the discourses of visibility, comprehensibility and determinacy that undermine their legitimacy.

It is therefore important to go beyond the “seeing is believing” attitude that is 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. This implies the adoption of participatory approaches and the creation of a new form of governmentality that acknowledges the validity of different epistemologies in environmental policy making.

It should also be possible to challenge the idea that the “whole” is the only scale on which valid environmental policies can be created. This implies abandoning large-scale and top-down approaches to policy making. Decentralised governance systems should allow local groups the autonomy to set priorities and regulate their

relationship with the environment. The idea that environmental policies should always be deterministic should also be challenged. Governments need to accept the unruly nature of environmental problems, and create solutions in an inclusive, experimental and emerging manner.

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Raoni Rajão is professor of social studies of science and technology at the Federal University of Minas Gerais, Brazil. His main research interests are the social aspects of information technology and environmental governance in the Brazilian Amazon.

79. The need for indigenous knowledge in adaptation to climate change in Nigeria

by
Godwin Odok

Most solutions dealing with climate change in rural Nigeria are biased in favour of a modern or Western worldview. Local indigenous knowledge of forest management and of adaption to climate change is seen as irrelevant.

Introduction

Forest areas in Nigeria are a significant part of the West African Guinean forests, which are themselves important for biodiversity. Nigeria's forests fall into three categories: open tree savannah in the drier middle and northern latitudes; lowland rainforest in the southern humid zone; and coastal mangroves and freshwater swamp forests, also known as high forests. Nigeria's forests form a significant part of the rainforest belt of West and Central Africa, representing about 15% of the world's remaining tropical forests (Babalola, 2012).

Traditional forest management practices were based on indigenous knowledge and were especially significant in response to natural disasters. They were mainly derived from folklore and people's traditions (see Table 79.1). Modern forest management activities started in the late 18th century with the establishment of regional forestry authorities (Babalola, 2012). The broad policy objectives at that time were to protect and maintain nature, while allowing for the sustainable ecological use of forest resources (Cross River State, 2011).

Table 79.1 **Indigenous forest management practices in rural Nigeria**

Practice	Reason
Preservation of special tree species such as iroko and cotton	They are the home of spirits
Preservation of portions of land with big rocks	They are the home of spirits
Not eating new yam during the "new yam festival"	The gods have to be appeased first
Shifting cultivation and crop rotation	
Not felling certain trees	They are agents of the gods
Preservation of forestland around drinking water sources	
Land inheritance from parents to children	
Prohibition of outright land sale, especially to external and non-communal interests	

Communities in rural Nigeria no longer maintain behavioural patterns that promote the sustainable use of forests. Indigenous habits and practices for forest management have all but disappeared. The destruction of forests is a main cause of climate change (World Bank, 2008). Sustainable forest governance, based on an ecologically sustainable culture, has also been identified as the best solution to climate change (IPCC, 2007). The disappearance of indigenous practices that sustain forests therefore presents a challenge for climate change adaptation in rural Nigeria.

Forest diversity and the possible extinction of indigenous forest management

Indigenous knowledge is local people's knowledge of a particular geographical area; it is knowledge that has survived for generations (Vansina, 1985). It is unique to a specific society and is embedded in the people's practices, institutions, relationships and rituals. During the 1970s and 1980s, a growing number of researchers explored how indigenous knowledge and institutions could contribute to more culturally appropriate and sustainable development (Boedhihartono, 2010). This research recognised that capitalist transformation threatened local communities and ecological systems, and was unsustainable (Olutayo and Odok, 2011; Oladele and Braimoh, 2010). It also acknowledged that indigenous people are more keenly aware of their needs than outside "developers", and have culturally defined needs which demand a substantive rather than a formal appreciation (UNDP, 2011).

Results that emerged from 459 questionnaire respondents, 33 in-depth interviews, 12 key informant interviews and other do-it-yourself participatory research activities (including social mapping, transects, seasonal calendars and institutional profiling), confirmed the absence and near extinction of indigenous practices for forest management in rural Nigeria. These conditions are believed to have negatively affected sustainable livelihoods in these areas. Modernity is blocking the oral paths through which indigenous knowledge of basic survival skills is communicated. This means that the forest-dependent peoples of rural Nigeria no longer learn from each other and no longer form common "attack-and-defence" units to protect local forest resources. In addition, the indigenous knowledge systems of these communities are rarely documented. In sum, these findings have established that modern climate change adaptation in rural Nigeria is detached from the people's local ecology, human geography, gender and class.

Conclusion and policy recommendations

Climate change adaptation programmes need to be culturally relevant if they are to be sustainable. In this context, the value of indigenous knowledge of forest management to climate change adaptation is clear. The social sciences undoubtedly have a role to play in reconciling modern Western knowledge and indigenous knowledge.

Adaptation projects and programmes must adopt approaches that inspire the highest level of local participation in forest areas. This would provide valuable insights into how people interact and share ideas, what their traditional knowledge and experience consists of, and how their ancestors managed forested areas and other related natural resources. It would also allow local communities to develop the skills and practices necessary to maintain new projects in a sustainable manner. While the importance of indigenous

knowledge is clear, it is equally important that indigenous and modern techniques and approaches complement and learn from one another to produce best practices for climate change adaptation.

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Godwin Odok is a doctoral student in the Department of Sociology, Faculty of the Social Sciences, University of Ibadan, Nigeria. His research interests include the sociology of development, the political economy of African development, and indigenous knowledge systems for climate change adaptation.

80. Quebec's Plan Nord and integrating indigenous knowledge into social science research

by
Steve Jordan

In the context of the Quebec government's Plan Nord (2011), this article discusses the contributions that social scientists can make to constructing new forms of research that are sensitive to the traditions of Canadian aboriginal communities. It argues that these new ways of working might inform the organisation, principles and practices of the current social sciences.

The government of the Canadian province of Quebec formally launched *Plan Nord* in May 2011. The plan envisioned broad and encompassing resource development – through mining, water, hydro-electric power, forestry and tourism – of vast areas of Quebec's arctic regions, which indigenous peoples still inhabit. The *Société du Plan Nord* was created as a joint venture to draw on the goals and expertise of a range of stakeholders, including First Nations and Inuit communities,¹ multinational corporations and the Quebec government. In addition, Quebec sought the participation of Canadian universities to contribute research and policy to develop the social networks needed to support *Plan Nord*. The provincial government's expected investments were approximately CAN 2.6 billion by 2016.

Plan Nord was to be implemented on indigenous territories and was envisaged as a "participatory organisation" (Government of Quebec, 2011). Both factors have significant implications for the research methodologies that natural and social scientists from the collaborating universities will adopt.

In this context, it is important to note that although the Liberal government of Jean Charest originally created and promoted *Plan Nord*, the minority government elected in September 2012, which Pauline Marois's nationalist Parti Québécois leads, has retained it as a policy for the development of the Canadian North. Despite their very different political ideologies, there appears to be an emerging consensus between the two dominant political parties of Quebec that *Plan Nord* should proceed.

This article outlines the possibilities that *Plan Nord* offers to researchers for exploring alternative research paradigms when working with aboriginal communities.

The Quebec and Canadian governments have a long history of colonial rule of Canada's First Nations. Despite this legacy, Canadian indigenous peoples' struggles for self-determination and autonomous government over the past two decades continue, and are evidenced by the ways in which these struggles are now influencing the conduct of research. This new emphasis stems from recent developments in the Canadian socio-political landscape.

First, the "Idle No More" movement (a movement of indigenous people demanding equal civil and political rights), currently sweeping Canada in response to the federal government's Bill C-45 (Government of Canada, 2012), addresses the divide between aboriginal histories and knowledge, and current institutional policies. Members of First Nations communities – and many from the wider population – view Bill C-45 as an attempt to revoke traditionally held rights over land and resources, particularly waterways.

Similarly, Canada's Truth and Reconciliation Commission hearings (TRC), currently underway in Amos, Quebec, are giving voice to the appalling legacy of the Canadian residential school system² and other assimilative forces, as well as the aboriginal peoples' efforts to reclaim respect and dignity.

Although mainstream Canadian social scientists have been slow to recognise the complex effects that Canada's colonial legacy has had on aboriginal people, awareness is growing. Moreover, new ways of working with indigenous communities take into consideration ways in which indigenous knowledge and community values might mediate urgent social challenges. These challenges include responses to climate and other environmental changes (Wolf, Alice and Bell, 2012); sustainable development (Cajete, 2012); food security, particularly the effects of "nutrition transition" (Kuhnlein et al., 2004); and the rising incidence and prevalence of *diabetes mellitus* (Boston et al., 1997; Jordan et al., 2000). Through participatory research, which repositions aboriginal people as co-investigators rather than viewing them as "objects" of research, current approaches attempt to acknowledge and respect first peoples' cultural traditions regarding knowledge-producing practices (Jordan et al., 2009).

These relatively recent shifts have even influenced the earliest formulations of *Plan Nord*. In contrast to Bill C-45, which aims to exclude them, *Plan Nord* places the aboriginal peoples at the heart of their land and communities, and makes them participants in the construction of new socio-economic realities. According to its original presentation and early commentary, this initiative regards aboriginal communities as "partners" and aims at creating "participatory organisations". In these organisations, they will ultimately participate fully in planning and decision making with regard to their territories (Government of Quebec, 2011). In this way, *Plan Nord* may be seen as a marker on a continuum of Canada's evolving relationship with its aboriginal cultures and knowledge.

As yet, *Plan Nord's* historical effect – the value and authenticity of its aims, the ethics of its approaches and the extent of its potential – is not known. Sceptics may rightly observe that it is not clear whose needs are ultimately being served. Furthermore, there is no certainty that the *Plan* will make any difference. Experience from earlier development projects, such as the Great Whale (River) hydroelectric-generating scheme of the 1990s, suggests that aboriginal interests may well be ignored. Only time will tell.

Nevertheless, approaches which are consensual, participatory and founded on First Nations' values and worldviews are being developed and incorporated into current social science research in Canada and globally. More importantly, aboriginal scholars are beginning

to explore an indigenous research methodology. They are drawing on the social sciences to stimulate this methodology, while aboriginal epistemologies, knowledge-producing practices and worldviews are informing it (Chilisa, 2012; Kovach, 2009; Porsanger, 2004; Smith, 1999).

The following general principles can guide new ways of working within the social sciences regarding indigenous populations. First, in order to develop novel and promising ways of working, the social sciences need to become open to new and perhaps unorthodox ways of conceptualising and investigating the social. Indigenous research methodologies might offer one model for this process. Other models might be alternative forms of leadership, social organisation, decision making and knowledge creation.

A considerable volume of research is already being conducted on the fringes of normal social sciences. This makes it possible to reconfigure how the social sciences can respond and adapt to the challenges of the 21st century.

The social sciences have historically tended towards knowledge-producing practices that can seem abstract, decontextualised and inaccessible to lay populations, especially those on the margins of society. This has especially impacted work involving indigenous peoples, whose literacy levels in colonial or settler languages are often low. A new social sciences research model could address this by insisting on an educational function that draws upon indigenous epistemological principles being incorporated into research collaborations with indigenous people. This idea is based on the belief that for true collaboration to occur, aboriginal peoples' knowledge-producing practices need to be recognised and that collaborative research should be conducted from a viewpoint that respects their traditions, customs and communities (Jordan, 2003; Kapoor, 2009).

The significance of the approach that *Plan Nord* proposes for social science research is that it espouses participatory ways of working with indigenous groups. It links aboriginal epistemologies and marginalised social science research to the front line: that is, to field work practices and to theory and concept building. In this respect, it is important to acknowledge that social scientists who have been working in the Canadian North for a decade or more are already exploring new research methodologies to inform and stimulate *Plan Nord*.

Notes

1. First Nations, Inuit and Métis are Canada's aboriginal people.
2. The 1876 Indian Act established residential schools for aboriginal Canadians. They are now widely viewed as having been responsible for sexual, physical and psychological abuse while supposedly undertaking a "civilising mission". The last school closed in 1996.

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Steve Jordan is an associate professor in the Faculty of Education and an associate member of the Faculty of Medicine, McGill University, Canada. Prior to joining McGill, he taught and conducted research at the University of Canterbury in New Zealand.

81. Participatory water governance in Mercosur countries

by
Alfredo Alejandro Gugliano and Davide Carbonai

Water is crucial to existence, and is getting scarcer. Participatory governance and involving citizens and social movements in the various stages of managing access to water in the Mercosur increases access to water and is an important means of democratising natural resource policy making.

Introduction

According to the UNESCO *World Water Development Report* in 2012, a combination of rising world temperatures, the growing demand for food as a consequence of demographic change, and the needs imposed by economic growth and market expansion, point to a potential threat of water scarcity in the near future.

Water allocation and management, or water governance, is an important debate, crucial for policy making across states and civil society. In the 1980s and 1990s, large parts of Latin America chose to privatise their water supply services. These policies have changed more recently to broaden the public nature of water supply services and to increase community involvement in their management.

Privatisation and nationalisation are not necessarily mutually exclusive. The experience of Brazil during the Fernando Henrique Cardoso administration (1994-2002) is an interesting example. The 1995 *Lei de Concessão dos Serviços Públicos* on the concession of public services included legislation to permit the privatisation of water resources. But two years later, in the proclamation of the National Policy for Water Resources (Law 9433/1997), water was recognised as a public good.

The Mercosur countries – Argentina, Brazil, Paraguay, Venezuela and Uruguay – witnessed the development of mechanisms valuing civic engagement in policy making in the late 1990s. Many researchers suggest that participatory policies redirect public spending towards the poorer sectors of the population, generate public transparency and accountability, and in general, stimulate higher levels of social participation. But others point to the difficulties involved in developing effective participatory processes. Some also criticise the state and traditional populist leaders' frequent control of such processes (Cortez and Gugliano, 2010).

Experiences of participatory water management

In the Mercosur region, different approaches have been adopted to strengthen community engagement in water management. Some are characterised by more representative mechanisms to encourage the involvement of organisations believed to represent water management interests (such as the state, consumers and the private sector), while the people's increased direct involvement characterises others.

The Brazilian experience is a good example of the development of a channel for institutional representation. The country has had the National Water Resources Integrated Management System in place since 1997. It consists of a national council for water resources, 23 state councils and 120 water basin committees. The committees are made up of public officials, water-basin-related civil society organisations, and consumers. The committees are primarily responsible for debating water-related issues at local and regional level, ratifying water basin management plans and monitoring their implementation (Jacobi, 2006).

Other Mercosur countries have also developed water management mechanisms to open up the possibility of direct civic involvement. In Venezuela, a law¹ on water supply and sanitation created water boards, *mesas de concertación*. These include water users, who discuss and assess water policy projects, investments and implementation at the national, local and regional levels. Building on existing civic public assemblies, it is estimated that there are nearly 7 500 such boards across the country (Lacabana and Cariola, 2007).

In Paraguay, civic involvement in water management occurs via water management boards.² These are also based on public assemblies, and their main duty is to manage the many aspects of water supply and public sanitation in small communities, those with fewer than 10 000 inhabitants. Other tasks they undertake include tackling sanitation-related issues, the planning and delivery of services, and the representation of water users in other public or private bodies. Legally registered as companies, it is estimated that some 2,000 *juntas* function across Paraguay (Moreno, 2008).

Even though a considerable part of its water supply services are in private hands, in Argentina too there are various experiences in water management, especially through the *cooperativas de agua* (water co-operatives). The co-operatives, which supply drinking water primarily to small localities, can be considered an alternative to the privatization or statist models, in that water supply is carried out by the membership of a private association created for the purpose of managing water (Muñoz, 2005).

Civic involvement in the Mercosur has also contributed to strategic management: the constitutional referendum on public ownership of water-related services held in Uruguay in October 2004 and approved by 62.75% of voters is a good example (Moshman, 2005).

Limits and prospects

Despite the positive results of these approaches, they are still heavily criticised. In Brazil, some point out that gathering social organisations on to a committee does not necessarily make the experience participatory. They also criticise the ineffectiveness of committee discussions. In Venezuela, criticism is similar to that levelled at other Bolivian participatory policies – that populist government policies are appropriating citizen involvement. In Paraguay, the difficulty is that various *juntas* have had to solve technical problems, because of a lack of infrastructure or of funds, thus jeopardising implementation.

In Uruguay, the government's slowness to implement the results of the referendum has also led to criticism. In Argentina, the emphasis is on the risk that some co-operatives will adopt strategies similar to those of private companies (Arenas, 2005; Moreno, 2008; Moshman, 2005; Abbers and Keck, 2009).

While these may be valid criticisms, the key issue is to determine whether they obstruct the development of participatory models as alternatives to public policy making and management, and specifically to water policies. It is worth stressing that since there are many participatory experiments in place in the region, some will succeed while others will inevitably fail. Uncertainty should not invalidate the perception that community engagement in policy making can improve the results of public policies (Narayan, 1995; Kliksberg, 2001).

In the Mercosur, change is perceptible after nearly two decades of participatory policies in water management. Paraguay and Venezuela have increased access to piped drinking water, to a coverage of 69.3% (a 27% increase) and 84 per cent (a 22% increase) respectively. In Brazil, 90% of the population has access to piped drinking water (an 8% increase). In Argentina the figure is 78% (a 10% increase), while in Uruguay coverage is nearly universal (98%).

This does not mean that all the difficult hurdles have been overcome. There is still huge inequality in water access and distribution between urban and rural areas; poor social sectors are often excluded, and large urban centres are favoured over small villages (UNDP, 2006). Similarly, progress still has to be made in broadening the region's laws on water management. New laws should unite and co-ordinate the various participatory instruments that each country has set in place. Furthermore, they should create mechanisms for citizens to be involved in the management of their common environmental legacy, such as the Guarani Aquifer System – an important underground water reservoir stretching across the entire Mercosur, except for Venezuela.

Conclusions

For Albert Hirschman (1984), one of the interesting points about community engagement in policy implementation is that besides the concrete outcomes, the process itself yields important intangible results. For example, the feeling of citizenship and sense of belonging, for so long numbed (characterised) by conditions of extreme exclusion, can return.

Of the various strategies available to manage water resources, policies that involve citizens in public management are an opportunity to expand government management capacity and harness community knowledge and experience, using them to solve social issues and increase the effectiveness of public policy. In the Mercosur, the experiments that have been conducted are proving effective in engaging local communities and citizens in setting the water agenda and managing it. They work by building on the interests of the users themselves, especially those with basic public policy needs.

Notes

1. Ley organica para la prestación de los servicios de agua potable y saneamiento (2001)
2. Juntas de Saneamiento Ambiental or Environmental Sanitation Boards, Law 369/72.

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Alfredo Alejandro Gugliano is professor at the Universidade Federal do Rio Grande do Sul, Brazil. His current research interests include the theory of democracy and citizen participation in governance.

Davide Carbonai is professor of political science and sociology at the Universidade Federal do Pampa, Brazil. His research mainly focuses on social network methods and industrial relations.

82. Glass half full or half empty? Transboundary water co-operation in the Jordan River Basin

by
Anders Jägerskog

Extreme water scarcity and political conflict in the Middle East mean that transboundary water can be a source of conflict. Yet conflict and cooperation do exist side by side between Israel and Palestine and between Israel and Jordan. A social science perspective is instrumental in understanding how water co-operation in the Jordan River Basin has developed.

Introduction

As the 2006 United Nations Development Programme (UNDP) *Human Development Report* noted, managing hydrological interdependence is “one of the great human development challenges facing the international community”. The Middle East and North Africa (MENA) is the region with the smallest per capita share of freshwater in the world (Allan, 2001). The region has only 1% of the available freshwater on the planet, and more than 5% of the population. In addition, much of the available water is found in rivers and aquifers shared by two or more countries, making conflict likely (Jägerskog, 2003).

Twenty years ago, researchers and politicians identified water as the next reason for war in the MENA region (Starr, 1991; Bulloch and Darwish, 1993; Homer-Dixon, 1994). However, none of the wars and conflicts that have occurred since were fought primarily over water (Wolf, 1995; Allan, 2001; Jägerskog, 2003). The analysts who predicted war over water did not take into account the water footprint of imported food. This covers the “deficit” of water in the region, and has led to a reduced risk of conflict as the global food market made more water available in its virtual form (Allan, 2001). Another reason for the decrease in the risk of conflict is that the states realised they had to co-operate over their shared waters, and did so despite other conflicts (Jägerskog, 2003). However, water still remains an issue of contention (Jägerskog, 2008).

Zeitoun and Mirumachi (2008) have shown that in transboundary systems, conflict and co-operation often exist side by side, and there is continuous negotiation even in periods of apparent disagreement (Earle, Jägerskog and Öjendal, 2010). This article discusses the quality and strength of the co-operation between the parties, which in turn

permits ongoing dialogue and negotiation. A social science perspective (primarily that of political science and international relations, but also sociology and discourse analysis) is instrumental in understanding how water co-operation in the Jordan Basin has developed (Jägerskog, 2003).

Israeli–Palestinian and Israeli–Jordanian water conflict and co-operation

Since the 1950s, Israel and Jordan have co-ordinated issues pertaining to their shared waters from the River Jordan. Under the auspices of the UN Truce and Supervision Organization, the parties have discussed their common concerns in the so-called “picnic table talks” since the 1970s (Wolf, 1995).

In some respects, this technical co-operation was later codified in the 1994 Israeli–Jordanian peace agreement, of which water was a central aspect. Some previously informal water arrangements became central to the agreement, which takes many of the aspects relevant for proper transboundary water management into account. However, it is still unclear on other aspects. One of these concerns water allocation during drought years, which are frequent. The peace agreement specifies that the Joint Water Committee (JWC) should deal with this matter, instead of having a clear formula within the agreement to address recurring droughts (Jägerskog, 2003). In spite of the challenges, the agreement has functioned relatively well since it was signed. Jordan even stores its winter water inside Israel by pumping Jordanian water from the Yarmouk Tributary to Israel’s Lake Tiberias; this water is returned to Jordan during the dry summer (Earle et al., 2010).

Israeli–Palestinian co-operation regarding water follows a different pattern. Before the Oslo process, there had primarily been unofficial dialogue between academics. Negotiations only started formally with the Oslo process. Further, the Declaration of Principles agreed on in 1993 and the subsequent Oslo II agreement in 1995 were never a full agreement on water – or any other issues – but dealt only partially with the water issue. The thinking was that negotiations about water would be concluded during the final negotiations between the two states, which were supposed to happen within five years of the Declaration of Principles. It was, however, agreed that the Palestinians had water rights, although these were not defined (Jägerskog, 2003). As with Israel and Jordan, a JWC has been institutionalised. This operates on a consensus-based approach, deals with West Bank water projects, and allows Israel to veto Palestinian projects. The original academic-level co-operation has rarely moved up to the political level (Jägerskog, 2003). While common norms and a certain degree of trust have been established between the professionals, political co-operation has been challenging. Selby’s analysis (2013) of the JWC since its inception reveals a rather damning picture of a failing structure that prevents the Palestinians from developing their own functioning water sector.

A political analysis of Jordanian–Israeli water relations shows that discourse and understanding at the technical level have provided improved co-operation, and that the political level generally accepted the discourse and development of norms that occurred at the technical level. This did not happen in the Israeli–Palestinian case, as entrenched political conflict overshadowed both water relations, and efforts to build joint academic knowledge (Jägerskog, 2003). From a social scientific perspective, the conclusion is that in a situation in which the discourse affects co-operation positively – as was the case between Israel and Jordan but not to the same extent between Israel and the Palestinians – technical understanding can develop into a certain level of cooperation (Ryan, 1998).

Conclusions

The process of establishing and maintaining co-operation in the Jordan River basin is challenging. In this short article, only part of the basin has been analysed, with Syria and Lebanon excluded. One important observation is that establishing co-operation is a process. It takes time and patience. Providing scientific material in order to gather data on flows and other aspects can contribute to improved decision making. In regions that are “securitised”, as is the Jordan basin, politics is more important than scientific knowledge. However, joint research and projects can prepare the ground for when a political situation is ready for a solution.

A second observation is that while establishing co-operation is important, the analysis cannot end there. It is essential to analyse the quality of co-operation. Is it robust, and does it improve justice and the equitable sharing of resources? In the case of Israel and the Palestinian Authority, the institutionalisation of co-operation via the JWC has maintained a structure that allows Israeli domination of its Palestinian counterparts (Selby, 2013).

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Anders Jägerskog is programme director at the Stockholm International Water Institute and associate professor in peace and development at Gothenburg University, Sweden.

83. Global governance and sustainable development

by
Alberto Martinelli

Global climate change is one of a number of issues, including business globalisation, that raise the need for global governance. There are many possible models for government on a world scale, all involving a growing role for new and existing global organisations.

Globalisation raises the question of global governance, the development of a set of norms and institutions concerning the entire world as a single system. Today's world is characterised by the contradiction between growing social, economic and technological interdependence, and increasing political fragmentation and cultural heterogeneity. As these networks of interdependence intensify, it becomes less feasible to see global issues – global environmental change, sustainable development, trade, finance and security – as separate problems. They no longer have their own institutions, nor can they be solved at national or sub-national government levels. The world system increasingly resembles a polity, or an organised society, albeit one with fragmented institutions. Governance at the global level needs formal and informal institutions and processes that regulate, guide and integrate global activities through which rules and norms governing the world order are made and sustained. (Martinelli, 2002).

Models of democratic global governance

Democratic global governance can be summarised in five major overlapping models:

- international liberal democracy
- radical democracy
- deliberative democracy
- cosmopolitan democracy
- multilevel governance of supranational unions.

I will add a sixth: polyarchic governance, as the most viable and effective (Martinelli, 2008).

International liberal democracy maintains that in order to face the threats to social cohesion of globalisation, and the ecological and political risks it involves, the model of

liberal democracy should be extended beyond the boundaries of the nation-state (Commission on Global Governance, 1995; Rosenau, 1997; Ikenberry, 2001). In this model, nation-states are still the most important actors, although international organisations and regimes play a growing role. This raises the fundamental question of accountability. Most international conventions and agreements do not mention to whom and how powerful global actors should be held accountable, nor do they specify which measures should be applied or by whom if international norms are ignored.

Radical democracy argues that alternative mechanisms of economic, social and political organisation should be created worldwide, and be based on the principles of self-government, equal rights, the common good and harmony with the environment. It aims to create the conditions necessary to empower people to take control of their own lives and create self-governing communities (Falk, 1995; Gret and Sintomer, 2002; Laclau and Mouffe, 2001). In this model, new global movements are the most important actors. This model is open to the criticism that innovative examples of direct democracy, such as participatory budgets, deliberative polls and mini-caucuses, become increasingly difficult to implement as the polity to which they apply becomes larger.

Deliberative democracy is rooted in Habermas's theory of communicative reason (1981), and has been developed in the works of Fishkin (2011), Dryzek (2010), Elster (1998) and Gutmann and Thompson (1996). It fits between the two described above. It can be seen as a variant of liberal and radical democracy with the specific aim of improving democracy.

Cosmopolitan democracy is based on a cosmopolitan law that entrenches a few universally shared principles. It implies the development of a global civil society in which democratic cosmopolitan institutions and public discourse can develop among individuals enjoying multiple citizenship in diverse, overlapping political communities (Archibugi, Held and Kohler, 1998; Held, 2002). It underestimates the power dimension, the persisting importance of nation-states and their conflicts. It also fails to identify the most important actors to make the project of cosmopolitan law real. This model is at present limited to "enlightened minorities".

Multilevel governance argues that global governance can only be the result of the gradual development of supranational unions, based on the European Union model. Supranational unions are formed by national governments voluntarily transferring portions of their independence to supranational institutions (Hix, 1999; Zeitlin and Pochet, 2005). However, interstate rivalries and different views of the national interest are serious obstacles to the development of union building, even in the European Union, the most advanced experiment of this kind to date. There are serious doubts that European "exceptionalism" can be reproduced in other regions of the world.

Polyarchic, mixed-actor governance for sustainability

All models have strengths and weaknesses. But taken together, these examples suggest that a viable democratic global governance project is possible. For global governance to be achieved, it should take seriously the continuing importance of nation-states as key actors when making policy on global issues. It should also incorporate some features of the main models outlined above.

Global governance can realistically be achieved through a polyarchic, mixed-actor, multipolar and multilayered system, in which the anarchy of sovereign nation-states is

reduced. Three types of non-state actors could control them: international organisations around a reformed United Nations Organization, community-type and market-type associations of world civil society, and supranational unions like the European Union. The basic underlying principles would be democratic accountability, individual and community empowerment, multiple identities, contextual universalism and supranational institutions. In this polyarchic mixed-actor system – the product of many actors pursuing different strategies, both competitive and co-operative – global governance is the result of a set of institutions and collective actor-governments, markets and communities whose actions are based on the principles of authority, exchange and solidarity (Martinelli, 2002, 2008). The most important actors in global governance for sustainability will be democratic governments, United Nations agencies, socially responsible corporations, non-governmental organisations (NGOs) and collective movements, as well as scientific and epistemic communities.

The governing role of nation-states and international organisations in environmental policy has been widely studied (Evans, 2012). Strong democratic policies and cultures favour global governance for sustainability. Democratic governments can play a major role by being open to the public's concerns. The urgent changes in attitudes and institutions required for sustainable development should take place in a widened democratic public space and with strengthened citizen participation. International governmental organisations can also play a significant role (through the United Nations Environment Programme (UNEP) and similar agencies). They can do this by offering a space for dialogue and co-operation, incentives for policy implementation, and resources for ecological education and specialised training, as well as by monitoring and evaluating policy (Karns and Mingst, 2009).

NGOs and collective movements also need consideration. These actors have been relevant for setting policy priorities, raising awareness of the issues, exposing governments and corporations' worst practices, and monitoring trends. They appear to be less effective in setting standards and rules, and at implementing specific policies (Keohane, 2002).

Greater recognition is needed of corporations and epistemic communities, and their role in governing global sustainability issues. Corporations are often only regarded as part of the problem, not of the solution. This view neglects the significant differences between corporations operating in different sectors. For example, the market for clean technologies, both hardware and software, is worth about EUR 500 billion. It also overlooks different managerial cultures and organisational structures, and the growing theory and practice of corporate social responsibility.

Two contradictory developments are taking place in capitalism today: First, there is increasing pressure from financial markets, which demand high short-term profitability and greater attention to stock values. Second, there is the development of a multi-stakeholder theory of the firm, according to which top managers and boards of directors take their responsibilities and fiduciary duties seriously with regard to a variety of stakeholders. These include stockholders and financial investors, but also employees, customers, suppliers, local and national communities, and future generations. The financial model of corporate control is strong, but stakeholder capitalism is here to stay too, and can contribute significantly to sustainable development.

As far as epistemic communities are concerned, the importance of scientists in international policy communities has already been acknowledged in cases like ozone layer depletion and climate change. But scientists' general influence is also increasing. The main reason is that the problems which decision makers – government and business, domestic and international – must address are becoming less familiar and more complex. Decision makers are unable to integrate new scientific knowledge claims whenever they have to make a decision, and must rely on existing shared knowledge. A more fundamental reason for greater involvement of epistemic communities in policy making exists, however. Democratic deliberation needs knowledge, theoretically robust and methodologically rigorous analysis, open debate of alternative interpretations, and the free production and exchange of ideas, in order to make sound choices among policy options. The role of open and independent science here is invaluable.

Epistemic communities of scientists and policy professionals can play a decisive role in implementing domestic policies and – in a growing number of countries – in encouraging national governments to implement international programmes. Knowledge regimes – in other words, the scientific disciplines and scientifically based assumptions which have a dominant influence on policy – have undergone significant changes (Haas, 1997). They have evolved through phases, with the social sciences joining the natural sciences and economics in the present phase of environmental policy, as the Future Earth project shows. This shift implies the active involvement of social science experts, which their recognition by the Intergovernmental Panel on Climate Change demonstrates.

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Alberto Martinelli is professor emeritus of political science and sociology, and former dean of the Faculty of Social and Political Sciences, at the University of Milan. Recent research interests include nationalism and the European Union, global governance and sustainable development.

84. The politics of Climate change and grassroots demands

by
Antônio A. R. Ioris

There is a pressing need to counter the dominant mode of commodity production and economic growth, which is responsible for the negative and unfair impacts of climate change. The political ecology critique emphasises the role of grassroots organisations and affected communities in the production of more inclusive public policies and mitigation strategies. The climate justice approach is a good example of the political ecology approach.

Climate change issues are at the centre of the current debate on socio-economic development and the future of humankind. However, despite a growing volume of environmental legislation, constant technological improvement and intense multilateral diplomacy, questions related to the allocation of natural resources and the conservation of ecosystems remain only partially resolved.

Anthropogenic climate change offers a unique entry point to assessing public and private responses to global environmental problems. One of the main paradoxes of science and policy making today is that although government and society increasingly recognise the magnitude of environmental impacts, reactions to these problems are usually fragmented and inadequate. Environmental degradation and social conflicts continue to disregard most responses, especially because these are normally based on techno-bureaucratic approaches and market-driven solutions (Leff, 2004).

In this context, the work of political ecologists enquires into the causes of environmental degradation, the asymmetric distribution of opportunities, and the unfair sharing of negative impacts. Political ecologists have emphasised the historical and geographical currency of environmental problems, the double exploitation of nature and society, and the expansionist nature of the dominant relations of production. “Political ecology is the politics of the social reappropriation of nature” (Leff, 2004: 267). Special attention has been paid to the limits of mainstream environmental management, and the politicised nature of technical assessments and policy implementation.

The political ecology critique is even more important if the slow progress of the negotiations on implementing the UN Framework Convention on Climate Change is taken into account. Many policy makers and neoclassical economists have recommended

stabilising greenhouse gas concentrations by allocating nations or administrative units appropriate emission reduction responsibilities. They then need to achieve the relevant reduction through market-based mechanisms. The basic assumption is that this should be pursued to the level where the marginal benefit of reducing emissions by one additional unit is equal to the marginal cost of curbing such emissions.

However, from a political ecology perspective this calculation of the costs of emissions and effects is inadequate, because it presumes that the greenhouse gas reductions will have a global welfare function. This reasoning ignores the differences between poor and rich countries (Anthoff and Tol, 2010). On the whole, these mainstream responses have largely maintained the interests of landowners, industrialists, construction companies and real estate investors at the expense of the majority of the population and of the recovery of ecological systems.

Despite the current rate of technological and logistical innovation, there are still a billion hungry and undernourished people worldwide. This is partially because of the failures of agricultural production, and partially because of market speculation, trade barriers and rising prices. Food supplies will be further reduced as agricultural production fails as a result of cyclical droughts and floods associated with climate change. In particular, smallholder and subsistence farmers are expected to suffer progressively worse localised effects of climate change (IPCC, 2007). In addition, the increased demand for biofuels such as sugarcane ethanol is another threat to the food supply, because producing biofuel increases the competition for land and resources (Ioris, 2011). At the same time, the global food economy as it exists today is a significant contributor to humanity's carbon footprint (Weis, 2007).

An important step towards understanding this complexity is to develop a clear appreciation of the socio-ecological interactions involved, the uncertainty and contested knowledge of the causes and consequences of climate change, and the interdependency between the diverse and unequal interests which are involved (Fish, Ioris and Watson, 2010).

The heart of the matter is the ongoing inability of governments and the representatives of the hegemonic agro-industrial sectors to formulate more inclusive and sound climate change policies. Their highly inconsistent ways of thinking, and the lack of effective responses to the risks that climate change poses, are a direct reflection of global and local political inequalities (Parks and Roberts, 2010). Those least responsible for climate change are usually the ones who experience its greatest effects. For instance, deprived communities are more likely to live in unsafe areas along river courses, to have more difficulty adapting to a changing environment, and to have fewer opportunities to influence government decisions. Yet the difficulty of incorporating the demands of grassroots groups meaningfully is not trivial. Existing decision-making systems are reluctant to recognise that those social groups with less political influence are likely to feel the effects of anthropogenic climate change most intensely.

The political ecology critique stresses that without fundamental shifts in the structure of production, and more inclusive public policies, there is a serious risk that climate change will affect different social groups unevenly. This will aggravate the hardship that low-income sectors already experience, and siphon off the results of the adaptation and mitigation measures to those who benefit more from the current economic model. Responses to climate change need to go beyond the techno-bureaucratic reductionism of most contemporary interventions, and deal with the connections between the practices (such as subsistence agriculture) of marginalised groups (such as urban poor people), social

institutions, and the discursive, symbolic and material aspects of climate change. At the same time, marginalised groups and grassroots activists need to address their failure to counterbalance the dominant tendencies, and to link their campaign strategies to a more broad-based political movement.

Fortunately, the past decade saw a broadening of environmental and social concerns from a political ecology perspective (Schroeder, 2000). Successful cases of mobilisation demonstrate that climate change policies should be related transformatively to the problems of poverty and marginalisation in the southern part of the world, and overconsumption and fuel dependency in the northern part. Partly through the conceptualisation of “just sustainability”, this led to sustainability and environmental justice discourses coming together (Agyeman and Evans, 2004). Similarly, wider developments in justice theory have moved beyond the distributional to emphasise the role of process, procedure and recognition in the production of unequal outcomes. Claims with regard to justice have routinely extended beyond the distributional to include matters of fairness in processes and regulations, inclusion in decision making, and access to environmental information related to climate change (Schlosberg, 2004). On the ground, organisations such as La Via Campesina (the international peasant movement) have tried to connect access to land, and food insecurity, with climate change and environmental injustice.

The campaign for “climate justice” is a positive example of the political ecology approach. This mobilisation includes a network of local and global organisations which emphasise that the causes and effects of climate change are related to concepts of social and environmental justice. Many grassroots organisations have repeatedly pointed out the politicised interactions between climate change threats and the erosion of social and economic rights. An example is Climate Justice Action (CJA), a global network of groups and individuals formed as part of the mobilisation around the 2009 United Nations Climate Change Conference in Copenhagen. CJA aims to promote the rights and voice of indigenous and other affected peoples.

These critical social movements want to disentangle the complexities of international law and governance, to find ways to turn economic, legal, and cultural norms toward climate justice. The lesson is that the climate change controversy is not only an environmental and economic issue, but primarily a human rights problem (Haines and Reichman, 2008). Creating and funding international institutions for adaptation to, or mitigation of, climate change undeniably involve questions of justice. Because it believes that current responses to climate change maintain or aggravate discrimination and injustice, the global movement for climate justice has fiercely criticised the ineffectiveness of top-down responses, as well as the opportunities for capital accumulation that the environmental crisis has created in the form of “green capitalism”.

Overall, the main task ahead is to counter politically the effects of the dominant mode of production, which are responsible for climate change and for the unequal distribution of its impacts. Reactions to anthropogenic global warming should prioritise human welfare and environmental sustainability before compensating states and economic sectors as the prevailing approach does. A new paradigm built on the principles of ecological productivity and cultural creativity should embody grassroots, local communities and campaign groups which demand environmental and climate justice (Leff, 2004). Effective and fair responses to anthropogenic climate change require the organised reaction of marginalised communities and social groups. They should take any opportunity to take part in policy making, establish alliances with other movements around the world, and carry out creative social learning and substantive political and economic transformation.

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Antônio A. R. Ioris is a lecturer in environment and society at the School of Geosciences, University of Edinburgh, Scotland. His main research interests are the political ecology of environmental regulation, the organisation and evolution of environmental management, and the political geography of economic development.

85. Green informal services in India? Rickshaws, rag picking and street vending

by
Ashima Sood

Are informal services greener than their formal or organised counterparts? Beyond their employment potential, nonmotorised transport, street vending, and waste sorting or rag picking use fewer resources and energy; they also tend to reuse and recycle materials. These possible benefits have been little recognized and rarely calculated. In India, supportive policy frameworks face legal hurdles, but protection for workers also needs more attention.

Informal employment includes self-employment in small and unregistered enterprises, as well as wage employment in conditions of insecure contracts and without benefits or social protection. In the year 2000, it accounted for 65% of nonagricultural employment in Asia (ILO, 2002). A decade later in India, it encompassed 79% of urban male employment and 81% of urban female employment (Chen and Raveendran, 2011: 6). India's National Sample Survey shows that informal services such as street vending and waste picking nearly doubled their share of urban employment between 2004 and 2009 (Chen and Raveendran, 2011: 12).

Although informal services continue to be a major segment of developing economies, policy makers and development economists have largely associated them with low productivity and low-quality jobs (Sood, 2012). Over the past few decades, however, concerted activist and advocacy work in India has tried to correct this impression. In so doing, these campaigns have highlighted not only the livelihood potential of these activities for the poorest and most disadvantaged sections of the workforce, but also their contribution to sustainable practices that emphasise reuse, recycling and low energy intensity (WIEGO, n.d.).

Are informal services the missing link between inclusion and sustainability in economic development? Interestingly, the economics literature has largely viewed the informal sector's environmental effect as negative, primarily because of the difficulty of enforcing environmental regulations (Blackman, 2000). Research has only very recently balanced this "deregulation effect" against a "scale effect", which acknowledges that the high labour intensity and low capital intensity of informal activities can be associated with lower energy use as well as lower carbon dioxide emissions (Elgin and Oztunali, 2013).

This article takes an alternative approach by focusing on case studies from three informal service sectors in India – nonmotorised cycle rickshaws, street vending and informal waste processing – that offer distinct environmental benefits. It first attempts to analyse the pathways that help achieve these benefits and the knowledge gaps that continue to hinder academic and policy understanding. Then it shows how these environmental effects have found recognition in policy processes in India, and outlines a policy agenda to support green informal services.

Advocacy and knowledge

The knowledge base on informal services and their environmental contributions has often emerged from close contact between advocacy and research. Perhaps the most successful example comes from solid waste management. Here the central role that the small army of often very poor, informal waste-sorting “rag pickers” and traders plays in boosting recycling rates and reducing greenhouse gas (GHG) emissions has to some extent been quantified (WIEGO, n.d.). Despite data limitations and methodological issues, one calculation suggests that through recycling and composting, their contribution to the decrease in GHG emissions far exceeds that of state and corporate technologies (Chintan, 2009).

Although the pollution and GHG mitigation effects of the nonmotorised cycle rickshaw sector have not been estimated, they can again be traced to labour intensity and energy use patterns. Both the Delhi Master Plan 2021 and the National Urban Transport Policy have acknowledged the cycle rickshaw’s role in a sustainable public transport system (Sood, 2012) that feeds into the cross-city Metro system.

Street vending, which accounts for 14% of urban informal employment in India (Chen and Raveendran, 2011: 12), suggests other pathways to lessen the environmental impact. These include the use of strong local supply chains to minimise transportation costs, less use of paper and plastic packaging materials, less use of electricity (WIEGO, n.d.) and lower capital intensity. Yet despite strong activist networks and a growing academic knowledge base (Bhowmik, 2010), there is little documentation or data on the supply chains, packaging, reuse and recycling practices, or energy use patterns of this sector.

Finally, rich traditions of repair and reuse in occupations such as shoe cobbling and tailoring have received little advocacy or academic attention.

Putting policy into practice

Although informal services have seen some policy and regulatory victories – often due to judicial intervention – converting these achievements into practice has proved challenging. This is primarily because of the gaps between the central, state and city-level jurisdictions in which policy is formulated and implemented.

For instance, judicial rulings in response to a sustained campaign in New Delhi have mandated an overhaul of the punitive regulatory regime that governs the cycle rickshaw sector, and instigated the drafting of more supportive legislation (Sood, 2012). However, until there is a national policy, this new framework is restricted to Delhi.

In contrast, the National Policy for Urban Street Vendors 2004, which was one of the earliest policy triumphs for informal service workers, has often been badly implemented because of the indifference or active hostility of the responsible municipal authorities.

Partly at the direction of the Supreme Court (Bhowmik, 2010), the central government has now introduced the relevant bill.

On the other hand, the recent debate on foreign direct investment in Indian retail illustrates how macro-economic decisions are often made with little empirical policy analysis of the ground-level conditions that affect millions of livelihoods. While commentators have noted that the growth of organised retail is a serious threat to the informal retail trade, much remains to be done to identify and quantify how this is affecting street vendors' supply chains and market access (Sood, 2012). Such research is critical in order to measure and compare the GHG and energy use effects of large-scale, capital-intensive retail with those of informal retail.

The downside of labour-intensive and low-resource services lies in the seasonality and income uncertainty that informal workers face. The environmental contributions of these services further strengthen the case for comprehensive social security and protection for these workers. The recommendations of the National Commission for Enterprises in the Unorganised Sector led to the Unorganised Workers' Social Security Act 2008, but since the legislation targets workers "below the poverty line", this limits those it covers (Dutta and Pal, 2012).

The health and safety risks in waste work and other hazardous industries pose a more tricky regulatory challenge. Addressing these issues without compromising the livelihoods of informal service workers requires a responsive regulatory apparatus that draws on a deep knowledge of local ground-level processes and on connections with local actors (Sood, 2012). City-level initiatives – such as Solid Waste Collection and Handling (SWaCHCoop), contracted by the Pune Municipal Corporation – demonstrate that the effective integration of informal waste workers under superior working conditions is possible (Schindler, Demaria and Pandit, 2012).

Are informal services the frontier of inclusive and sustainable development? Economists have been sceptical of the environmental impact of informal activity. But the literature in this area often focuses on informal manufacturing and not on services (Blackman, 2000). The economic incentives and constraints for informal services encourage low-impact resource and energy use and high labour intensity. The Indian experience shows the role of judicial intervention in protecting livelihoods that depend on these activities. However, the gaps between national and local policy and implementation, and the lack of worker protection and social security, remain barriers.

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Ashima Sood is a writer and researcher on urban development issues, based at the Indian School of Business in Hyderabad, India.

86. Debating Transformation in multiple crises¹

by

Ulrich Brand, Achim Brunnengräber, Steinar Andresen, Peter Driessen,
Helmut Haberl, Daniel Hausknost, Sebastian Helgenberger, Kirsten Hollaender,
Jeppe Læssøe, Sebastian Oberthür, Ines Omann
and Uwe Schneidewind

Robust political and social action is required for humanity to stay within planetary boundaries and ensure socially just and sustainable development. The challenges that this involves are increasingly discussed in terms of socio-ecological and sustainable transformation. The term “transformation” is an appropriate one because it points to the complex financial, economic, social, political, resource and climate dimensions of the crisis.

The social sciences are active in developing the novel approaches to social innovation which are needed to address today’s great challenges. This priority is also a central pillar in the European Commission’s strategy for Horizon 2020, the EU programme for research and innovation for 2014-2020. In its Strategic Research Agenda, the European Joint Programming Initiative, JPI Climate, describes its aim as “[s]ynthesizing knowledge for a climate-friendly and climate-proof Europe”. Europe needs integrated scientific support for policy development and decision making informed by knowledge.²

The transformative contribution of the social sciences in this field results from their role in reflecting on the processes leading to global environmental problems, their driving forces, and attempts to deal with them. They have a role in examining differing interpretations of crises, institutional innovations, successful experiments, and change that pioneers induce in specific areas. Different forms of knowledge as well as their interdisciplinary and transdisciplinary co-production also need to be considered (O’Brien, 2010). Moreover, social sciences contribute by exploring visions of the socio-ecological or socio-technical system. These visions have the potential to shape existing markets and institutional structures, attitudes, and everyday practices. In this way, social sciences can contribute to improved societal and political reflexivity, and have a high value for decision-making processes.

Different meanings of transformation

The concept of transformation has different meanings. The term is often used in a normative-strategic sense (e.g. WBCSD, 2010; NEF, 2010; WBGU, 2011) but it is also applied

in an analytical-descriptive sense (Haberl et al., 2009; UNEP, 2011; World Bank, 2011). The normative usages identify problems and show effective and socially desired ways of dealing with them (e.g. www.gtinitiative.org). This is especially true of discourses on a new type of economy (such as a green economy) but also relates to different understandings of prosperity (such as de-growth), a greater and progressive role for the state, and the expansion of local production and consumption patterns.

The analytical usage, by contrast, tries to analyse past and present changes to assess and explain them.

A detailed review of the literature about transformation can help identify both shared aspects and differing ones, whether transformation is a concept or a paradigm, and whether and how it forms a part of scenarios and visions. A review can help us understand increasingly complex social science perspectives on global environmental change in times of a multiple crisis, which are usually based on the natural sciences and the humanities.

There is no one best way to realise a climate-friendly, sustainable and just society (Hulme, 2009). Policy makers might be able to formulate better aims and strategies if they had better knowledge of the explicit and implicit ontological assumptions about problems, of the drivers of nonsustainable change, of visions and pathways, of progress and barriers, and of actors and practices. In this sense, policy makers' levels of insight into current contexts and processes empower them to try to realise a better society.

Common ground

What can be identified as common ground so far? First, it is obvious that the literature on socio-ecological transformation – and the related one on transition and transition management – differs from scientific diagnoses of the state of natural, socio-economic and cultural environments and their interaction. The need to generate profound changes to production and consumption patterns is broadly acknowledged (Kates, Travis and Wilbanks, 2012).

Transformation research goes beyond incremental change and towards particular policy fields such as climate change or biodiversity policies. This is important given the multiple character of the current crisis. So it is acknowledged secondly that transformation involves nonlinear processes because it deals with dynamic, multidimensional, and complex systems as well as potential tipping points. Third, it is acknowledged that technical innovation is important but not enough; social innovations are central to socio-ecological transformation. A fourth common consideration is that analyses of unsustainable developments and necessary changes take place unevenly over time. Both of these elements relate to multiple spatial scales and system levels, including for example the international level, which overlies the national, regional and local levels, and functional levels such as markets, states and civil society. The literature does not favour any scale or level.

Open questions

What issues can a review and careful interpretation of the literature clarify? First, the social sciences can conceptualise the subjects of environmental transformation – that is, the state and the intergovernmental system in conjunction with private and civil society

actors (e.g. Fischer-Kowalski and Rotmans, 2009; Geels 2010 in his outstanding contribution) – via a range of different approaches.

- What are the constituents of the state and governance structures?
- What is their range of action? Which interests, rationalities and kinds of knowledge are the most important?
- What is the role of values, meanings, beliefs and belief systems?
- What roles are played by the pioneers of change, social experiments, innovation and best practices?
- In what way do networks contrast with or complement states, governance, markets and civil society?
- Does transformation indicate more power-driven processes or is it a result of deliberation? What is the logic according to which these governance processes are organised?
- And what is their relation to normative aims of transformation? How is change constructed, managed, or even blocked between state, corporate and civil society actors?

The same questions apply to the object of transformation, in other words society and its relation with natural systems. How should we conceptualise and investigate societal relations to global environmental changes, multidimensional problems, and unsustainable social and natural subsystems? What are the megatrends and drivers of change?

Some approaches consider long timescales to analyse the transformations of socio-metabolic systems, while approaches like transition management (Fischer-Kowalski and Rotmans, 2009) or the multi-level perspective (Geels, 2010) need shorter timescales. In other approaches, implicit assumptions should be made more explicit in order to sharpen the evolving social scientific discourse on transformation. By bringing the subject and object dimensions of transformation together, insights and possible policies will be fostered, irrespective of how manageable, if at all, particular aspects of transformation turn out to be.

One strength of the social sciences is that they encompass different world views, each with its own specific characteristics. For example, they reflect on the insight that climate change is not a discrete problem that can be solved, but instead rather forms a condition that requires humanity to make choices (Hulme, 2009). Feminist or postcolonial approaches to existing and desired transformation emphasise other aspects than institutionalist or rational choice viewpoints.

Despite recognition of the current multiple crisis, the danger remains of unintended effects, in Robert K. Merton's sense of the "unanticipated consequences of purposive social action" (1936), and of shifts in crisis strategies. For instance, the production of agrofuels might promote the use of renewable energy and capital market investments in the real economy (here, a new strand of literature on the "financialization of nature" emerges). At the same time, competition between different land-use strategies and the disempowerment of local people might be a consequence of other approaches, perhaps framed as "food versus fuel", or through counter-effects caused when European policy supports the automobile sector mainly to retain employment.

Furthermore, we know that there is no energy supply system without side-effects – whether this is centralised, based on large-scale nuclear power and fossil sources, or whether it relies on more decentralised systems. Examples of such side-effects include the

environmental pollution generated by the fabrication of solar panels in China, which are used as an energy source in Europe.

Social science can make a crucial contribution to our understanding of the multiple crisis and of socio-ecological transformations, for example through scientific descriptions and analyses of the ongoing crisis strategies, different normative perceptions and societal changes, on a local to a global scale. This helps us to understand and enhance the possibilities of making a normatively desired and strategic transformation towards low-carbon, sustainable and just societies.

Notes

1. This paper is based on a literature review activity in the framework of the European Joint Programming Initiative JPI CLIMATE (www.jpi-climate.eu), financed by the Austrian Federal Ministry for Science and Research (BMWF). Some of the contributors are affiliated to Working Group 3 of JPI CLIMATE.
2. www.jpi-climate.eu/_img/article/JPI-CLIMATE_Strategic_Research_Agenda-adopted_111109.pdf.

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Ulrich Brand is chair of international politics at the University of Vienna and he was member of the Expert Commission on “Growth, Well-Being and Quality of Life” of the German parliament.

Achim Brunnengräber is associate professor at the Department of Political and Social Sciences, Free University of Berlin.

Steinar Andresen is research professor at the Fridtjof Nansen Institute in Norway.

Peter Driessen is professor of environmental studies at Utrecht University, the Netherlands and chair of the research group ‘Environmental Governance’.

Helmut Haberl is director of the Institute of Social Ecology Vienna of the Alpen-Adria Universität Klagenfurt, Wien, Graz.

Daniel Hausknost is senior researcher at the Institute of Social Ecology at Alpen Adria Universität Klagenfurt.

Sebastian Helgenberger is scientific coordinator for Joint Programming Initiatives at Climate Change Center for Global Change and Sustainability at the Universität für Bodenkultur Wien, Austria.

Kirsten Hollaender is senior scientific officer at the Project Management Agency, Part of the German Aerospace Centre.

Jepppe Læssøe is professor at the Department of Education, Aarhus University, Copenhagen, Denmark.

Sebastian Oberthür is academic director of the Institute for European Studies at the Vrije Universiteit Brussel.

Ines Omann is senior researcher at the Sustainable Europe Research Institute in Vienna.

Uwe Schneidewind is president and chief research executive of the Wuppertal Institute for Climate, Environment and Energy and Professor for Sustainable Transition Management at the University of Wuppertal.

87. Payments for ecosystem services in biodiversity conservation

by
Katia Karousakis and Edward Perry

Payments for ecosystem services (PES) are a growingly important conservation tool. Over 300 PES schemes are known to be operational around the world. They involve payments for the preservation of biodiversity, beauty, carbon sequestration, water flows and other natural but endangered services of value to humanity.

Projected trends in biodiversity loss mean that there is an urgent need for the greater application of policies and incentives to promote biodiversity conservation and sustainable use. With the Organisation for Economic Co-operation and Development (OECD) *Environmental Outlook to 2050* projecting a further 10% loss in biodiversity by 2050, governments need to use the full range of policy tools available: regulatory approaches, economic mechanisms and information instruments (OECD, 2012).

Payments for ecosystem services (PES) are an important part of the toolkit that is increasingly used around the world. PES are a flexible, incentive-based instrument intended to promote conservation and the sustainable use of natural resources. They have the potential to deliver large cost-effectiveness gains compared with indirect payments or regulatory approaches.

Biodiversity and ecosystems provide invaluable services to society, including food, clean water, genetic resources, flood protection, nutrient cycling, climate regulation, and aspects of cultural, aesthetic and spiritual significance. However, as these are often public goods, they are not fully reflected in market prices and are undervalued and underprovided. Private companies and policy makers do not always consider the social (external) costs and benefits of natural resources, ecosystem conservation and sustainable use; instead they only consider their private costs and benefits. To promote the provision of ecosystem services, users pay incentives (PES) to individuals or communities whose management decisions influence the provision of these services. The payments compensate service providers for the additional costs of conservation and sustainable use over and above what is required by existing regulations.

PES programmes have proliferated over the past decade, with more than 300 programmes worldwide. They are used to address biodiversity, watershed services, carbon sequestration and landscape beauty, and are implemented at local, regional and national

levels. The programmes have mobilised a substantial amount of finance: five national programmes alone (in China, Costa Rica, Mexico, the United Kingdom and the United States) channel over USD 6.5 billion per year into landscape and ecosystem conservation and sustainable use.

The achievement of the potential gains from PES depends on how they are designed and implemented. The experience of existing PES programmes suggests the following overarching guidelines. Payments should target sites with the highest biodiversity and ecosystem service benefits, the highest risk of loss or potential for improvement, and the lowest opportunity costs (Wunscher et al., 2006).

A number of approaches and tools, such as metrics and indicators, help achieve this. They have been used to identify areas where benefits are highest. For example inverse auctions, where potential ecosystem service providers submit bids indicating the minimum payment they are willing to accept in order to provide an ecosystem service, have been used to prioritise payments to sites with low opportunity costs (OECD, 2010). By implementing such approaches, the Tasmanian Forest Conservation Fund in Australia, which aims to secure the protection and management of high-conservation-value forests on private land, achieved cost-effectiveness gains of more than 50% compared with a programme where payments were not targeted (OECD, 2010).

Other features that need to be considered for effective PES design include clearly defined and enforced property and land tenure rights, as well as measures to address permanence. For example, the risk of events such as forest fires or illegal logging may undermine a landholder's ability to provide an ecosystem service for the length of time stipulated in a PES agreement. Other features that must be addressed include leakage (when the provision of ecosystem services in one location increases pressures on ecosystems in another), the putting in place of a robust monitoring and reporting framework to assess and evaluate the programme over time, and strong enforcement.

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Katia Karousakis is an environmental economist at the Climate, Biodiversity and Water Division, Environment Directorate, leading OECD's work on biodiversity.

Edward Perry is a consultant for the Climate, Biodiversity and Water Division, Environment Directorate, OECD. He focuses on the biodiversity outlook to 2050 and financial mechanisms for biodiversity.

88. Monitoring the effectiveness of adaptation investments

by
Nicolina Lamhauge and Michael Mullen

Development projects often have the reduction of vulnerability to climate change as a key objective. Monitoring and evaluation methods are now being introduced to analyse the effectiveness of such measures. Problems remain, including the long timescales of climate change, and the modest role of climate change adaptation within many major development initiatives.

The reduction of people's vulnerability to climate change is a common aim of development programmes, policies and plans. Given the wide range of possible measures to achieve this goal, it is important to understand the approaches to adaptation that reduce climate vulnerability effectively. Monitoring and evaluation can help identify which measures are the most effective, and can facilitate mid-course adjustments that may improve the effectiveness of adaptation initiatives. Although monitoring and evaluation frameworks for adaptation are in their infancy, development agencies have a long record of evaluating projects and programmes with adaptation-related components.

The Organisation for Economic Co-operation and Development (OECD) examined 106 projects from six development agencies to identify common challenges, and to learn from the different approaches used to assess project components related to adaptation (Lamhauge, Lanzi and Agrawala, 2011). While some of the projects were funded through specific climate change funds and programmes, most were development projects with activities marked as adaptation in the OECD Creditor Reporting System.¹ These projects have been under way for some time and are more likely to have completed their monitoring and evaluation than more recent adaptation initiatives, which are often still in the early planning or implementation phases.

The study identified a number of challenges to the monitoring and evaluation of adaptation. They can be grouped into three broad categories. First, the effects of climate change may only appear over several decades, which makes it difficult to evaluate outcomes in the short and medium term. To address this challenge, the study

recommends differentiating between short and medium-term activities (such as the number of adaptation workshops conducted) and outputs (such as the percentage of households with more climate-resilient livelihoods) which can be directly attributed to a project, and by contrast, long-term outcomes (such as reduced climate vulnerability) to which a project may contribute but which cannot be regarded as direct outcomes of it (Lamhauge et al., 2011).

The second challenge is how to measure the causal linkages between an intervention and actual change on the ground. This problem is compounded by the call for climate change to be integrated into all development projects and programmes (OECD, 2009). This means that adaptation is often a relatively small component of a specific development initiative. To get around this challenge, qualitative, quantitative and binary indicators are used. For example, the development of a policy framework (a binary indicator) does not ensure its implementation or sustainability. It needs to be complemented by a qualitative indicator that assesses the change brought about by the policy, and by quantitative indicators of the number of initiatives introduced as a result of the policy (Lamhauge et al., 2011).

A third challenge is the difficulty of setting baselines and targets. It has been argued that baselines and targets for adaptation should be based on climate projections. However, the localised nature of most adaptation projects means that appropriate climate projections are not always available. Even when they are, a certain level of technical expertise is required to use them. In most of the projects examined by the OECD, development agencies formulated the baselines and targets on the basis of the current climate (Lamhauge et al., 2011).

These challenges are not unique to adaptation; they are also found in other development fields. Valuable lessons can be learned by examining how they are used elsewhere – in education, health or fragile states, for example – and how some of these challenges have been addressed. Increasingly, development agencies are also looking beyond the success of individual projects towards monitoring and evaluating the success of broader national programmes. This is partly in response to the 2011 Cancun Adaptation Framework, which called on least-developed countries to move from national adaptation programmes of action towards more strategic national adaptation plans, with the support of developed countries.

Notes

1. The OECD Creditor Reporting System (CRS) is a database that brings together financial statistics on projects and programmes funded by members of the OECD Development Assistant Committee (DAC), non-DAC development partners, EU institutions and other international organisations and private donors. Since 2009, the CRS has also been tracking development assistance in support of climate change adaptation.

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Nicolina Lamhauge's work at the Organisation for Economic Co-operation and Development (OECD) focuses on the links between environment and climate change adaptation in developing countries, particularly the monitoring and evaluation of climate change adaptation

Michael Mullen leads the OECD's work on climate change adaptation, including the analysis of adaptation policies in OECD countries and the integration of adaptation into development assistance.