World Social Science Report 2013
Changing Global Environments

28. The consequences of global environmental change

Introduction to Part 3

by
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This section identifies current and future consequences of global environmental change events for people and communities, with special attention to the poorest and most vulnerable. Understanding how global environmental change events will impact on the different groups and sectors within societies is essential to improving current policy measures and to design effective solutions.

To many, "global environmental change" is still an impenetrable and distant concept, and projections of doom and gloom – however often repeated – fail to make it more meaningful. Yet droughts kill crops that undermine farmers' livelihoods. Storms wipe out homes that families have occupied for generations. Loss of species and land can mean loss of food, clean water, medicines, landscape, access to ancestral grounds, and essential income.

Social science research is essential to understand how changes in our water, air, climate, environment and oceans influence individuals and communities, organisations and businesses in society, through time and in very different social contexts around the world. Social science also plays a role in the development of responses that can build resilience and reduce risks and vulnerabilities for people. Parry, Canziani and Palutikof (2008) define resilience as the ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning; the capacity to adapt to stress and change. Climate change resilience requires flexibility, skills and capabilities, redundancy, collaborative multisector approaches, planning and foresight, diversity and decentralization and plans for failure (Parry et al., 2008). This combination of capacities and activities will reduce the risk of climate change affecting natural and human systems and regions, and the extent to which climate change may damage or harm a system. In other words, it will reduce the vulnerability of the system to new conditions.

Environmental and natural resource management, and hazard and disaster risk management, have long been studied by social scientists. They tell us that we cannot fully

understand the risks and benefits that arise from the environment without understanding the role of people in causing, making sense of and responding to these risks and benefits. Nor is it possible to identify effective solutions without understanding social interactions and practices. To put this differently, the consequences of global environmental change will always remain unclear if we study the physical environment alone. Resilience is the capacity of people and ecosystems to cope with and respond to changes in their environment and the resources available to them. New risks may emerge through the interaction of social change with environmental changes.

The consequences of global environmental change

Part 3 looks at global environmental change around the world, including droughts in China (Zheng, Pan and Zhang) and North Africa (Bédrani and Benhassine), floods in Nigeria (Oluwatayo), biodiversity loss (Cortes and D'Antona), coral reef bleaching (Abdullah), and extreme events and disasters more generally (Silbereisen, van Ijzendoorn and Zhang). These contributions illustrate how the consequences of climate and environmental change for society can be direct or indirect. Direct impacts often entail familiar, but more frequent or severe, hazards, but may also involve challenges that are new, at least in the affected region. Indirect impacts include changes to underlying biophysical systems which generate benefits to society (so-called ecosystem services) and which form the basis for social and economic activities. By exploring these linkages in social-ecological systems, the social sciences offer essential contributions to our understanding of vulnerability, impacts and resilience, people's capacity to cope and respond to risk and change.

The perpetual challenge: The social basis and context of risk

Contemporary analysis of the impacts of climate and environmental change is concerned with the factors that underpin risk, vulnerability and human resilience, and how these are perceived, framed and managed in different social contexts. In the quest for more reliable interventions to reduce risk and vulnerability, many researchers attempt to define them absolutely, for instance as a basis for standard setting. Such studies often use relatively common, geo-referenced socio-demographic information to identify the most vulnerable groups. Others contend that such data are inconclusive, and instead focus greater attention on the extent to which risk, vulnerability and resilience are shaped by the social relations and the social context in which they emerge.

Two contributions illustrate the first approach. Zheng, Pan and Zhang develop a vulnerability assessment for rural communities to measure the vulnerability of a community in China, and find it a useful index to guide policy interventions. Similarly, Oluwatayo measures households' vulnerability to floods in relation to social parameters such as household size and income level, as climate change contributes to an increased frequency of these events. Ahmed's contribution, by contrast, illustrates the second approach with a focus on social capital, which is considered a good predictor of risk and resilience by many. In this case study of Dhaka, Bangladesh, a metropolitan area with more than 10 million people, the research shows how limited social capital is contributing to the low resilience of residents as natural hazards increase as a result of climate and global environmental change. Developing vulnerability indicators for urban areas is highly relevant considering that the great majority of the world's future

population growth is predicted to take place in cities and urban landscapes. The United Nations (2006) estimates a global increase of 2.9 billion urban residents to 5 billion by 2030, with most of this growth occurring in Africa and Asia. The impacts of climate change on cities already affected by poverty, pollution and disease are currently threatening quality of life and economic and social development in urban areas. UN-Habitat (2011) argues that urban areas have a pivotal role in both climate change mitigation and adaptation, through for example the adoption of changes in transportation, land-use patterns, and production and consumption patterns of people living in cities.

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

The crucial role of resilience

Resilience and adaptive capacity are always present to some extent even in the least well-resourced groups and societies. They enable them to respond to environmental risks and vulnerabilities, and to adapt to change. Depending on their level of available human, social, natural and financial capital, such responses can involve a portfolio of strategies. They might include resource sharing (informal and formal), self-organisation and co-operation to manage risk, market mechanisms such as insurance, the development of social norms and public policies (rule setting, distributive policies and information provision), and other forms of managing or living with risk, such as migration. Since the distribution of risks and the capacity to cope with risk are uneven, they are the subject of debate at all levels of social organisation. Differential responsive capacity also raises many questions of rights, responsibilities, governance and equity, with a range of principles and approaches being suggested for handling them (see Parts 5 and 6).

A theme of Part 3 is the importance of people's choices in their responses to climate change, their capacities to moderate their experience of these hazards, and how environmental change can itself impinge on people's ability to respond. Adger and Adams suggest that environmental change affects patterns of migration because it influences the location and mix of economic activities. They also argue that migration could mitigate risks associated with global environmental change through the changed spatial organisation of economic activities internationally. However, for Baldwin and Gemenne vulnerable populations do not have the resources, networks or information needed to migrate, and are trapped; exposed to the consequences of global environmental and climate change. Abdullah points out that in the case of coral reef degradation, the populations of countries with high levels of economic development have greater adaptive capacity to deal with the problem than those with fewer resources.

Keskitalo emphasises that adaptation is most needed and cost-effective where risks associated with climate change result in economic vulnerability, even in the short term. Silbereisen, van Ijzendoorn and Zhang argue that children's vulnerability to disasters is not only directly influenced by exposure and greater sensitivity, but also indirectly by an extreme event's impact on parental care, as well as by genetic factors influencing children's resilience. Turmoil in a disaster-affected region is translated into a range of adversities experienced by victims, such as the breakdown of established family relationships and routines. Chimanikire shows that Zimbabwean women in rural areas are more vulnerable to the effects of climate change than men, as they provide water and fuel for cooking. Reduced rainfall means they have to walk farther to collect these resources. However, women can also be active agents of change, as they possess unique knowledge and adaptation skills (see also Agarwal, Part 1). Farmers and indigenous peoples in the Amazonian region are also adapting by re-learning how to predict the weather by observing modifications in animal behaviour due to weather changes (Mesquita). These cases illustrate the universal and flexible interaction of people with nature as vulnerability and resilience are socially constructed and lived.

The contribution of social science research

Social science research is essential for understanding the risks, vulnerabilities and social response capacity in light of climate and global environmental change. Social science researchers can translate indigenous knowledge to decision-makers (Mesquita), establish how the equity and identity dimensions of climate change-induced migration intersect with wider issues of ethnicity, gender and age (Baldwin and Gemenne), and reveal the links between human migration and environmental change (Adger and Adams). Social science researchers can also provide adaptation and disaster response guidelines (Oluwatayo; Silbereisen, van Ijzendoorn and Zhang), help create collaborative resiliency and adaptive capacity (Ahmed), help understand strategies for marine ecosystems by accounting for their resiliency (Abdullah), or create indicators of vulnerability to climate change (Zheng, Pan and Zhang).

A century and a half after George Perkins Marsh's seminal work on how people shape, and are shaped by, their environment, and more than six decades after Gilbert White's foundational work on the social dimensions of hazards and risk, the all-too-real and emerging consequences of environmental change bring home in tangible experiences what we all now must grapple with. We are responsible for the consequences of climate change, now we have to find a way of mitigating the impacts. With more than 7 billion of us having the economic and technological power to alter the planet, the social sciences have the task of untangling the complex, multi-scale and dynamic processes. Processes whereby people in one part of the world suffer the consequences of climate change due to the behaviour of people in another part of the world.

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