

Environmental Change: Adaptation Challenges

Barbora Duží *et al.*

Global Change Research Centre AS CR, v. v. i.



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Jindřich Kynický, Martin Brtnický, Jitka Novotná

ENVIRONMENTAL CHANGE

Adaptation Challenges

Global Change Research Centre,
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1. INTRODUCTION TO ENVIRONMENTAL CHANGE: ADAPTATION CHALLENGES

“Whatever the warming scenarios, and however successful mitigation efforts prove to be, the impact of climate change will increase in the coming decades because of the delayed impacts of past and current greenhouse gas emissions. We therefore have no choice but to take adaptation measures to deal with the unavoidable climate impacts and their economic, environmental and social costs.”

(EU Strategy on adaptation to climate change, Brussels, 16. 4. 2013, p. 216)

This monograph summarizes theoretical and empirical evidence of environmental change impacts on the physical environment and human societies, with a focus on climate change. Global climate change is considered as one of the most serious environmental challenges facing our civilisation. Considerable anthropogenic contributions to climate change are generally accepted across scientific, policy, and practice communities. Human activities alter the climatic system mainly through greenhouse gas emissions, with lesser contributions from land use changes. Generally speaking, every economic sector and human activity influence the global climatic system in some way. Human society will need to adapt to these changes if we do not want to experience economic losses or further deterioration of environmental, and consequently livelihood, conditions.

Better understanding of ongoing trends in environmental and climate change affecting the physical environment and consequently the supply of ecosystem services that are essential for human well-being is needed. It is necessary to be aware that changes in ecosystem services could seriously affect the functioning of human systems. Schröter *et al.* (2005) worry about the decreasing trends of fundamental supply of ecosystem services, such as declining soil fertility and water availability, thereby causing increased environmental and social vulnerability in many regions. Many well respected scientific journals dealing with environmental change are published, as *Climatic Change*, *Regional Environmental Change*, and *International Journal of Climate Change Strategies and Management*. These journals bring diverse evidence from various regions throughout the world, not just about negative consequences of environmental change, but also about measures, strategies and policies being adopted to adjust and overcome these problems.

This monograph, *Environmental Change: Adaptation Challenges*, examines concepts of “environmental change” and “adaptation” within different discourses, frameworks, regions and regional case studies. We understand environmental change in a broad, general way, as the “interaction of environmental systems, including the atmosphere, the biosphere, the geosphere and the hydrosphere and human system, including economic, political, cultural and socio-technical systems. Human systems and environmental systems meet in two places: where human actions proximately cause environmental change and where environmental changes directly affect what human value” (Stern *et al.* 1992). Thus, climate change is one specific manifestation of environmental change, exemplified by rising temperatures in recent decades. Apart from temperature rise, climate change has been observed through sea level rise, changes in patterns of precipitation, and changes of intensity and frequency of weather extremes (EEA 2010).

Recently, we observe one important orientation in the scientific literature on “global” dimensions due to the character of these changes at the global level. Many attempts have been realised to measure and evaluate the level and magnitude of these changes on global environmental change. One of the most well-known activity is Millennium Ecosystem Assessment Report evaluating ecosystem services, their conditions, trends and scenarios, and response options on global and local scales (Millennium Ecosystem Assessment 2005).

Not accidentally, a special Report of the Intergovernmental Panel on Climate Change (IPCC) titled “Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation” (IPCC 2012) deals with the necessity of finding new ways of adjusting human society to one of the most visible manifestations of climate change: climate and weather-related extreme events. Even though adaptation is not a new term for use in the climate change framework, there are some points to be highlighted. The Report emphasises adaptation as a **challenge** and points out the need to take into account the **uncertainty** of risk management and future trends. The Report also

mentions that adaptation does not depend on climate extremes alone, but also on the level of *vulnerability* and *exposure* of society to climate extremes. Again, nothing is new, but the Report consolidates such material.

This monograph is based on several parts interconnected with these key concepts: environmental change, climate change, physical environment, society, communities, and different levels of adaptation. Several chapters cover the issue of human perception, evaluated as an essential part of these, but difficult to measure or quantify. We are aware of the limitations herein, but we hope to bring small pieces of the puzzle into the long and never-ending exploration of the better understanding of the issue with feasible and long-term solutions for human societies as well as the physical environment.

The structure of the monograph is following. Monograph opens with a contribution by Ilan Kelman and Stavros Mavrogenis introducing concepts of the theory, policy, and practice of adaptation to environmental change, with a focus on climate change. They define climate change adaptation, provide an overview of international negotiations and outcomes, and analyse several levels of adaptation, starting by distinguishing international, national and community-based adaptation. They also review the IPCC's approaches to adaptation being anticipatory, planned and autonomous adaptation.

The next contribution by Jan Vávra, Vera Peters, Eva Cudlínová, and Miloslav Lapka explores social perception of possible climate change impacts by the public in two different regions in the Czech Republic and in Germany. One of the most important contributions is introducing the social vulnerability index, indicated mainly by low education, low income, and high age in society. The authors researched the role of socio-demographic characteristics including mentioned social vulnerability in perception of climate change. The results show that water-related issues, like water scarcity, droughts, or floods are perceived as being the most severe climate change consequences. They also found some considerable differences in perception between the national samples.

Contribution by Barbora Duží, Dmytro Vikhrov, Robert Stojanov, and Ilan Kelman also discusses the Bečva region where they conducted a field survey among regional stakeholders and household residents, but focusing more on social dimensions of adaptation to floods. In the theoretical part, the authors explore societal adaptation to impacts of climate extremes and they further analyse various factors influencing adaptation, including perception. The authors examine adaptation in terms of coping as short-term adaptation and adaptation itself as an advanced, long-term way of adjusting to climate extremes. In the empirical part, the authors present several important findings, mainly low adaptation measures adopted by households, contrary to some advances on the regional level.

The monograph closes the contribution by David Juříčka, Lucie Janošíková, Jindřich Kynický, Jitka Novotná and Martin Brtnický, who introduce environmental and social changes and their impacts on nomadic communities in a distant region of Mongolia. Compared to Europe, the region is quite different in terms of climatic conditions, ecosystems, and livelihood strategies of local communities. The chapter analyses the main environmental changes, especially aridification and social changes after the break up of communism and various responses of local societies. As one of the most visible trends is shifting nomads tracks and pastures, or finally giving up the nomadic lifestyle and increasing migration to large cities like the capital, Ulan Bator. The paper is designed mainly as an introductory review and calls for further empirical research.

Barbora Duží

January 2014

3. SOCIAL PERCEPTION OF CLIMATE CHANGE CONSEQUENCES IN THE CZECH REPUBLIC AND GERMANY

Jan Vávra, Vera Peters, Miloslav Lapka and Eva Cudlínová

Abstract

Climate change is probably the biggest present-day environmental problem and a great global challenge. The impact of climate change, direct or indirect, can affect whole societies as well as individuals. We wanted to explore the perception of possible climate change impacts in two Central European countries with different climate change awareness and public discourse. The study was carried out among the population of two regions in the Czech Republic and Germany. These regions are situated in the South Bohemia Region and the federal state of Brandenburg. In total, we asked more than 1000 respondents for their assessment of the impact of ten climate change consequences. We present the results on the perceived impact on different levels (global, country, personal), and the effect of socio-demographic characteristics using the concept of social vulnerability. The results show that water related issues, like water scarcity, droughts or floods are perceived as the most severe climate change consequences. There are considerable differences between the national samples, e.g. Czechs are more concerned about new diseases or species extinction, Germans about climate tax. Overall, Czech respondents show a higher risk perception, they are more concerned about most of the potential consequences than Germans. Regarding the different levels of impacts, respondents in both countries expect a higher impact on the global level than for their countries or themselves. The social vulnerability concept is a stronger predictor in the Czech Republic than in Germany; here the more vulnerable population expects higher impacts on the country and personal levels. Low education and low income are more important predictors than high age. We discuss possible causes of the results in the context of both countries.

Keywords

Climate change, Czech Republic, Germany, risk, social vulnerability, sociology, survey.

3.1 Introduction

Climate change is not only an object of interest of many natural scientists but of social sciences as well. The interest of social sciences in measuring public perception of environmental issues can be traced to the 1970s (e.g. Dunlap and Van Liere, 1978). Since the early 1990s climate change has become one of the most important topics in environmental sociology and related fields. Social research on climate change includes a variety of subtopics, like the public understanding and social representation of climate change (Kempton, 1991; Fischer *et al.*, 2012), knowledge of the topic (Bostrom *et al.*, 1994), comparison with other possible threats (Bord, Fischer and O'Connor, 1998), motivation for climate change mitigation (O'Connor *et al.*, 2002), factors influencing behavioural intention (O'Connor, Bord and Fisher, 1999) and personal responsibility for climate change and foreknowledge (Kellsted *et al.*, 2008). Recently, more attention has been paid to social denial of climate change (Norgaard, 2006), barriers to personal engagement (Lorenzoni *et al.*, 2007), perception of climate policies (Fischer *et al.*, 2011) and the changes of climate change discourse (e.g. Reusswig, 2010; Beck, 2010). Public awareness of climate change as a serious problem is also a topic in many opinion polls. By trend they report a decrease of public interest in climate change in the last few years in the EU (EC 2009, 2011) as well as the US, Canada, Australia or New Zealand (Ratter, Philipp and von Storch, 2012) after a peak of concern around 2007/2008.

In this study, we focus on the risk perception of climate change consequences among the population of two regions in the Czech Republic and Germany. Climate change risk perception is a significant predictor for the acceptance of behavioural intentions and governmental policies leading to climate change mitigation (O'Connor, Bord and Fisher, 1999; O'Connor *et al.*, 2002).

We present the countries' differences in their assessment of various impacts on different levels, and test the effect of socio-demographic characteristics using the concept of social vulnerability.



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