



Sven Rannow
Marco Neubert *Editors*

Managing Protected Areas in Central and Eastern Europe Under Climate Change

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Editors

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Photographer: Marco Neubert, 2009

Caption: Dried clay illustrating climate change impacts

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Preface

The idea to investigate the impacts of climate change on nature protection sites supported by a remote sensing-based monitoring tool – inspired by Lovejoy and Hannah’s book *Climate Change and Biodiversity* – was the starting point of the project “Adaptive Management of Climate-Induced Changes of Habitat Diversity in Protected Areas” (HABIT-CHANGE). This first idea was further developed and extended during several meetings with a growing number of interested partners. After two years of preparation, the project proposal was submitted to the European transnational funding programme INTERREG IV B Central Europe and later on approved for a three-year runtime. We chose this funding opportunity since climate change does not stop at national borders and the programme supports science-practice-policy cooperation and implementation, which is especially needed for this topic. Since the Central European area is expected to be especially affected by climate change impacts, it is an appropriate investigation region. Furthermore, by choosing European investigation areas it was possible to evaluate the concept and regulations of the EU Habitats Directive – the most important pillar of European wildlife and nature conservation that forms a network of protected sites across the European Union called Natura 2000.

In March 2010, a consortium of 17 great and well-respected partners from nature protection site administrations, scientific institutions, and nature conservation authorities started researching. However, several of the institutions interested in joining the partnership were unable due to financial or administrative reasons. Thus, we additionally had a large number of highly interested associated institutions.

During the project runtime, a lot of public recognition was gained: The HABIT-CHANGE project was selected as:

- One of 28 good practice examples worldwide for the UNESCO-MAB Conference “For life, for the future. Biosphere reserves and climate change” in 2011
- A project of strategic importance of the INTERREG Central Europe funding programme combined with additional funding for capitalisation activities

- A so-called lighthouse project of the German INTERREG/transnational cooperation office by the Federal Institute for Research on Building, Urban Affairs and Spatial Development

The results achieved by the project are part of the book content. Extended and more detailed technical reports are available on the project's website.

Dresden, June 2013

Marco Neubert and Sven Rannow

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This book was compiled within the project “Adaptive Management of Climate-induced Changes of Habitat Diversity in Protected Areas” (HABIT-CHANGE). We thank the European transnational funding programme INTERREG IV B Central Europe for co-funding this project (reference number 2CE168P3).

A project would not work without the support of a functioning partnership. Thus, we thank all our project partners and their respective teams, including their administrations, the whole lead partner team, all the cooperating associated partners as well as our advisory board members with special thanks to Jochen Schumacher.

We thank all participants of the numerous project events as well as the “International Conference on Managing Protected Areas under Climate Change” (IMPACT) for their fruitful discussions and various inputs to the project. Together with various interested and cooperating experts they contributed to the project’s success and helped to gain a high level of attention.

Writing and publishing this book took a lot of effort and could not have been done without the following people. We would like to express our gratitude to:

- All authors including the contributing external experts
- The internal and external reviewers, especially Stefan Lang, Jochen Schumacher and Rene Griesbach, as well as
- The editor team of the Springer series “Advances in Global Change Research”

Dresden, June 2013

Marco Neubert and Sven Rannow

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Part I
Introduction

Chapter 1

Natural Heritage at Risk by Climate Change

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1.1 Climate Change as a Threat to Habitat Diversity

The Fourth Assessment Report of the Inter governmental Panel on Climate Change (IPCC 2007a) clearly underlined the existing trend of climate change. It projected future developments with dramatic impacts, such as increasing temperature, changes in both amount and distribution of precipitation, change of the climatic water balance, and the increasing occurrences of extreme events.

These changes will have serious impacts on nature (IPCC 2007b) and endanger the natural heritage that is protected within nature reserves, national parks, biosphere reserves or other protection categories. These facts are already recognised on a European policy level: “Climate change has the potential, over a period of a few decades, to undermine our efforts for the conservation and sustainable use of biodiversity” (European Commission 2006, p. 13).

Current discussions connected to climate change often focus on the prevention or mitigation of greenhouse gas emissions. Even though mitigation of climate change is of utmost importance, protected area administrations as well as nature protection authorities also need support on the political (administration) as well as on the practical level (management) in order to cope with climate change and their adaptation to it. To preserve ecosystems, habitats, and species, as well as their goods and services, for society under changing climatic conditions it is recommended to:

- identify potential climate change and land use-induced threats;
- model regional climate change effects and their potential impacts on protected areas (see Chaps. 2 and 3);
- evaluate existing management practices;

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- derive a set of indicators reflecting local-scale effects of climate change (see Chap. 6);
- establish monitoring concepts based on earth observation data and ground truthing (see Chap. 7);
- assess habitat sensitivity to potential impacts (see Chap. 8);
- analyse existing legal framework for adapted management in protected areas (see Chap. 9);
- adapt management plans, strategies, and measures of protected areas to climate change effects (see Chap. 10);
- implement the findings on a practical level with the help of local experts, as well as fostering public awareness of the policy and stakeholders, and also the demand for adaptive management (see Chaps. 11, 12, 13, 14, 15, 16, 17, 18, and 19);
- provide guidelines for climate change adaptation of protected areas on national and transnational (e.g. EU) level.

These issues were part of the project objectives of “Adaptive Management of Climate-induced Changes of Habitat Diversity in Protected Areas” (HABIT-CHANGE) and will be presented and discussed in this book. Thus, the information about existing problems and solutions on local and regional levels and the experiences of implementing adaptation strategies with all its facets shall be shared. This volume should support other conservation managers in coping with the challenges of climate adapted management.

1.2 The Need for Adaptation and Obstacles for Application

The diversity of species and habitats is one of the foundations of life on earth (Barnosky et al. 2012; Cardinale et al. 2012). Therefore, it seems advisable to safeguard biodiversity on Earth from substantial threats like climate change (e.g. McLaughlin et al. 2002; Carvalho et al. 2010; Bellard et al. 2012). Its first effects are already apparent (Parmesan et al. 1999; Root et al. 2003) and the speed of change is increasing (Chen et al. 2011). The impacts of climate change will put additional pressure on the majority of endangered species and habitats. The adaptation of conservation management in the face of such extensive transformations is a pressing need and an ambitious target. Changing climate conditions as well as global transformations are challenging nature protection in general and conservation management on site. To address these challenges new and adapted concepts, tools, and practices are necessary (Dawson et al. 2011; Hobbs et al. 2010). Most methods and tools are already available but need to be used with a new perspective of climate change adaptation in mind (Hansen and Hoffman 2011; Lawler 2009). This could be achieved, for instance, by:

- incorporating climate change in national or regional biodiversity conservation plans (e.g. Groves et al. 2012);
- reflecting potential effects of climate change in the design of wildlife corridors and adapting existing area networks (e.g. Vos et al. 2008);

- including vulnerability to climate change effects as a factor in the development of endangered species lists;
- considering potential effects of climate change in protected area management plans (e.g. March et al. 2011);
- considering potential effects of climate change like shifting distributions within species action plans (Singh and Milner-Gulland 2011);
- assessing the effect of climate-induced changes in carrying capacity in population viability analysis;
- considering potential effects of climate change on habitat restoration plans (e.g. Battin et al. 2007);
- developing habitat restoration plans for habitats that are endangered by climate change effects like sea level rise.

The following chapters exemplify the adaptation of concepts, methods and tools for conservation management. This is illustrated for protected areas located in Central and Eastern Europe.

This book focuses on protected areas because they are a prominent element of conservation schemes worldwide. They safeguard the most treasured biodiversity hotspots and focus conservation action at the local and regional level. Even though climate change is considered a global problem and changes, e.g. in species distribution, become only apparent when analysed on the global or regional scale, it is the individual sites that are the first to feel the effects on endangered species and habitats. During the last years a growing number of parks and conservation sites have made individual adaptation efforts (e.g. March et al. 2011; Littell et al. 2011). These efforts are challenged by the fact that climate change rarely is the only pressure to consider. This is especially true for large conservation sites, such as biosphere reserves, which are characterised by cultural landscapes and influenced by existing land use.

At most Central and Eastern European conservation sites climate change adds to a myriad of existing problems and interacts, either directly or indirectly, with them. Changes in temperature, precipitation, seasonality, or the frequency and severity of extreme events, have direct effects on species and habitats. Indirect effects, however, need to be considered, too. For instance changes in abiotic conditions, like changing river runoff and groundwater regimes or changing phenology, and biotic interactions, have impacts on local biodiversity. In addition, autonomous adaptations of local stakeholders show potential for increasing existing or creating new conflicts. Changing practices in agriculture, forestry, fisheries, or tourism have ripple effects on protected sites and surrounding areas. Improvement of conservation management at site level is needed to handle these new problems.

Projections of future climatic trajectories are accompanied with notorious uncertainties and ecosystem responses are complex due to their non-linear and often unclear relationships between causes and effects of changes, like feedback loops, substantial temporal and spatial lags, and frequent discontinuities (Prato 2008). Most local conservation experts are uncertain when to react and how to