

# Chapter 1: Introduction

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The aims of this book are twofold. First, the volume offers a selection of research outcomes that were realised in the framework of a research programme supported by the Ministry of Education, Youth and Sport of the Czech Republic in 1999–2004. The programme was titled “Geographical structure and evolution of interactions of natural environment and society” MSM113100007). This multiannual research has been continued when the Ministry decided to give scarce resources also to a new research programme in 2004 for a period that started in 2005. Accordingly, the first aim of this book is to illustrate the scope of the research programme. Second, the book makes the case for necessary continuity in research efforts of researchers in the four Departments of Geographical Section at Faculty of Science of Charles University in Prague. It also attempts to indicate needed changes that have been incorporated in the new research programme or research plan which has again received financial support from the Ministry in 2005. The new programme (MSM002162083) is titled “Geographical Systems and Risks Processes in Context of Global Changes and European Integration” and provides a wider setting for activities of the research team of four geographical departments at the Faculty of Science. The first research plan gave already a priority to thematic groupings of research questions that allowed for integration of a wide research field of physical and social geography, demography and geoinformatics.

The research results of the first research plan (1999–2004) indicated some further specifications of research activities in the current research plan that has started in 2005. The chapters in this volume reflect the essential decision to orientate the research efforts of the team more specifically on the study of geographical systems and risks processes in context of global changes and European integration. This research is the study of the interconnectedness of geographical structures of environmental systems and systems of society and contributes to the understanding of (a) differentiations and relationships in heterogeneous systems, to the identification of (b) structures of an integral geographical organisation and dynamics of environmental and societal systems in global context and in framework of European integration and to the understanding of (c) risk processes in the evolution of geographical systems.

At the level of methodology and analysis, the outcomes of research activities in the first research plan and also in the current research plan have shown the importance of a variety of modelling approaches. There is given more emphasis to the interconnec-

tions among basic research themes in analyses of structures in geographical environment in the Czech Republic and to deeper analyses of environmental structures in the region of Labe river catchment area. This current research specification is there, because it can contribute to a deeper integration of approaches and methods by regional integration of thematic orientations of research activities of the programme. Simultaneously, there is a greater emphasis on studies of risk processes. For example, after the catastrophic flood of August 2002, the importance of basic data changed and the themes of natural and anthropogenetic dangers and barriers and limits of geographical environment became key research subjects (see Langhammer *et al.*, 2006). The studies of specific geographical structurations of the catchment area of Labe and its tributary rivers and evaluation of risks and settlement structure and tendencies of local and regional socio-economic development necessarily demand integrated approaches. Analyses on lower scale levels will be understood in settings of processes and problems at various levels in the European and global system. In the specification of objectives of the current research plan there is therefore proposed a structure of specific objectives of the research team that incorporates issues of regionalisation and multi-scale connections of widely designed geographical analyses. These new specifications and directions are reflected in the composition of this book with the emphasis given to a variety of modelling approaches.

A model is a simplified representation of reality in which only the essential elements of processes under investigation are included (see Haggett, Cliff, Frey, 1977; Bennett, Chorley, 1978). Modelling approaches reported in this book are concerned with geographical systems that can involve flows of mass, energy, information or ideas, depending on the manner in which geographical systems are defined. To be useful, models have to be parsimonious, composed of a limited number of well-chosen elements, processes and relationships. However, models of real geographical systems have still to preserve all the fundamental characteristics necessary to understand processes being investigated. Therefore, the cases of modelling included in this book make attempts to strike a balance between needed simplicity and necessary comprehensiveness. The aim of this book is to investigate a variety of geographical systems with an emphasis given to analyses and assessments of risk situations and risk processes. The analyses and assessments try to highlight the ways in which various processes in nature and society can be understood as risk processes, often entangled, and in terms of uncertainties, threats and hazards.

The book is divided into three parts and fifteen chapters. Chapters in the first part attempt to open a number of crucial issues that beset studies of geographical systems and uncertainties and risks processes. The authors acknowledge complexities of geographical systems and conceptualise them as in terms of an integral geo-societal system (see also Dostál, Hampl, 1995; Hampl, 2000). They also are considering some issues that are implied in views on character of risks and uncertainties. Such considerations appear to point out to necessary methodological pluralism in research on complex geographical systems, their mechanisms and emerging risk and uncertainty situations. The systemic conceptualisation in terms of an integral geo-societal system allows specifications of a number of mechanisms that are structuring complex

geographical systems and lead to changing regionalisation tendencies and multi-scale connections in the interface between societal development and its setting in environmental structures (see also Dostál, Hampl, 2004). The authors draw the conclusion that without an appropriate qualitative modelling of complex geographical systems the geographical research would be lacking necessary orientations for development of quantitative models and approaches.

Chapters in the second part of the book demonstrate a number of quantitative modelling approaches that appear useful in studies of various systems in the field of physical geography. There is a thematic emphasis given to conceptualisations and quantitative modelling concerning hydro-geographical phenomena and risk situation such as floods, changing quality of water or erosion. Other important research themes are directed to modelling issues of climatic phenomena and environmental pollution, and landscapes. The third part of this book is including five chapters that are concerned with modelling of land use, societal phenomena and population dynamics. There is put an emphasis upon the importance and generalization of land use changes (see also Bičík, 1997). The two chapters are devoted to sophisticated statistical modelling of demographical and biosocial risks. The last chapter is concerned with complex statistical modelling that is based upon a postulated explanatory model assessing risks of tendencies towards regional socio-economic inequalities.

All chapters of this book indicate that our relations to environment have become problematic. It is a hope of the authors that this collection of studies of a wide range of research themes and problems of qualitative and quantitative modelling can contribute in part to a better understanding of the development of complex geographical systems and possibly also to advance our knowledge concerning challenges that seem to be faced in risk management at different societal levels and geographical scales (see also Beck, 1992; Giddens, 1994; 2002).