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Population Dynamics and Supply Systems

A Transdisciplinary Approach

campus

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Supplying the population as societal and scientific challenge

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Every society must deal with the challenge of providing its members with appropriate goods and services in such a way that basic human needs are satisfied and a reasonable quality of life is ensured while at the same time preserving the natural bases of life. Supplying the population with adequate food, water, housing, energy, transport systems, education and health services is of utmost importance to a society. It is essential to a society's reproduction and capacity to maintain its potential for further development, and hence critical for sustainable development.

This book is an introduction to a social-ecological perspective on population dynamics, focusing on demographic changes and supply systems, and their interdependencies. As will be demonstrated, population dynamics is of great importance for the provisioning of basic goods and services: the question of how many people live where, now and in the future, and which needs and requirements they possess is a fundamental issue for all societies. Yet, 'demographic changes' encompass a whole range of phenomena, of both a quantitative and a qualitative nature, including population growth or decline, age distribution, household structures, migratory movements and many more.

Particular population changes and their impacts on provisioning vary in different regions of the world. However, since many goods and services rely on natural resources such as land or water, one fundamental common pattern of demographic changes is that they are associated with *social-ecological problems*, that is, problems arising when social activities and ecological effects are so tightly intertwined that the boundaries between 'nature' and 'society' increasingly disappear (Becker and Jahn 2006). Social-ecological problems are interdependent, difficult to predict and are not isolated in particular sectors; rather they unfold simultaneously along various temporal, spatial and social scales, from local to global, from present events to far-reaching consequences, from actions taking place within the context of

everyday life to those occurring within multilateral political regimes. Within social-ecological problem situations ecological threats and environmental degradation are connected with deficits in information and knowledge or in economic or technical means, with subjective restrictions on behavior, with inequality and with limited steering capacities. With respect to the provisioning of the population with basic goods such as water, energy, or food, these problems may result in an insecurity of supply or an impairment of ecosystem services to such a degree that a supply system breaks down, and this could lead possibly to the collapse of an entire society (cf. Diamond 2005). The authors of the present volume will examine forms of crisis-prone developments in detail and will specify conditions for a more sustainable development.

As far as population dynamics and its connection to sustainable development is concerned, the knowledge base needed for analysis and action is badly fragmented. Scientific knowledge is dispersed over a broad spectrum of disciplines, different theoretical concepts and methodological orientations. Normally, studies about population issues analyze demographic developments and their impacts on either society (e.g. economic development, social systems, labor market), or the environment (e.g. use of natural resources, biodiversity, emissions). The connection between demography and sustainable (or non-sustainable) development, however, is still a matter of dispute, both within science as well as society.

The approach presented in this volume is innovative in that it develops a new object of research: population dynamics is systematically related to supply systems. This allows structuring the nexus of population, environment and society in theoretically and methodologically new ways. Based on the assumption that the associated problems are complex, making it difficult to distinguish between cause and effect, the study emphasizes structural relationships and mutual interactions among specific demographic changes and transformations of supply systems. In doing so, the focus is on social-ecological problems arising in connection with water and food supply. At the center of the study are separate problems in different regions of the world that display a common pattern, with the specific triggers for social-ecological transformations also being identified. This approach contains a specific normative view: what is most important is not 'sustainable demographic development'; rather, the non-sustainability of supply systems defines the focus of research. Of central interest are the regulation

problems arising from supply systems, and the latter's adaptive capacity for dealing with demographic changes.

A transdisciplinary approach

Social-ecological problems arising from interactions between population dynamics and transformations of supply systems display a hybrid character. Such problems are frequently referred to as "unstructured problems" (cf. Klein 2004). On the one hand, they consist of human interactions with natural systems (e.g. land use and land cover, agriculture, industry); on the other hand, social, economic, institutional and technical developments interact with norms, power constellations, and patterns of needs and interpretation (e.g. perceptions of an 'adequate' demographic development). Thus, they feature a considerable divergence of values and knowledge in a context of intense political discussion. Both the epistemological and ethical dimensions of this process are characterized by uncertainties, non-knowledge and contested knowledge, while at the same time the claims being made for political decision-making are high. In light of uncertainties, and particularly in the context of sustainable development, knowledge and scientific practices of analysis become contested objects in the course of societal negotiation processes, with the latter including conflicts over the validity of different interpretations of an issue.

Hence, postulating that a population must be appropriately supplied may initially appear trivial, but it in fact gives rise to a multitude of intricate problems at different levels of discourse: at an *analytical* level, the question can be formulated: how can complex interactions among demographic, social and ecological processes be adequately described and understood? At a *normative* level, one may ask: how can people be adequately provided with basic goods and services? And at a *strategic* level, it can be asked: what elements, instruments and practices are needed for the regulation of supply systems.

In order to answer these questions a particular research approach is required. Such an approach needs to transcend the boundaries of natural scientific and social scientific disciplines, as well as those separating scientific from practical knowledge in order to produce practically relevant strategies for problem solving. This is the claim of transdisciplinarity,