Introduction to the *Research Handbook on Environmental Sociology*

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Environmental problems such as climate change, loss of biodiversity, deforestation, air and water pollution, or the sealing of soils are urgent problems of humankind. They have been on the political agenda for many years but sustainable solutions and improvements are still missing in most areas. Many of these problems require technical solutions such as efficient ways to produce enough energy, housing, and food for an increasing world population. However, environmental problems are caused by humans, and it is only through a change of human behavior that they can be solved. These changes require that humans change the way they generate and use energy, substituting coal, oil, and gas by renewable energy sources. Moreover, adopting new technologies might not be enough but must go hand in hand with changes in lifestyle, reductions in consumption, reductions in mobility, and reductions in the use of land. The required changes will probably include all areas of life including our nutrition and how we grow food.

This *Handbook* explores the state of the art of sociological research and insights on how these changes can be introduced and enforced. The *Handbook* focuses on empirical studies investigating what drives climate change and other forms of environmental endangerment and destruction. The environment is a global commons. The challenge of preserving it is whether humans will be able to cooperate. In the past, commons were mostly local and within the control of communities, regions or countries. These times have changed through globalization. Today the challenge is no longer how small groups of humans can cooperate but how many countries, and within each country, many individuals can cooperate. This makes the study of environmental problems a core topic for sociology and other social sciences.

The *Handbook* is structured around the essential topics that have been addressed in sociology and neighboring disciplines so far. These themes can broadly be structured into four areas. First, much research focuses on the causes of environmental problems, for example on the drivers of carbon dioxide (CO₂) emissions or on the causes of other environmental problems. These topics are reflected by three chapters that comprise the first part of this *Handbook* which we termed “Causes and consequences of environmental problems”. The chapter by Axel Franzen and Sebastian Mader provides an up-to-date overview of the development of CO₂ emissions, both with respect to the production-based accounting scheme as well as with respect to consumption-based emissions. The chapter shows that population growth and increases in wealth are the main drivers of CO₂ emissions. Hence, the contribution demonstrates that climate change can only be mitigated by limiting (or decreasing) population growth, and by decarbonizing the economy, for example decoupling the production of goods and services that constitute a country’s GDP from the use and consumption of fossil fuels.

Since CO₂ emissions depend directly on energy demand, the question of what is driving energy demand is a very central question followed up by Brantley Liddle and Hill Huntington in the second chapter. The authors find that energy demand depends almost proportionately

on GDP (elasticity of 0.7) and there is no indication that it will decline with increasing GDP. They also find that the price elasticity of energy demand is in the range of -0.2 to -0.3 , and hence relatively low. Therefore, they conclude that environmental policy must focus on the decarbonization of energy production.

The third chapter by Tobias Rüttenauer and Henning Best is concerned with the consequences of environmental problems. The chapter investigates the question regarding how air pollution (NO_2 , SO_2 , PM_{10} , $\text{PM}_{2.5}$) is distributed in Germany and whether environmental justice or injustice can be observed. They find disadvantages for foreigners within municipalities.

The second part of the *Handbook* deals with the measurement and description of pro-environmental attitudes. Pro-environmental attitudes are often found to be an antecedent of pro-environmental behavior of individuals but can also induce politicians and decision makers to legislate pro-environmental rules and regulations. The first chapter of this part by Axel Franzen and Sebastian Mader investigates and compares different ways of measuring environmental concern. Measuring, and particularly the measurement of latent constructs like environmental concern are the basis of research related to these types of topics. In the second chapter of this part, John Kenny looks at the development of environmental concern in Europe. The chapter accounts for the rise of environmental issues on the public agenda and how they evolved in light of environmental disasters such as the chemical accident in Seveso or the explosion of the nuclear power plant in Chernobyl.

In the third chapter, Taciano Milfont analyzes how pro-environmental attitudes are related to other personality traits such as the Big Five. He finds that openness to experience as well as honesty-humility and agreeableness are positively linked with pro-environmental attitudes. In the fourth chapter Helen Fischer and Karlijn van den Broek summarize current insights into climate change knowledge and beliefs of citizens. They pay special attention to the role of individuals' confidence in knowledge and how this shapes their beliefs.

The third part of the book consists of five chapters on environmental behavior. In the first chapter, Peter Preisendörfer and Andreas Diekmann review the problems of measuring and explaining individual pro-environmental behavior. They discuss the distinction between intent-oriented and impact-oriented measurement of individual behavior and the relation of socio-demographic characteristics, cognitive and affective factors, as well as structural and political context factors. Ulf Liebe provides an overview of non-monetary incentives such as social norms, information, status competition, and green defaults on energy conservation of households in the second chapter. Monetary incentives are usually effective, but come along with side-effects or cannot be applied for political reasons. Hence, non-monetary incentives can play an important role to reduce energy consumption.

Manfred Milinski addresses in his chapter the problem that mitigating climate change is a global commons and decision-making subject to free riding. He condenses the key characteristics of the decision problem into a game theoretical decision task, the climate change game. The chapter describes and summarizes the experimental evidence on factors facilitating or impeding cooperation in the climate change game. In the fourth chapter Patrick Bigler and Doina Radulescu report results from a study about the decision of households in Switzerland to switch from conventional to renewable heating systems. Their study shows that households mainly respond to the purchase costs when implementing a new heating system and to a lesser extent to future heating resource costs. Part III ends with a contribution by Ann-Kathrin Blankenberg and Jonas Gottschalk on a relatively new aspect of environmental behavior in

financial markets. The authors present the results of an empirical study on the question of how investments in green stocks perform in comparison to alternative equities investments.

The last part of the book contains five contributions that deal with questions about the acceptance of pro-environmental policies and technologies. This part starts with a contribution by Stefan Drews who presents an extensive review of determinants and correlates of public support for climate policy. The review includes personal factors, perceptions of the policy instruments, the way those policies are presented and the broader political context. In the following chapter Christiane Lübke describes and analyzes the extent of climate skepticism in Europe. Using data of the European Social Survey she applies multilevel analysis and investigates the key individual as well as contextual factors that are related to climate change denial.

In the third chapter of Part IV Isabelle Stadelmann-Steffen and Philippe Thalmann investigate via choice experiments the voting behavior of Swiss citizens on energy-related policies. The authors utilize the special features of the political system in Switzerland where inhabitants regularly vote on specific policies. The authors focus on the difference between problem awareness and willingness to act. They show that, although a large majority of citizens are more or less climate concerned, much fewer consider fighting climate change a priority for social action.

Fabian Thiel investigates in his chapter the acceptance of road pricing in a large German city (Munich). His results suggest that road pricing is not very popular in Munich, particularly among car drivers most affected by it. Finally, Part IV closes with a contribution by Laurent Ott, Mehdi Farsi and Sylvain Weber about a choice experiment on the opinions of carbon taxation in Switzerland. The authors use latent class analysis and find that opinions in Switzerland are divided between those who support carbon taxation and those who are very skeptical about it.