CHAPTER 1

Introduction

“2019 has been a year of climate disaster,” was the headline of a commentary by Geoff Goldrick (2019) in the *Guardian*. It summarizes the many severe events of that year ranging from bush fires in Australia, unprecedented early tropical storms, and heat waves in Europe to record-low sea ice levels in the Arctic. He concludes, “And yet despite all the scientific evidence, all the destruction, all the suffering, all the apocalyptic predictions, and all the strikes and marches, nothing happens. Global CO₂ emissions continue to rise and the world leaders procrastinate.”

His dire conclusion notwithstanding, 2019 was also the year that brought a lot of attention to the climate crisis. Fridays for Future protests energized the youth, Greta Thunberg was elected “Person of the Year” by *Time Magazine*, and the media reported frequently about the climate relevance of certain behaviors and the contribution of mobility, consumption, and other factors to greenhouse gas (GHG) emissions. Hopes thus were high that individuals would become more aware of their climate impact and subsequently alter their behavior.

The advent of the coronavirus and the subsequent COVID-19 pandemic brought a sudden end to this attention to the climate. The public’s attention switched to the virus and governments reacted to the pandemic

Lead author: Markus Hadler. All results of this book except for the results on lifestyles are based on the project “Measuring CO₂-relevant behaviors in surveys” funded by the Austrian National Bank OeNB (#17892).

with various measures, ranging from vague recommendations to strict lockdowns. On the positive side, in terms of climate, the 2020 emissions report (UNEP, 2020) showed that these measures led to a reduction in GHG emissions, especially in the area mobility and transport. However, it is unclear whether these effects will be lasting or if a rebound effect in terms of behaviors will occur. Regardless, the Corona measures made clear that individual behaviors can be altered to an extent that was not anticipated beforehand.

This book focuses on such individual behaviors. Our research addresses the questions of which behaviors are of climate relevance, who is engaging in these behaviors, in which contexts do these behaviors occur, and which individual perceptions and values are related to them. In terms of research methods, we focus on the measurement of climate-relevant behaviors with population surveys. Our goal in this regard is to develop an instrument that allows a valid estimate of an individual's output with as few questions as possible. A concise way of using a questionnaire to estimate an individuals' impact, in turn, provides room for additional questions on attitudes, values, socio-demographics, and so on that are not always grasped in online footprint calculators, smart meters, and similar tools. In this vein, our book also offers a guideline for survey researchers.

We do not stop at measuring climate-relevant behaviors. We also aim to identify factors that shape these behaviors. In doing so, we follow a sociological interpretation and consider behaviors to be shaped by the context as well as by individual characteristics. This part of our endeavor speaks to researchers who are interested in the applicability of different theories and approaches to this specific type of environmental behavior. Furthermore, we also consider the perceived obstacles to acting in a more environmentally friendly way and use this information to highlight possible levers for addressing change.

1.1 SOCIOLOGY AND CLIMATE RESEARCH

The relation between the environment and sociology could be described by a Human Exceptionalism Paradigm until the 1970s when Dunlap and Catton proposed the New Environmental Paradigm (Catton Jr & Dunlap, 1978; Harper, 2015). The difference between these two views is that the former considers human development as "exceptional, independent from environmental forces and capable of adapting via cultural change," whereas the New Environmental Paradigm considers humans and the environment

to be intertwined. A distinct environmental sociology thus developed only very recently, given the long history of sociology and its roots in the Enlightenment.

The 1970s also marked a change in climate research. Differences and fluctuations in the climate had been discussed for centuries, but only in the 1970s did the scientific opinion start to swing toward agreeing on an increasing temperature trend (see Dunlap & Brulle, 2015). Subsequently, the Intergovernmental Panel on Climate Change (IPCC) and other institutions were funded to monitor the development of the environment and the climate (see Hironaka, 2014). The IPCC itself publishes reports on the latest scientific findings. The discourse was initially dominated by the natural sciences. The inclusion of social sciences started with an increasing consideration of economics and psychology, which resulted in an emphasis on “systems” and a “methodological individualism” approach when considering human actions.

More recently, sociological views have gained importance as well. These views are discussed in detail in the edited volume of Dunlap and Brulle (2015), which summarizes the thoughts and ideas of the American Sociological Association’s taskforce on climate change. Sociology, in their view, needs to discuss the social and political roots of climate change, address its possible consequences for societies, and go beyond the apolitical depiction of climate change measures. In this view, GHG emissions are not equal in terms of their consequences. While reductions due to more efficient coal plants appear to be the same on a GHG scoresheet as reductions due to windmills, only the latter have a greater sustainability potential and can initiate societal transformations. Furthermore, sociology should also consider social justice aspects. GHG reductions by limiting the living space of less privileged groups may result in the same reduction of emissions as limiting international flights for individuals who are better off. Yet, the justice aspects would not be the same.

Brulle and Dunlap (2015) also emphasize that sociological approaches go beyond a singular focus on individuals. For example, geographical characteristics; political, historical, and institutional frameworks; and structural contexts must be considered as well. In some cases, these contextual situations can be grasped by studying country specifics such as particular infrastructure, laws and regulations, financial incentives, the price level of various behavioral offerings, the state of the national economy, and cultural and social norms (Kollmuss & Agyeman, 2002; Stern, 2000). International comparative studies are particularly interesting in this

regard, because that possible differences can also be attributed to these factors among all the other potentially influencing factors. This can be seen in a study on environmentally friendly private and public behavior (Hadler & Haller, 2011, 2013), which showed that private behaviors are much more common in countries when appropriate means are provided, whereas public behavior is less context dependent.

In sum, individual actions take place within a social framework. Sociological approaches aim to counteract an over-emphasis on the individual and rational actor models by also considering aspects such as the influence of class, status, conspicuous consumption, and also routines and habits (Ehrhardt-Martinez et al., 2015). Furthermore, steering effects can also emanate from a moral or value level, which is often not fully recognized in rational choice models. For example, certain traditional religious beliefs can have positive effects on environmentally relevant behavior—such as the non-consumption of the GHG problematic beef in India or the limited use of technology by Orthodox Jews on the Sabbath. Climate-relevant attitudes, in addition, not only are important for associated environmental behaviors but also influence political opinions. Attitudes toward GHG emissions, for example, turned out to be a relevant issue when it comes to political polarization in the United States (Dunlap et al., 2016).

Finally, considering the scope of recommendations, Brulle and Dunlap (2015) criticize a post-political stance of climate change research. Results and studies take the political and social background of a neo-liberal world for granted, and recommendations for solving the climate crises are only expressed within this framework. In this regard, they point to the report “America’s Climate Choices” by the National Research Council which acknowledged that population growth and economic growth are the main sources of the climate problem in the United States. Yet, the report also stated that it will not look into adjusting these two factors, as they are beyond political acceptability. According to Dunlap and Brulle (2015), this thinking is also engrained in the ICPP reports, which do not consider measures such as birth control or curbing economic growth. Taken-for-granted views and aspects, however, were shattered in the final phase of our research, when the COVID-19 crisis led to unprecedented restrictions on social life. We thus will try to include some insights from the current research on this topic in our concluding chapter.

1.2 CLIMATE-RELEVANT BEHAVIOR AND IMPACT

The main title of this book is “Surveying Climate-Relevant Behavior.” However, what is a climate-relevant behavior? Using Stern’s (2000) typology of environmental behaviors, “relevance” refers to Stern’s definition of impact, which is “the extent to which it changes the availability of materials or energy from the environment or alters the structure and dynamics of ecosystems or the biosphere” (Stern, 2000, p. 408). Furthermore, we are focusing on private-sphere behavior and leave out the dimension of public behavior. Private behaviors have a direct impact on the environment, while public behaviors such as protesting and other forms of activism have mostly indirect effects (Stern, 2000, p. 409).

The impact of behaviors, however, depends strongly on the context. The amount of emissions from using an electric stove, for example, depends on the production of the electricity. Comparing the United States and Europe shows that in the United States 63% of the electricity is produced from fossil fuels, 20% from nuclear energy, and 18% from renewable sources (EIA, 2021). In contrast, the figures for the EU in 2018 are 40% fossil fuels, 26% nuclear power, and 33% renewable resources (Eurostat, 2021). On average, an individual cooking a meal in the United States has a larger GHG impact than an individual cooking the same meal in Europe. These differences become even more amplified when more energy-intensive behaviors such as the use of electric cars are considered.

The main geographical focus of this book is Austria and Europe. The national contexts hence are “advanced industrial nations”—countries that have a large overall per-capita GHG impact and thus are of particular relevance when addressing climate change. According to the UNEP emission report (2020, p. XXV), the richest 1% of the world population produce twice as many emissions as the poorest 50% emit in total. Furthermore, as Rosa et al. (2015) point out, global and local inequalities are heightened as richer nations outsource the environmental burden to poorer countries. This type of international outsourcing of emissions is happening by shifting the dirty production to developing countries. To address this shift, we follow a consumption-based approach when assessing an individual’s GHG impact. All emissions are considered that are emitted in the production and transportation of a good or a service, regardless of the place of production.

As for the overall environmental impact, it is usually assessed at the societal level using the IPAT formula (with “I” referring to the impact,

“P” to the population size, “A” to affluence in terms of GDP per capita, and “T” to technology) or its sociological version of Stochastic Impacts by Regression on Population, Affluence and Technology (Rosa et al., 2015). Technology, as Rosa et al. (2015, p. 37) point out, refers to “all other things, such as culture, institutional practices, and political processes” and not just to technology. Research was able to identify complex relationships between the variables, uneven exchanges between countries, treadmills in production, and other factors. Yet, the basic insight is that population, production/consumption, and land use are the most important drivers of the societal impact.

We use two indicators for the climate impact. First, greenhouse gas (GHG) measured in CO₂ equivalents is used in most chapters. This measure combines the emissions from various GHGs based on their global-warming potential (UNEP, 2020). Furthermore, one chapter considers the energy consumption of respondents, which opens another interpretation. Altering the energy production from fossil fuels to renewable resources results in reduced GHG emissions for certain behaviors. Yet, the energy demand remains the same and prevents using energy for other purposes.

Finally, we need to point out that we focus on the individually “caused” parts of the emissions, as discussed in detail in Chap. 3. Considering the main sources of emissions often points to specific industries and economic sectors, whereas the emissions of a single individual are small in comparison (Perrow & Pulver, 2015). In Austria, to name an example, around 50% of the industrial sector’s CO₂ emissions and around 10% of the total CO₂ emissions are produced by a single steel company.¹ Yet, the UNEP emission report (2020, p. 62) estimates that household consumption accounts for around two-thirds of global GHG emissions, as households consume the goods produced by the industry.

¹ <https://kurier.at/wirtschaft/bei-der-voestalpine-droht-in-oesterreich-kurzarbeit/400735461> Accessed: Apr 7, 2021.

1.3 MEASURING CLIMATE-RELEVANT BEHAVIOR IN SURVEYS

Our book aims to improve the use of surveys in measuring climate-relevant behaviors. This goal raises the underlying question of which advantages survey data can offer compared to “hard” data sources such as national statistics on GHG emissions or data derived from smart devices.

Data derived from the use of “smart” technologies such as smart meters, mobile-phones, GPS data, and so on capture only the behavior of individuals who use these technologies. In contrast, survey data can be collected in a representative manner for the general population. Furthermore, the consideration of different sectors of social life such as work, leisure, and consumption would require data from numerous “smart” devices. These data would have to be captured and combined at the individual level, which raises data protection concerns and issues with the recruitment of participants, who use “smart” devices in all areas. Finally, “smart” devices cannot capture the underlying intentions, values, and beliefs of their users. They also cannot determine which part of a purchase is intended for which household member or whose behavior is to be assessed in terms of energy use and emissions. Several explanatory variables would therefore still have to be collected in addition to achieve a “holistic picture.”

Aggregated data such as national inventories of emissions can be used for an overall per-capita view, but do not allow one to make inferences about the behavior of specific individuals and groups. National averages at a per-capita level, for example, assign each individual an equal portion of the national figure. Differences between groups and specific usage patterns, hence, cannot be grasped. Survey research can be useful in this regard as it allows the consideration of the consumption pattern of different individuals and social groups. This information, in turn, can be used to study the link between social structure, attitudes, and the GHG impact. Yet, survey research has its own caveats such as relying on reported behaviors, sampling biases, and problems in the data collection process. We aim to minimize some of these problems and to develop a brief instrument that captures most of an individual’s GHG emissions and leaves room for other survey questions.

Our approach of surveying climate-relevant behavior starts with identifying the GHG emissions-relevant areas of social life and the development of related survey questions. This process also includes a test of the validity

of these questions before they are used to estimate the GHG impact of a respondent. Given that the respondents live in different areas and regions, our approach also considers external characteristics. The development of the instrument and the validation was conducted in Austria in 2019. Yet, the final chapter also provides an outlook at the European level.

In sum, the measurement and explanation of environmental behaviors based on surveys will provide insights regarding the presence of certain behaviors and attitudes among different social groups. We can analyze which groups pollute a lot and whether or not there is connection to environmental attitudes. It will also allow us to discover gaps between impact, intention, and attitudes and to make recommendations at this level.

1.4 RESEARCH TEAM AND CONTENT OF THIS BOOK

The results presented in this book are related to the involvement of the authors in various research endeavors. The main underlying project is the study “Measuring the CO₂ Impact Using Survey Research,” which was funded by the Austrian National Bank OeNB (#17892). The goal of this project was to develop a survey that is able to capture the GHG emissions of respondents in a reliable and valid manner. The survey data is available at the Austrian Social Science Data Archive (Hadler et al., 2021). Markus Hadler was the principal investigator and all other authors were involved in one form or another. Furthermore, Stephan Schwarzingger and Neil Bird were part of the ECHOES project team, a H2020 funded project (<https://echoes-project.eu/>) that included a survey of Europeans on climate-relevant behaviors (Reichl et al., 2019). Finally, Markus Hadler and Markus Schweighart also led the development of the 2020 “Environmental Attitudes and Behaviour” questionnaire of the International Social Survey Programme (ISSP; www.issp.org). The attitudinal questions used in the main survey were taken from the ISSP modules. In turn, results from the study presented in this book informed the development of the climate-relevant behavior questions in the 2020 ISSP questionnaire.

Chapter 2 addresses the question of measuring environmental attitudes and behaviors. It points out that the focus in measuring environmental behavior is often on items that are associated with the respondents’ intention to do something “good” for the environment. These are often symbolically important behaviors such as turning off lights or recycling. With the growing importance of climate change, behaviors that involve the

emission of large amounts of GHG are now being surveyed more frequently. Chapter 2 provides an overview of the scales used so far to measure environmental behavior, in particular emissions-related scales, as well as surveys that included questions on this topic. A look into previous studies indicates that intention-based behavior is explained to a greater extent by attitudes, while impact-based behavior is more closely linked to socio-demographic factors such as income. Considering impact-oriented environmental behavior in an analysis makes it possible to explore the interaction of socio-demographic characteristics, attitudes, behavior, and environmental consequences in different contexts.

Chapter 3 considers different areas of social life, discusses the emissions that are associated with these areas, and shows how the emissions from specific behaviors can be estimated. It starts with a top-down estimate of the consumption-based emissions by life-area. Emissions are organized into segments that may be easily reduced by changing the behavior of an individual and those segments that are fundamental aspects of our society. The latter (e.g., building construction) form a base emission that each member of society inherits that cannot be altered easily by individual behaviors and hence are also not the focal point of this book. Once the emission segments are defined, the remainder of this chapter discusses how to estimate the GHG output and the energy demand of a respondent. There is a trade-off between accuracy and level of detail, and the need to combine bottom-up survey results with the top-down national emissions inventory. In addition, for some segments or items, there may be data limitations (i.e., lack of data). The selection of indicator items and methods to overcome these problems, so that a reasonable accurate estimate of GHG output given survey limitations is achieved.

Subsequently, Chap. 4 deals with the development and validation of our survey. It covers the most important methodological aspects of the underlying study and describes the selection and validation of questions for measuring emission-related behavior. Survey questions are introduced for the main GHG-relevant segments identified in the previous chapter. We also consider alternatives for some questions, compare their reliability and validity, and point to the most suitable versions. To this purpose, the suitability of the questions for measuring impact-relevant behavior is first discussed. Secondly, a comparison is made with available validation criteria that have been collected for this purpose and appropriate questions are selected on the basis of this empirical evidence. Furthermore, this chapter

also discusses our methodological approach and the sampling of our main survey in detail.

Chapter 5 presents the results of our main survey. First, a descriptive overview of the emissions of the Austrian population as well as those of our respondents is provided. Through the variety of questions added in the survey, it is possible to get a detailed insight into how Austrians behave in those areas that are actually relevant to emissions. The findings show that the area of mobility—with an emphasis on annual car usage and flights—as well as meat consumption account for around 50% of the annually produced emissions. Chapter 5 continues to identify the most relevant questions for measuring the GHG impact of an individual, that is, to capture the largest possible amount of GHG emissions with the smallest number of items. This attempt results in a selection of five items, which are able to capture more than three quarters of the emissions. The concluding analysis of factors that shape these emissions shows that socio-demographic variables are much more important than attitudes and values.

The previous chapter focused on the total emissions. Chapter 6 considers a multidimensionality of consumption in the form of different energy demands based on the lifestyles of Austrians. The backdrop for this chapter is that existing research demonstrated weak relationships between environment-related attitudes and the overall environmental impact. It proposes that a look at more specific behaviors and their joint occurrence in specific lifestyles is more promising. The analysis identifies five lifestyles based on energy demand in the six areas of social life (housing, mobility, consumption of goods, diet, leisure activities, and information). It concludes that the selection of policy measures must consider the differences between these Energy Lifestyles.

Chapter 7 turns to the subjectively perceived obstacles to lowering one's GHG emissions. The starting point is that many individuals seem to have difficulties adopting environmentally friendly behavior, despite having a strong environmental awareness. This phenomenon is known as the Value-Action Gap. The chapter tests a model that assumes a linear relationship between attitude, intention, and behavior in environmentally related low-cost behaviors—in this case consumption and mobility behavior. Previous studies suggest that discrepancies can occur between personal environmental attitudes, the resulting intention, and the subsequent environmental behavior. In the first part of this chapter, quantitative analyses are used to determine which groups are particularly likely to exhibit a gap between these three factors. Second, these groups are examined in

more detail in 15 qualitative interviews regarding the reasons for these discrepancies as well as the desired policy solutions.

The final chapter summarizes the main insights from the previous chapters and tests whether our approach is also applicable at an international level. Our international outlook remains limited to the European context and data from the ECHOES project mentioned above. Initially, we had planned to use data from the International Social Survey Programme, which covers countries across the world. However, its 2020 surveys on environmental attitudes and behaviors were delayed due to the COVID-19 pandemic. Our international outlook, nevertheless, shows that the proposed items in Chap. 5, which capture more than three quarters of the Austrian GHG emissions, also work well in other European countries. Similarly, the lifestyles identified in Chap. 6 are also present in other societies. Correlating the scope of these lifestyles and the explanatory power of our approach with different national characteristics reveals various influences of political institutions, societal affluence, environmental degradation, social demographics, and other national characteristics. The final chapter closes with a look at the impact of the COVID-19 pandemic. As pointed out in the beginning of this introduction, it had a huge impact on GHG emissions (UNEP, 2020). We will present some results based on data collected during the COVID-19 crisis and discuss the influence of this pandemic on environmental attitudes and behaviors. Results suggest that concerns about COVID-19 also affected individual willingness to act for the environment.

REFERENCES

- Catton, W. R., Jr., & Dunlap, R. E. (1978). Environmental sociology: A new paradigm. *The American Sociologist*, 41–49.
- Dunlap, R. E., & Brulle, R. J. (Eds.). (2015). *Climate change and society: Sociological perspectives*. Oxford University Press.
- Dunlap, R. E., McCright, A. M., & Yarosh, J. H. (2016). The political divide on climate change: Partisan polarization widens in the US. *Environment: Science and Policy for Sustainable Development*, 58(5), 4–23.
- Ehrhardt-Martinez, K., Rudel, T. K., Norgaard, K. M., & Broadbent, J. (2015). Mitigating climate change. *Climate change and society: Sociological perspectives*, 199–234.
- EIA, U.S. Energy Information Administration. (2021). Retrieved April 6, 2021, from <https://www.eia.gov/tools/faqs/faq.php?id=427&t=3>

- Eurostat. (2021). Retrieved April 6, 2021, from [https://ec.europa.eu/eurostat/cache/infographs/energy/bloc-3b.html#:~:text=40%20%25%20of%20the%20electricity%20consumed,power%20stations%20burning%20fossil%20fuels&text=Among%20the%20renewable%20energy%20sources,solar%20power%20\(4%20%25\)](https://ec.europa.eu/eurostat/cache/infographs/energy/bloc-3b.html#:~:text=40%20%25%20of%20the%20electricity%20consumed,power%20stations%20burning%20fossil%20fuels&text=Among%20the%20renewable%20energy%20sources,solar%20power%20(4%20%25))
- Goldrick, G. (2019). *2019 has been a year of climate disaster. Yet still our leaders procrastinate*. Retrieved April 6, 2021, from <https://www.theguardian.com/commentisfree/2019/dec/20/2019-has-been-a-year-of-climate-disaster-yet-still-our-leaders-procrastinate>
- Hadler, M., & Haller, M. (2011). Global activism and nationally driven recycling: The influence of world society and national contexts on public and private environmental behavior. *International Sociology*, 26(3), 315–345.
- Hadler, M., & Haller, M. (2013). A shift from public to private environmental behavior: Findings from Hadler and Haller (2011) revisited and extended. *International Sociology*, 28(4), 484–489.
- Hadler, M., Schweighart, M., & Wardana, R. (2021). *OeNB CO2-relevant environmental behavior*. Data will be available for free at the Austrian Social Science Data Archive. www.aussda.at; <https://doi.org/10.11587/WQGMKY>
- Harper, C. (2015). *Environment and society: Human perspectives on environmental issues (2-downloads)*. Routledge.
- Hironaka, A. (2014). *Greening the globe*. Cambridge University Press.
- Kollmuss, A., & Agyeman, J. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, 8(3), 239–260.
- Perrow, C., & Pulver, S. (2015). Organizations and markets. *Climate change and society: Sociological perspectives*, 61–92.
- Reichl, J., Cohen, J., Kollmann, A., Azarova, V., Klöckner, C., Royrvik, J., Vesely, S., Carrus, G., Panno, A., Tiberio, L., Fritsche, I., Masson, T., Chokrai, P., Lettmayer, G., Schwarzwinger, S., & Bird, N. (2019). *International survey of the ECHOES project*. Dataset. Zenodo. <https://doi.org/10.5281/zenodo.3524917>.
- Rosa, E. A., Rudel, T. K., York, R., Jorgenson, A. K., & Dietz, T. (2015). The human (anthropogenic) driving forces of global climate change. *Climate change and society: Sociological perspectives*, 2, 32–60.
- Stern, P. C. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, 56(3), 407–424.
- United Nations Environment Programme. (2020). *Emissions Gap Report 2020*. Nairobi. <https://www.unep.org/emissions-gap-report-2020>

Open Access This chapter is licensed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.