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14 Conclusion

Towards a ‘deep debate’ on the Anthropocene

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Summary

In this edited volume, we explored the contributions that political science as a discipline can offer to the evolving Anthropocene debate. The term *Anthropocene* denotes a new geological epoch in the Earth’s history in which humans have become the main drivers of planetary-wide changes (Crutzen 2002). Some authors interpret this as good news, pointing to progress as a result of human ingenuity and the endless possibilities of managing the Earth system for the sake of human benefits (e.g., Ellis 2011; DeFries et al. 2012). Others have argued that the notion of the Anthropocene constitutes a wake-up call for humanity to act in the light of scientific evidence which is indicating fundamental and irreversible state shifts in the various interrelated ecosystems of our planet (e.g., Rockström et al. 2009; Steffen et al. 2015). Against this background, we seek for a ‘deep debate’ on the Anthropocene in the sense of providing sound disciplinary insights to an interdisciplinary exchange. We have addressed two fundamental questions in this book: (1) *What is the contribution of political science to the Anthropocene debate, e.g., in terms of identified problems, answers and solutions?* (2) *What are the conceptual and practical implications of the Anthropocene debate for the discipline of political science?*

To answer these questions, the edited volume presented a series of original analyses from the field of political science organised along three dimensions: In *Part I (Theories and concepts)*, we provided novel theoretical and conceptual accounts of the Anthropocene. The chapters in this part dealt with the questions: What is the political dimension of the Anthropocene debate, and how does the human-dominated epoch change the foundations of existing theoretical and conceptual approaches of the discipline? *Part II (Governance and practices)* engaged with contemporary politics and policy-making in the Anthropocene. The contributions in this part scrutinised questions of political repercussions of the human age for individual policy domains, such as climate change, agriculture and security. Finally, *Part III (Critical perspectives and implications)* offered critical reflections on the Anthropocene debate. The chapters of this part raised questions related to societal responsibilities in the human age and consequences for political procedures, our political-administrative systems, and for future generations.

This concluding chapter proceeds with a summary and review of the results put forth in the individual contributions along the volume's main questions. We then highlight three distinct themes and related challenges emerging from the research presented in this book. Firstly, we refer to the question of *governance*, touching upon the need for improved institutions and practices to avoid planetary disruptions, as well as the in-built limitations of steering and management – both in terms of effectiveness and democratic values. Secondly, we stress the important analytical and normative contribution of *political theory* for the Anthropocene debate. Thirdly, we discuss the challenge of *interdisciplinarity*, in which disciplinary perspectives, such as political science, need to find their adequate role and place with regard to the overarching debate. Finally, we provide an outlook on the ongoing Anthropocene debate and close with some final remarks.

Key findings

This section recapitulates the main findings of this edited volume along the two guiding questions developed at length in the introductory chapter. By referring to the individual chapters, we (1) underscore the contributions of a political science perspective to the Anthropocene debate, and (2) discuss the implications of the Anthropocene for the discipline of political science. We begin with a summary of the chapters' findings along the three parts of the book, *theories and concepts*, *governance and practices* and *critical perspectives and implications*. Thereafter, we identify four broader challenges for political science theory and practice emerging from the Anthropocene debate: *ontological and epistemological foundations*, *human-nature relations*, *concepts and concrete institutional forms* and *governance*.

Contributions from political science to the Anthropocene debate

The authors of this volume provide rich insights into the question of what the contributions of a political science perspective to the Anthropocene debate could be. Regarding the first part of the volume, dealing with *theories and concepts*, the authors carved out theoretical and conceptual findings which emphasise the political dimension of the Anthropocene term.

In chapter 2, Maïke Weißpflug illustrates what political theory can contribute to the Anthropocene debate. By inquiring into the political philosophers Hannah Arendt and Theodor Adorno, Weißpflug is able to explain the multiple ways in which the Anthropocene is embedded in ideas about the relationship between human and nature. Weißpflug outlines how the Anthropocene has been framed as a normative narrative from the very beginning, starting with the original article by Paul Crutzen and Eugene Stoermer (2000). Both Arendt and Adorno criticised such 'grand' narratives and, instead, demanded a more nuanced understanding of human-nature relations. Such ideas have developed within the discourse of modernity over a longer period. Arendt's critique of the 'Archimedean point' and her understanding of politics as 'care for the world' and Adorno's 'idea of a natural

history', his critical reflections on nature domination, and the question of technology, are vantage points to rethink the philosophical framework for a more resonating Anthropocene narrative. This narrative could reconnect our actions with the consequences for the world we live in.

In chapter 3, Johannes Lundershausen evaluates the Anthropocene as a scientific description of ongoing Earth system transformations. He outlines the dichotomisation of the scientific descriptions of the Anthropocene as 'crisis' or 'opportunity' which opens up the different normative logics underpinning these representations and enables scrutiny of the complex co-constitution of scientific and normative statements. While there might not be concrete policy prescriptions emerging from this line of inquiry, connecting the normative logics of scientific representations to political implications will help analysts and political actors alike to better navigate the complex entanglement of Earth system research and decision-making, for example, with regard to discussions about geo-engineering.

In chapter 4, Basil Bornemann critically reflects upon the relationship between the concept of governance and the Anthropocene. The author demonstrates that the Anthropocene invokes a co-evolutionary, transformation-oriented and temporally extended understanding of governance. Such an understanding of 'anthropogenic governance' revolves around several features: It mediates between the universalistic claims of the Anthropocene concept and particularistic governance interpretations thereof. Moreover, it conceives of collective action as being shaped by, and at the same time shaping, co-evolutionary socio-ecological dynamics. This implies that anthropogenic governance is essentially post-hierarchical, and makes use of diverse ways of thinking and forms of collective action which are beyond human control. Overall, anthropogenic governance is located on a meta-level to allow for both taking account of the diversity of contexts and forms of governance, and referring to the big picture. Yet, anthropogenic governance is still not a sufficient basis for future-oriented governance. It is lacking an element of normative guidance which is crucial for mobilising and perpetuating support for societal transformations of the future.

In chapter 5, Franziska Müller seeks to make sense of the Anthropocene from an International Relations theory perspective. She approaches the debate along the three dimensions of (1) worldviews and research paradigms, (2) analytical categories, especially the understanding of agency, as this category is central for understanding the relation between human agency and man-made ecological crisis, and (3) problem-solving strategies, such as problem definitions and modes of governance. Müller's main contribution is to raise awareness about the incompatibility of current Holocene International Relations theory and the challenges of the Anthropocene, which she describes as 'ecocide'.

In the second part of the volume, engaging with *governance and practices*, the authors underscored the political repercussions of the Anthropocene as a concept and a debate by focusing on different policy domains.

In chapter 6, Judith Nora Hardt analyses how the field of security studies has dealt with the concept of the Anthropocene and scrutinises the contribution of environmental security studies to the Anthropocene debate. Hardt holds that the

current Anthropocene debate is problematic because of the lack of a clear definition of the term Anthropocene. Hence, she suggests that the Anthropocene concept needs to be further developed and articulated. In this endeavour, security studies can, according to Hardt, help detect major constitutive and defining features of the Anthropocene discourse. The particular contribution of the field of environmental security studies to the Anthropocene debate is that it reminds us that actors shape the current securitisation trend as for example by highlighting and disseminating the planetary boundaries concept. In this regard, the sub-discipline of critical security studies can reveal (potentially dangerous) securitisation moves in academic and public discourses.

In chapter 7, Lukas Hermwille aims to build a bridge between two academic schools of thought concerned with global changes, i.e., the transition research literature – an academic field that is dedicated to the study of transitions of socio-technical systems – and the global environmental governance perspective. Hermwille claims that the field of global climate governance can be regarded as a ‘boundary object’ or a ‘governance laboratory’ to explore possible solutions for addressing human-induced global environmental changes in the Anthropocene. Reviewing the broad literature on global climate governance and politics, Hermwille argues in favour of a more systemic perspective that takes the interconnectedness of global environmental and technological changes into account. Thus, the author aims at broadening the narrow perspective on the issue of climate change and suggests that the various existing governance mechanisms for combating global warming will also have an effect on the responses to other pressing environmental challenges.

In chapter 8, Chris Höhne contributes to the debate on the Anthropocene by pointing to the important role of emerging economies in causing and potentially mitigating environmental changes. His chapter deals with the case of Indonesia that is showing increasing domestic engagement on climate mitigation. As the country was not obliged to fulfil any mitigation targets under the Kyoto Protocol, rational choice scholars would not expect any domestic action. To understand Indonesia’s commitment, Höhne hence adds a constructivist perspective to the rationalist approach. He finds that the fact that the Indonesian government has incorporated global norms of climate mitigation since 2007 can first of all be explained with norm entrepreneurs (external actors like the World Bank) and the country’s concerns of its social reputation (e.g., as host of the Conference of the Parties to the United Nations Framework Convention on Climate Change held in Bali in 2007).

In chapter 9, Sandra Schwindenhammer analyses the issue of agricultural governance in the Anthropocene. The global agri-food system reveals complex interdependencies between global food supply chains and non-linear environmental changes and can hence be regarded as an example of the dynamic co-evolutionary relationship between nature and society. Schwindenhammer adopts a (critical) constructivist perspective to International Relations research. From that perspective, the Anthropocene is conceived not only as an objective state of planetary change, but as a social construction. It is an interpretative category that draws our attention to processes of societal interpretation about the present and future

of the Earth. Consequently, she concludes that more nuanced concepts of norms and actors are needed in the literature concerned with International Relations. While the dimension of norms highlights the normative foundations and interpretations of societal problems in the Anthropocene, the dimension of agency deals with the material and normative embeddedness of norm entrepreneurship in the Anthropocene. Constructivist research can contribute to the Anthropocene debate by adding knowledge on the formation and diffusion of global norms and the role of norm entrepreneurs. It can also direct our attention to processes of norm contestation and the marginalisation of non-Western normativity in the Anthropocene.

With regard to the third part related to *critical perspectives and implications*, the authors identified crucial and future-oriented consequences that are so far underrepresented in the current Anthropocene debate.

In chapter 10, Till Hermanns and Qirui Li focus on land use change in the Anthropocene. Sustainability impact assessment is a tool to measure the impacts of land use changes on environmental, economic and social systems. The authors present an analytical framework for sustainability impact assessment that includes a representation of humans as a major geological driver of land use changes in the Anthropocene. As a result, the authors call for objectives-led sustainability impact assessment approaches, which use societal benchmarks for assessing the state of environmental, economic and social aspects of sustainable development. Political science, and social sciences more generally, have an important contribution to make to these assessments. On the other hand, the integration of knowledge about environmental thresholds of the Earth system into sustainability assessment is a key requirement in order to support political decisions about future land use patterns. Overall, sustainability impact assessment of land use changes in the Anthropocene requires both, knowledge about targets and values of stakeholders and other societal actors at different regional scales and governance levels, and knowledge about thresholds in the bio-geophysical Earth systems to avoid overuse in the human space usage.

In chapter 11, Dörte Themann and Achim Brunnengräber perceive the Anthropocene as a concept to explore the interdependencies between a radically transformed nature, the human-made technosphere with its resulting path dependencies and internal dynamics, and societies (which are both driving forces of the Anthropocene and are affected by it). From a critical theory perspective, the two authors illustrate the unintended consequences of human progress and capitalist accumulation using nuclear power generation and the question of nuclear waste and its storage as an illustrative example. A key finding of the two authors is the necessity for modes of governance that are better suited for the Anthropocene. A central concern in improving governance, according to the authors, should be overcoming unequal power relations both on different political levels and between countries.

In chapter 12, Jens Marquardt examines how the Global South is involved in the Anthropocene debate. Based on an assessment of more than 1,200 articles published in the Web of ScienceTM database between 2002 and 2016, the chapter looks at representation, contributions and framings, i.e., the involvement

of researchers based in the Global South, research on the Global South, and specific non-Western framings of the Anthropocene from a Southern perspective. Marquardt finds that, for a global topic like the Anthropocene to become a legitimate discourse, it is necessary not only to have diversity in terms of disciplines involved, but also in terms of geographic representation and adequate local and regional framings. In this regard, the contribution once again highlights the political nature of the Anthropocene concept.

In chapter 13, Jörg Tremmel, coming from the sub-discipline of political theory, makes a normative argument and recommends an extension of the 300-year-old separation of powers between the legislative, executive and judicial branches. Tremmel claims that in order to make our political system more future-oriented, it is crucial to establish a new (fourth) branch which ensures that the interests of future generations be taken into account within contemporary decision-making processes. In particular, he proposes the establishment of an office for future generations or a 'future council' that should have the right to introduce norms and rules, integrating the competencies of this institution with those of the parliament. Thus, Tremmel points out that political scientists, or more particularly political theorists and philosophers, can contribute to the Anthropocene debate by calling attention to the necessity of rethinking our existing forms of government.

Impacts of the Anthropocene debate on the discipline of political science

In addition to highlighting the distinct contributions made by political science scholarship, our authors also acknowledge the need for the discipline to take seriously the challenge of the Anthropocene. We see four broader challenges emerging here.

First, established political science theories and entire sub-disciplines have to rethink their *ontological and epistemological foundations* in the Anthropocene. Müller's contribution (chapter 5) is most advanced in this regard and clearly underlines the demand for a more in-depth discussion of International Relations theory against the backdrop of the human age. Referring to Adam Burke et al. (2016), she argues that the status of the planet as a whole remains unseen when observed through the theory's epistemological lenses. While other authors have been quick in claiming that International Relations theory has failed in offering approaches to collective, post-human survival, Müller makes suggestions for research strategies that can pave the way towards a theory of Anthropocene International Relations. She argues in favour of a shift away from anthropocentric worldviews. Instead, classical norms have to be redefined in a way that embeds socio-ecological perspectives and leaves space for system transformation. This points to an ecological understanding of mutual solidarity, a redefinition of the responsibility to protect as a directive for 'ecological intervention', or to an inter-species right to clean air.

These findings are mirroring the argument put forward by Hardt (chapter 6). She contends that a broadening of the security norm in terms of 'ecological

security' would help to overcome the separation between international anarchy and the ecosystem by emphasising the relationship between humanity and the conditions of our own survival. Hardt further points out that the advent of the Anthropocene challenges existing security conceptions and requires scholars dealing with such concepts to reconsider core assumptions of their particular field. At the same time, Hardt sees great potential for a connection between the Anthropocene to the issue of security as it would allow for a research focus on the condition of humankind and the central values and fears in the human-nature relationship.

Related to that, Schwindenhammer (chapter 9) looks at global agricultural governance from a constructivist International Relations perspective, which focuses on processes of social interpretations of the Anthropocene. She argues that more elaborate concepts of norms and actors in International Relations research are needed, e.g., regarding the normative foundations and interpretations of societal problems in the Anthropocene, and the normative embeddedness of actors. Against various forms of universalist accounts of the Anthropocene, her analysis directs our attention to issues like norm contestation and the marginalisation of non-Western perspectives in the Anthropocene. This is in line with Müller's contribution which demands theory development to deal with post-humanist worldviews that put limitations to human agency, while being aware of anti-democratic and post-political tendencies some post-humanist readings bear. Agency would in this sense be driven by inter-species/trans-species solidarity and empathy for each other's vulnerabilities, as those are everyone's 'Earth others'. Both contributions thus question the existing ontological foundations on which large parts of the current Anthropocene debate rest.

A second theme highlighted as a challenge for political science is the renewed interest in *human-nature relations* revealed by the Anthropocene.

Bornemann (chapter 4), for example, in his analysis of governance in the Anthropocene, states that governance is a concept rooted in the social world and thus comes with a clear social bias. The Anthropocene concept, in contrast, points to the inescapable interconnectedness of the social and natural spheres and highlights their co-evolution. Consequently, the Anthropocene calls for a re-materialisation of politics and political theory. Nature needs to be integrated in the conceptual constructions of political science. For governance analysis and practice, this means to acknowledge that it is deeply entwined with co-evolutionary socio-ecological dynamics, in the sense that governance is limited by socio-ecological dynamics, but also has potential for (reflexive) governance design. This insight should be integrated in environmental and sustainability governance more generally.

The theme of a re-materialisation of societal practices can also be discerned in the analysis by Hermanns and Li (chapter 10). As the two authors argue, the integration of knowledge about ecological thresholds of the Earth system into sustainability impact assessment is a key requirement for sustainable land use. While this is not new but rather a fundamental requirement of any sustainability assessment, the novel twist of sustainability impact assessment in the Anthropocene can

be seen in the fact that, even in the ‘human age’, the material and ecological pre-conditions of life are not overridden but remain valid. The result is again – as with ‘anthropocenic governance’ in Bornemann’s contribution – hybrid. Meaningful sustainability assessment needs both: knowledge about targets and values of social actors at different regional scales and governance levels as well as knowledge about ecological thresholds of the Earth system.

Another perspective on human-nature relations is offered in the contribution by Weißpflug (chapter 2). She argues that political theory needs to revisit this core discussion in the light of the grand challenges. Weißpflug demonstrates that the Anthropocene narrative is a fruitful stimulus for an updated philosophical discourse of modernity. For this purpose, it might be helpful that scholars of political theory engage in broader debates about the modern lifestyle, the possibility and conditions of cultural change and the experimental search for new life forms. She further argues that who ‘we’ are and what we ‘should do’ are political questions depending on and decided by real-world actions. Instead of taking ‘god-like’ perspectives, scholars should contribute to a plurality of decentralised narratives of the Anthropocene that allow people to actually connect with nature, while not losing sight of the dire and radical global consequences of human lifestyles and actions for the Earth system.

A third theme can be found in the call for revisiting *established concepts and concrete institutional forms* in the Anthropocene.

Höhne (chapter 8) shows that the Anthropocene debate forces International Relations research to open the ‘black box’ of the nation-state. His contribution stresses the need for studies that bring constructivist norm research together with a rational choice approach in order to understand ‘real world’ phenomena. Höhne moreover makes a case for overcoming sub-disciplinary boundaries within political science. In particular, he argues that, in order to be able to respond to environmental change, we need to combine insights from the sub-fields of International Relations and comparative politics to better understand the dynamics between the global, the national and the local.

In a similar vein, Hermwille (chapter 7) argues in favour of a combination of transition theory and regime theory to better understand climate change governance as a boundary object. He perceives global climate change as an external pressure to existing (global) governance approaches and contends that the various insights gained from studied concerned with global climate governance should be put in context with broader ideas on societal transformations. By taking advantage of the knowledge of both the literature on global climate governance and the scholarship of transition studies, scholars and policy makers will be able to alter unsustainable routines and deep structure variables that are otherwise difficult to change from within the different socio-technical systems.

Bornemann (chapter 4) takes a more critical view and questions the political science portfolio in that he scrutinises the concept of governance in the Anthropocene. He argues that the underlying problem orientation of governance becomes an issue. Governance thinking in the Anthropocene, oftentimes being pragmatic and solution-oriented, is primarily concerned with attempts to influence ongoing

co-evolutionary, socio-ecological dynamics and development trajectories. Notions such as ‘navigation’, ‘adaptation’ and ‘transformation’ bear witness of a loss of control and suggest that actual states have become more fluid and insecure. As a consequence, governance is no longer geared (only) towards problem-solving in the sense of collective negotiation and choice.

Marquardt (chapter 12) calls for exploring and engaging with alternative world-views and development paradigms from the Global South. Instead of asking what impacts the Anthropocene debate might have on the Global South, the author argues for an open debate in which novel conceptualisations originating in the Global South can be taken seriously, for example indigenous forms of knowledge, *sumak kawsay*, *Ubuntu* or *ecological Swaraj*. This is closely related to Müller’s contribution which argues that a careful assessment of our concepts in terms of appropriateness and aptitude for Anthropocene problem constellations is needed, as they may contain anthropocentric limitations, for instance regarding questions of political representation or actor proliferation. Instead, Müller demands Anthropocene governance to limit the role of Eurocentric voices and encourage a greater plurality. The result in all of the above cases is a reinterpretation of established concepts as a reaction to the Anthropocene debate.

A fourth identifiable theme related to the question of how political science needs to react to the Anthropocene debate is *governance*.

Lundershausen (chapter 3) studies scientific descriptions of the Anthropocene ‘as crisis’ and ‘as opportunity’ in order to highlight the co-constitution of scientific and normative statements. Scrutinising the normative logics that descriptions of desirable states of the Earth system incorporate, the chapter also illustrates their implications for responses to Earth system change. On this account, governance is influenced by apparently non-political scientific descriptions of the Earth system. This implies that political science research needs to engage more deeply with the normative foundations of the Anthropocene debate. As Bornemann (chapter 4) observes, the Anthropocene is challenging established environmental and sustainability governance theory and practice by promoting ‘anthropocenic governance’ as a new form of future-oriented governance. Traditionally, governance thinking focuses on current problems and actor constellations to bring about collective action to tackle the issues at stake. The Anthropocene expands this time horizon. Governance arrangements become embedded in ‘deep time’ (Davies 2016) that includes the challenge of dealing with long-term consequences and effects, which are uncertain or unknown. As mentioned above, this necessitates acknowledgement that governance is deeply entwined with co-evolutionary dynamics of socio-ecological systems.

With regard to global climate governance, Hermwille (chapter 7) argues that the field of political science and particularly the scholarship engaged with the policy domain of climate change need to rethink their narrow approach. Exploring the ontological basis of the two fields of global climate governance and transition research, he calls for a combination of these two literatures that help to develop a more holistic perspective on environmental changes in the Anthropocene. Similarly, Themann and Brunnengräber (chapter 11) highlight the need to

overcome established forms of Holocene governance by acknowledging the complex interrelations between nature, technology and society. Here the natural and engineering sciences have a major role to play in communicating uncertainties and ‘unknowables’ to the political system. Recognition of the fundamental uncontrollability of certain technologies and the related temporal uncertainties should also be taken into greater account in the decision-making process.

Finally, Tremmel (chapter 13) highlights the implications that the proclamation of the Anthropocene has for the currently relevant concept of democracy. He contends that the emergence of a new geological epoch, which is characterised by an increasingly disruptive human impact on the Earth system, requires a further advancement of our form of government. To render our political system more future-oriented, he proposes the introduction of a new fourth branch that represents the interests of future generations, i.e., ‘future councils’ that should have the right to pass bills, integrating its competences with those of the parliament.

Summing up the various answers to the two guiding questions of this edited volume, it has become apparent that political science as a social science discipline is able to make genuine contributions to the Anthropocene debate, while at the same time the Anthropocene challenges political science scholarship in fundamental ways. We believe that this conclusion is a solid basis for the future engagement of political science with the Anthropocene debate.

Challenges and opportunities

Beyond the findings of the individual chapters summarised and structured above, we identify three broader challenges and opportunities arising from adopting a political science perspective on the Anthropocene debate. First, the question of *governance* is paramount, as both, the protagonists of a ‘crisis’ reading of the Anthropocene and those that regard the Anthropocene as a chance, develop ideas about how to ‘steer’ the coupled nature-social system in the right direction. Second, in determining this ‘right’ direction, *political theory* might offer important normative insights. And third, while disciplinary depth is an important prerequisite for meaningfully engaging in the Anthropocene debate, the complexity of the challenge requires to move beyond disciplinary silos and to practice genuine *interdisciplinarity*.

Governance

If we take the diagnosis contained in the Anthropocene framing serious, we need to urgently change course. As Frank Biermann and colleagues formulate in their Earth System Governance Project, humanity needs to “steer away from critical tipping points in the Earth system that might lead to rapid and irreversible change. This requires fundamental reorientation and restructuring of national and international institutions toward more effective Earth system governance and planetary stewardship” (Biermann et al. 2012, 1306). Insights from political science based governance scholarship are therefore in high demand. There is an

opportunity to improve the quality of the often quite technical and non-political governance debate by adding genuine insights from the field of political science, as developed throughout the pages of this book. Against this background, we formulate three important reminders for those interested in the urgent task of devising appropriate governance systems for the Anthropocene.

First, governance is political. The task of governing and the related instruments and approaches of governance are by no means purely a technical issue, a mere implementation of planetary boundaries objectively revealed by natural scientists. Governance is instead a genuinely political activity that involves ethical judgments and that has (often well masked) distributive consequences. The well-known mantra of political science ‘who gets what, when and how?’ can serve as a welcome reminder that we need to constantly scrutinise the inherent contradictions and contestations manifesting themselves in governance options for the Anthropocene. Throughout this book, we have encountered various contributions engaging with questions of legitimacy and accountability. We believe that this broad theme constitutes an important avenue for future research.

Second, governance is complex. The Anthropocene debate has raised attention to the inherently complex nature of the Earth system and the related tipping points and, more broadly speaking, the issue of non-linearity. Adding to this complexity of coupled social-natural systems, governance in itself has become increasingly complex (Pattberg and Widerberg 2019). The Anthropocene is governed at various levels by myriads of formal and informal systems of rules, involving a broad range of actors, agendas and rationalities. As a result of this governance complexity, we are observing unintended side-effects and emergent properties that are difficult to anticipate. The complexity of existing governance is also an important reminder that rational planning and design for governing the Anthropocene might be a mere fiction.

And third, governance is uncertain. Even when well designed and accurately implemented, the outcomes of different modes of governance entail a high level of uncertainty and ambiguity. Next to the challenge of unintended consequences and non-linear behaviour, governance is also constantly (re-) negotiated and contested. As a consequence, governance efforts might fail. Anticipating, acknowledging and allowing for failure thus becomes an important strategy in the Anthropocene. Political science scholarship concerned with governance and institutions can offer important contributions to this line of thinking, for example, via the concepts of governance experiments (Hoffmann 2011) and experimentalist governance (Zeitlin 2015).

Political theory

One genuine opportunity lies in enriching the Anthropocene debate with insights from political theory. The contributions in this book illustrate that some issues of the Anthropocene debate have been at the core of political theory for several decades, if not centuries. In particular, from a political theory perspective, the Anthropocene debate essentially deals with human-nature relations and ‘our

place in the world' (Tremmel, chapter 13). Although these issues are not new, we can observe crucial differences and shifts.

Ethical theories developed in the Holocene tend to become increasingly outdated, in particular in terms of scale. They were concerned with the vicinity, with dealing with neighbours, other estates, the other sex or gender. Humans living on the other side of the world were hardly an object of ethical considerations nor were future generations in Ancient Greek philosophy. In this vein, most people continue to prioritise issues in their immediate surrounding to which they are emotionally attached. It is easier to mobilise for local nature conservation than for global climate action.

The Anthropocene implies a shift in political theory as it provokes debates about 'global ethics' and 'future ethics'. Political scientists can make suggestions for reform of our political systems and institutions to realise new normative imperatives (Biermann et al. 2012). For example, Tremmel envisions an office for future generations. However, such suggestions for political reform raise serious concerns. The 'grand' narrative tends to normatively imply even greater human interventions. While present institutions cannot be held accountable by future generations anymore, there is a general tendency that experts replace elected decision makers.

The dichotomy between humans and nature as well as between present and future generations neglects, first, differences and inequalities among the present generations and, second, common interests that past, present and future generations share. Moreover, the dichotomy implies that humans are separate from nature. The volume revealed the need for a more nuanced understanding of human-nature relations in the Anthropocene debate. Besides, again, we need to face the very politics of the undifferentiated Anthropocene concept itself. There is an invisible weight that comes along with this 'grand' narrative; and it implies greater burden for some compared to others.

Interdisciplinarity

The thrust of this volume was to bring political science perspectives to fruition for the Anthropocene debate. Throughout the book, we have shown that the discipline is in the position to meaningfully contribute to the debate. At the same time, it remains challenging to make the political science contributions relevant and accessible for the more natural science-oriented debates. On the one hand, there is request for 'answers' and 'solutions' with regard to how to govern in an age of 'global ethics' (for example, offices for future generations as a fourth branch of government). Political scientists should more intensively engage in a debate on how to reform democracy with regard to Earth system protection and future generations' interests. On the other hand, the vast majority of political scientists might contribute to postponement of this debate by deconstructing the 'grand' narrative and revealing the very politics of the demand for a reform of government. The challenge is to take advantage of political science analytical capacity and to inject the deeper and more meaningful conclusions from political

science into the Anthropocene debate – without however making dialogue impossible.

Disciplinary depth is a prerequisite for any meaningful engagement in the Anthropocene debate. At the same time, our aim is not to play off the different (natural and social science) disciplines against each other. The aim is not to find novel, allegedly ‘better’ definitions and concepts to understand the Anthropocene, or ‘superior’ policy recommendations to address the global environmental and sustainability problems. We argue that the complexity of the challenge requires to move beyond disciplinary silos and to practice genuine interdisciplinarity. Therefore, we call for a plurality of voices and disciplines in the debate. As Andrew Barry and Marc Maslin put it:

If a formal definition of the Anthropocene epoch is accepted, this is only one of many equally valid definitions of the Anthropocene and others must be continually explored. It has been exciting to see how the concept of the Anthropocene has engaged different subjects in ways that climate change and sustainability have not.

(Barry and Maslin 2016, 4)

Our plea goes in the same direction: The Anthropocene should be understood as a bridging concept that can help to overcome the gap between natural and social sciences. This requires participation and engagement of a broad range of disciplines to contribute with all their depth. Each disciplinary perspective, such as from the discipline of political science and others, needs to find their adequate role and place in the debate. A challenge also lies in the communication and mutual understanding between the disciplines which are based on radically different ontologies and epistemologies. The various challenges and quandaries of interdisciplinary collaboration have been analysed and discussed elsewhere (e.g., Hix 1994; Barry et al. 2008; Frodeman et al. 2017). These difficulties notwithstanding, we call for a ‘deep debate’ on the Anthropocene that allows for in-depth *and* interdisciplinary debates of the various topics of the ‘human age’.

Outlook and final remarks

The Anthropocene is upon us. However, far from representing a unified and coherent concept, the Anthropocene appears in multiple forms and thereby retains a certain amorphousness. As a basic distinction, the Anthropocene can be on the one hand understood as a scientific debate about the system boundaries of planet Earth, the role of *homo sapiens* in shaping this system and the related indicators to measure human impacts. The discussion about the exact starting point of the Anthropocene, and its related ‘golden spike’ is emblematic for this part of the debate. On the other hand, the Anthropocene also serves as a metaphor for complex changes and evolving uncertainties in the role and self-perception of humankind as a planetary agent. This is the angle from which political science enters the debate.

As we have seen throughout this book, political science is able to contribute to both of these broader strands of the overall debate. Related to the understanding of the Anthropocene as a warning against crossing important Earth system boundaries, political sciences as a discipline can offer analyses and prescriptions about governance as problem-solving, from suggestions for improved sustainability impact assessments to better future-oriented governance frameworks. However, beyond a focus on problem-solving, political scientists can provide meaningful contributions to a critical discourse about the ethical and normative implications of the Anthropocene and human agency therein. We are therefore convinced of the relevance of political science as one voice in the emerging Anthropocene debate.

Nevertheless, we also acknowledge a need for further learning and cross-fertilisation across disciplinary boundaries. The challenge of the next years will be to make the multiple disciplinary voices of political science heard in the Anthropocene debate, without rejecting the fundamental and possibly transformative meaning of the Anthropocene for studying contemporary politics.

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