Necessary but not Sustainable? The Limits of Democracy in Achieving Environmental Sustainability

Marina Povitkina
Department of Political Science
University of Gothenburg

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Cover graph: A scatterplot showing the relationship between democracy, measured by Electoral Democracy Index from the Varieties of Democracy institute, version v7.1, and quality of government, measured by the Indicator of Quality of Government from the International Country Risk Guide developed by the PRS group, year 2010.
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Abstract

The world today faces a number of environmental problems that are both severe and urgent. Finding effective solutions is one of the top priorities for the international community, with at least half of the United Nations Sustainable Development Goals relating either directly or indirectly to reaching environmental sustainability. The question is: *How to reach these goals?* Environmental problems pose a complex dilemma for decision-makers. They have low visibility, a slow response time to policy interventions and often require multi-pronged policy solutions that are sufficiently funded, supported and rigorously enforced. Yet, they are rarely the first priority for voters. Solutions to environmental problems therefore rely on long-term vision and commitments, appropriate expertise, as well as institutions that can secure compliance from all the relevant actors.

This dissertation looks at the political institutions that, it is argued, make countries more likely to commit to and reach environmental sustainability goals. It revisits previous findings indicating that democratic institutions are more conducive to securing strong environmental performance. Democracy, which shapes the rules of preference aggregation and thus influences environmental decision-making and policy adoption, does not necessarily guarantee that these policies will be successfully implemented. This dissertation argues that the performance of democracies in achieving environmental sustainability depends on the quality of government, which, broadly, encompasses the absence of corruption, high rule of law and high bureaucratic capacity. Quality of government shapes the implementation of public policies, but it may also affect the incentives of decision-makers in environmental policy-making. This dissertation hypothesizes that democracy and quality of government interact in the production of environmental sustainability outcomes.

The five articles included in the dissertation test this overarching hypothesis on four key Sustainable Development Goals related to environmental sustainability: the reduction of CO_2 emissions to avert climate change, preparedness for natural disasters that may arise as a result of climate change, the provision of energy, and the provision of clean water. The results are consistent across the studies and show that more democracy is only beneficial for environmental sustainability outcomes when high quality of government is in place. However, when quality of government is low, democracies tend to underperform, doing no better or doing even worse than authoritarian regimes. Corruption, weak public administration, and lack of rule of law undermine incentives for and the credibility of policy efforts, and obstruct the implementation of public policies related to environmental sustainability, thus limiting democratic governments' ability to act in the long-term interests of the public.

Sammanfattning på svenska

Världen idag står inför omfattande miljöproblem som är både allvarliga och brådskande. Att hitta effektiva lösningar på dessa problem är av högsta prioritet för det internationella samfundet. Ett uttryck för detta är att minst hälften av Förenta Nationernas uppsatta mål kring hållbar utveckling just handlar om att direkt eller indirekt nå olika miljömål. Frågan är bara: *Hur nås dessa mål?* Miljöproblem utgör ett komplext dilemma för beslutsfattare. De är inte alltid direkt synliga, det tar ofta lång tid innan riktade policyåtgärder ger verkan och de kräver ofta mångfacetterade lösningar som är tillräckligt finansierade samt har stöd och kraft att genomföras. Samtidigt har dessa problem sällan första prioritet bland väljarna. Lösningar på miljöproblem kräver därför långsiktiga synsätt och åtaganden men även rätt kompetens och institutioner som kan säkra följsamhet från relevanta aktörer.

Den här avhandlingen fokuserar på de politiska institutioner som har inflytande över i vilken utsträckning länder verkligen åtar sig och når uppsatta miljömål. Avhandlingen omprövar tidigare forskningsresultat som indikerar att demokratiska institutioner har en betydande roll i att främja ett hållbart miljöarbete. Demokrati formar spelreglerna för aggregering av intressen och påverkar således beslutsfattandet i miljöfrågor och hur de införs. Samtidigt demokrati i sig garanterar inte lyckad implementering. Den här avhandlingen argumenterar för att kvalitet i samhällsstyrningen är ett nödvändigt villkor för att demokratier ska kunna nå miljömässig hållbarhet. Samhällsstyrningens kvalitet innefattar sådant som grad av korruption, rättssäkerhet och effektiv förvaltning. Därigenom både formar den implementeringen av politiska beslut och kan påverka incitament för beslutsfattare att anta miljöpolicy. Den här avhandlingen argumenterar för att demokrati och kvalitet i samhällsstyrningen interagerar med varandra i att skapa förutsättningar att nå hållbara miljöresultat.

De fem artiklar som ingår i avhandlingen testar den övergripande hypotesen som förutsätter att både demokrati och kvalitet i samhällsstyrningen är nödvändiga för att skapa bättre miljö- och hållbarhetsarbete. Avhandlingen fokuserar på fyra hållbarhetsmål som relaterar till miljö: minskning av koldioxidutsläpp, beredskap för naturkatastrofer som kan följa av klimatförändringar, energiförsörjning samt försörjning av rent vatten. Resultaten är konsekventa i de olika studierna och visar att demokrati bara är fördelaktigt för miljön om det samtidigt finns hög kvalitet i samhällsstyrningen. Om däremot kvaliteten i samhällsstyrningen är låg, tenderar demokratiska stater att inte överträffa, eller till och med göra sämre ifrån sig, än auktoritära regimer. Korruption, svag offentlig förvaltning samt svaga rättssäkerhetsprinciper tycks undergräva incitament och trovärdigheten i policyåtgärder samt hindra implementeringen av åtgärder relaterade till miljömässig hållbarhet. I förlängningen begränsar detta ett demokratiskt styrelseskicks förmåga att kunna säkra befolkningens långsiktiga intressen.

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1
Research problem

Let us consider two low-lying coastal countries prone to storms and severe floods. One of them experiences extensive flooding every year, which each time creates massive destruction, leaving thousands of people affected and millions of dollars in damage. The other has constant storms and similarly high risk of floods, but each time the local rivers overflow hardly anyone is affected and damage rarely exceeds half a million dollars. These two countries are Bangladesh and the Netherlands. Both have more than half of their territories exposed to extreme weather events and high population densities under high risk, but the outcomes are strikingly different.

Examples of such striking differences in the degree of environmental problems around the world are plentiful. Water quality in Moldova and its close neighbor Romania was severely affected by Soviet industrial activities between the 1960s and 1980s. Nowadays, however, while water quality in Moldova is one of the worst on the European continent, citizens in Romania can safely drink water from the tap. Tokyo and Shanghai are two vibrant and highly populated metropolitan hubs, but while air quality in Tokyo is relatively high, Shanghai's residents are often forced to stay inside due to high pollution warnings. What can explain such variations in environmental conditions?

Preparing for natural disasters, providing safe drinking water or ensuring good air quality are tasks for national governments. In this dissertation, I argue that in order to understand the differences in how countries take care of their environment, we have to look at the institutions that shape the functioning of a country's political system. On the one hand, these are the institutions that shape the articulation of the demand for a healthy environment, which, as a consequence, affect whether environmental issues appear on the political agenda. On other hand, these are the institutions that shape the implementation of environmental policies. The interaction between these two sets of political institutions influences how political systems respond to environmental challenges.

Despite its crucial role in ensuring environmental sustainability, the state has received little attention within environmental political science research (for studies on the role of the state in solving environmental problems see, for example, Barry and Eckersley 2005b; Duit 2014; Jänicke, Weidner, and Jörgens 1997). Instead, studies have predominantly focused on searching for solutions to environmental

problems either locally or globally. Indeed, many environmental issues are local in character. Most natural resources suffer from problems with open access, and their sustainable use is therefore tightly connected to solving collective action dilemmas stemming from open access (Hardin 1968; Ostrom 1990). Collective action dilemmas encompass situations in which individuals have to sacrifice some degree of their short-term self-interest for the collective long-term benefit (Dawes 1980; Olson 1977). In the case of natural resource management, collective action dilemmas imply the clash between personal interest in resource overexploitation for the maximum gain in the short term and sustainable resource use that allows continuous exploitation of a resource over a long period of time. Achieving collective long-term benefit or in this case, sustainable use of natural resources, requires successful collective action or cooperation among resource users and a willingness to sacrifice in the short-term for the benefit of the collective in the long-term. As a consequence, a large strand of research has focused on determining the factors that influence individual behavioural choices, that is the proneness of individuals to engage in collective action, cooperate and manage the resources sustainably (see, for example, Ostrom 1990; Agrawal and Goyal 2001; Anderies et al. 2011; Berkes 1989; Ostrom et al. 2002; Ostrom, Gardner, and Walker 1994).

Apart from posing multiple local challenges, many – probably even most – environmental problems are also inherently global. All the ecosystems on the planet are linked: particles travel and penetrate into ecosystems far from the location of the emitters; inhabitants of marine ecosystems and animals migrate and spread diseases and pollutants; algae on the surface of oceans produces oxygen, which enters the atmosphere and spreads through the air (Rockström, Steffen, Noone, Persson, Chapin, et al. 2009a). Such inherent interdependency of global ecosystems has given rise to a strand of literature searching for solutions to environmental problems in the international arena. This literature focuses on international environmental regime formation, transnational environmental governance, international institutions building, lobbying in international negotiations, as well as signing and ratification of international environmental treaties (see, for example, Young 1989, 1999; Baettig, Brander, and Imboden 2008; Bäckstrand 2008; Bernauer and Betzold 2012; Biermann and Pattberg 2012; Bulkeley et al. 2014; Carraro 1997; Hoffmann 2011; Meyer et al. 1997; Pattberg 2005, 2007).

States, however, play a key role in solving both local and global environmental problems. They set rules for domestic actors' behavior in natural resource use and are thus able to regulate actors' choices in environmental collective action and affect environmental outcomes within their borders. At the same time, they are key negotiating parties in the international arena: they determine whether to sign or not to sign international environmental agreements and whether to ratify them

by applying international guidelines to their domestic legislation.

It is also within the function of states to secure the provision of environmental goods to citizens. Environmental projects usually require large-scale implementation and coordination schemes to reach out to broad segments of populations. They also imply the necessity of extensive investment with uncertain returns, which might only be visible in the long run. It is difficult to exclude people from the benefits of environmental projects such as good air quality or preparedness for natural disasters. It is, therefore, possible for individuals to receive the benefits of such projects without directly paying for them. Due to the high risk of such externalities, the large scale of environmental projects, and the uncertain return on investments, private markets tend to underprovide environmental benefits to the population if left to their own devices (Fukuyama 2014a; Neumayer 1999). Individual initiatives, such as building private wells or installing air cleaners at home, are also not enough to address the large-scale problems that stem from the many interconnected processes, which individuals are unable to influence. National governments have the potential to collect the economic means needed for tackling such large-scale problems by encompassing them within public policies and delivering improvements in environmental conditions, among other public goods.

Despite these core roles in solving (or contributing to) environmental problems, the state has received little attention within environmental politics research. While recent studies have attempted to draw attention to the necessity of studying the state for an understanding of environmental problems (Barry and Eckersley 2005a; Duit 2014, 2016; Eckersley 2004; Hanf and Jansen 1998; Jänicke, Weidner, and Jörgens 1997; Lundqvist 1980; Meadowcroft 2012), we still know very little about which characteristics make states more likely to commit to environmental goals and move forward on the path towards environmental sustainability. In contrast, in political science the state itself has been the center of attention, however, the environmental challenges that the states have to face have been largely overlooked. In political science, the provision of environmental benefits to the population, such as clean water and clean air, is often equated to the provision of other welfare benefits, such as health, education, unemployment insurance, pensions, and other government services related to social support and maintaining human well-being.

Public services related to environmental protection, however, pose a combination of complex challenges, which makes them distinct from other public services in several respects. First, the provision of welfare benefits is primarily driven by domestic challenges, while actions towards protection of the environment stem additionally from the global environmental crisis and the outcomes of these actions will have spillover effects internationally. Second, taxation schemes to generate budgets for environmental action are not as well integrated in the national fiscal

systems as taxation plans for generating social welfare. Third, environmental issues have a combination of characteristics which make them complex problems for decision-makers to address. These characteristics include: having a large number of actors on multiple levels involved in determining the outcomes, the low visibility of results, multiple sources of the problem, and diluted sources of responsibility. Other social welfare problems also possess some of these characteristics: however such a combination is rare in other policy areas. Fourth, science plays a larger role in determining environmental goals than in the sphere of social welfare (Gough 2016; Meadowcroft 2005). Environmental issues are thus complex, technically, politically and administratively, and the strategies towards successful environmental performance are not yet established. Therefore, with the rise of environmental challenges, there is a need to define the role of the state in addressing environmental problems and revisit its current functions in the provision of social welfare, extending these towards the new environmental domain.

The overall ambition of this dissertation is to bring a focus on the role of the state in addressing the issues of environmental sustainability and investigate characteristics of states conducive to strong environmental performance. As environmental issues are multidimensional, the role of the state can be studied from various different perspectives. In solving collective action dilemmas on a subnational level, the state can be seen as an external rule enforcer and a source of legitimate coercion for rule compliance and cooperation (Mansbridge 2014; Ostrom 1990). In global governance structures on a supranational level, the state can be studied as a negotiating actor deciding on the signing and ratification of international environmental treaties (Baettig, Brander, and Imboden 2008; Eckersley 2004). In this dissertation, I focus on the national level, that is the state itself and its characteristics, which connects to, and also has implications for, global and subnational levels of environmental problem-solving (Duit 2014). More specifically, the dissertation taps into the functioning of the political system of states, examining such features as are favorable to achieving environmental sustainability goals.

The rest of the introductory chapter of the dissertation proceeds as follows. In Section 2, I review the previous research on the role of the state in achieving environmental sustainability and present the aim of the study. In Section 3, I discuss the concept of environmental sustainability and the implications of the ecosystems' characteristics for environmental decision-making, as well as discuss the theoretical arguments as to why democratic institutions and quality of government matter for ensuring environmental sustainability. I also present the hypothesis positing the interaction between democracy and quality of government in their effect on environmental sustainability and build this dissertation's theoretical model. In Section 4, I describe strategies for operationalization of the main concepts of the

dissertation, describe the methods used in the articles, and discuss the limitations of the selected approaches. In Section 5, I present the empirical findings of the five articles included in the dissertation. Section 6 concludes and discusses possible avenues for future research.

2
Previous research

Within the scarce literature on the role of the state in achieving environmental sustainability and the characteristics of political systems favorable for reaching environmental goals, the research has primarily focused on studying factors conducive to pro-environmental decision-making. These include the representation of green interests or green parties in government (Knill, Debus, and Heichel 2010; Muller-Rommel and Poguntke 2002), whether the form of government is presidential or parliamentary (Fredriksson and Wollscheid 2007), the form of the relationship between the state and society that defines the rules for interest group representation (Neumayer 2003; Scruggs 2001; Siaroff 1999), or the number of veto points and players that determines the complexity of the decision-making process (Jänicke 2005; Tsebelis 2002). These factors may indeed play a role for environmental policy-making. However, a bigger puzzle is; which of the underlying institutional conditions that create the framework for these decisions-making processes to unfold – democratic or authoritarian regime type – is beneficial for the environment? As of the current state of research, this puzzle still remains unsolved.

Regime type is a set of formal and informal rules that shape access to political power. It "determines the methods of access to the principal public offices; the characteristics of the actors admitted to or excluded from such access; the strategies that actors may use to gain access; and the rules that are followed in the making of publicly binding decisions" (Schmitter and Karl 1991). Regimes, according to some classifications, can be broadly dichotomized into authoritarian and democratic, but the variation spans from totalitarian dictatorships of one-man rule to liberal democracies with relatively free and fair multi-party competition.

In the existing literature, there is a large debate on whether democratic forms of government are beneficial for the environment. The normative debate on the democracy-environment nexus presents contradictory views. Some scholars criticize the modern form of democracy for its liberal values and therefore inability to oppose people's reluctance to engage in environmental protection (Ehrlich 1968; Heilbroner 1974; Kennedy 1993; Ophuls 1977). Others emphasize that the current form of democracy is too weak and does not appropriately represent the will of the people, relying on corporate interests instead, and call for more democracy rather than less (De-Shalit 2000; Dryzek 1990, 1992; Hayward 1998; Jacobs 1991; Saward 1993). Yet another school of thought insists that liberal democracy can be com-

patible with environmental values, as it guarantees essential human rights, such as freedom of expression and association, which contribute to stronger environmental protection, and the right to a healthy life, which is inherently connected to the health of ecological systems (Eckersley 1992, 1995, 2004; Goodin 1992; Jagers 2007; Passmore 1974; Sagoff 1988; Saward 1993; Wissenburg 1998).

In parallel, empirical research has focused on studying the actual performance of democratic regimes with respect to various environmental outcomes. Empirical accounts of the problem have produced somewhat inconclusive results. The majority of studies find that more democracy is associated with favorable environmental outcomes (see, for example, Barrett and Graddy 2000; Bättig and Bernauer 2009; Bernauer and Koubi 2009; Fredriksson and Wollscheid 2007; Gleditsch and Sverdrup 2003; Li and Reuveny 2006; Neumayer 2002; Sjöstedt and Jagers 2014), apart from a few exceptions that report the opposite (*e.g.*, Midlarsky 1998). However, the results are inconsistent between different indicators of environmental performance, with no particular pattern that could potentially hint at why democracy tends to have a positive association with some outcomes but does not seem to be related to others.

One of the major drawbacks of these studies is that they do not differentiate between the possibly heterogeneous effects of democratization at different levels of democratic development or in different regime types. Instead they simply report a general observation on whether more democracy is associated with better environmental outcomes. However, is more democracy always better than autocratic rule? The real world examples show that there is a large variation in how democracies perform in ensuring environmental sustainability. Perhaps moving from the democratic institutions of Poland to the democratic level of Germany might produce noticeable improvements in environmental commitments; however, would the effects be the same when moving from authoritarian Russia to a low-level democracy like in Ukraine, Georgia or Moldova? Several studies attribute the different performance of democracies to countries' different economic capacities (Arvin and Lew 2009; Povitkina et al. 2015; Spilker 2013). However, very few suggest that such variation might stem not only from the lack of financial resources, which might well be a consequence of more underlying reasons, but from the actual inability of some states to reach their official goals or, in other words, the lack of state capacity (Skocpol 1985, 9).

The necessity of a capable and largely non-corrupt state for reaching official goals and delivering social services has been widely acknowledged in the political science literature (Acemoglu and Robinson 2012; Fukuyama 2011, 2013; Jänicke, Weidner, and Jörgens 1997; Miller 2000; Rothstein 1998, 2011; Rothstein and Teorell 2008; Sikkink 1991). However, it has barely entered the debate in environmental politics.

Some scholars emphasize the critical "administrative function" of the state when implementing environmental policies (Duit 2016), others similarly point out the importance of "bureaucratic capacity" in reaching environmental goals (Ringquist 1993a, 1993b, 1995). However, a comprehensive empirical account of the relationship between state capacity and environmental outcomes, comparable to the efforts testing the democracy-environment relationship, is absent. Large-N studies on the ability of states to implement their tasks on the environment are limited to the investigation of the effect of corruption on different environmental outcomes by scholars in economics (see, for example, Cole 2007; Damania, Fredriksson, and List 2003; Fredriksson and Svensson 2003; Pellegrini 2011; Welsch 2004) or case studies in political science (see, for example, Robbins 2000; Sundström 2015). These findings uniformly suggest that corruption has a detrimental impact on environmental quality. One of the major drawbacks of these studies, however, is that they do not account for the role of regime type in their analysis, and therefore, overlook the important set of institutions that shape environmental decision-making.

The strands of research examining the role of democracy and the role of different elements of state capacity in environmental research have thus existed in parallel, rarely intersecting, creating omitted variable bias and overestimation of the effects of each of these two correlated phenomena (Pellegrini and Gerlagh 2006, 333). Few studies aiming to explain environmental outcomes account for both democracy and state capacity simultaneously (for the few examples, see Pellegrini and Gerlagh 2006; Sjöstedt and Jagers 2014), while the relationship between the two different but interconnected sets of political institutions has received even less attention. Despite the fact that low state capacity can disrupt the functioning of democratic states, which would imply then that the effect of democracy is *dependent on* state capacity, the link between democracy and state capacity in their impact on the provision of public goods and services has been largely overlooked. Only a few studies attempt to theorize the interdependent relationship between the two and test their interaction in the production of public policy outcomes. These studies focused on economic growth (Knutsen 2013), school enrollment, and infant mortality (Hanson 2015), while in environmental political science research, the interdependent relationship between democratic institutions and institutions determining the ability of the state to implement official goals has been ignored entirely.

This dissertation *aims* to address this research gap and examine how the interplay between 1) democratic institutions that shape how the demand for environmental policies is articulated and 2) the quality of government that shapes the implementation of these policies contributes to the supply of public goods and services related to environmental sustainability. Modelling the interdependence

between these two distinct but interconnected sets of political institutions that guide the functioning the political system (Easton 1953; Eckersley 2004; Fukuyama 2013; Rothstein 2011) provides an opportunity to better understand the difference in the performance of political systems in the delivery of public services, including environmental protection. It accounts both for the rules that influence the rulers' incentives to commit to environmental goals and the capacity of the state to deliver the results.

3
Theoretical framework

3.1 Environmental sustainability

Ensuring sustainable development is central to human survival. On the one hand, economic development is crucial for improving living conditions today and in the near future. On the other hand, long-term economic development relies on limited natural resources and therefore requires a balance that does not jeopardize the ability to pursue economic development in the future, as this could undermine the living conditions of future generations and even the continuity of humankind. The first attempts to address the issue of sustainable development date back to 1972 when the United Nations member states came together in Stockholm to discuss the challenge of pursuing economic development with limited natural resources. The global discussions continued in 1987 when the Brundtland Report, "Our Common Future", by the World Commission on Environment and Development coined the common understanding of the term. According to their widespread definition, developing sustainably implies *meeting the needs of the present without compromising the ability of future generations to meet their own needs* (WCED 1987). Since then, countries around the globe have been continuously committing themselves to reaching various goals of sustainable development (UN Millenium Project 2005; United Nations 2015).

The concept of sustainable development rests upon three pillars, all deeply interconnected (Figure 1). It entails ensuring people's *social* and *economic* welfare while protecting the *environment* and natural resources (Hansmann, Mieg, and Frischknecht 2012). Apart from the fact that the three dimensions affect one another, each of them is complex and deserves one or more dissertations for itself. In this study, I focus in particular on environmental sustainability, which is connected to, but distinct from, the other two pillars of sustainable development. It implies the protection of ecological systems that support human life (Goodland 1995). The dependence of human life on environmental sustainability makes the environmental element an essential core of the sustainable development concept and it is a key reason why it became this dissertation's focus.

Environmental sustainability is related to the protection of ecological systems that support life to ensure their indefinite continuity. Human life depends on the health of these systems for food, water, air, pollination, waste reduction, and

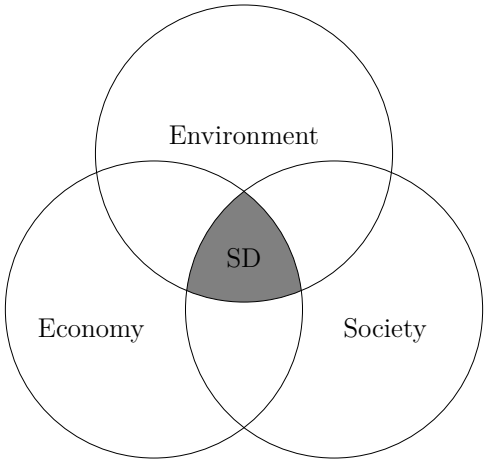

Figure 1: Three pillars of sustainable development (SD)

other ecological services (Goodland 1995). Healthy ecological systems create environmental conditions in which it is possible for people to sustain good health, including, for example, clean air free from harmful chemicals and particles, and clean drinkable water. The quality of the environment thus relies on the health of ecological systems. Protection of ecological systems and ensuring environmental sustainability is human-centered and is mostly about sustaining the conditions in which it is possible for the humankind to survive and "fulfil their needs" (Dryzek 1987). Understanding the causes of environmental destruction and the continuous failure to commit to environmental goals and protect ecological systems requires understanding the complex nature of ecological systems and the human environment as a whole, as this complexity has implications for environmental decision-making.

3.1.1 Characteristics of environmental sustainability

Several of the characteristics of environmental problems, which stem from the characteristics of ecological systems in the first place, affect peoples' choices either towards or away from environmental sustainability. Mapping these characteristics of environmental problems can help compare environmental protection with the alternatives, understand people's choices, and situate national governments among other actors in addressing environmental problems. Most importantly, such mapping can help recognize processes within states conducive to overcoming the challenges for decision-making that these characteristics create. Among the most prominent characteristics of environmental sustainability, the existing literature mentions the following.

First, each ecosystem involves multiple components, such as air, water, soil, *etc.* These components are inherently *interconnected* (Meadowcroft 2014; Rockström, Steffen, Noone, Persson, Chapin, et al. 2009b), and therefore, environmental problems relating to particular ecosystem components are also interconnected. For example, concentration of carbon dioxide (CO_2) in the atmosphere, which affects climate change, does not only depend on the intensity of anthropogenic emissions, but also on the state of the forests and oceans that absorb carbon dioxide and help the system to "clean up" (Rockström, Steffen, Noone, Persson, Chapin, et al. 2009a). As ecosystem components are interdependent, the causes of deteriorating ecosystem health, as well as the consequences of different events, are difficult to track.

Second, ecosystems *respond slowly to human action.* After actions towards improving environmental sustainability are taken, it can take years before the results of those actions become visible. For example, after the introduction of sulphur dioxide (SO_2) reduction measures, it took roughly 20 years before substantial changes became observable and measurable. The response of the climate to the reduction of carbon dioxide (CO_2) emissions will take even longer (Gardiner 2011). The slow-changing nature of such environmental outcomes makes changes in environmental conditions not immediately visible to decision-makers.[1]

Third, there is a *large number of actors* that have the power to affect ecological systems (Ostrom 2009). These include, for example, resource users who are directly involved in the extraction of natural resources, such as people who inhabit areas close to the resource or private companies; green civil society organizations, which aim to protect natural resources; national governments, which establish norms of behaviour regarding natural resources; international organizations that guide the choices of national governments; and often private firms, which can pollute the environment. The health of ecosystems depends on the complex network of interactions between actors on these multiple levels and their behavioral choices.

Fourth, each ecosystem component can perform *multiple functions* for humans. On the one hand, using the framework of Ostrom and Ostrom (1977), a clean water body can be considered a public good, providing a source of drinking water for people, a habitat for river products (*e.g.*, fish) that people can consume, and supporting other ecosystem components, such as forests and soil. On the other hand, it can be a common good, serving as a waterway for transportation, or a dumping place for waste from production and sewage. Therefore, regulating a

[1] By decision-makers in this section I imply all actors who have direct or indirect, short-term or long-term impact on environmental quality – from ordinary people who decide on their actions in their everyday lives, to polluting businesses, to rulers who decide on environmental policies. These include both elected officials seeking re-election and authoritarian rules who seek mass support.

Table 1: Characteristics of environmental problems

Problem characteristics	**Some implications for decision-making**	**Some implications for management**
Multiple sources of the problem	Diluted responsibility. Difficult to isolate effects of human actions on the environment from the effects of factors external to human control	Requires experts in decision-making, awareness of the breadth of the issue, cooperation among agencies dealing with different problem components, and unification of the competing goals
Slow response to human action	Low visibility of results. Requires long time horizons	Requires paying the concentrated costs now for future diffused benefits
Large number of actors on multiple levels	Diluted responsibility for actions, difficult to hold any of the actors accountable.	Requires coordination among actors on all levels and coherence in their goals
Multiple dimensions of the problem	Diluted responsibility. Requires awareness of the breadth of the problem	Requires different management approaches for solving different dimensions of a single problem
Focus on preventing destruction rather than building something new	Low visibility of results. Requires long time horizons.	Requires solving collective action dilemmas over resource exploitation

single water body can require a diversity of approaches – one that ensures universal access to a public good and its sustainability (*e.g.*, clean water) and another that is conducive to solving collective action in the "tragedy of the commons" (*e.g.*, securing cooperation between emitters in reducing water waste) (Hardin 1968).

Fifth, tackling environmental problems and the provision of public goods related to environmental sustainability is often related to preventing future damage rather than building something new. Prevention of future damage is needed to ensure that environmental problems do not surpass "tipping points" – conditions where ecological systems lose their resilience and shift to another (undefined) state (Lenton et al. 2008). The problem is that tipping points for degrees of environmental damage are rather vague or undefined. It is unclear as to which thresholds actors must aim for and also how to avoid reaching these thresholds, as ecosystems are interdependent and problems with one ecosystem component can spill over to other ecosystem components (Rockström, Steffen, Noone, Persson, Chapin, et al. 2009a; Steffen et al. 2015). A focus on damage prevention, and especially the unclear aims of prevention, contributes to *low visibility* of actions towards tackling environmental problems.

These characteristics of ecological systems (listed in Table 1) can steer decision-making away from tackling environmental problems, despite the recognition of

their importance:

- *Interconnectedness of ecosystems* makes it difficult to isolate the effects of human actions on the environment from the effects of factors exogenous to human control. This makes it difficult to hold responsible actors accountable and makes it easier for them to avoid punishment for actions harmful to the environment.

- *Slow response to human actions* makes environmental problems or improvements in environmental conditions belong to the uncertain future, presenting people with the problem of concentrated costs and diffused benefits. While the time to act is now, improvements in the health of the environment as a result of human action taken today will only be evident to our uncertain future selves or unknown future generations. This uncertainty of future outcomes and invisibility of results today make people prioritize current problems rather than uncertain future ones.

- *Large number of actors* dilutes the responsibility for actions taken towards harming or preserving the environment, making it difficult to hold any of the actors accountable. Ecological systems also *surpass national borders*, which contributes to diluted sources of responsibility.

- Different ecosystem components that have the characteristics of public, private, club or common goods, require different management approaches, as human incentives for their use differ depending on rivalry and excludability (Ostrom and Ostrom 1977). At the same time, multiple functions of environmental components imply that even a single physical phenomenon can require various management approaches (Holzinger 2001).

Environmental issues share many of these characteristics with other aspects of human welfare. Interconnectedness of environmental problem components can be related to the problem of societal inequalities that stem from many sources. Slow response and invisibility of environmental problems are features also inherent in, for example, pension programs. The global character of some environmental problems can also be related to the problems of migration. Prevention of environmental degradation can be compared to the maintenance of already existing infrastructure. Just as with natural resource protection, provision of many public services also requires solving collective action problems in tax collection in order to generate budgets for these services.

While the characteristics of environmental issues are not necessarily unique in the way they affect decision-making, their combination poses a challenge that is

rare for other types of societal problems. On the one hand, ensuring environmental sustainability is highly dependent on the choices of those actors involved in collective action dilemmas regarding the use of natural resources, *i.e.* to cooperate and not overexploit a common good. On the other hand, it depends on the universal provision of public services to an undefined constituency (Falkemark 1999). Only in the case of extreme and visible environmental problems do interests to protect the environment become vested interests, convenient to address through politics. Otherwise, environmental protection only brings diffused benefits. Taken together, the characteristics of environmental problems accumulate into the problems of invisibility and diluted responsibility. Both of these problems have implications for the decision-making of both the actors involved in preserving the common good and governments responsible for the provision of public services.

This combination of characteristics makes environmental problems inherently complex and it is unlikely that collective action for coping with ecological problems will take place voluntarily. Management of such complex ecosystems, which affect one another, depend on the actions of multiple actors at many levels and transcend national and generational boundaries, requires systematic coordination from a legitimate and credible enforcer that can effectively coordinate and mobilize systematic knowledge about the complexity of the issues, use it, and ensure general long-term commitment to sustainability. The state is so far the only actor that is potentially capable of taking on this complex coordinating role. Additionally, the state plays a key role in providing public services aimed at environmental protection and reaching environmental sustainability goals, when compared to private actors or end users themselves.

Outlining environmental characteristics serves a dual goal. First, it helps emphasize the essential role of the state in tackling environmental problems as opposed to local self-management or international environmental regimes. Second, it lays the ground for further introduction of how democracy and quality of government are fit to address the implications of environmental problem characteristics for environmental decision-making and management.

3.2 The role of the state in achieving environmental sustainability

The state has been conceptualized as a form of political organization of people with "the monopoly of the *legitimate* use of physical force within a given territory", functioning under a single system of government (Weber 1946, emphasis added). With the legitimate power to exert coercion on its territory, the state is a crucial actor in achieving environmental sustainability goals.

At low levels of environmental problem complexity, for example, when the number of actors is low and they are involved in managing a single resource (*i.e.*, a forest or a pond), it is easier for such actors to coordinate cooperation. Elinor Ostrom has emphasized that local self-management and control in this case can help reach sustainable natural resource use under eight conditions/principles that should guide the interaction among resource users. These principles include: clear group boundaries, existence of rules that match local needs, participation of resource users in decision-making, respect of the local rules of resource use by outside authorities, monitoring by resource users, existence of sanctions, and availability of means for conflict resolution. Under these principles, Ostrom argued, there is a high chance that resource users will cooperate in collective action for maintaining the sustainability of the ecosystems they manage (Ostrom 1990, 2010). While these rules can predict successful collective action in relatively small groups, they seem to face a number of challenges when the group size increases (Ostrom et al. 1999).

As the number of actors grows, their interactions become more complex and it becomes more difficult for them to monitor each other's behavior (Agrawal and Goyal 2001). Additionally, as the area they manage expands, the interaction between ecosystems and their components becomes more complex. As a result, understanding of the environmental problems might diverge between different actors while the outcomes of actors' actions become less visible and more difficult to track. As their incentives to free-ride increase, successful collective action becomes less likely.

In order to achieve collective action on a large scale in such complex matters as environmental protection, there appears to be a need to coordinate the behavior of actors and to set rules to regulate their collective choices. National governments have an inherent and (ideally) legitimate power to do this. By adopting laws and regulations applicable to the entire country's territory, a state's government has the power to perform the function of a "third party" that can guide the actions of actors, monitor their behavior and enforce solutions favorable to environmental sustainability (Mansbridge 2014). As most of the interactions between resource users and the other actors that affect ecosystems are complex and interconnected, and as environmental sustainability issues are complex in themselves, the state needs to intervene in governing the ecosystems to direct the behavior of the actors operating within its territory and to guide their choices towards sustainable development.

Apart from creating and maintaining legal frameworks and formal institutions that guide the behavior of local actors in managing common-pool resources, states are also key figures in solving global environmental issues. Within the structure of

global environmental governance, which consists of international non-governmental organizations (NGOs), such as Greenpeace or the World Wide Fund for Nature, transnational business corporations, such as Siemens or Johnson&Johnson, the supranational European Union and international organizations such as the United Nations or the World Trade Organization, states might seem invisible. However, it is ultimately up to states whether to create supra- and international organizations, whether to sign or not sign international agreements and whether to follow or not follow their guidance in domestic political decisions. Domestically, national governments can develop and uphold legal frameworks, gather and disseminate knowledge about environmental issues through, for example, introduction of mandatory ecology classes in schools; they can employ administrative measures, such as taxation, fines, and other policy instruments, as well as provide an arena to resolve environmental conflicts (Duit 2014, 2016; Duit, Feindt, and Meadowcroft 2016). Through these functions states can influence the behavior of corporations, NGOs, and local resource users operating on their territories. They can both facilitate the shift towards environmental sustainability and hamper it. States can also greatly facilitate or hamper non-state initiatives, such as sharing economy projects in local communities, the work of non-governmental organizations in advocating environmental interests, and the development of environmentally-friendly practices by businesses.

Another key function of states in achieving environmental sustainability is the provision of public services and welfare related to the environment to their citizens. As many of the ecosystem components have the characteristics of public goods (such as clean water or air), it is the state's task to ensure their redistribution among the citizens. Individual initiatives to install private water wells or air filters are unlikely to suffice in solving water quality or air quality problems on a large scale. At the same time, left to their own devices, private markets can lack incentives to engage in the provision of environmental public goods due to the high risk of externalities – situations in which individuals can enjoy the benefits of receiving a good (*e.g.*, a clean environment) without choosing to enjoy the benefits and pay for them (Fairbrother 2016a). By collecting taxes, governments can acquire the means necessary to provide environmental public goods and engage in the large-scale expensive implementation of projects with high externalities. While markets benefit from individual monetary exchanges and lose from externalities, governments, on the contrary, can benefit from them, as they can get the support of a larger proportion of the population to stay in power. This makes state governments more likely to engage in the provision of environmental public goods than the markets.

Thus, the state has the power to address the environmental problems that

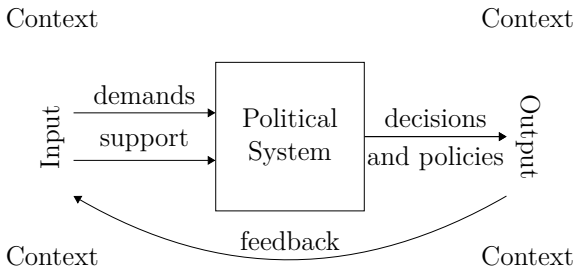

Figure 2: Political system by Easton (1953), amended

stem from both the common-good characteristics of the ecosystem components, by shaping the interaction of actors around common-pool resources and having the potential to resolve problems related to free-riding (Mansbridge 2014), and the public-good characteristics of the ecosystem components, by providing environmental public goods and supporting their redistribution (Duit, Feindt, and Meadowcroft 2016). At the same time, the state is a "significant node" in the network of international environmental governance (Eckersley 2005, 159), a key negotiating party, with the power to bring international decisions into action by ratifying international environmental treaties.

While the role of the state has been acknowledged in environmental politics research (Barry and Eckersley 2005a; Duit 2014; Eckersley 2004), we still know very little about what makes states take on environmental challenges and reach environmental goals. Therefore, the state remains a "black box" in environmental politics research. Unpacking this "black box" and looking into the functioning of the political systems of states, can help identify factors beneficial for pro-environmental decision-making and the setting and reaching of environmental goals.

In 1953, Easton suggested looking at the functioning of states through the lens of system analysis. Figure 2 depicts the original idea, with slight modifications. According to Easton's system-view of political life, political decisions depend on demands from the "organized effort" of society to address them in a top-down manner (Easton 1953) and the support of a political system that underpins the legitimacy of decision-making. For example, the demand for environmental protection can drive decision-making towards environmental sustainability, while support for the organization of the political system favors legitimacy of environmental laws and regulations created by government. Decisions translate into the outputs of the political system in the form of laws and regulations and have direct consequences for the society as they shape the behavior of citizens and organizations operating within the territory in which the state maintains legal jurisdiction.

To understand how different political systems respond to environmental chal-

lenges we need to study the institutions or "rules of the game" (North 1990, 3) that shape the functioning of the inputs and outputs of the political systems, *i.e.* guide the making of political decisions and their implementation. For the moment, we still lack empirical evidence as to which political institutions favor countries' environmental commitments and make countries reach favorable environmental outcomes, and still have much to learn about how a state should be governed in order to achieve environmental sustainability.

The view of the political system suggested by Easton (1953) is helpful to understand the formation of the political will or the functioning on the "input"-side of the political system. However, it does not seem to acknowledge the presence of the state apparatus in the production of public policy *outcomes* and therefore overlooks the importance of characteristics that shape the functioning of the "output"-side of the political system. In the next sections, I take Easton's view of political life as a point of departure, as it provides a useful framework for outlining previous research on the relationship between democracy and environmental outcomes. In the sections that follow, however, I also add an additional component to the drawing of the political system that is missing from Easton's model – the state apparatus and the institutions that guide its functioning.

3.3 Democracy and environmental sustainability

To advance our understanding of the governing rules and principles that facilitate countries' progress on the path towards sustainability, we, first of all, have to turn to institutions that are favorable for pro-environmental decision-making and shape the "input"-side of the political system (see Figures 2 and 3). One of the largest debates in this research domain concerns which type of political regime is beneficial for the environment: democracy or authoritarian rule.

Minimally defined, democracy or "the rule of the people" is a combination of institutions that secures free elections and representative government. According to Dahl (1989, 233), this set of institutions includes frequent free and fair elections to the government, universal suffrage, freedom for citizens to form and participate in political parties or civil society organizations, freedom of expression, particularly freedom to openly criticize officials and the government, availability of alternative sources of information not controlled by the government, freedom to run for public office, and a constitutional guarantee that government officials that execute control over decision- and policy-making are *elected*. Authoritarian rule, on the contrary, implies a form of government with power concentrated in the hands of a single leader or small elite. In an athoritarian system, responsibility to the people is not necessarily secured by a constitution. In this dissertation, I refer to different

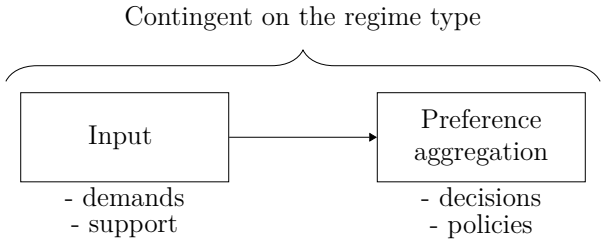

Figure 3: Political institutions that shape the input-side of the political system

regimes types as being both in a dichotomy and as the opposite ends of the same scale, with low levels of democracy referring to non-democratic (authoritarian) regimes.

Democratic or authoritarian governing principles ultimately determine the rules of preference aggregation within a polity[2] and for the large part shape how the rest of the decision-making procedures are designed. Naturally, within political regimes, there are many nuances in terms of decision-making processes. The structural organization of government, such as the number of veto points and players, determines the complexity of the decision-making process; the form of the relationship between the state and society defines the rules for interest group representation; while whether the form of government is presidential or parliamentary, and the extent of the representation of different interests in the parliament (*e.g.*, green parties), influences the balance of powers in decision-making. All of these factors affect decision-making in general and there is some existing research on how they play out for environmental decision-making in particular (Fredriksson and Wollscheid 2007; Jänicke 2005; Knill, Debus, and Heichel 2010; Muller-Rommel and Poguntke 2002; Neumayer 2003; Scruggs 2001; Siaroff 1999). In this dissertation, however, I do not go into the details of the decision-making process, but rather focus on regime type as a set of overarching principles guiding these processes. The next sections and Table 2 summarize the main arguments as to why democratic institutions can be both beneficial and detrimental for the environment.

[2] In democracies, the preferences of numerous interest groups are aggregated through the processes of representation. In authoritarian regimes, these are the preferences of a dictator and/or the narrow elite that are aggregated in decision-making. While the term "preference aggregation" is more common to describe decision-making in democracies, it is helpful to apply it to the authoritarian regimes when comparing decision-making in both regime types, to set a common baseline for the comparison.

3.3.1 Why democracy can be "good" for the environment

Democracy has been argued to favor environmental commitments in solving both global and local environmental problems, for a number of reasons.[3] First, democratic institutions provide the necessary means for increasing *public awareness about environmental issues*. Freedom of expression and freedom of the press allow media outlets to inform the population about environmental problems and expose environmental issues as political failures. Freedom of association provides opportunities for environmental interest groups to organize into non-governmental organizations and to inform the public through their educational campaigns. Environmentally aware people are more likely to make pro-environmental decisions in their daily lives and and to give their votes to parties that address environmental issues in their programs.

Democracies are more likely to have *environmental issues on their political agenda* than authoritarian regimes due to their openness to a variety of interests. Freedom of expression and association allows environmental interest groups to organize for protests against environmental degradation as well as to lobby for their interests politically. These activities facilitate the penetration of environmental issues into political programs and thus influence political decision-making. Freedom of party organization also allows environmental interest groups to form green political parties and to bring their interests into comprehensive policy programs. Democracies are also more cooperative in international environmental agreements and tend to comply with international environmental treaties, ratifying their prescriptions in domestic legislation (Bättig and Bernauer 2009; Neumayer 2002; Weiss and Jacobson 1999). The environmental preferences of the population aggregate through votes in free and fair elections and help parties and politicians with environmental issues covered in their programs get into the political arena.

The possibility of public deliberation on environmental problems allows pro-environmental arguments to come to the surface and to take into account citizens' preferences beyond elections (Baber and Bartlett 2005; Dryzek 2000; Smith 2003). Citizen and interest group engagement in discussion and argumentation provides constant feedback and allows for better integration of the societies' environmental views and values in the decision-making process. This makes deliberative democracy a good fit to face up to the complexity of environmental problems (Dryzek 1990).

Through free and fair elections, which are a necessary attribute of democracy, citizens can also hold politicians *accountable* for not delivering on their promises to

[3] For a comprehensive account of the main arguments on how democratic institutions can affect the environment, see, *e.g.*, Li and Reuveny (2006); Spilker (2013); Bernauer and Koubi (2009); Sjöstedt and Jagers (2014).

address environmental problems, and can give their votes to alternative candidates. Such accountability mechanisms increase the likelihood that rulers will be more responsive to the environmental concerns of the population (Sen 1999).

Democracies are also believed to *finance public policies more* than less free political systems as the size of the "winning coalition", whose preferences need to be addressed in policy-making, is larger (Bueno de Mesquita 2003). By aiming to please a large proportion of the electorate in order to win votes, democratic rulers are more likely to extend social welfare universally and deliver public goods, including environmental quality, among other benefits (McGuire 2010). It is simply more efficient for leaders in democracies to provide public goods and services rather than to engage in tit-for-tat exchanges and buy the support of the majority with private goods (Lake and Baum 2001). This mechanism is especially relevant for environmental problems of a local character.

3.3.2 Why democracy can be "bad" for the environment

Some characteristics of democratic institutions, however, are also believed to hamper the adoption of environmental policies. Despite the pluralistic nature of democracies, strong corporate interest groups can gain high influence over the political decision-making process. Politicians may become compelled to respond to the short-term interests of these groups, which can go against environmental protection concerns (Dryzek 1992), instead of the long-term preferences of the public, if any (*e.g.*, Bättig and Bernauer 2009). Liberal values cultivated in modern democracies can go against environmental values and aggregate through elections into government programs that oppose rather than favor environmental protection (Dobson 2000). Liberal democratic ideals might also limit support for government intervention in domestic affairs (Mathews 1995). However, in achieving sustainable natural resource use, (legitimate) state coercion is needed to enforce compliance in collective action (Mansbridge 2014).

Additionally, some characteristics of public policies related to environmental sustainability are not compatible with some of the features inherent to democratic institutions. A particular attribute of environmental sustainability as a public policy outcome is that actual benefits from policy actions taken towards environmental sustainability may become visible or measurable only years after these actions have taken place (see section 3.1.1). Therefore, addressing environmental sustainability involves one of the greatest political challenges: the need to make decisions today that are beneficial for people in the distant future and people who are not yet born. Commitment towards environmental sustainability thus requires decision-makers to have *long time horizons*.

Time horizons can be understood as a "distance into the future to which a

decision-maker looks when evaluating consequences of a proposed action" (Ebert and Piehl 1973, 35). If the time horizon of decision-makers is too short, they may undervalue returns from the project. The optimum decision requires that the time horizon of decision-makers is suited to the time characteristics of the factors in the decision. In politics, time horizons influence the behavior and choices of political leaders and determine whether planning is made for the long or short term. Short-sighted decision-makers tend to prioritize policies that ensure quick delivery of results, while rulers with long-term thinking are more likely to finance policies that produce visible results after a longer time lag. As ecosystems are slow-responding to human action, the problematique of time horizons is one of the biggest challenges for democracies. An optimal case requires time horizons long enough to match the slow response of environmental outcomes to policy change. However, due to constant political challenges arising from electoral cycles, political leaders in democracies are likely to be short-sighted, which can prevent them from allocating budget resources to the implementation of such long-term policy projects as environmental protection (Congleton 1992). In addition, capitalist markets that tend to discount the future and liberal democratic values mutually reinforce short time horizons.

As many environmental outcomes, such as relative decrease in emissions or protection of a distant forest, *might not be directly visible* after policy interventions, it can be difficult for people to hold governments accountable for the lack of pro-environmental decision-making or effective implementation. Besides, many environmental outcomes also depend on causes exogenous to government control, such as forest fires that affect the condition of forests, biodiversity, and air quality, or oil spills that affect the health of marine ecosystems. Such environmental complexity makes it difficult to isolate the effect of government action on the actual outcome, even if the outcome is observable, by concealing government efforts in delivering the goods (Harding and Stasavage 2013; Mani and Mukand 2007). It makes it difficult for the public to judge government efforts in environmental protection as such judgements are based only on their experiences. In democracies, low visibility of environmental outcomes negatively affects public demand for government action, and without such demand, even a responsive government will have few incentives to address environmental issues. Low visibility and the long-term response of the environment to policy actions provides constant incentive for democratic rulers to focus on other public policies that yield short-term results, rather than to focus on such long-term commitments as pro-environmental policies, simply to make it easier for the public to evaluate government actions.

Empirical evidence for the democracy-environment link is ambiguous. Some studies find a positive relationship between the two, others – no association at

Table 2: Democracy and the environment, some of the main mechanisms summarized

Mechanisms of positive influence	Mechanisms of negative influence
• Likely provision of public goods (incl. environmental public goods) to win support of broad masses • Accountability through elections for pro-environmental interests • Freedom of media can raise public awareness about environmental issues • Openness to a variety of interests, including environmental interests	• Openness to a variety of interests, including businesses • Short time horizons promoted by electoral cycles

all, while a few even report a negative effect of democracy on the environment (Barrett and Graddy 2000; Bättig and Bernauer 2009; Bernauer and Koubi 2009; Fredriksson and Wollscheid 2007; Gleditsch and Sverdrup 2003; Li and Reuveny 2006; Midlarsky 1998; Neumayer 2002; Sjöstedt and Jagers 2014; Spilker 2013). Moreover, the reported effects differ between the different outcomes and sample sizes used in the analyses. The important limitation of the majority of empirical studies examining the effect of democracy on environmental outcomes, however, is that they fail to account for the effect of institutions that shape implementation of environmental policies, leaving a lot of variation in the performance of democracies unmodelled. While we can expect that there is an effect of democracy on environmental decision-making, the fact of decisions for environmental sustainability does not automatically guarantee that these decisions will be implemented. The decision to protect the environment and the actual observable outcome are separated by the chain of implementation processes, and the success of environmental policies also depends on the ability of the state to implement the official goals (Skocpol 1985). The quality of the public administration that implements the decisions, and of the institutions that shape the implementation processes to a large extent determine whether the state is able to introduce and apply the appropriate policy instruments, as well as to ensure monitoring and enforcement (Howlett, Ramesh, and Perl 2009). Such a well-functioning apparatus, however, is not necessarily an attribute of democratic systems. As Huntington (1991, 9–10) notes:

> Governments produced by elections may be: inefficient, corrupt, short-sighted, irresponsible, dominated by special interests, and incapable of adopting policies demanded by the public good. These make such governments undesirable but they do not make them undemocratic. (...) [Therefore,] democracy [should be] clearly distinguished from other characteristics of political systems.

3.4 Quality of government and environmental sustainability

Reaching observable and tangible results in environmental sustainability requires not only the adoption of environmental policies, but also their sound implementation. Therefore, apart from the rules and principles that shape pro-environmental decision-making, it is crucial to understand the institutions that favor the implementation of these political decisions and the actual delivery of environmental outcomes (see Figure 4). The ability of governments to implement official goals and deliver public goods and services (including a healthy environment), has been broadly defined as "state capacity" (Skocpol 1985, 9). While the term "capacity" is comprehensive and useful for a general discussion regarding state capabilities, it is quite problematic for building a theoretical framework for further quantitative analysis. "Capacity" is a broad multi-dimensional concept and it is more useful as an umbrella term for a number of factors rather than as a factor in itself.

The factors under the "capacity" umbrella can differ depending on "the official goals" that a government sets out to reach. The means of implementation can vary between different goals as certain conditions/institutions might be necessary for achieving some goals but not necessary for achieving others. For reaching some official goals, some argue, certain forms of corruption can be functional. In low state capacity settings, when public officials lack adequate official salaries, bribery can incentivize officials to actually provide certain services because they get income from service recipients. Similarly, ethnic favoritism or clientelism can favor the delivery of targeted or means-tested goods (Huntington 1968; Walton 2013; Zarazaga 2014). However, in the provision of environmental public goods or implementation of other programmes that require long-term implementation, there are few reasons to believe that any such form of corruption can be beneficial. For example, while a corrupt clientelistic state can have the capacity to deliver distributive goods, such as water pipes or boreholes, to the target population, this "short-term capacity" would not be enough to guarantee the maintenance of these water pipes and boreholes or for ensuring that the quality of water is high enough to be safe to drink. In this section, I attempt to summarize the conditions that are particularly conducive to the implementation of environmental sustainability programs and in this way conceptualize the "capacity" of the state required to reach environmental goals.

Capacity to implement long-term projects with universal coverage, such as environmental sustainability, depends on institutions that can ensure continuous, uninterrupted implementation of environmental policies over a long period of time, and also shape the incentives of civil servants and decision-makers towards long-term

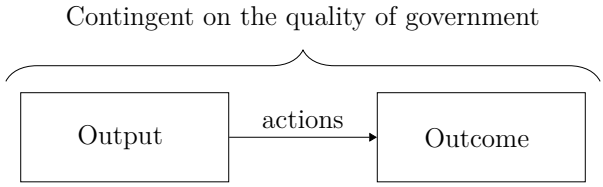

Figure 4: Political institutions that shape the output-side of the political system

projects. These institutions pertain to rules favorable for the effective performance of public administration, which designs and implements policies, the rule of law to secure implementation of long-sighted environmental laws against short-term interests, and the absence of corruption, in both grand and petty forms, as corruption is both an effect and a cause of short-sightedness (Charron and Lapuente 2010, 2011; Rothstein, Samanni, and Teorell 2012). Following the tradition set by Rothstein (2011), I refer to this combination of factors as "quality of government"(QoG), which is broadly connected to state capacity; however, it not only accounts for whether the state can reach its goals but also *"how"* it reaches them (Hanson and Sigman 2013; Rothstein 1998).

3.4.1 Bureaucratic capacity and environmental sustainability

Any public policy benefits from a public administration capable of implementing the set tasks. However, a well-functioning civil service is not a necessary condition for reaching some types of policy goals. For example, provision of highly visible, targeted and means-tested goods and services, such as selective building of road infrastructure, parks, medical or education facilities, might not necessarily require a strong public administration. Rulers can deliver the goods relatively quickly through clientelistic and vote-buying strategies, using the contracting or targeting efforts of politicized agencies. Policies aimed at achieving environmental sustainability, however, have low visibility, require long-term commitments, and inherently target the broad, public masses. Carrying out such public policy programs inevitably relies on a strong public administration, capable of undertaking complex tasks and committing to long-term implementation.

The strength and capabilities of a public administration, it is argued, depend on formal and informal rules that shape the selection and motivation of civil servants (*e.g.*, Dahlström and Holmgren 2017; Evans and Rauch 1999; Miller 2000; Weber 1978). These rules are related to the employment of civil servants, their protection from political influence, the guarantee of fair salaries, and the predictability of their careers. The "ideal" Weberian model of a capable bureaucracy prescribes

meritocratic recruitment, autonomy of the public administration from politics, and a predictable career ladder, which provides long-term rewards for civil servants, including long-term salaries (Weber 1978). These conditions are beneficial for the implementation of environmental policies in a number of ways.

Meritocratic recruitment, through formal examination or selection by education, increases the likelihood that the chosen employees will be competent in their duties (Dahlström and Holmgren 2017). As many environmental issues are interconnected, environmental sustainability projects require high competence of civil servants and awareness of the breadth of environmental problems. The issue requires *well-developed and thought-through action plans* that aim at long-term maintenance and bring long-term results. Incompetent agency heads, who often end up in top positions due to connections with political leaders, might be incapable of developing such long-term programs, which are able to account for the breadth of the issue. On the contrary, competent professionals, using their knowledge and experience, are more likely to develop effective action plans that match the complexity of environmental issues.

Level of expertise also affects the *day-to-day performance of the public administration*. Higher competence increases the chances that a public official has the knowledge required for the job and/or decreases the time needed for learning the necessary skills. Incompetence also decreases the incentives of civil servants to comply with policy goals, as they recognize that their ability to implement these policies is limited (Huber and McCarty 2004).

Meritocratic recruitment additionally helps generate *esprit de corps* (from French: "group spirit"), as individuals will get the impression of shared knowledge and abilities with their colleagues. This helps civil servants develop similar goals, which in turn favors *coherence within public administration structures* (Evans and Rauch 1999). Meritocratically employed civil servants, whose job depends not on political leaders but rather on their own job performance, are also more likely to develop *incentives towards professional goals* rather than opportunistic behavior. This, overall, stimulates effectiveness in implementation of public policies, including environmental policies (Dahlström and Holmgren 2017, 15; Ujhelyi 2014).

In contrast to employment by merit, political appointments to positions within the public administration are argued to destabilize it and undermine the performance of civil servants. Political appointments often result in a high turnover of agency heads, creating "leadership vacuums", and thereby obscuring agency goals (Lewis 2007). This leads both to incoherence within the implementation bodies as well as the inability of civil servants to actually commit to implementation under the unstable leadership (Cornell 2014). Incoherence and inability to commit are

detrimental to such long-term and complex projects as environmental sustainability programs.

A predictable career ladder and material incentives create motivation for civil servants to stay within the government and thus increase competence over time. Attractive employment conditions also decrease staff turnover and prevent the loss of *institutional memory*; they lengthen the time horizons of civil servants and reduce their incentives to engage in corrupt practices for personal short-term gain (Cornell 2014; Evans and Rauch 1999). The competence and reliability of civil servants contribute to building high bureaucratic capacity, which increases the likelihood that the state will be able to implement policies (Dahlström, Lindvall, and Rothstein 2013). High turnover and loss of institutional memory are detrimental to the implementation of such long-term projects as environmental policies, as they might disrupt the implementation of initiatives before any results are reached.

3.4.2 Rule of law, corruption and environmental sustainability

The rule of law is another aspect of governmental quality crucial for the committed implementation of such long-term projects as environmental sustainability policies, which have diffused benefits and often intangible results. The concept of rule of law is highly debated in the literature, yet most of the definitions build upon two basic premises: "that people should obey the law and be ruled by it" as well as "the government shall be ruled by the law and subject to it" (Møller and Skaaning 2012; Raz 1979, 212). While the first building block refers to the obedience to the law by the general public, the second dimension implies "equality under the law before the courts" (Skaaning 2010). In other words, rule of law implies that "the rules are binding even on the most powerful political actor, the state itself" (Fukuyama 2014b, 1327). Compliance with the laws by the general public and private actors is necessary for achieving the environmental goals set by governments. At the same time, governments' obedience to the law and equality of all actors under the law before the courts secures commitments to policy objectives (Fukuyama 2014b; Møller and Skaaning 2012; Raz 1979; Skaaning 2010). For rulers, there is often an incentive to divert budget resources from long-term policy programs to policies that bring immediate outcomes and that build legitimacy in the short term. If the rule of law is sufficiently weak, this incentive is easier to put into action. The degree of the rule of law also influences the capacity of the state to enforce laws, which is crucial to (quasi-) voluntary compliance and the cooperation of actors in collective action dilemmas over natural resource protection.

Under weak rule of law, it is also easier for public officials to misuse their office for private gain and engage in corruption, which is detrimental to long-term environmental policy goals for a number of reasons. First, corruption *decreases states'*

Table 3: QoG and the environment, some of the main mechanisms summarized

	Component	Mechanisms	
QoG	Corruption	• Disrupts coercive capacity • Disrupts extractive capacity • Hampers voluntary compliance • Makes it easier for special interests to gain political influence • Indirect impact through economic growth	• Knowledge that policies are likely to be implemented can affect citizens' demand for policies • Knowledge that policies are likely to be implemented affects incentives of politicians to adopt policies • Lengthens time horizons of politicians (*e.g.,* through checks and balances) and thus can compensate for invisibility of environmental problems • Lengthens time horizons of citizens (also, often through providing economic security) and thus can compensate for invisibility of environmental problems
	Bureaucratic quality	• Impacts quality of policies - better action plans • Lengthens institutional memory • Implies coherence within bureaucracy • Better day-to-day performance of bureaucrats	
	Rule of law	• Contributes to the strength of environmental laws • Can reduce influence of special interests over politics • Increases compliance with laws	

coercive power. If public administration is corrupt then regulations are rarely followed and ultimately environmental laws do not get implemented (Damania, Fredriksson, and List 2003; López and Mitra 2000). There are few incentives for emitters, illegal loggers or poachers to comply with regulations if they can offer a bribe to government officials and pay their way out of the prescribed codes of behaviour instead (Desai 1998; O'Connor 1994). From their side, orrupt inspectors may take bribes and, for example, underreport emissions, allow illegal logging, overfishing and poaching instead of punishing the wrongdoers with fines and enforcing compliance with the standards (Damania 2002; Robbins 2000; Sundström 2015).

Second, corruption *hampers voluntary compliance* by decreasing trust in the government and fellow citizens (Delhey and Newton 2005; Dinesen 2013; Richey 2010; Rothstein 2009; Rothstein and Stolle 2008). Lack of trust in government diminishes public support for government interventions, including support for various policy instruments needed to launch implementation of policies and secure compliance (Fairbrother 2016b, 2017; Harring and Rönnerstrand 2016). Not being

able to trust that the government can successfully enforce laws, actors have few incentives to comply with them voluntarily. At the same time, lack of trust that others follow the regulations decreases actors' incentives to obey.

Third, corruption, by decreasing trust in governments and general trust, also affects people's support for and proneness to pay the taxes that could potentially contribute to the environmental budget (*e.g.*, Fairbrother 2016b, Fairbrother (2017); Hammar and Jagers 2006; Harring 2013; Harring and Jagers 2013). If citizens do not trust that the government can spend their tax contributions wisely there are few incentives for them to contribute. At the same time, if citizens believe that their fellow citizens do not pay taxes, there will also be few incentives for them to pay (Hammar, Jagers, and Nordblom 2009). Additionally, in a corrupt polity, public revenues can be diverted from their target purpose and enrich government officials instead. In such a manner, corruption also diminishes the *extractive capacity* of the state.

Fourth, in a corrupt system, it is easier for *special interests to gain political influence*. The business interests of polluting industries often contradict environmental sustainability goals. A corrupt system provides an opportunity for businesses to bribe policy-makers and push their interests through to decision-making (Wilson and Damania 2005). If judges are not independent and are subject to political influence or can be bribed, it is easier for such powerful interest groups to impose their preferences on judges and override environmental laws.

Fifth, corruption can affect environmental sustainability *indirectly*, through its negative impact on economic growth (Mauro 1995). Studies expect that corruption can decrease pollution at lower levels of economic development by obstructing the growth of industries, as well as increase pressure on the environment in high-income countries by preventing investment in green technologies (Cole 2007; Welsch 2004). Corruption also interferes in the hiring process of government officials and thus affects competence levels and the level of commitment to policy objectives, leading to inadequate inspections and poor enforcement (Ringquist 1993a), while corrupt civil servants simply have fewer incentives to implement policies (Huber and McCarty 2004).

All three aspects of governmental quality relevant to the environmental commitments of countries – strength of the public administration, rule of law, and corruption – interact, affecting one another in multiple ways. Rule of law is intimately connected with corruption, as discussed earlier in this section. Meritocratic employment in public administration has been said to reduce corruption while political appointments have been argued to provoke it (Dahlström and Holmgren 2017). At the same time, stronger rule of law can enforce meritocratic employment rules, while weak rule of law intensifies political influence over public admin-

istration. Taken together, these factors can give a comprehensive idea of whether policies are likely to get implemented in countries or not. Collectively, the impression of a well-functioning state can also affect a ruler's incentives for policy commitments as well as the demand for environmental protection from the citizens. Confidence that the state is able to commit to long-term projects, not steal the resources collected by taxes, combined with the economic security that usually comes with higher governmental quality, can positively affect citizens' demands for environmental protection (see Table 3). Therefore, by securing implementation and facilitating the development of citizens' demands for environmental action, quality of government can to some extent compensate for the obstacles to pro-environmental decision-making created by the low visibility of environmental problems.

Empirical large-N studies investigating the relationship between the quality of government (or its different aspects) and the environment are limited to the studies investigating the relationship between corruption and environmental outcomes. The studies uniformly find a negative effect of corruption on different environmental outcomes, implying that higher corruption has a detrimental effect on environmental quality (see *e.g.*, Cole 2007; Pellegrini and Gerlagh 2006; Welsch 2004).

3.5 Hypothesizing the interaction between democracy and quality of government

> "While a virtual industry has sprung up in the past generation analyzing the correlates of democracy with just about everything, one of the most understudied and undertheorized relationships is that between democracy and the state" (Fukuyama 2014b, 1326)

In order to reach environmental sustainability targets, states need to both adopt environmental policies and secure their implementation. Therefore, to understand political system characteristics favorable for reaching environmental goals, we need to consider the institutions that shape both of these processes (Figure 5).

As previous chapters suggest, the adoption and implementation of policies are shaped by distinct sets of political institutions. Institutions that shape political decision-making and preference aggregation guide the functioning of the input-side of the political system and pertain to the regime type, *i.e.* the democratic or authoritarian "rules of the game". The degree to which the "rules of the game" are democratic determines the extent to which the elections are free and fair, representation is wide, expression is free, alternative sources of information are available, and the freedom of association in political parties and civil societies organizations is developed (Dahl 1989). These rules relate to access to political power and have

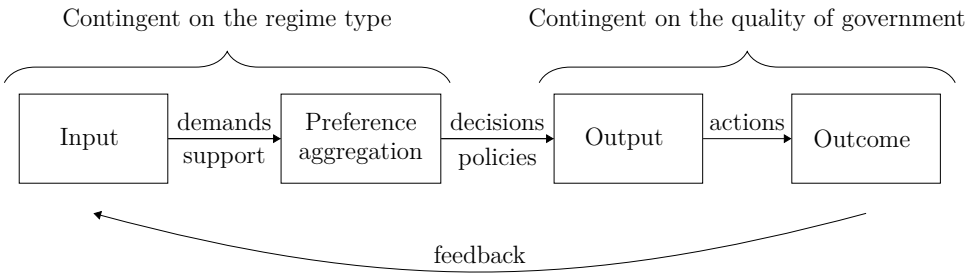

Figure 5: Political institutions that shape the input and output of the political system

little to do with the actual exercise of power, which is connected to the implementation of policies and actual delivery of public policy outcomes (Rothstein 2011; Rothstein and Teorell 2008). Institutions that shape the implementation of political decisions instead guide the functioning of the output-side of the political system and pertain to the quality of government, which encompasses, broadly, the absence of corruption, the rule of law and the administrative capacity of the state.

Thus, democratic institutions, that shape the functioning of the input-side of the political system, and governmental quality, that shapes the functioning of the output-side of the political system, interact in the production of outcomes (Fukuyama 2014b). There are reasons to expect that quality of government shapes how democratic regimes perform (Fukuyama 2014a). It is also plausible that governmental quality plays out differently for policy outcomes within different regime types.

One of the most explicit connections between the two sets of political institutions is the link between democracy and administrative apparatus. Democracy and public administration are connected through the channels of politicians' accountability to the electorate: to get re-elected, democratic leaders need to deliver on their promises. To deliver, they need a well-functioning public administration ready to serve their interests (Behn 1998). For this reason, recruitment to public agencies is often politicized. Political appointments to the public administration and the capacity of public administration to perform the assigned tasks, however, do not necessarily go hand in hand. Although some argue that political appointments enhance accountability (Peters and Pierre 2004), recent studies show, in contrast, that it undermines the performance of the state apparatus (Dahlström and Holmgren 2017). Political appointments may disrupt accountability channels, as political appointees have stronger incentives to misreport policy performance data crucial for the public to evaluate government performance than meritocrati-

cally employed civil servants (Boräng et al. 2018). Additionally, stronger political control of public administrations seems to correlate with high corruption, clientelism, and poor provision of public goods (Bersch, Praça, and Taylor 2017; Cornell and Grimes 2015; Dahlström, Lapuente, and Teorell 2012; Geddes 1994; Keefer 2007; Nistotskaya and Cingolani 2016; Shefter 1994; Stokes 2013).

In a politicized public administration within a democracy, the careers of administrative personnel highly depend on which party wins the election. Job insecurity increases motivation for civil servants to maximize private benefits while in office and engage in corrupt practices if the opportunity appears. Insecurity also incentivizes short time horizons. This in its turn, paradoxically, reduces the ability of politicians to influence the actions of civil servants and therefore can diminish the ability of politicians to achieve policy goals (Huber and McCarty 2004).

By contrast, if meritocratic recruitment is the norm, few civil servants will lose their jobs after new elections. This makes it more likely that they will develop longer time horizons in their commitment to public policy implementation. Meritocratic rules of employment constrain politicians in democracies from pursuing targeted policies, as they become unable to influence the administrative agenda in the state apparatus. Thus meritocratic public administrations, to a certain degree, "tie the hands" of incumbents and create a limit to the actions of democratic rulers (Cornell 2014). Without such constraint, politicians can have strong motivation and opportunity to focus on the provision of targeted goods to benefit a few citizens rather than public goods that benefit the majority (Keefer and Vlaicu 2008). In this regard, although politicization of public office is a common practice in many established democracies, a higher degree of politicization is associated with lower administrative capacity and is likely to diminish the benefits that democratic institutions might bring to the citizens.

Separation of careers additionally creates a system of checks and balances through which civil servants can exert oversight on politicians and "counterbalance" their incentives for a short-sighted behavior. This stimulates long time horizons within the political system and makes it more conducive to such long-term commitments as environmental sustainability.

Another mechanism through which public administration impacts the functioning of democratic regimes is by affecting the quality of adopted policies. Civil servants do not only carry out laws decided upon by politicians; agency leaders are also responsible for designing step-by-step action plans for policy implementation. Low administrative competence negatively influences the quality of these action plans, even if the overarching law decided upon in the parliament is promising. The level of competence in the public administration can therefore determine whether public policies succeed or fail (Gormley and Balla 2013).

Administrative or bureaucratic capacity also affects *political decisions* on the allocation of resources for the implementation of welfare programs. There are few incentives for politicians to spend money on projects that require high bureaucratic capacity if they are aware that public administration is corrupt or incompetent (Dahlström, Lindvall, and Rothstein 2013). Due to their complexity, policies directed towards environmental sustainability require the high discretion of the public administration, and in countries with low bureaucratic capacity politicians are unlikely to allocate funding for such complex long-term projects if they know that the public administration is incapable of formulating effective action plans or rigorously enforcing them. It is more attractive for politicians to direct resources away from long-term environmental projects to similar short-term policies that bring more visible results. Some examples of such short-term policies are building parks instead of reforesting a country's national forest reserves or building water pipes to broaden access to drinking water instead of cleaning water sources.

The quality of public administration is, however, only a part of the story. Corruption and weak rule of law can also intervene in how democratic institutions work for environmental sustainability. Corruption provides unique opportunities for the personal enrichment of civil servants and politicians. It can disrupt the benefits that democratic institutions can bring to citizens through undermining the coercive capacity of the state, disincentivizing compliance and greasing the wheels for the penetration of special interests into politics, as described in the previous section.

With corrupt "rules of the game" politicians are more likely to steal resources from public policy budgets. This problem is especially acute with public policies that require long-term implementation and bring results with low visibility, such as environmental sustainability programs. The slow response of the environment to human action (see Section 3.1.1) obstructs monitoring of government actions aimed at implementation of environmental sustainability programs, making misappropriation of public funds less visible in this domain. Low awareness about environmental problems and their generally diluted sources can further obstruct the channels of democratic accountability, as citizens might not be aware of how to judge government actions. If people do not know which governmental actions are beneficial for the environment, their judgment can rely on incorrect signals and lead to satisfaction with insubstantial outcomes. This also makes it easier for politicians to deviate from environmental commitments. The challenges created by the slow response of the environment to policy interventions, their low visibility and also diluted responsibility are therefore especially critical in democracies with low quality of government.

Weak rule of law lays the ground for corrupt behavior and embezzlement, which

divert resources away from environmental sustainability goals. A corrupt judicial system can also be a threat to implementation of such long-term projects as environmental sustainability. Interest groups with influence over politics and greater financial resources, which are often not environmental interests, may be able to "buy" victory in controversial cases regarding environmental sustainability.

This detrimental effect of low governmental quality on environmental sustainability outcomes, I expect, can be especially strong in democracies compared to authoritarian regimes, while high quality of government can be especially beneficial for environmental sustainability in democracies. The literature argues that democratic institutions are beneficial for environmental sustainability due to pluralism, freedom of information and openness to "green" interests. High governmental quality allows democracies to commit to these "green" agendas by facilitating long-term implementation.

Even in democracies, where environmental concerns have the opportunity to enter decision-making and environmental movements can make their voices heard, governments are more likely to have better policies and deliver the results under the condition of high governmental quality. High quality of government facilitates longer time horizons of the regime, opens doors to knowledgeable public officials that have expertise more appropriate to the context of environmental issues than politically appointed employees could have, and creates positive reinforcement for policy-making through a positive anticipatory effect.

The literature argues that democratic institutions can be detrimental for environmental sustainability due to the openness of democratic regimes to interests that go against environmental protection and due to short time horizons defined by the span of the electoral cycle. Weak rule of law, incompetent and unstable bureaucracy, as well as corruption stimulate democracy's negative impact on environmental sustainability. Low quality of government triggers incentives for the short-sighted behavior that electoral cycles already provoke and the democratic rules of the game become more about vote-buying and satisfying the interests of the influential few rather than the majority.

By contrast, stable bureaucracy, strong rule of law and absence of corruption help harness the positive effects that democratic institutions have on environmental sustainability, including broader representation, freedom of information, broader redistribution, and provision of public goods to broader masses. Strong bureaucracy and rule of law tie politicians' hands in following up on their incentives to satisfy their short-term interests.

In authoritarian regimes, where policy-making solely depends on the will of the ruler, quality of government does not have the same strong moderating effect as in democracies, which can prevent the short-sighted opportunistic behavior of those

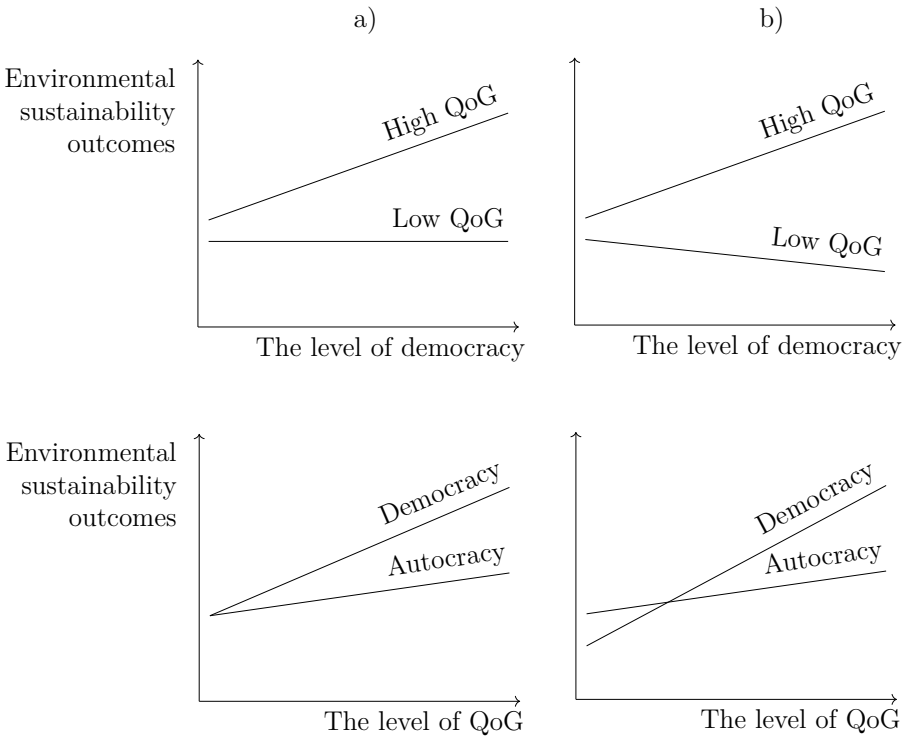

Figure 6: Two alternative patterns of the relationship between democracy and QoG in their effect on environmental sustainability

in power. Instead, its main effect is on the implementation of policies and the capacity of the regime to fulfil official tasks. Bureaucratic capacity also weighs on autocrats' decisions to commit or not to commit to complex long-term tasks, as it gives autocrats an indication as to whether the public administration is capable of implementing them or not.

If both the input- and output-sides of a political system are shaped by political institutions favorable to environmental sustainability, then the political system is more likely to reach environmental sustainability targets than if only one of the sides of the political system is functioning under favorable political institutions. The effects of democracy and the components of quality of government can be seen as complementary to each other in the production of environmental sustainability outcomes. While democracy is conducive to the provision of public goods (*e.g.*, Bueno de Mesquita 2003; Lake and Baum 2001), successful delivery of such goods is unlikely if the capacity to implement public policies is low. By contrast, when quality of government is high, the positive effect of democracy on the uni-

versal provision of public goods intensifies, as the government is actually capable of delivering the goods (Hanson 2015). The same money spent on the provision of public goods and services in countries with high and low quality of government, produces more public goods delivery in high-capacity states, due to more effective implementation (Knutsen 2013, 3).

We can therefore expect that democracies with high governmental quality have better environmental performance than democracies with low quality of government. While this expectation is rather straightforward,[4] it is less intuitive as to how democracies with low and high quality of government stand against authoritarian regimes with different levels of governmental quality in securing environmental sustainability.

In authoritarian regimes with low quality of government, where the capacity to implement policies is low, dictators are more likely to engage in predatory behavior or focus more on their political survival without committing to long-term programs of universal welfare provision (Acemoglu and Robinson 2006; Bueno de Mesquita 2003; Robinson 1998). High state capacity, Knutsen (2013) hypothesizes, however, can compensate for the lack of democracy and provide dictators with the tools to deliver public goods. In contrast to democracies with low governmental quality, which are incapable of public goods provision, some dictators in high quality of government contexts are still able to provide universal social welfare. We can therefore expect that authoritarian regimes with high governmental quality can, on average, outperform democracies with low quality of government (Figure 6).[5]

It is, however, an open question as to whether democracies with low quality of government outperform authoritarian states with low quality of government. Figure 6 illustrates two alternative patterns. Panel *a)* on Figure 6 depicts a pattern, in which the performance of democracies with low quality of government is no different from that of authoritarian regimes with low quality of government. Knutsen (2013) argues that "more democracy" can compensate for the lack of state capacity in reaching short-term goals visible to the electorate, such as economic growth. This implies that democracies tend to better deliver short-term visible outcomes than non-democratic regimes, even if their state capacity is low. It is, however, unlikely, that more democracy can commit to long-term environmental sustainability projects in low quality of government settings. Therefore, in the provision of environmental outcomes, the differences between democracies with low quality of government and authoritarian regimes with low quality of government might not be substantial.

[4] Despite being straightforward, these conditional effects have not been tested in previous research.

[5] Lack of observations on authoritarian states with high quality of government makes it problematic to put this expectation to an empirical test

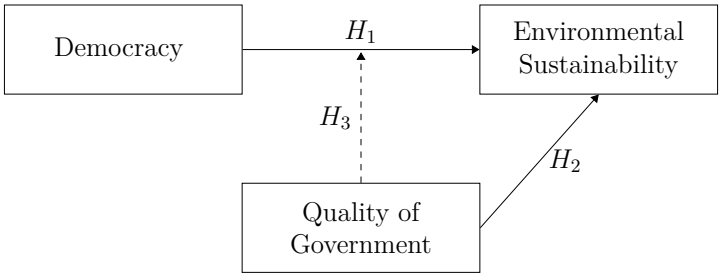

Figure 7: The relationship between democracy, quality of government and environmetnal sustainability

Panel *b)* on Figure 6 presents a pattern, in which democratic regimes with low QoG perform worse than authoritarian regimes with low QoG in securing environmental sustainability outcomes. This pattern can appear if low governmental quality is more detrimental for environmental sustainability outcomes in democracies than in authoritarian regimes. One of the mechanisms behind this relationship may be that poor governmental quality can create strong incentives for democratic rulers to steal resources or spend the resources on short-term projects, targeting specific groups of the electorate through clientelistic exchanges, rather than securing universal delivery of public goods and services (Hanson 2015; Knutsen 2013). In low quality of government settings, environmental (long-term) commitments are for this reason highly unlikely. At the same time, some authoritarian regimes with low governmental quality, if they are stable, can still (hypothetically) secure the provision of environmental public goods and services if the results are more or less visible to the ruler's main support group.

To sum up, the majority of previous studies have focused on testing the following two hypotheses:

H_1 More democracy is associated with better environmental sustainability outcomes

H_2 Higher quality of government is associated with better environmental sustainability outcomes

This dissertation moves the previous efforts forward by claiming that the two effects cannot be considered separately when investigating political determinants of public policy outcomes. Both democracy and quality of government are two indispensable parts of the political system and affect (moderate) each other's impact on public policy outcomes. In this dissertation, I suggest that they should rather

be considered in interaction (Figure 7)[6] and suggest the following hypothesis:

H_3 The effect of democracy on environmental sustainability outcomes is conditioned by the quality of government.

Another plausible hypothesis is that the effect of quality of government on environmental sustainability outcomes is dependent on the levels of democracy (see lower panel of Figure 6), which could be depicted by an arrow from the "Democracy" box to the arrow connecting the "Quality of Government" and "Environmental Sustainability" boxes on Figure 7. While in some parts of the empirical analysis I test this hypothesis alongside H_3 to investigate nuances of the interaction effect, investigation of the moderating effect of democracy is not the main focus of this dissertation. Instead, the moderating effect of the quality of government is. Also, I do not hypothesize how *different combinations* of political institutions relate to environmental sustainability, as it is uncertain if we can generalize the hypothesized relationship patterns across different environmental sustainability outcomes. Instead, I leave the patterns of the interaction to reveal themselves during the empirical analysis, and instead present, in Figure 6, different expectations regarding the interdependent effects of democracy and quality of government on environmental sustainability outcomes.

[6] There is a vast literature arguing that democracy and quality of government are also related and can affect one another. Some claim that democratic institutions eventually bring state capacity (*e.g.*, Montinola and Jackman 2002; Shefter 1994), others that it is state capacity that helps democratic institutions to develop (D'Arcy and Nistotskaya 2017; Fortin 2012; Linz and Stepan 1996; Møller and Skaaning 2011). In this dissertation, I do not delve into this debate and do not model mediation, as the causality between the two is not firmly established. Instead, while acknowledging that these two sets of institutions affect one another, I model their interaction, emphasizing that they are still distinct sets of political system characteristics.

4
Research design

The dissertation consists of five articles, each testing the hypotheses of the study on different Sustainable Development Goals (SDGs) (United Nations 2015) related to environmental sustainability.

Article 1, The Limits of Democracy in Tackling Climate Change, is solo-authored and published in *Environmental Politics* (2018). The article investigates the role of democracy and corruption in driving the levels of CO_2 emissions that contribute to climate change. Countries' efforts to reduce CO_2 emissions are a part of strategies to mitigate climate change, which is Sustainable Development Goal #13.

Article 2, Do Political Institutions Moderate GDP-CO_2 relationship?, is co-authored with Ole Martin Lægreid and published in *Ecological Economics* (2018). The article delves into the results of article 1 in greater detail and tests if the political institutions that have been found to matter in predicting CO_2 emissions also moderate the relationship between the level of economic development, operationalized with gross domestic product (GDP) per capita, and CO_2 emissions. Separating economic growth from the increase in CO_2 emissions is an essential step towards climate change mitigation. Our moderation analysis helps determine if rich well-governed countries (democracies with low corruption) have indeed managed to decouple increases in their GDP per capita from CO_2 emissions, as theories suggest. While article 1 investigates the direct effect of political institutions on CO_2 emissions, article 2 investigates their indirect effect that goes through economic development.

Article 3, "Gimme Shelter": the Role of Democracy and Institutional Quality in Disaster Preparedness, is co-authored with Tove Ahlbom Persson and published in *Political Research Quarterly* (2018). The article looks at whether democracy and quality of government can predict how countries prepare for natural disasters. Preparation for natural disasters is a part of a country's strategy to adapt to climate change, which also falls under SDG #13.

Article 4, In Light of Democracy and Corruption: Institutional Determinants of Electricity Provision, is co-authored with Frida Boräng and Sverker Jagers and is *QoG Working paper 2016:14*. The article engages in the academic debate on the role of democratic institutions in determining the extent of electrification and revisits the renowned findings by Min (2015) that longer

democratic experience is associated with higher electrification rates. The article replicates Min's empirical tests and investigates whether corruption in public administration disrupts the positive effect of democracy on electricity provision, as revealed by Min (2015). Access to reliable energy helps reduce the use of firewood and coal, as well as deforestation and the land degradation connected to it. It is listed among the tasks within SDG #7.

Article 5, Fresh Pipes with Dirty Water: How Quality of Government Shapes the Provision of Public Goods in Democracies, is co-authored with Ketevan Bolkvadze and is under "Revise and Resubmit" in the *European Journal of Political Research*.The article examines how democracy and quality of government contribute to the provision of clean water and delves into the mechanisms behind their interdependent relationship by investigating a typical case of democracy with low governmental quality. Access to clean water is one of the targets in SDG #6. Table 4 summarizes the articles and the main findings.

Table 4: Summary of the articles included in the dissertation

Article number	Title of the article	Environmental sustainability problem	Dependent variable	Independent variables in interaction	Main Findings
Article 1	The Limits of Democracy in Tackling Climate Change	Contribution to climate change SDG #13	CO_2 emissions per capita	Democracy, corruption	• Democracy is associated with lower CO_2 emissions only when countries have fairly low levels of corruption. • When corruption is high, democracies perform no better than authoritarian regimes.
Article 2	Do Political Institutions Moderate GDP-CO_2 Relationship?	Contribution to climate change SDG #13	CO_2 emissions per capita	Democracy, corruption	• Political institutions moderate GDP-CO_2 relationship • Countries with stronger democratic institutions, absence of corruption, and active civil society have separated economic growth from CO_2 emissions after reaching GDP of $45 000/capita.
Article 3	"Gimme Shelter": The Role of Democracy and Institutional Quality in Disaster Preparedness	Adaptation to climate change/ Preparedness for natural disasters SDG #13	Number of people affected by natural disasters	Democracy, QoG	• Democracy is associated with lower number of disaster victims only when QoG is high. • When QoG is low, democracies have more disaster victims than authoritarian regimes.
Article 4	In Light of Democracy and Corruption: Institutional Determinants of Electricity Provision	Energy provision SDG #7	Proportion of population living in unlit areas	Democracy, corruption in public administration	• Democracy is associated with high energy provision only when corruption in public administration is low. • When public administration is highly corrupt, democracies perform no better than authoritarian regimes.
Article 5	Fresh Pipes with Dirty Water: How Quality of Government Shapes the Provision of Public Goods in Democracies	Water quality SDG #6	1) Biochemical oxygen demand 2) Level of wastewater treatment	Democracy, QoG	• Democracy is associated with higher water quality only when QoG is high. • When QoG is low, democracies perform worse than authoritarian regimes.

4.1 Data

4.1.1 Dependent variables

In Article 1, *The Limits of Democracy in Tackling Climate Change*, I investigate the interdependent effects of democracy and corruption on CO_2 emissions. CO_2 emissions are largely a by-product of energy use. They result from the combustion of fossil fuels to generate electricity and heating, burning of gasoline and diesel in transportation, chemical reactions in the production of metals, cement and chemicals, and other industry activities (IPCC 2014). While the world ecosystems are designed to absorb some amount of CO_2, excessive amounts of CO_2 emission can result in concentrations that exceed the absorption capacity of ecosystems and contribute to climate change (IPCC 2014). Reducing CO_2 emissions to the levels within the absorption capacity of ecosystems is a part of the efforts to mitigate climate change. It is listed as Sustainable Development Goal #13.

Climate change as an environmental problem has characteristics that make it complex to solve. It is a product of interconnected processes between various ecosystems; it develops slowly as a response to anthropogenic and non-anthropogenic drivers; the benefits of climate change prevention are highly diffuse; there are a large number of actors on many different levels involved in contributing to climate change; and the issue requires the involvement of experts in decision-making.

Analyzing data on emission levels has certain advantages over analyzing data on the chemical concentration of CO_2 in the atmosphere. Concentration data are only relevant for the city level and are difficult to reliably estimate, since emissions travel and the precision of measurement depends on the quality of the measuring device. Emissions, on the other hand, directly reflect actions that emitters take, since the measure directly shows how much carbon dioxide emitting actors release. In measuring CO_2 emissions, I use the indicator from the Emissions Database for Global Atmospheric Research expressed in tons of CO_2 emissions per capita per country and per year (Oliver et al. 2015).

In Article 2, *Do Political Institutions Moderate GDP-CO_2 relationship?*, the main dependent variable is the effect of GDP per capita on CO_2 emissions or per capita GDP elasticities of CO_2 emissions. Many rich countries today have reached their current levels of economic development by overexploiting natural resources or/and by means of intense industrialization, which exert high pressure on the environment. Today, as environmental crisis is gradually approaching, countries at low levels of economic development can hardly rely on reaching high income levels by the same means as developed nations without severe environmental consequences for the rest of the globe. As there is still a need for economic development, one of

the biggest questions today is how to reach sustainable economic growth without additional pressure on the environment. Decoupling economic growth from the increase in CO_2 emissions, which is largely driven by industrial activities and unsustainable energy use, is one of the crucial steps towards sustainable development. In the article, we treat such separation of economic growth, operationalized with GDP per capita, from CO_2 emissions as one of the challenges that countries face on the path to sustainable development. This challenge falls under SDG #13.

In Article 3, *"Gimme Shelter": the Role of Democracy and Institutional Quality in Disaster Preparedness*, Tove Ahlbom Persson and I explore the interdependent effects of democracy and quality of government on countries' ability to prepare for hazardous weather events and thus minimize the number of victims from natural disasters. Ensuring public safety and security from natural disasters involves the provision of public goods, including the mapping of hazard areas, construction of preventive measures, such as dykes or levies, establishment and maintenance of early warning systems, and securing reliable public infrastructure, such as evacuation roads, health centers, and shelters (Raschky 2008; Schulz 2015).

In societies unprepared for natural disasters, constant adverse weather events hamper growth and impact human health and development. Prepared countries, on the contrary, do not have to spend considerable proportions of their budget to deal with the consequences of disasters. They have the underlying security to invest in growth and human development. Therefore, preparing for future disasters is a necessary pillar of sustainable development and it is listed as a target under sustainable development goal #13. Ability to prepare for natural disasters is an asset in the adaptation to climate change, as the number of natural disaster is likely to grow due to temperature changes and ecological imbalances (Parry et al. 2007).

Preparedness for natural disasters is a complex issue. There is uncertainty regarding when the next disaster will occur and therefore undertaking preparatory steps requires long time horizons from decision-makers, as politicians will only reap the benefits from their actions when the next natural hazard occurs. Natural hazards are external shocks and therefore the responsibility for the number of victims is not necessarily perceived as a political failure. However, the benefits of disaster prevention for the people are not as diffused as those from CO_2 emission reductions. People directly experience the negative consequences of natural hazards if the country is unprepared. Therefore, disaster preparedness has high visibility in areas frequently hit by natural disasters. Quick mobilization and mitigation of the consequences of disaster are possible even in short-sighted political regimes. However, preparation for future disasters that minimizes the number of disaster victims requires long time horizons from decision-makers as it involves the provi-

sion of public goods that would foster support for government actions only when the next natural hazard strikes.

In the article, we operationalize preparedness for natural disasters with the total number of people affected per year, a measure taken from the International Disaster Database, gathered by the Centre for Research on the Epidemiology of Disasters (Guha-Sapir, Below, and Hoyois 2016). We weight it by the number of disasters happening in countries per year, population size, or land area to make the measure more comparable across countries.

In Article 4, *In Light of Democracy and Corruption: Institutional Determinants of Electricity Provision*, Frida Boräng, Sverker Jagers, and I investigate the interdependent effects of democracy and corruption in public administration on the government provision of energy. Energy is needed for heating, lighting, cooking, industrial purposes, *etc.* and it can be produced through, for example, the burning of firewood, coal or by generating electricity in power plants. Electricity materializes the need for energy and provides opportunities to reduce the use of firewood and coal, consequently reducing deforestation and the land degradation connected to it.

The provision of "reliable, affordable and modern energy services" is a target under the UN's sustainable development goal #7 (United Nations 2015). While electricity generated through non-renewable sources helps to achieve this goal to a lesser degree than electricity generated through renewable energy sources, such as hydro-, solar- and wind-power plants, it still contributes to the reduction of wood and coal-burning practices, which makes provision of electricity necessary for sustainable development.

Provision of electricity is a less complex undertaking for decision-makers than protection of the population from natural disasters or mitigation of climate change through CO_2 emissions reductions. It relies on a fewer number of actors, mostly electricity providers, either public or private, and mostly involves problems typical to public goods delivery. Electrification projects are visible but may take time before the results can be directly observed.

In the article, we operationalize energy provision with a measure of the proportion of population living in unlit areas. We use the satellite data capturing night-time lights from the Defence Meteorological Satellite Program's Operational Linescan System (DMSP-OLS). In the article, we do not distinguish between the sources of electricity, which generate lights visible on the satellite images.

Article 5, *Fresh Pipes with Dirty Water: How Quality of Government Shapes the Provision of Public Goods in Democracies*, is an empirical account of the interdependent effects of democracy and quality of government on water quality. Safe drinking water is a basic human need and is crucial for human health. Goal #6

in the SDG framework sets access to safe and affordable drinking water as one of the essential targets.

The problems of water quality are complex. Water ecosystems depend on the condition of the forests and land surrounding the water bodies and therefore are inherently connected to forest and land management. It requires strong expert knowledge and awareness of the ecosystem interdependance. Water management therefore requires consultation with scientists. While providing access to water through building pipes and boreholes can be achieved in a short time frame, reaching and maintaining good drinking water quality is a long-term undertaking. It is connected to reducing water emissions, building and maintaining water treatment plants, as well as maintaining the self-cleaning properties of the water by sustaining the health of aquatic ecosystems and biodiversity.

As access to clean drinking water is one of people's basic needs and is essential for human wellbeing, the issue of water quality has, seemingly, high visibility. However, it takes a relatively long time before the results from actions to purify water sources become visible to the general public. Additionally, water quality, to a certain degree, depends on factors outside government control, such as the polluting and extractive behavior of the neighboring countries sharing a particular water body. Diffused sources of pollution make it difficult to isolate the effect of government competence on the actual outcome by concealing government efforts in delivering access to clean drinking water.

In the article, we measure water quality in two ways. First, we capture the level of water pollution by using the measure of biochemical oxygen demand (BOD) in internal water bodies. The indicator measuring BOD is taken from the World Bank (World Bank 2015). Second, we measure the efforts to reduce organic water pollution by the number of wastewater treatment plants operating in countries relative to population connected to wastewater treatment plants. The measure is taken from the Environmental Performance Index and varies from 0 to 100 with higher values denoting higher levels of wastewater treatment (Hsu et al. 2014)

All five articles, therefore, inspect the interdependent influence of democracy and QoG on various UN sustainable development goals related to environmental sustainability at different complexity levels. *Reduction of CO_2 emissions*, which is the focus of the first two papers, is related to climate change mitigation, and is crucial for achieving sustainable development goal #13 (United Nations 2015). Achieving reductions in CO_2 emissions is the most complex task for national governments out of all the sustainable development goals considered in this dissertation. It requires institutions that simultaneously make governments cooperate in global collective action, act as successful third-party enforcers in regulating collective action between domestic emitters, think long-term in addressing problems

with consequences for future generations rather than current voters, involve experts in the decision-making to determine reasonable CO_2 emission targets, and that facilitate policy implementation, ensuring repeated monitoring and inspections.

Preparedness for natural disasters involves provision of public goods and is more directly visible to people than reduction of CO_2 emissions. It is connected to climate change adaptation and is an official target under sustainable development goal #13. Preparation for natural disasters is a less complex project for implementation than reduction of CO_2 emissions, however it also poses a complex dilemma for decision-makers. It requires political institutions that secure the provision of the necessary public goods, such as disaster-resilient infrastructure, promote long time horizons to deal with uncertainty regarding the occurrence of external shocks, and that enable consultation with experts for disaster-resilient planning. In contrast to CO_2 emissions, disaster preparations require institutions that ensure universality of public goods provision to minimize the impact of disasters on marginalized groups. It is not, however, directly connected to governments' role in facilitating collective action or providing monitoring and inspections.

Provision of energy poses less complex dilemmas for decision-makers than provision of other public goods covered in the articles, namely, stabilizing the climate, preparing for natural disasters and ensuring high water quality. It can essentially be provided without dealing with external shocks, managing numerous sources of the problem, or involving expert opinions in decision-making. However, electrification also requires political institutions necessary for universal public goods delivery and long time horizons, as electrification projects take time and need maintenance. It also requires involving experts (engineers) in the implementation of electrification projects as installing and ensuring the functioning of electricity grids is a technically complex task. Provision of electricity is listed in the UN sustainable development goals as goal #7.

Ensuring access to *clean drinking water* is a highly complex problem connected to finding a balance between the provision of public goods with quick returns, such as building pipelines, and public goods with slow returns, such as purifying water bodies. Reaching water quality that is safe for drinking is a target under sustainable development goal #6. It requires political institutions that trigger the same mechanisms as those needed to facilitate collective action among local emitters for reducing CO_2 emissions, make states cooperate in collective action in managing shared water bodies, ensure effective inspections and enforcement, and that involve experts in decision-making over water management. It also requires political institutions favorable to disaster preparation, such as those ensuring universal public goods delivery and long time horizons for maintaining water quality

longer than the current electoral cycle. Compared to CO_2 emissions or natural disaster preparedness, however, clean water has higher visibility for the electorate, as it is a basic need and affects people's everyday lives.

CO_2 emissions, readiness to cope with natural disasters, electricity provision, and water quality vary in their degree of complexity and therefore present a useful set of problems for comparison. Possessing different problem characteristics, the different sustainable development goals analyzed in this dissertation provide an opportunity to compare whether the political institutions under investigation, namely, democracy and quality of government, are designed to tackle problems at different levels of complexity.

The measures used in the analysis relate to the provision of public goods pertaining to the environment or protection of the environment and they do not capture environmental sustainability directly. Sustainability, which relates to the continuity of the "favorable" environmental outcomes, is difficult to capture at present, as efforts to protect the environment are rather recent. Ecosystems respond slowly to human action and it is still impossible to draw conclusions on whether the achieved "favorable" outcomes are sustainable or not. Such conclusions will require continuous measurement and expert evaluation over a long period of time. However, the first actions towards protecting the environment today, as well as the provision of environmental public goods that contribute to reaching sustainable development goals – outcomes that this paper does address – can serve as an indication of countries' first steps towards environmental sustainability.

Policy outcome vs policy output

All five articles analyze the connections between political institutions and the observable state of the environment. In the existing literature that analyzes such connections, the observable state of the environment is often referred to as "environmental performance" or "environmental outcomes". Such terminology necessarily implies certain actions towards environmental protection or provision of environmental public goods. This in turn implies the presence of environmental policies, laws and regulations, as they are tools for reaching environmental goals. Theories outlined in the theoretical chapter of this dissertation suggest that policies mediate the relationship between democracy and environmental outcomes. In this dissertation, however, due to the lack of comprehensive cross-country data on the presence of such policies, I do not model the mediating effect of public policies, and rather directly investigate the relationship between political institutions and the state of the environment. Such implicit mediation by public policies, however, does not pose a severe threat to the results, as it only adds noise to the data and

increases the likelihood of false negatives rather than false positives.

Additionally, the presence of environmental policies is only a weak proxy for countries' commitment to protect the environment. The presence of policies does not imply that they will automatically be implemented; what matters are the actual actions towards environmental protection (*e.g.*, reduction of emissions) or provision of environmental public goods (*e.g.*, disaster prevention measures).

Comparing the state of the environment between different political regimes, without modelling policy mediation, can still provide valuable insights into which political conditions, through one mechanism or the other, are favorable for maintaining a healthy environment or delivering environmental public goods, even if we cannot be certain that states achieve particular environmental outcomes due to the adoption of environmental policies. We can, however, infer such from the theories after accounting for potential confounders.

4.1.2 Independent variables

Both democracy and quality of government are theory-laden concepts and their measures rely on theories used by data collecting organizations when designing expert surveys. My choice of indicators for the operationalization of these concepts is based, first of all, on the theories underpinning the relationship between democracy, quality of government and environmental outcomes, and, secondly, on methodological considerations.

In articles 1, 3, and 5 the level of *democracy* is operationalized with the electoral democracy index from the Varieties of Democracy (V-Dem) project (Coppedge, Gerring, Lindberg, Skaaning, Teorell, Altman, Bernhard, Fish M., et al. 2016). Data provided by the Varieties of Democracy project have an advantage over other existing measures of democracy due to the transparent aggregation and data collection processes. The data coding involved 2,500 country experts, who provided estimates of regime characteristics for each country-year (Pemstein et al. 2017). The electoral democracy index is based on the "thin" (minimal) understanding of electoral democracy, conceptualized by Dahl (1989) as Polyarchy. It measures freedom of association and expression, the extent to which elections in countries are free and fair, whether suffrage is universal, and whether the executive is elected, either through popular elections or through a popularly elected legislature (Coppedge, Gerring, Lindberg, Skaaning, Teorell, Altman, Bernhard, Fish, et al. 2016). The advantage of a thin definition of democracy is that it does not combine electoral institutions, political rights, and civil liberties with the rule of law, unlike definitions of democracy used by other organizations measuring democracy, such as Freedom House and Polity IV, whose indicators are common in the empirical literature. Rule of law is an institution that shapes exercise of

political power rather than access to political power (see, *e.g.*, Rothstein 2011) and using a "thin" definition of democracy allows for testing the hypothesized interaction effect between democracy and governmental quality without conflating the two through the overlapping measurements.[7] The index varies from 0 to 1, with higher values corresponding to higher levels of democracy.

In articles 2 and 4, my co-authors and I use experience with democracy instead of democracy level at a given year as an independent variable, and the reasons for this are different in each of the articles. In article 2, the choice is guided by the methodological considerations specific to the moderation analysis we perform. Investigating the moderating effect of multiple political variables requires modelling interactions between them and GDP per capita. We opted for dichotomizing all indicators gauging political institutions and constructing binary indices, as it makes interpretation of the interaction effects easier and more intuitive. In addition, we perform cross-country regression, but aim to incorporate information from the time series into the analysis. Therefore, we opted for computing a measure of a cumulative experience with democracy by counting the number of years when a country scored 1 on a democracy indicator. In article 4, we use experience of democracy to first replicate and then revisit the findings by Min (2015), who also uses experience of democracy as his main independent variable. In this way the article makes an empirical contribution to the current academic debate.

In both articles we use a dichotomous measure of democracy developed by Cheibub, Gandhi, and Vreeland (2010) in the main analysis. In article 2 we also fill in missing values using the Varieties of Democracy dataset (for the methodology of imputation, please see the Methods section of the article). Cheibub et al's (2010) measure is coded as 1 if the chief executive and legislature are popularly elected, if more than one party is competing in the elections, and if "an alternation in power under electoral rules identical to the ones that brought the incumbent to office [...] have taken pace." Taking the originally dichotomous measure creates a more intuitive (and more internationally recognized) distinction between political regimes than we could obtain using our own dichotomizing strategies.

In the operationalization of *governmental quality*, the articles follow different strategies. In articles 3 and 5, my co-authors and I use an indicator of Quality of Government from the International Country Risk Guide (ICRG) developed by the Political Risk Services (PRS) group that aggregates different aspects of governmental quality into a single score per country and per year. More specifically, it

[7] For robustness checks in articles 1, 3, 4, and 5, however, I do use the indicator of democracy developed by Hadenius and Teorell (2005) and updated by Teorell et al. (2016) in the Quality of Government dataset every year. The index is an average between Freedom House and Polity IV measures of democracy and has been shown to perform better in terms of validity and reliability than its separate parts.

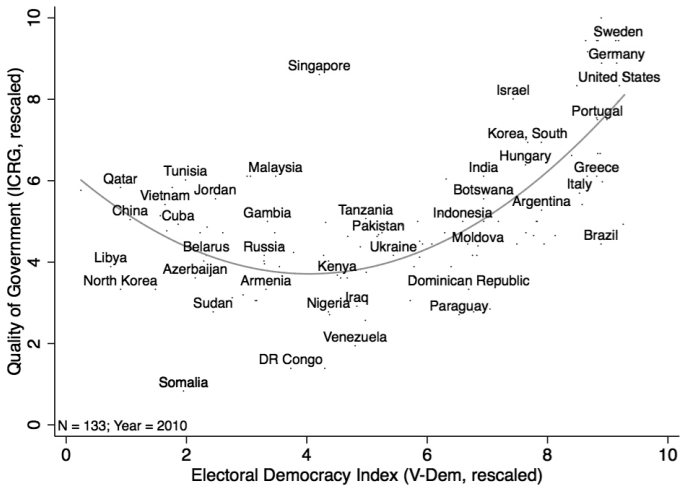

Figure 8: Countries plotted according to democracy and QoG dimensions

accounts for the extent of corruption, bureaucratic quality, and the degree of law and order in countries around the globe (ICRG 2014). The corruption indicator measures the prevalence of corruption within polities in different forms, including patronage, nepotism, job reservations, tit-for-tat exchanges, unofficial party funding and close connections between politics and business. The indicator on law and order measures the strength and capabilities of the legal system, as well as public obedience with the law. The measure of bureaucratic quality is a proxy for the capacity of a public administration to perform its tasks independently from political influence, and also taps into the issues of meritocratic employment of civil servants.

Taken together, the components reflect aspects of governmental quality relevant for countries' environmental performance, as described in the theoretical chapter. It is rather difficult to disentangle the separate effects of these different but highly interconnected factors pertaining to quality of government, as they all affect each other and often go "hand-in-hand". However, they are all still highly relevant for the provision of disaster preparedness and water quality and can disrupt the positive effects of democracy. Therefore, the aggregated composite measure of governmental quality, which captures the underlying phenomena of quality of government rather than its distinct aspects, is more useful for estimation than its parts taken separately. The index varies from 0 to 1, where higher values reflect higher quality of government.

In articles 1 and 2, I use a narrower indicator of governmental quality and investigate if the effect of democracy on CO_2 emissions is particularly conditional on the level of corruption. I choose a narrower indicator for a number of reasons. First, it captures theories of how governmental quality can influence CO_2 emissions in particular more precisely. The corruption indicator more directly captures the influence of business interests in policy-making, which is relevant for CO_2 emission policies. Second, it more directly captures problems with monitoring and inspecting emitters' behavior than broader measures of QoG and reflects incentives for polluters to comply with the rules. Third, corruption is an established determinant of CO_2 emissions in environmental economics research (see, *e.g.*, Cole 2007; Damania, Fredriksson, and List 2003; Fredriksson and Svensson 2003; Pellegrini 2011; Welsch 2004) and using the corruption indicator allows me to communicate with the previous research more directly. I operationalize the level of corruption with the Varieties of Democracy project's composite indicator of political corruption, which measures executive, legislative, judicial and public sector corruption and therefore also taps into many of the aspects of the quality of government index used in articles 3 and 4. The index varies between 0 and 1, where higher values correspond to higher corruption.

In article 4, my co-authors and I explore democracy's effects on the provision of energy, in the form of electricity, conditional on the extent of corruption in public administration. By using a narrow indicator of governmental quality, we aim to capture only the necessary conditions that we think are especially important for the achievement of less complex sustainable development goals, such as provision of reliable electricity. Electrification is connected to the provision of public goods rather than protection of the commons, it is not affected by exogenous factors outside of electricity providers' control (apart from exogenous shocks), and it requires the involvement of experts in the implementation of electrification programs but not necessarily policy-making. Corrupt public administration, incapable of developing action plans and implementing official goals, is one of the major obstacles interfering with the successful implementation of electrification projects and using a more specific indicator provides an opportunity to investigate a more specific mechanism of how quality of government moderates the effect of democracy. We use V-Dem's indicator of corruption in public administration, which measures to what extent public officials provide favors for bribes, and to what extent they "steal, embezzle, or misappropriate public funds or other state resources for personal or family use" (Coppedge, Gerring, Lindberg, Skaaning, Teorell, Altman, Bernhard, Fish, et al. 2016).

Figure 8 plots countries on the dimensions of democracy and quality of government for the year 2010. Democracy is measured with the electoral democracy index

from the Varieties of Democracy project (Coppedge et al. 2017), while quality of government is measured with the quality of government index from the International Country Risk Guide (from Teorell et al. 2017). Table in the Appendix to the introductory chapter of this dissertation specifies how different countries score on democracy and quality of government dimensions in the year 2010.

4.1.3 Control variables

The challenge with using environmental outcomes (state of the environment) rather than environmental outputs (policies) as dependent variables is that environmental outcomes can depend on a multitude of factors, including a country's history, economy, geography, and demographics, as well as other external factors. As a result, it can be challenging to isolate the link between political institutions and the environment.

In the articles, I make sure to control for the most relevant factors, established in the previous research as determinants of their respective environmental sustainability outcomes, to separate the effect of these factors from the effect of political institutions. The set of control variables differs between studies and is individual to the environmental outcome under investigation. In all papers, I control for countries' level of economic development, operationalized with GDP per capita. Higher economic development is associated with higher environmental pollution (CO_2 emissions and BOD) and at the same time higher likelihood that countries have enough financial resources to invest in environmental protection (*e.g.*, build electricity grids, wastewater treatment plants, and disaster-resilient infrastructure).

Papers 1, 3 and 5 also include a control of population density. On the one hand, densely populated areas are more likely to emit more, have more polluted water and are more vulnerable to natural hazards. On the other hand, it is easier to provide public goods related to the environment, such as renewable sources of energy to reduce carbon dioxide emissions, high water quality, and disaster-resilient infrastructure, to densely living populations. Papers 1 and 5 include a control for the size of the urban population to account for higher emissions/pollution from metropolitan areas and the latitude of countries' capital cities to account for geography-specific drivers of CO_2 emissions and water pollution. Papers 1 and 2 additionally include controls for the extent of oil production per capita, as countries with higher oil production tend to emit more due to lack of incentives to invest in alternative energy sources and demand from the international market. In paper 1, I also control for countries' merchandise export per capita to account for international demand for higher industrial production, Kyoto protocol ratification to account for countries' commitment to reduce CO_2 emissions, and an island

dummy, as islands tend to have fewer opportunities for industrial production and therefore substantially lower CO_2 emissions. In Paper 5, I additionally control for the land area of countries, as it requires more effort to clean water bodies and build wastewater treatment plants if the territory is large. In Paper 3, I add measures for countries' population size, as more people are expected to suffer the consequences of a disaster in more populated countries. I also add the measures of the frequency of disasters, to account for demand for disaster protection, and an equality index, as in more equal societies more people have access to disaster-resilient infrastructure. Paper 4 takes the set of independent variables from Min (2015).

Demand

Demand for certain goods (outcomes) constitutes the input-side of the political system (see Figures 2 and 5). The effect of democracy – which shapes how the demand for environmental sustainability is articulated – on environmental outcomes, implies the presence of demand for environmental sustainability, to which politicians can respond: public demand, demand from organized interests (civil society or businesses), or external demand (from the international organizations or neighbors). In the papers included in this dissertation, I do not model the presence of demand directly. This is due to the lack of comprehensive and reliable cross-national time-series data that could capture people's attitudes and preferences regarding the environment. It is also problematic to compare citizens' average demand for environmental protection across countries, as it is, on average, low in most political contexts. The key question becomes why demand appears and advances in some societies but not others. Economic security and confidence in the capabilities of the state apparatus (determined by the quality of government) can affect demand (Fairbrother 2016b, 2017), and in this dissertation I specifically test the role of such underlying factors, without explicitly testing the mechanisms of their impact.

When the demand for public policy outcomes is not straightforward, I use proxy measures that can partially account for the presence of demand. When using CO_2 emissions as a dependent variable, I control for the level of economic development operationalized with countries' GDP per capita. Higher GDP per capita can, to some extent, account for people's post-material preferences, which can include care for the environment (and Fairbrother 2013; Gerhards and Lengfeld 2008; Inglehart 1995, 1997; with the evidence from Kidd and Lee 1997). When using number of people affected by natural disasters as a dependent variable, I use the variable gauging the frequency of natural disasters to capture demand, as it can,

to some extent, account for whether citizens will support action towards disaster preparation. We believe that people are more likely to have a personal interest in disaster preparation if they are frequently exposed to natural disasters. In the papers using water quality and electricity provision as dependent variables, we do not model demand, as we assume that clean water and electricity are basic needs of the population and there are few controversies regarding demand for these public goods.

Data limitations

As I mainly use secondary data sources in this dissertation, my results fully depend on the reliability of these data. Although no data are perfectly reliable, some data are better than others. I ensure that the most recent and widely used data sources are used, basing my choices on the previous research.

An inherent characteristic of data that gauges political and social factors is that the scores are based on subjective expert opinions. Although some data collection initiatives, more so than others, deal with cross-country and cross-expert comparability, it is still difficult to guarantee a unified understanding of questions and concepts between experts, especially experts from different countries. The Varieties of Democracy project, from which I take some of my independent variables, specifically targets this problem in their measurement model (Marquardt and Pemstein 2017; Pemstein et al. 2017).

Another potential source of bias is that the quality of data is better for some countries than for others. For example, there are more experts available to judge political developments in the United States than in, for example, Fiji, and the historical literature available to experts is more diverse and extensive for the United States than for Fiji. Similarly, data on environmental variables can be more effectively collected in the developed countries compared to the developing world as it is more likely that developed countries have more modern and precise equipment and qualified staff for taking measurements. Such bias in data collection could contribute to the homoscedasticity of errors in the models. While it is difficult to affect data collection processes, I deal with homoscedasticity in the models by using different types of robust standard errors.

Despite these limitations, cross-country data provides a unique opportunity to investigate global patterns of country performance, explain cross-national differences, and arrive at policy recommendations for national governments, which are key actors in securing environmental sustainability (see section 3.2). To make sure that the results of my studies are comparable with other studies in the field, I use the most widely used data in the research community.

4.2 Methods

All articles in the dissertation use a deductive approach and test the main theoretical model of the study. They present analyses of the interaction between democracy and governmental quality in their effect on CO_2 emissions, number of people affected by disasters, provision of electricity, and provision of water quality. Article 2 additionally tests if these political institutions, together with the number of veto points and players and the extent of civil society participation, moderate the relationship between gross domestic product (GDP) per capita and CO_2 emissions.

With the aim of exploring the role of political institutions in countries' environmental performance, my empirical tests rely on time-series cross-sectional data, using country-years (in articles 1, 2, 3 and 5) or countries (in articles 4 and 5) as units of analysis. Comparing countries is a valuable tool for drawing conclusions about the relationships between the variables of interest, as a countries (states) are the key form of political organization of people, stable over time, which affect people and their environments.

4.2.1 Within-Between estimator

Articles 1, 2, 3 and 5 employ multilevel modelling approaches to account for the hierarchical structure of the data. The empirical analysis in articles 1, 3, 4 and 5 uses country codes and country divisions as suggested by Teorell et al. (2016, 5–6) in the Quality of Government Dataset. In analyzing the relationship between democracy, quality of government and different dependent variables related to environmental sustainability, I am interested both in whether changes in these political institutions are associated with changes in the environmental sustainability outcomes at a national level and whether differences in these political institutions are associated with differences in environmental sustainability outcomes observed across countries.

The pooled OLS approach suggested by Beck and Katz (1995) has not proven to be a viable option for the analysis of time-series cross-sectional data due to the slow-moving nature of both the dependent and independent variables, which results in high autocorrelation and makes inclusion of the lagged dependent variable to deal with autocorrelation issues problematic. Cross-country OLS regressions suffer from omitted variable bias, while fixed effects regression eliminates potentially interesting information on the differences between countries. To accommodate all of these problems in testing the main hypothesis of the study, in articles 1, 3 and 5 I use the within-between estimator, developed by Bell and Jones (2015) and based on earlier work by Bartels (2008), Rabe-Hesketh, Skrondal, and Pickles (2005),

and Mundlak (1978). The within-between estimator recognizes the hierarchical structure of the data; it simultaneously accounts for variation between countries and developments over time within states. The model allows the use of random effects by addressing the issue of correlated errors between the two levels of estimation (cross-country and over-time) by mean centering of time-varying variables and simultaneous inclusion of their country means. Following Bell and Jones' (2015) guidelines, I calculate deviations from the country means for each independent variable and use them instead of the raw values together with the country means of these independent variables. The model can be summarized in the following equation:

$$y_{it} = \beta_0 + \beta_1(x_{it} - \overline{x_i}) + \beta_2\overline{x_i} + \beta_3 z_i + (u_i + e_{it}) \quad (1)$$

where i is a country, t – year, β_0 is the intercept, x is a vector of the independent time-varying variables, z is a vector of time-invariant variables, u is an error in the between-equation, and e is an error in the within-equation.

The advantages of the within-between estimator is that it produces different coefficients for the analysis of variation between units and the analysis of variation within units and allows comparison of the between- and within-effects of the independent variables. An alternative approach for the analysis of time-series cross sectional data is system-GMM estimation as suggested by Arellano and Bond (1991). However, system-GMM models do not provide an opportunity to compare differences across countries.

4.2.2 Fractional logit

In article 4, my co-authors and I take as the point of departure the previous work by Min (2015) and undertake a cross-country analysis. As we aim to perform a replication study, which we would like to build our contribution upon, we adopt Min's methodological approach. We use fractional logistic regression with Huber-White robust standard errors as suggested by Papke and Wooldridge (1996) and Wooldridge (2002, 661) to estimate the interdependent effects of democracy and QoG on the proportion of population living in the unlit areas across countries. This estimation is useful because, different to the OLS regression, it forces the predicted values to fall inside the 0-1 interval, which is defined by the variance range of the dependent variable. In fractional logit, the predicted values of the dependent variable are generated by the following logistic function:

$$E(y|x) = \frac{exp(x\beta)}{1 + exp(x\beta)} \quad (2)$$

4.2.3 Two-stage moderation analysis

In article 2, the aim is to model the moderating effect of various political factors on the relationship between GDP growth and CO_2 emissions. We perform our analysis in two stages. First, we estimate the relationship between GDP per capita and CO_2 emissions in each of the 156 countries under investigation. We utilize dynamic common correlated effects methodology to estimate an error correction model that accounts for non-stationarity, cross-sectional dependency and parameter heterogeneity.

$$\begin{aligned}\Delta log(CO_2pc_t) = \alpha + \beta_1 log(CO_2pc)_1 + \beta_2 \Delta log(GDPpc)_t \\ + \beta_3 log(GDPpc)_{t-1} + \beta_4 log(YEAR)_t + Z + \varepsilon\end{aligned} \tag{3}$$

where

$$\begin{aligned}Z = \beta_5 \Delta log(\overline{CO_2pc})_{i,t} + \beta_6 \Delta log(\overline{CO_2pc})_{i,t-1} + \beta_7 \Delta log(\overline{CO_2pc})_{i,t-2} \\ + \beta_8 log(\overline{CO_2pc})_{i,t-1} + \beta_9 \Delta log(\overline{GDPpc})_{i,t} + \beta_{10} \Delta log(\overline{GDPpc})_{i,t-1} \\ + \beta_{11} \Delta log(\overline{GDPpc})_{i,t-2} + \beta_{12} log(\overline{GDPpc})_{i,t-2}\end{aligned} \tag{4}$$

In this way we obtain β-coefficients for the effect of GDP per capita on CO_2 emissions in every country in the sample. An error correction model provides the opportunity to estimate both long-term effects (based on the coefficients of lagged-level variables) and short-term effects (based on coefficients of differenced variables) of GDP per capita. We calculate the long-term effect or the long-run multiplier (LRM) by dividing the GDP per capita coefficients by the negative value of the error correction term (for example, $\beta_3/-\beta_1$). We then use the obtained values as the dependent variable in the second stage of our analysis. Therefore, the dependent variable in the second stage of the analysis is a long-term effect of GDP per capita on CO_2 emissions per country over the years under investigation (1972-2014). We test if political institutions affect these long-term effects of GDP per capita on CO_2 emissions by performing an ordinary least squares regression:

$$\begin{aligned}LRM(log(GDPpc)) = \alpha + \beta_1(GDPpc) + \beta_2(GOV\_^*) \\ + \beta_3(GDPpc \times GOV\_^*) + \beta_4(OPRODpc) + \varepsilon\end{aligned} \tag{5}$$

where LRM(log(GDPpc)) is a long-run multiplier or long-term effects of per capita GDP on CO_2 emissions, GOV_* is a term capturing the political traits under investigation (*i.e.*, democracy, corruption, bicameralism, proportional rep-

resentation, and/or civil society participation), and OPRODpc is a control variable in the models – a value of oil production per capita per country and per year.

4.2.4 Qualitative investigation

In article 5, in addition to a Large-N quantitative analysis, my co-author and I perform a qualitative investigation of mechanisms behind one specific pattern that stands out from our findings in the quantitative part. In particular, we investigate how the incentives created by elections and electoral competition may have deleterious consequences in a setting with low governmental quality for the provision of high water quality as an example of a public good related to environmental sustainability. We choose a typical case of a democracy with low quality of government with a low residual and explore political and bureaucratic impediments to the government provision of safe drinking water using original triangulated interview data from Moldova that we collected in April 2016. For a more detailed description of the methodology, see Method section and Appendix A of article 5.

We arrange the quantitative and qualitative parts of the article into a nested analysis within a mixed-method design framework as suggested by Lieberman (2005). The qualitative part of the paper allows for an in-depth analysis of the mechanisms behind the hypothesized relationship between democracy and quality of government in their effect on water quality as one of the sustainable development goals, and also provides insights into the potential mechanisms that can drive the relationship patterns found in other articles.

4.2.5 Limitations of the statistical analysis

There are several limitations of the statistical analysis that have implications for the conclusions we can make from the studies. First, the slow-moving character and path dependency of both the independent and dependent variables makes it problematic to estimate any short-run relationship. Therefore, in most studies I make sure to estimate long-term effects by conducting analyses based on country-averages (between-effects). The results of the between-parts of the analyses that provide an idea of the long-term relationship between the variables are more tangible than the results found in the within-parts of the analyses, which produce dynamic short-term effects.

Second, in correlational studies, it is difficult to establish causality in the relationship between the phenomena under investigation and therefore inferences that I make from the analyses are associational or non-causal. Establishing associations, however, is a key first step in exploring the relationship between the variables and allows drawing a conclusion on whether it is reasonable to proceed

with investigating the causality. That said, it is not highly plausible that environmental conditions affect levels of democracy or quality of government in a country. Therefore, in the case of correlational evidence, with the help of theory, and after controlling for alternative explanations, it is possible to draw assumptions regarding the direction of the hypothesized relationship and infer causality, even if it is not possible to secure solid causal links.

Third, and related to the previous point, several independent variables are correlated, which implies that democratic development, economic development, and high quality of government often go together. Their simultaneous inclusion in the models does not directly create a problem of multicollinearity (according to the established multicollinearity tests), but it becomes difficult to isolate their effects on the dependent variable, especially given that current conditions are a result of long historical developments. Including relevant confounders into the models helps to partially separate the associations between the variables; however, even existing theories cannot provide a reliable idea as to which of the factors came first or which one is the most important predictor. Such uncertainty only emphasizes that it is more relevant to look at these factors in combination (as this dissertation does) rather than estimate their separate effects.

Despite some limitations, cross-country analysis can provide important insights into the relationship between the variables, provided that we acknowledge the complexity and limitations of modelling such analysis. While it is possible to track how strong bureaucracy, corruption, rule of law, and democratic institutions (such as free and fair elections, free media, or freedom of association) influence environmental outcomes in each particular country, only statistical analysis, which combines comparable evidence from numerous cases, can establish whether the observed patterns are systematic.

5
Empirical findings

The findings from the five articles vary in their support for Hypotheses 1 and 2, which postulated *independent* effects of democracy and quality of government on sustainable development outcomes related to environmental sustainability. More specifically, the findings show that both the level of democracy and the level of corruption matter for the reduction of CO_2 emissions. More democracy is also associated with lower pollution in water sources, while quality of government does not seem to have a significant association with the level of water pollution when its effect is considered separately from that of democracy. However, quality of government seems to be more important than democracy for building wastewater treatment plants in reaching sustainable development goal #6. At the same time, neither democracy nor governmental quality seem to have an independent effect on the number of people affected in disasters. The inconsistent results between the papers echo the inconsistent findings reported in the previous research. Hypothesis 3 of the dissertation instead suggests that modelling the independent effects of democracy and quality of government is likely to create a misspecification problem. The theoretical model of this dissertation implies that democracy and governmental quality should rather be considered in interaction whenever we analyze the provision of public goods, especially those public goods that are complex and require long-term implementation.

The tests of Hypothesis 3 have produced coherent findings between the articles. The results show that the effect of democracy on different sustainable development outcomes related to environmental sustainability does seem to be contingent on the quality of government. The patterns of the relationship, however, differ between the different outcomes. The results in Article 1, *The Limits of Democracy in Tackling Climate Change*, indicate that the effect of democracy on CO_2 emission levels depends on the level of corruption: more democratic countries tend to emit less only when corruption is low. Similarly, the results show that lower levels of corruption in democratic and semi-democratic regimes are associated with lower carbon dioxide emissions per capita. For example, being democratic and relatively uncorrupt Austria is more beneficial for reducing air emissions than being democratic and corrupt Slovakia. When corruption control is low, however, the democracy level does not seem to make a difference for the level of emissions. In practice, it means that it makes no difference to the level of carbon dioxide

emissions if a country is a democratic and corrupt Jamaica or an authoritarian and corrupt Azerbaijan.

The results in article 2, *Do Political Institutions Moderate GDP-CO_2 relationship?*, further specify that the interaction between democracy and corruption, coupled also with civil society activities, moderates the relationship between economic development and carbon dioxide emissions. The findings indicate that a combination of strong democratic institutions, low corruption and an active civil society is beneficial for reducing emissions of carbon dioxide if GDP per capita is high. Countries that have this combination of political institutions have managed to decouple economic growth from CO_2 emissions.

The results in article 3, *"Gimme Shelter": the Role of Democracy and Institutional Quality in Disaster Preparedness*, support theoretical expectations that the effect of democracy on natural disaster outcomes depends on countries' quality of government. Higher quality of government is associated with substantively lower number of people affected by natural disasters only in countries that have also reached a high level of democracy. For example, people suffer less in democracies with high quality of government such as Sweden, Iceland, or the Netherlands than in democratic Slovenia, where quality of government is lower. Among non-democracies, quality of government does not seem to help disaster preparedness. The positive effect of democracy on disaster outcomes was similarly shown to be dependent on a country's quality of government. More democracy seems to favor disaster preparedness only when quality of government is relatively high, or, as our models indicate, has reached a level on a par with that of Italy. Strikingly, among countries where quality of government is low, *i.e.* lower than the level of the Philippines, more democratic countries seem to suffer more from natural disasters than do less democratic states. Our findings imply that only countries that experience both high quality of government and the benefits of democracy have a significantly fewer number of people affected by natural disasters than the rest. Neither democracy nor high quality of government, taken separately, seems to be a sufficient condition for disaster preparedness among political sources of vulnerability. More democracy can even be more detrimental than less democracy in contexts with pervasive corruption, incompetent and inefficient public administration, and the lack of rule of law.

The results in article 4, *In Light of Democracy and Dorruption: Institutional Determinants of Electricity Provision*, provide a contribution to the current debate on the institutional determinants of electricity provision and complement the work by Min (2015). The findings show that the effect of democratic experience on electrification is conditional on the level of corruption in the public administration. Democratic history is associated with a lower share of population living in unlit

areas only if a country has been able to reduce corruption to at least a level on a par with that of Moldova. In the context of widespread corruption, long experience with democracy seem to have no effect on electricity provision to the population. However, once a certain level of corruption control is in place, democracy does have the expected desirable effect.

The results in article 5, *Fresh Pipes with Dirty Water: How Quality of Government Shapes the Provision of Public Goods in Democracies*, similarly indicate that more democracy benefits water quality only when quality of government is relatively high, or, according to our results, has reached a level on a par with that of Greece. For example, this implies that water quality in more democratic and relatively uncorrupt Belgium is better than in relatively uncorrupt Cyprus, which has lower scores on the democracy indicators. When quality of government is low, or lower than the level of Romania, more democracy is associated with higher water pollution. For example, corrupt and more democratic Ukraine is expected to have lower water quality than corrupt and authoritarian Azerbaijan, according to our data and specifications.

The findings uniformly show that more democracy is only beneficial for sustainable development outcomes when quality of government is high, be it for a less complex task for decision-makers such as the provision of energy, more complex projects such as the protection of populations from natural disasters or highly complex undertakings, such as reduction of organic water pollutants or CO_2 emissions. The quality of government threshold at which point democracy becomes beneficial varies between the outcomes. For democracy to favor reduction of CO_2 emissions, it requires corruption levels not higher than the score of 6 on a 0 to 10 scale, where 10 is least corrupt (due to inverse reading of the indicator). The score of 6 approximately corresponds to corruption levels in Turkey. To benefit disaster preparation, democracy seems to require a slightly higher quality of government, at approximately the level of 7 on a 0 to 10 scale, where 10 denotes high QoG. The score of 7 approximately reflects the level of corruption in Italy. Democracy's positive association with organic water pollution reductions does not come out significant until a country has reached a level of 7.5 on a 0-10 quality of government scale, which is approximately the level of QoG in Spain. With regards to electrification, the necessary level of corruption in public administration for democracy to exert a positive effect is much lower, namely, 7 on a 0-10 scale, where 10 is most corrupt. The indicator of democracy, however, here captures the experience of democracy rather than current level of democratic development and the lower moderating threshold of corruption can be due to the fact that higher experience with democracy can partially account for lower levels of corruption in our cross-country sample.

Higher quality of government similarly has positive effects only in cases of democratic regimes. However, the findings vary between sustainable development goals. With regards to CO_2 emission reductions, QoG seems to already exert a positive effect in semi-democracies that have reached a score of 5 on a 0-10 democracy scale. The score of 5 is approximately the level of democracy in Ukraine. With regards to reducing number of disaster victims, QoG seem to help only after a democracy has reached as high a score as 8, which is the level of democracy in Brazil. At the same time, democratic regimes with relatively high and low QoG were not shown to perform significantly differently in the levels of organic water pollution after democracy has reached the score of 4. Surprisingly, higher quality of government seem to correlate with higher number of disaster victims and higher levels of water pollution in autocracies. In the first case, the result can imply that higher QoG simply does not help to protect populations from natural disasters if a country is authoritarian. The reasons for why this is the case can be investigated in future qualitative research. In the second case, it is likely that autocracies with higher QoG focus on securing economic growth, while economic growth is often associated with higher pollution.

Higher democracy also correlates with higher water pollution and a higher number of people affected by disasters in cases where the quality of government is low. This implies that more democracy can actually be harmful for these environmental sustainability outcomes unless a country has reached a certain level of QoG. In-depth investigation of a typical case that scores high on democracy and low on quality of government in article 5 has revealed why this can be the case. Democracies with weak quality of government seem to be dominated by business interests that turn the attention of politicians away from sustainable development goals; they lack the system of checks and balances that could otherwise constrain democratic leaders from pursuing their own self-interests; they tend to have poor-functioning, politicized public administration, incapable of developing action plans and implementing policies. This seem to be the case even with experts taking high positions in the public administration, because they end up stumbling across incoherent policy goals between agencies and constraints from politicians who are in their turn guided by business interests. In sum, democracies with low QoG seem to develop short time horizons incompatible with long-term policy goals such as sustainable development, and these dysfunctional institutions, which tend to stimulate rulers' self-interests, make democracies perform worse than authoritarian regimes.

6

Concluding discussion

With climate change rapidly gathering pace, change in biodiversity changing the integrity of the biosphere and ocean acidification destroying the marine ecosystems, current environmental problems are both severe and urgent. While awareness about environmental problems varies across the globe, there is at least a global agreement that humanity needs to act. The question is: *How?* The nature of ecological problems makes them invisible to decision-makers and creates diluted sources of responsibility, which makes voluntary collective action for protecting the environment unlikely. At the same time, environmental protection creates externalities, which makes private markets unlikely to engage in environmental protection if left to their own devices. Environmental protection and achieving environmental sustainability thus requires universal public goods provision, as well as regulations and "legitimate coercion", which can only be secured by countries' governments.

This dissertation began by comparing different countries in their environmental performance: Netherlands and Bangladesh in their response to natural disasters, Romania and Moldova in their water quality, and Japan and China in the air quality in their main cities. The main argument of this dissertation is that in order to understand the differences in countries' performance, we need to turn to characteristics that make states likely to commit to and reach environmental sustainability. Taking as a point of departure theories about states' political systems, this dissertation's focus has been on the connection between the institutions that guide the functioning of the input-side of political systems, which shapes preference aggregation in policy-making, and institutions that guide the functioning of the output-side of political systems, which shapes policy implementation. The interaction of institutions that shape the functioning of the input- and output-sides of the political system, this dissertation argues, to a large part determines how and whether states commit to and implement public policy programs, including environmental programs.

The aim of this dissertation has been to revisit existing theories positing that democratic governments carry the characteristics necessary to address environmental problems and reach environmental sustainability goals. I argue that in order to understand the political determinants of environmental performance the focus on democracy is insufficient and has to be accompanied by equal attention to

the quality of government, which, broadly, encompasses the absence of corruption, high rule of law and high bureaucratic capacity. Democratic institutions primarily account for the functioning of the input-side of political systems. They determine the rules for representation and peoples' access to political power and therefore influence decision-making based on the aggregation of preferences for sustainable development. They also influence the size of population entitled to receive such public goods that are related to environmental sustainability. At the same time, quality of government shapes government capacity to implement sustainable development policies. It defines how the decisions to distribute public goods are implemented and whether they are implemented at all. The interaction between the two sets of political institutions, I argue, overall shapes a country's ability to address complex problems, such as the challenge of sustainable development.

The articles in the dissertation compare how countries around the globe perform in addressing the sustainable development goals related to environmental sustainability set by the United Nations (United Nations 2015). More specifically, the five articles examine how democratic institutions interact with quality of government in delivering the different public goods related to environmental sustainability. The results support theoretical expectations that the effect of democracy on sustainable development outcomes is conditional on countries' ability to implement tasks and deliver public services. The results consistently show that more democracy is only beneficial for sustainable development outcomes when quality of government is high. This is true both for highly complex tasks, such as reduction of organic water waste or climate change mitigation and reduction of CO_2 emissions, and for less complex projects such as the provision of energy or climate change adaptation and preparation for future disasters. Coupled with an active civil society, democracy and high quality of government seem to also moderate the relationship between economic development and CO_2 emissions. This implies that democratic and largely uncorrupt countries with an active civil society have managed to decouple economic growth from the emission of carbon dioxide. For the delivery of public goods related to environmental sustainability, such as preparedness for natural disasters and high water quality, more democracy even seems to be detrimental if quality of government is low. As results from the case study show, in the absence of constraints, political leaders in democracies with poor-functioning institutions tend to focus on satisfying their own short-term interests rather than serving the interests of the public and, as a result, such democracies fail to deliver desirable outcomes to the people.

The state of the environment can depend on a multitude of factors, including economy, geography and demographics. The results of the studies included in this dissertation illustrate that even when accounting for other relevant expla-

nations of environmental conditions we experience today, politics still makes a difference. Democratic institutions do seem to contribute to higher environmental performance, however only on the condition of high quality of government. Theories suggest that democracies perform better because of the greater likelihood that environmental issues will appear on political agendas in democracies than in other regime types. The results of the studies included in this dissertation make an important specification: democracies can *only* perform better if their quality of government is high enough to secure the implementation of such long-term policies as environmental protection.

These results, however, do not imply that countries with other forms of government cannot ensure environmental sustainability. We evidence more and more individual examples of successful environmental reforms in authoritarian regimes: Singapore is one of the busiest and most densely populated, but at the same time, cleanest cities on the planet. China is continuously making reforms to implement environmental programs. The analysis in this dissertation does not neglect such cases. What the results instead show is that the actions of authoritarian regimes towards environmental protection have not yet been as systematic as actions of democratic states to reflect in the statistical results. The advantage of statistical analysis is that it helps us zoom out from isolated cases and success stories to see whether certain characteristics of political systems can make a difference globally. Given the state of the world as it is known now, it seems as if in general only democracies with high government quality have managed to achieve higher environmental performance than others and a combination of strong democratic institutions and high quality of government do seem to make a significant difference compared to alternative characteristics of political systems.

The contribution of this dissertation is two-fold. First, the dissertation contributes to the environmental politics literature by investigating the "black box" of the state examining the political institutions necessary for committing to and reaching environmental sustainability goals. Second, the dissertation contributes to the political science literature on the institutional determinants of public goods provision by emphasizing the necessity of considering the combination of institutions within the political system in the production of public goods and by extending the previous findings to a new, environmental domain.

The results have clear *policy implications*. To solve environmental problems today, a focus on solely amending the behavior of individuals in collective action problems or countries' behavior in global environmental regimes is insufficient. We need to understand state institutions and the interaction between them when designing environmental reforms as they shape the incentive structures of people's choices domestically and countries' choices in the international arena. In

particular, when committing to environmental reforms, decision-makers and policy advisers should pay particular attention to the quality of government and the level of democratic development of the countries in which the reform will take place. Simply adopting environmental policies and extending funding is not sufficient. Building the capacity of environmental agencies, strengthening environmental courts and reducing corruption in the environmental inspectorate should be necessary elements in any environmental reform.

It is beyond the scope of this dissertation to provide detailed recommendations on *how* to improve the quality of government for better environmental performance. We can infer from the existing literature that policy-makers should first and foremost target the incentives of the involved stakeholders, within and outside the government apparatus. For example, this can imply stimulating the incentives of bureaucrats to commit to long-term implementation by employing experts in the environmental agencies rather than political cronies, thereby securing their careers and salaries. It can also imply stimulating the long time horizons of political leaders by supporting the development of programmatic parties that have environmental agendas secured in their programs, or by strengthening the political opposition/independent judiciary to promote checks and balances. Any environmental reform should also place an emphasis on including experts who are aware of the breadth and complexity of environmental problems in decision-making procedures. The qualitative findings of this dissertation, however, emphasize, that including experts is not enough in the context of weak systems of checks and balances and the presence of corruption. Even the most knowledgeable public officials and advisers can face obstacles to their service if there is a powerful, unconstrained influence of interests that go against the needs of the environment over the political decision-making and politicians, in turn, can interfere in the functioning of the public administration. As elements of governmental quality are tightly interconnected in delivering the success of environmental sustainability projects, reforms should concern all relevant elements of governmental quality simultaneously.

The results of this dissertation also suggest that putting high hopes on the equally successful enviromental performance of all democratic governments is quite preliminary. While many Western democracies have shown examples of high environmental performance, the democratic regimes of Latin America and the democracies developed after the breakdown of the Soviet Union, lag behind. With the third wave of democratization giving hope for a "better" world, this dissertation reminds that weak quality of government limits democratic institutions. The articles in the dissertation provide empirical evidence that democracy is, at most, not sufficient for solving the complex problems, such as those related to environmental sustainability, that societies have to face today. This dissertation emphasizes

that this is because environmental issues are a particular challenge for democratic regimes. As decision-making in democracies *relies on* constant feedback between citizens' demands and governments' commitments and actions, democratic institutions are particularly suited to the provision of public goods and services that are quickly deliverable, have clear responsibility channels tied to countries' governments, and visible to an electorate, who can judge the performance of their governments. Quality of government, no doubt, benefits the provision of such goods and services. Yet, it is not a necessary condition for their delivery. Democratic governments, in some instances, can deliver some such goods and services without a particularly high governmental quality. However, slow-moving, invisible, highly complex environmental problems with uncertain tipping points require more than democratic institutions. They also require a set of political institutions that can guarantee their viability on the political agenda and secure implementation against the incentives for short-sighted behavior. This dissertation emphasizes that quality of government is a large and necessary part of this set of political institutions.

6.1 Avenues for future research

Future research can focus on conducting more qualitative enquiries into the mechanisms of the interaction patterns revealed in the different studies to provide policy recommendations as to which political drivers of poor environmental performance to target. For example, future studies can compare the performance of democratic regimes, with both high and low quality of government, against the performance of authoritarian regimes with high quality of government to conclude whether democracy is a necessary condition for high environmental performance at all. Due to the small number of authoritarian regimes with high governmental quality in the world today, it is currently impossible to conclude whether such regimes outperform the world's democracies on average, using statistical analysis. However, exploring the drivers of the successful environmental performance of authoritarian regimes and comparing these qualitatively to the drivers of success and failure in democracies can provide important insights into the sufficient conditions for successful environmental reforms.

The advantage of looking at the connection between underlying institutional conditions and the state of the environment is that such analysis allows investigation into how the broad features of political systems play out for environmental outcomes. A natural step forward can be to investigate the role of more narrow institutional conditions on environmental policy commitments and the effect of different decision-making procedures: whether democracy is presidential or par-

liamentary, the role of decentralization, the number of veto players, and party composition in parliament. Further research can also model the mediating effect of environmental policies and public opinion on the effect of democracy on environmental sustainability outcomes, as well as investigate the effect of different types of policies and policy instruments on environmental outcomes. Such detailed investigation can provide the opportunity to look for more precise mechanisms of democracy's effect on the environment and suggest a more narrow set of conditions favorable to stronger environmental performance.

The results of this dissertation show that quality of government matters for the performance of democracies. Therefore, politicians have reasons to intervene in the organization of bureaucratic agencies or transform institutions shaping the working of the executive branch (Dahlström and Holmgren 2017; Holmgren 2018). This implies that quality of government can be considered a mediator or a mechanism through which democratic rulers can achieve official goals (*e.g.*, Montinola and Jackman 2002; Shefter 1994). There is a vast literature, however, arguing that quality of government or state capacity precedes the establishment of democratic institutions, which implies that it is democracy that should be treated as a mediator in the suggested models (*e.g.*, D'Arcy and Nistotskaya 2017; Fortin 2012; Linz and Stepan 1996; Møller and Skaaning 2011). Without giving preference to either of the sequencing theories, in this dissertation I do not explore the mediating effects of either of the factors, instead treating them as interdependent and modelling interaction effects. Future studies can investigate possible mediation.

A broader puzzle that I stumbled across while writing this dissertation is what constitutes long time horizons of both authoritarian and democratic regimes. Long time horizons are not necessarily attributes of country leaders but rather a result of institutional configurations favorable to the adoption of policies aimed at long-term implementation. Future research can investigate which institutional configurations, both in autocracies and democracies, make governments more likely to credibly commit to policies that only bring results after a long time lag, such as environmental protection. While political stability has been found to matter for time horizons in authoritarian regimes (Wright 2008), we know very little about the prerequisites of long time horizons in democracies.

Environmental sustainability is a multidimensional issue and this dissertation only taps into a few of its components. As ecological systems are complex and each of the environmental sustainability goals is unique, plausibly requiring distinct combinations of governing approaches, we cannot safely assume that the results of the studies included in this dissertation are generalizable to other environmental sustainability goals. Future studies can test the hypothesis positing the interaction between democracy and quality of government on other aspects

of environmental sustainability, such as preserving biodiversity, the health of marine ecosystems, sustainable production and consumption, and the provision of clean energy. Such analysis can verify if the results of the studies included in this dissertation can be generalizable to other environmental sustainability goals, *i.e.* whether the combination of democratic institutions and quality of government is indeed suited to reaching all sustainable development outcomes related to environmental sustainability.

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Appendix

Division of countries according to democracy and quality of government dimensions in 2010

		Quality of Government (ICRG)				
		Above mean (>5.5)		Below mean (<5.5)		
Democracy (Electoral Democracy Index, V-Dem)	Above mean (>5.5)	Finland	France	Lithuania	Colombia	
		Iceland	Chile	Argentina	Panama	
		Denmark	Portugal	Turkey	Brazil	
		Austria	Spain	Mongolia	Suriname	
		Netherlands	South Korea	Trinidad and Tobago	Moldova	
		Sweden	Taiwan	Indonesia	Bulgaria	
		New Zealand	Slovenia	Philippines	Bolivia	
		Norway	Czech Republic	Peru	Albania	
		Canada	Croatia	Mexico	El Salvador	
		Australia	Poland	Uruguay	Burkina Faso	
		Germany	Hungary	Lebanon	Guatemala	
		Belgium	India	Ghana	Senegal	
		Switzerland	Slovakia	Costa Rica	Dominican Republic	
		Ireland	Greece	Serbia	Sierra Leone	
		United Kingdom	Namibia	South Africa	Liberia	
		Japan	Estonia	Jamaica	Mali	
		Cyprus	Latvia	Ecuador	Paraguay	
		United States	Italy	Guyana		
		Israel	Botswana	Romania		
	Below mean (<5.5)	Singapore		Ukraine	Gabon	Azerbaijan
		Malaysia		Zambia	DR Congo	Somalia
		Kuwait		Pakistan	Algeria	Cuba
		Morocco		Bangladesh	Cameroon	Iran
		Jordan		Guinea-Bissau	Uganda	Vietnam
		Tunisia		Tanzania	Gambia	Syria
		Oman		Cote d'Ivoire	Armenia	Myanmar
		Qatar		Nicaragua	Guinea	China
		Saudi Arabia		Iraq	Russia	North Korea
				Venezuela	Angola	Libya
				Sri Lanka	Yemen	
				Mozambique	Congo	
				Honduras	Niger	
				Kenya	Zimbabwe	
				Togo	Kazakhstan	
				Papua New Guinea	Sudan	
				Nigeria	Ethiopia	
				Malawi	Belarus	
				Haiti	Madagascar	
				Thailand	Egypt	

Note: The table was produced using Quality of Government dataset, version jan17 (Teorell et al. 2017) and Varieties of Democracy dataset version 7.1 (Coppedge et al. 2017)