

The Institutional Foundations of Sustainability: What Can We (Not) Learn from Positive Political Economy?

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Abstract

This article offers a critical synthesis of the positive political economy literature on political institutions from the perspective of sustainability. We consider a socio-economic system sustainable if it allows humans to live lives they deem meaningful and is capable of renewing itself over extended periods of time. Institutions that maintain order, reduce conflict, and allow collective decisions to be made lay the foundation for economic development. However, such development is often unsustainable in the long run without levels of cooperation and foresight that today's political institutions usually do not achieve. Sustainability requires policies that do not corrode natural capital over centuries and millennia, governance across multiple scales of decision-making, and strategies to deal with exceptionally high levels of complexity. The core of our argument is that the political institutions of the state deemed successful for promoting order and growth are too competitive to meet these particular challenges on their own. We call for political economists' attention to complementary institutional arrangements that can address these challenges. Conversely, we find that the sustainability literature is insufficiently grounded in the positive political economy theory of the state. We therefore offer suggestions for how these two fields may better heed one another.

Keywords: sustainable development, sustainability, politics, political science, political institutions

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1 Introduction

Socio-economic systems can be considered *sustainable* if they are capable of meeting human development needs – broadly defined, enabling meaningful lives – while protecting the earth’s life-support systems. We address the question of how political institutions at national and sub-national levels affect societies’ sustainability. Institutions are rules that, if followed, regularize behavior. The type of behavior that institutions promote has profound effects on the ability of individuals and communities to lead meaningful lives without undermining planetary life-support systems.

How do political institutions shape sustainability? As a step toward answering this question, we offer a critical analysis of what the large body of literature on political institutions in mainstream, positive political theory can tell us about sustainability and juxtapose it to the large literature on environmental governance. In positive political theory, institutions are the equilibrium of a game in which people attempt to regularize social situations (Calvert, 1995). In considering the effect of these institutional equilibria on society, most political economists are not concerned with sustainability, focusing instead on economic growth or the immediate provision of specific public goods. This article aims to identify properties of these institutions that are critical for sustainability, and in so doing offers hypotheses for future research.

We recognize that scholars have written extensively about the institutional basis of sustainability. Different fields have contributed important answers to the question of how institutions help, or more often hamper, the goals of sustainability. For one, the literature on international institutions highlights the lack of appropriate institutions at the international level to elicit adequate cooperation (Walker et al., 2009) and the ingredients of successful treaties (Barrett, 2003). At lower levels, two related strands of the literature examine the role of decentralization (Larson and Soto, 2008) and of property rights regimes on the maintenance of forests, irrigation systems, and fisheries (Schlager and Ostrom, 1992; Alston, Libecap, and Schneider, 1996; Agrawal, 2001). The governance literature investigates the role of policy networks, leadership, trust and organizational structure, emphasizing adaptive management and social learning (Folke et al., 2005).

However, these studies mostly stand separate from the positive political theory literature on national institutions. In this article, we bring them closer together. In the last decades, positive political theory has made substantial progress in clarifying the role of national institutions in providing the conditions for peace and development, an essential ingredient of sustainability. One of the central findings is that functional states

– states that guarantee stability and provide security of self and property – require high levels of economic and political competition (North, Wallis, and Weingast, 2009). Institutions that support this competition include elections, checks on the executive, constitutional safeguards on individual rights, and open and competitive markets. As the mainstream body of work on positive political economy makes clear, these forces are necessary to ensure political stability and order. In doing so, they contribute to certain aspects of sustainability. Since they free people from violence and enable investment and growth, they promote many human capabilities. In his work on famines, Sen (1983) has shown that democracies better protect citizens from the impact of natural disasters. Being responsive to broad segments of the population, such states also invest in human capital, such as health and education. This further increases human capabilities, while triggering a decline in fertility rates, a positive trend for sustainability (Sen, 2013).

And yet, we argue that this competition is at odds with the scale of cooperation that we need given the interdependence of our actions, embedded as we are in ecosystems and industrial systems. These competitive forces explain many difficulties in finding comprehensive ways of addressing the challenges of sustainability. The human development enabled by modern political institutions is often unsustainable in the long run because of three difficult problems: the long time horizons over which human-environment dynamics unfold, the multiplicity of geographical and political scales, and the exceptionally high levels of complexity that we confront as a result of having to manage both natural and social systems, as well as their interactions.

Even the most advanced and successful political institutions do not meet these three challenges, but for reasons that previous research has not clearly identified. Political and economic competition undermine our ability to set long-term horizon problems on the political agenda, agree on policies about them and implement them consistently over time. Multiple social and geographic scales require high levels of coordination and cooperation, but contemporary political institutions do not incentivize coordination and cooperation across jurisdictions. When new institutions are created to solve the problem, difficult issues of accountability and representation emerge. Finally, the high levels of complexity that are common in governance for sustainability require an emphasis on robustness and adaptation. By means of examples, we show how the competitive dynamics of today’s political institutions can have the opposite effect of undermining robustness and discouraging adaptation. To our knowledge, this article is the first to consider the interactions between the competitive foundation of economically successful political systems and the three challenges

of sustainability listed above, thereby highlighting the sustainability costs of competitive institutions.

Recognizing this tension between competition and cooperation, we propose that the institutions that effectively solve the problems of conflict and instability have to be *accompanied* by complementary institutions that can foster cooperation on the scales at which we need it. A fruitful way forward may thus be to examine the *interaction* between the basic and competitive institutions of the state and the aforementioned hybrid regimes of environmental governance or the variety of local institutions for resource management, as these may already offer partial solutions to the problems posed by competition.

We provide two empirical illustrations of the role of political institutions in sustainability, one on drylands management and the other on renewable energy. In the case of drylands, strategies of state building and modernization, coupled with misleading models of the sustainability of these ecosystems and non-inclusive political institutions, have undermined customary land use institutions adapted to maintain the resilience of drylands. In Denmark, the traditional institution of agricultural cooperatives accounts for the enduring and widespread support for wind energy. More broadly, the Danish case gives us a concrete example of how certain institutional arrangements can help further cooperation between governments and civil society and promote long-term social change.

Section 2 serves as a background section, in which we summarize the mainstream approach of political economists to the study of political institutions and highlight what we see as its fundamental contribution to sustainability. Section 3 and 4 form the core of the article. Section 3 delves into the salient characteristics of sustainability that challenge political institutions. In synthesizing and evaluating arguments for why our political institutions are insufficient, we bring into dialogue the political economy literature with the scholarship on institutions and sustainability. Section 4 presents our case studies and relates them to our arguments. We conclude with some suggestions for future research.

2 The Study of Political Institutions: Insights from Positive Political Theory

The study of political institutions is based on three foundational problems of social action: the inconsistency and instability of collective decisions, credible commitment, and information scarcity. In the literature, political institutions are considered successful if they solve these problems and thus tame violence, enable some degree of cooperation, and promote economic growth. We consider the order provided by these institutions to be a minimal condition for sustainable development. Yet, the political institutions currently

deemed successful are premised on a logic of competition that ultimately allows too little cooperation to address the challenges of sustainable development.

We focus on the *effects* of political institutions on societal outcomes, ignoring the mechanisms by which these institutions came into being. In particular, we do not claim that political institutions were initially designed to solve the problems they actually solve. Political institutions may emerge both from the interests of specific groups, strategically advanced in the creation of institutional structures, and from the many contingencies shaping their unforeseen effects and their evolution over time (Streeck and Thelen, 2005). The origin of institutions lies too in the ideas of a time, within the cognitive bounds of actors (Aoki, 2001). For these reasons, the endogenous nature of institutions does not preclude a meaningful analysis of their effect.

In what follows, we discuss the political institutions of the modern state. We define these institutions as the basic rules of decision-making and the selection of leaders. Examples include electoral rules, checks and balances, the powers of the judiciary, and constitutional safeguards on political liberties. Most modern states are liberal democracies, but cases such as Singapore show that an authoritarian regime can also have many features of the modern state. To maintain a sharp focus, we deliberately exclude international institutions from consideration.

2.1 Taming Violence and Enabling Investment

Historically, economic growth has been associated with political stability based on institutions that provide leaders with incentives to uphold order while exercising restraint in the use of power (Acemoglu, Johnson, and Robinson, 2005). Understanding what kinds of institutions durably provide these incentives has required understanding the mechanisms triggering violent conflict and the challenges that arise in the organization of coercive power.

Modern political science analyzes violent conflict as arising from a failure of actors to resolve their disputes via peaceful bargains (Przeworski, 1991; Bates, 2001). Disputes that can trigger violence occur of course on all levels of economic and political life: the temptation to predate on others' investments, the division of payoffs from collective undertakings and tradeoffs between competing policies. The anticipation of violence and of the lack of durability of agreements is the first roadblock to development. In the broadest term, states alleviate the threat of violence by centralizing decision-making authority and enforcement

power. Their relative success in doing so and translating increased order into broadly distributed prosperity depends in systematic ways on the institutions that constitute the state.

The centralization of power can create order because it offers a solution to three fundamental sources of instability that affect collective agreements and hamper peaceful bargains. The first of these is demonstrated by the “chaos results” of political science: under most conditions, there exists no rule for translating a set of demands into a collective choice that yields a stable outcome (e.g. McKelvey, 1979). As a result, in environments without institutions, multilateral alliances are typically volatile and agreements short-lived. One solution is to limit the set of options by centralizing and structuring decision-making (Shepsle, 1979).

The second challenge is that of credible commitment (Miller and Hammond, 1994; Acemoglu, 2003). A non-credible commitment is a promise that is unlikely to be held in the future, given likely changes in circumstances. For example, two owners of assets could agree to respect each others’ property. If one of them accrues more wealth in the future, gaining in power, he may be tempted to renege and predate on his neighbor. In medieval Europe, for example, lords fortified and created armies as trade and manufacturing expanded (King, 1994). Since such activities drain resources, elite members may find it worthwhile to submit to a hierarchical organization in which one member of the elite is responsible for policing. The centralization of coercive power eliminates the option of predation, which offers an explanation for why, during the feudal wars of the 11th and 12th century, lords agreed to increase the influence of royal courts in both England and France (Duby, 1987).

The third challenge in making collective agreements is that of information scarcity (Greif, Milgrom, and Weingast, 1994; Epstein and O’Halloran, 1994). With incomplete information, it is difficult to monitor compliance with agreements and the relative power of different actors. Without some institutional means to facilitate monitoring, agreements may never be made, or, if made, easily break down, possibly degenerating into feuds.

The traditional form of the state, spanning much of past as well as contemporary societies, is a small elite organization that centralizes the use of violence to facilitate cooperation between its members (North, Wallis, and Weingast, 2009). The traditional state spans a great variety of institutional forms, from a single executive player with no consultative body to large parties with sophisticated bureaucracies. Indeed, the larger the dominant coalition, the greater the need for rules specifying the terms of the cooperative pact

between its members and facilitating mutual monitoring (e.g. Myerson, 2008). Despite their variety, a common characteristic of these political institutions is that they are based on a logic of exclusion and rent-seeking. It is by manipulating privileges and distributing rents from the control of activities that the pact between members of the elite, and thus order, is maintained.

This traditional means of ensuring order allows investments by those in the dominant coalition and can lead to some growth (Olson, 1993). However, much of the effort of the state is directed towards maintaining its hold on power via the continued distribution of privilege to its supporters. As a result, rent-seeking is rampant and innovation, which upsets the status quo, sluggish. Most importantly, such states are fragile because the stakes of access to power are extremely high: all issues are determined by the same set of individuals and while commitments may be credible between members of the compact, commitments to the rest of the population are not, and predation by the state on private individuals is frequent.

The modern state is based on a different logic, one rooted in open competition. It is based on a popularly understood constitution that comprises inclusive individual rights, procedural rules constraining the state's use of power, and competitive access to positions of authority (North and Weingast, 1989; North, 1990; Wittman, 1995; Mittal and Weingast, 2013). Together, these characteristics offer robust solutions to the three challenges to peaceful bargains. Coercive power remains centralized, which as we have seen offers commitment power to private actors. However, decision-making authority is typically fragmented, across committees of legislatures, and as a function of the distribution of veto players. Decisions are thus more circumscribed, which lowers their stakes, and also limits the instability of collective decision alluded to earlier. The popularly understood constitution creates a common understanding of the proper limits to the exercise of power, while open competition creates the incentives to monitor different actors' use of power and puts some limits on the rents that accrue to those in office.

Because these institutions successfully protect what groups of citizens fear losing the most, no coalition attempts to pursue its interests through extra-constitutional means (De Figueiredo and Weingast, 1999). Whereas the traditional state was vulnerable to external changes, such as small variations in the relative power of groups, the competitiveness of access to power also allows the system to adjust to perturbations threatening the equilibrium of interests (Mittal and Weingast, 2013). The result is that in systems featuring true open competition in the exercise of power, peace tends to be durable and property protected, allowing

for long-term private investments by most if not all societal actors.

2.2 Enabling Cooperation

The modern state can avoid violent conflict and commit to the protection of private property, but how does it fare in enabling cooperation more broadly? Cooperation can be sustained in repeated interactions through reputation and norms of reciprocity, but this mode of cooperation easily breaks down when interactions are sparser and when monitoring is imperfect (Axelrod, 1997). Scholars of political institutions maintain that centralized coercive power, if not used arbitrarily, can solve this problem by helping actors commit to their agreements (Hardin, 1968; Olson, 1993). Hierarchies also have the means of solving the informational problem behind cooperation. A centralized authority with enforcement resources can elicit the information necessary to determine mutually profitable levels of contributions to the joint cooperative effort (Green and Laffont, 1977). It can also invest in monitoring behavior, solving the informational aspect of the commitment problem. Beyond these generic properties of hierarchies, modern states possess legal frameworks that supports the creation of organizations outside of the state (North, Wallis, and Weingast, 2009), thus expanding the opportunity for forming cooperative alliances in society.

Despite the improvements in collective productivity afforded by the modern state, the cooperation it enables is limited relative to what is required to meet the challenge of sustainability. As explained in the previous section, stable and robust polities that deter violence are based on a logic of competition between diverse interests. The institutions of these states can enforce contracts among economic actors, but they usually do not lead to optimal collective decisions within government (Miller and Hammond, 1994). While there are gains to collective agreements, there also are incentives to invest in promoting one's strategic position and undermining that of others. Below, we examine how this affects sustainability challenges, given their specific properties.

Settings in which competitive forces put limits to cooperation abound. A prime example is that of electoral competition, which leads political parties to focus on shaping their platforms in order to maximize their probability of winning office. While this process is thought to make parties responsive to the wishes of the electorate, it can also create incentives to polarize policy platforms, diverting from bipartisan initiatives. Trubowitz and Mellow (2005) show this empirically for the American Congress, where periods of bipartisan policy-making coincide with periods where moderate voters were key to the alliances of politicians.

Political competitiveness can also lead politicians to *divide* public opinion, manipulating beliefs to create support for specific platforms, sometimes pitching members of the citizenry against each other (Glaeser, 2004). In a dynamic world, electoral incentives create additional problems. Because everyone knows that future electoral competition will trump any promises made today, certain socially efficient policies may be impossible to undertake and policy may be distorted today because it affects who wins in the future (Besley and Coate, 1998; Moe, 2005).

In the economic domain, the highly competitive business environment of many modern democracies makes coordinating businesses to undertake publicly valuable actions, such as investing in the skills of the workforce, difficult. Culpepper (2001), in comparing workforce reforms in European countries, shows that it is possible to create cooperation among businesses, but this requires deliberate actions by the government. There is also increasing evidence that political institutions can, over long periods of time, exert an influence on the *culture* of cooperation among citizens. By culture of cooperation, we refer to the proclivity of citizens to sustain cooperation in the absence of hierarchy and reputational incentives. Institutional settings favoring large markets and impersonal exchange, such as the modern state, seem to increase people's willingness to support cooperation among strangers (Marlowe et al., 2008; Henrich et al., 2010). However, when the state systematically takes over the management of various public goods, the culture of cooperation can be crowded out (Frey, 1997). Because research on the feedback between institutions and the culture of cooperation is still in its infancy, the question remains open as to the potential to expand cooperation within the competitive institutions of the modern state.

3 Sustainability: Three Difficult Challenges for Political Institutions

We have thus seen that the competitive institutions of the modern state are a key ingredient of peace. By offering stability, they also permit individual investments, and thus economic growth, some degree of cooperation and the safeguard of individual rights. In turn, a multitude of interest groups form and sustain the competitiveness of institutions. Where it has prevailed, this political model has advanced many aspects of sustainability. We have already mentioned the increase in human capabilities. On the environmental front, (Bohn and Deacon, 2000) show that political regimes under which property rights are secure often slows down deforestation.

Yet, sustainability puts additional demands on the political order. Ecologists have shown us that our

actions are interconnected to a great degree. Our inability to heed these interconnections results in the misuse of natural resource systems. While substantial, the degree of cooperation enabled by the institutions of the modern state is insufficient to tackle some of the key features of sustainability problems: long time horizons, multiple political scales, and exceptionally complex dynamics. In what follows, we explain why these features are particularly challenging for current institutions. These challenges, and the difficulties they pose to political institutions mean that an approach to sustainable development that focuses on the search for better policies is incomplete (e.g. Hallegatte et al., 2012), especially approaches that focus entirely on fixing market failures: as we show, there are particular political failures we must attend to. To be complete, the quest for structuring sustainable socio-economic systems must address the need for better political institutions, institutions that are able to identify, collectively choose and implement these policies. We conclude that complementary institutions are needed to address sustainability problems. These would complement the basic competitive institutions of the modern state that so successfully secure the boundary conditions of order outlined above and the fundamental procedural rights gained in the process of building state institutions.

3.1 Long Time Horizons

Many of the biophysical processes that humans now shape feature long-term dynamics. Change is typically cumulative and small changes may take decades to cumulate in a crisis. Conversely, restoring a degraded system function or component may require effort sustained over decades or more. Simply stabilizing greenhouse gas emissions now requires us to approximately halve emissions, and it may take 50-70 years to overhaul an energy system (Victor, 2011). In addition, some long term changes are also irreversible. For example, different fractions of the carbon dioxide emitted in the atmosphere are absorbed on different time scales, ranging from decades to millennia, implying that climate change is to some degree irreversible (Archer et al., 2009).

For some issues, we can estimate the time profile of costs and benefits. Others entail such long-term horizons that we are only able to form very subjective perceptions of risks, as is the case of the management of nuclear waste. Politically, the time dimension of these phenomena imply that the distribution of costs, benefits and subjective risks varies over time and repeatedly change in response to past actions. These characteristics lead to a number of political challenges that current institutions are not necessarily well

equipped to address. We identify some of these institutional shortcomings at the three phases of the policy process: agenda setting, choice of policy and policy implementation.

At the agenda-setting stage, a key question is who has the ability to promote a long-term problem on the political agenda. By definition, problems not yet on the political agenda are not salient to voters. Championing a response to them is not an attractive policy for politicians due to the informational characteristics of long-term sustainability issues. Since such issues often require certain costs today for uncertain benefits in the future, it is difficult to credibly frame intervention on such issues as having clear benefits for voters (Jacobs, 2011). The issue of nuclear waste provides an illustration. In virtually every country, governments promoted the development of nuclear energy before the problem of waste management had even been researched. In most countries, nuclear waste legislation emerged several decades after the launch of the first commercial reactors (Berkhout, 1991). The intractability of the waste problem has either resulted in a moratorium on nuclear power, or postponement of the waste problem.

Focusing events are often necessary to draw attention on an emerging issue, especially if the latter cumulates slowly over time (Kingdon, 1984). In the case of climate change, natural disasters tend to raise the political profile of the issue (Liu, Lindquist, and Vedlitz, 2011). However, relying on spontaneously occurring events is unsatisfactory due to the irreversibility of many dynamical systems. For example, a coastal flood could indicate that sea-level rise has already occurred. Institutions such as the Intergovernmental Panel on Climate Change may be able to institutionalize focusing events, by regularly providing high-profile information. Similarly, international negotiations, or rulings by High Courts, may force an issue on domestic political agendas.

Long-term horizons also exacerbate the difficulties of policy choice. First, voters and other political actors may discount the value of long-term policies because they do not expect these decisions to be time-consistent and to reliably lead to desired outcomes (Jacobs and Matthews, 2012). Institutions of both deliberation and of commitment are often missing to coordinate expectations in order to minimize the costs of transitions (Rodrik, 1991). Second, wherever the political system allows fragmented and unequal representation of interest groups, special interests promote policies that shift future burdens unto other groups rather than investing in collectively beneficial solutions (Jacobs, 2011), as seems to be the case in many instances of fisheries policy (Botsford, Castilla, and Peterson, 1997). Finally, the case of nuclear waste reminds us that

the more subjective the assessment of risk, the harder it is to build the trust necessary to agree to irreversible collective investments for solving a problem.

In the implementation stage, the chief difficulty is political commitment. This can be made difficult when, to obtain enough support, politicians formulate policies with too many divergent goals. Green industrial policy, for example, usually promises job increases, profitability and environmental returns. Failure on one front can undermine the legitimacy of a policy that performs well on another (Rodrik, 2013). Reform processes also need adjustment in the face of changing circumstances and dynamic coalitions. For example, many renewable energy technologies become more competitive as their share increases (Lipp, 2007; Aklin and Urpelainen, 2013). At the same time, Cheon and Urpelainen (2013) show that the influence of industrial sectors on countries' energy policies depends on the interaction between the sizes of groups respectively supporting and opposing further growth.

Because of the central importance of interest groups, popular governance frameworks for sustainable development, such as ecosystem-based management or transitions management, have stressed stakeholder involvement and consensus. They tend to yield more horizontal networks of decision-makers. Recent assessments of eco-system based management conclude, however, that the agreements stakeholders come to often lack ambition and easily unravel due to small shifts in power over time in the coalitions that sustain them (Layzer, 2008). The question institutional analysts thus need to address is how to organize a structure of authority that can accommodate changes in coalitions over time, or makes them less likely.

The long-term dynamics that sustainable development must grapple with seem to require that we institutionalize the long-term because competitive electoral politics often fail at all three stages of the political process. This may involve we more systematically consider the long-term impacts of policies, for example thanks to a constitutional principle. It may require that we forge institutions that can implement reforms gradually, while broadly distributing their benefits in order to fuel further support, as illustrated by the successful deployment of wind energy in Denmark.

3.2 Multiple Spatial and Social Scales

The management problems in sustainable development rarely fit within pre-existing political jurisdictions. This could be fixed by horizontal coordination between jurisdictions. Additionally, problems of sustainable development also occur at multiple levels of geography and social organization – coordination of a vertical

kind is thus also desirable. The multiplicity of horizontal and vertical interactions is typical of problems in sustainability, which creates a need for political organizations to coordinate and cooperate (Ostrom et al., 1999; Ostrom, 2012). For example, a wind farm yields profits to the individual owner, while creating local nuisances that spread beyond the individual owner and environmental benefits that accrue to the world as a whole (Toke, 2002; Vasi, 2011). In most countries, the difficulty of harmonizing these three scales is a stumbling block in the development of wind farms. The example of Denmark shows that the presence of institutions that successfully reconcile these scales can make an enormous difference in society's ability to implement environmental reform.

Yet, coordination between political jurisdictions seems difficult to sustain, as illustrated by the European Union's failure at coordinating a fisheries policy. Different political jurisdictions – in this case, European states – have different political incentives and limited ability to influence outcomes in other jurisdictions. Reasons for cooperation failure abound. First, institutions may lack capacity to allocate resources to that activity and lack knowledge about activities and capacities in other jurisdictions. Second, there may be little incentive for political actors to address issues that are not circumscribed to the constituency that elects them. Third, the focus of political actors may be on competition for resources from the central state. Finally, there may be opposition to sharing decision-making power, especially from the central state when it seeks to consolidate authority, as illustrated by our case study of drylands management.

Lack of capacity to cope with multi-level and transboundary problems often prompts the creation of new, issue-specific jurisdictions. In fact, multi-level management problems have mushroomed in all areas of public life. In the United States, for example, the number of special districts dealing with specialized public goods has risen from 12,340 to 35,356 between 1952 and 2002 (Hooghe and Marks, 2003). Redefining authority to fit the scale of a sustainability problem is increasingly associated with some degree of “co-management,” defined as the sharing of responsibilities and decision rights between public authorities and private stakeholders or civil organizations. Such institutions have a good record in small-scale common pool resources, such as local fisheries management, and evidence about the factors contributing to their success is increasing (Gutierrez, Hilborn, and Defeo, 2011). Traditionally, many local resource management institutions were autonomously created by users of ecological resources, without the intervention of government. Such institutional systems usually consist of a property regime and rules for collective decision-making.

These tailored systems often compare favorably to systems entirely devised by official governments, as indicated by statistical studies of many small-scale resource systems around the world (Poteete and Ostrom, 2004; Gutierrez, Hilborn, and Defeo, 2011). Being fit to the dynamics of the resource, they can learn and develop the capability to respond to environmental feedbacks and surprises faster than do centralized agencies (Folke et al., 2007).

Letting new entities proliferate freely creates new problems, however. Other externalities may be ignored, important groups excluded, or a lower or higher level of decision-making forgotten. The scale of management may shift over time, as when a dam is built that creates new linkages between upstream and downstream inhabitants of a river catchment. Recognizing this, some researchers have highlighted the potentially constructive role of what is now called “bridging institutions,” such as municipal offices with the mandate to coordinate the efforts of various organizations and ensure their compatibility (Olsson et al., 2007). These are institutions whose mission is to continuously link institutional actors, allow information to circulate and prospect for potential synergies. Ideally, they also hold the capacity to rapidly mobilize the right stakeholders when a new problem arises. Of course, other ways of stirring and leveraging the multiplicity of decision-making institutions may exist or be invented.

The proliferation of new centers of authority raises important questions about the exercise of public authority. Are the centralized institutions of the state similarly committed to enforce agreements forged by these newly created special-purpose institutions? Is official backing by the executive branch necessary for success? Case studies have demonstrated that agreements arising from ecosystem-based management in the United States were not transcribed into law and, possibly as a result, often short-lived (Layzer, 2008).

Competitive access to power and a shared conception of the constitutional bounds of power are important ingredients to check the use of power. When new tailored institutions arise, what defines the legitimate use of their authority, and what are different individuals’ rights to be involved in decisions (Mikalsen and Jentoft, 2001)? Little is known about how our uncoordinated attempts to construct structures of control adapted to the varied scales of the problem we confront in turn affect power dynamics, accountability and democratic values. For example, Dingwerth (2005) considers the case of an innovative governance mechanism, the World Commission on Dams, and notes that the ability of a small, elite group of insiders to decide on who may participate in the proceedings undermined the accountability, inclusiveness, and legitimacy

of the mechanism. In this case, a new mechanism solved some of the problems that prevented traditional cooperation among states but created a host of new issues that were never resolved. Future research should more explicitly examine the interaction between multi-level special purpose institutions, and the traditional branches of government (executive, legislative and judiciary). We need to know whether they can complement each other, one potentially improving the fit of policies to context, increase consensus and share information, the others offering procedural checks, commitment, and resources.

3.3 Complexity

In the Northern Highland Lake District of Wisconsin, there are over 7,600 lakes fished by hundreds of thousands of humans. The dynamics of this landscape unfold over multiple spatial and temporal scales, with surprising outcomes (Brock and Carpenter, 2007). Daily, lake dynamics are interlinked by the mobility of the fishermen. If fishing is poor on a given lake, they can move. Yearly, the housing market responds to lake quality, luring or repelling residents. The landscaping and clear-cutting activities of these residents in turn slowly reduce fish habitat, which take decades to recover. With smaller habitats, the fish populations become more vulnerable to collapse. The interaction of these processes and the fishing practices of residents lead to rapid shifts in fish stocks, sometimes triggering waves of fish stock reduction across the landscape.

The example shows that biophysical and human systems form complex adaptive systems (CAS), a class of complex systems in which “patterns at higher scales emerge from localized interactions and selection processes at lower scales” (Holland, 1995). Since problems of sustainability are often found at the interface of social and ecological systems, they usually feature CAS. Climate change, biodiversity diversity, land use, and persistent organic pollutants are but some examples of issues with CAS front and center of the problem. While many other social issues are related to CAS, the ecology-society interface in the field of sustainability increases the frequency and degree of complexity to an even higher level. We consider one reason why the political institutions of the modern states may have limited ability to deal with the challenge of governing CAS: they often do not sufficiently bolster the robustness of socio-ecological systems. The reason is that they tend to simplify reality, and promote certain messages at the expense of the diversity of viewpoints and solutions that is needed for successful adaptation.

CAS share dynamic patterns that challenge institutions seeking to manage them. First, these systems typically have multiple regimes. External shocks can cause the system to shift from one regime to the next.

They are also subject to abrupt change due to slow dynamics internal to the system that push the system towards another regime. For a long time, there is no association between the slow change and the system state. Agents and observers are surprised when the system flips, for example from lush savannah to desert (Scheffer, 2009). Finally, change is often irreversible. As one reverses the trend responsible for the regime change, the return trajectory differs.

Complex systems theory has established that to manage CAS, we must strive to increase their robustness rather than optimize an output or fend off a specific external threat (Levin, 2007). Robustness refers to the capacity of a system to function despite perturbations. This is achieved by withstanding some perturbations and adapting to others. Several system properties contribute to robustness, with different case-specific implications than those arising from a focus on efficiency (Levin, 2007; Krakauer, 2006). The concept of robustness is central in the sustainability literature, which emphasizes policies and strategies that would increase robustness. But do the political institutions of the modern state produce policies that enhance the robustness of socio-ecological systems?

Robustness requires constant adaptation. Just as diversity is the engine of adaptation in biological systems, so too is diversity key for social adaptation (Page, 2010). Thus, building robustness compels us to consider a diversity of alternative models of the systems we seek to manage. In the NHDL example, ecologists have shown that because of the multiple temporal scales, when decision-makers only consider one model and institutional solution, they will lead the system astray, even if they monitor and rationally update their estimates. Key to robustness in this context is active experimentation and iterative consideration of alternative models and policies. For this reason, some form of deliberation is a necessity. Political scientists have so far analyzed the question of whether or not deliberation is desirable under the assumption that actors have to deal with simple forms of uncertainty (Austen-Smith, 1990; Humphreys, Masters, and Sandbu, 2006). Instead, we should focus on how deliberation could be structured to leverage the cognitive diversity of actors without heightening the conflicts that stem from diverging values.

Modern democracies far outperform previous forms of governance in their ability to promote experimentation of a diversity of solutions to complex social problems (Knight and Johnson, 2011; North, Wallis, and Weingast, 2009). Within the large category of democracies, federations may be more adaptive than unitary states. Bednar (2008) explains that the sub-units of federations, in their form from the union, may regularly

upset the rules of the federation. This promotes experimentation with the institutions of the state. In turn, the greater variety of safeguards in federations, against usurpation of authority, ensures that these experiments are filtered, the worst being vetoed and sanctioned by other players. While societies have made important strides toward allowing the diversity of ideas that is necessary for adapting to complex dynamics, we argue that the challenges of sustainability require that we pay direct attention to the performance of institutions on that front and seek ways of bolstering it. Indeed, the following examples illustrate how political institutions often have the opposite effect of reducing cognitive diversity and undermining robustness.

Anderies, Ryan, and Walker (2006) analyze the slow decline in robustness of a large catchment in Australia, highlighting the interplay between ecological change and the response of institutional actors. After Europeans converted the landscape from deep-rooted to shallow-rooted vegetation, the water table slowly rose and the system became more vulnerable to dry and wet periods. In response, agricultural groups requested and obtained support for building irrigation and reservoir infrastructure to maintain the productivity of their activity. The authors' analysis shows that these responses to resource degradation – aimed at maintaining the productivity of the very activities driving the problem – caused the system to become increasingly vulnerable to unusual weather spells, as high water tables lead to acute soil salinization. Robustness declined, as the set of system states that could be achieved by affordable changes in management shrunk over time, gradually reducing the set of feasible future courses of action. This suggests that the interest groups mobilized to respond to the threats they themselves created, may respond by searching for patches that further rigidify the system, and decrease its robustness. In this case, it is the ascendancy of incumbent interest groups that reduces robustness, which could be alleviated by allowing the participation of a much broader set of stakeholders and of potential new groups of users of the resource.

The state's mechanism of control may also lead to ecological vulnerability. Scott (1998) provides numerous examples of how the state, through its central bureaucracies, simplifies the world to make it legible at the scales of its accounting and monitoring, leading to homogeneous policies that are blind to context. Yet, systems often become more vulnerable when policies are homogeneous. Going back to the NHDL example, ecologists have shown that fishing policy (e.g. limits on catches) must be spatially diverse. Our case study on drylands also illustrates this point. The traditional mobility of herders in the landscape provided micro-levels responses to the extreme spatial and temporal variability in dryland resources. The building of

centralized states, however, has in many regions suppressed this local-level variability in natural resource use patterns. The multiplication of public authorities discussed above may be a healthy antidote to the homogenization tendency of the central state (Folke et al., 2007), greatly enhancing the adaptive capacity of political institutions.

4 The Sustainability of Drylands: Illustrating Institutional Failure

This section offers a brief illustration of the challenges that sustainability poses to political institutions in the case of the sustainability management of drylands. The drive to establish order, the habit of using simple frameworks to understand complex systems and the lack of pluralism in relatively autocratic systems together contributed in several regions to increasing the vulnerability of drylands and their populations to drought and desertification.

Accounting for over 40% of the Earth's land surface (Millennium Ecosystem Assessment, 2005), the case of drylands is important. The current variability in the sustainability of drylands is also informative, as this variability is traceable to patterns of land use, which are themselves traceable to political forces. In addition, dryland ecological dynamics are complex, with both short-term fluctuation and long-term trends, the potential for irreversible degradation and different challenges arising at different spatial scales.

4.1 Background

Drylands are zones where water is scarce. These are zones where the ratio of mean precipitation to mean potential evapotranspiration is less than 0.65, which implies that evaporation and transpiration from plants usually balance precipitation, yielding a dry environment. They comprise savannas, grasslands, shrublands and deserts.

The long-term degradation of drylands is called desertification. The extent of desertification is highly uncertain but estimated at 10-20% of dryland area, which spans the equivalent of twice the area of India (Millennium Ecosystem Assessment, 2005). Desertification is difficult to assess because these ecosystems exhibit dramatic fluctuations in rainfall and vegetation production, including extended periods of drought (Herrmann and Hutchinson, 2005). These areas can thus go through spells of very low productivity, yet rebound to high productivity once the rains come back, as has happened in the Sahel. This resilience of drylands to drought can be slowly lost when the hydrographic balance is changed by water infrastructure,

when there is excessive pressure on soils and vegetation during dry spells and when these fragile soils are put into cultivation (Geist and Lambin, 2004; Okin et al., 2009).

Currently, about 38% of the global population lives in drylands, mostly in developing countries. Most drylands are used for grazing animals, and almost 80% of the Earth's grazing area lies in drylands (Asner et al., 2004). Within dryland biomes, livestock herders are located in the most stressed regions. This stress includes both more aridity, poorer soils, and greater temporal variability of the environment (Asner et al., 2004). Dryland populations lag behind on most socio-economic indicators relative to their respective national populations (Millennium Ecosystem Assessment, 2005). The sustainable development of drylands requires us to pay special attention to the resilience of these ecosystems to drought, and the opportunities of mobile pastoralists to improve their livelihoods. These two aspects of the system are clearly coupled and driven by political forces (Geist and Lambin, 2004; Fernandez-Gimenez and Batbuyan, 2004; Sneath, 1998).

4.2 Traditional Institutions and Drylands Management

In many areas of the world, the traditional institutions of pastoralists have managed drylands sustainably over long time horizons by solving the problems of complexity and multiple scales. These institutions allowed for the mobility of humans and animals, which seems to be key to the resilience of both ecosystem and people. Because the carrying capacity varies enormously in time and space, mobility allows herders to adapt to variation in aridity without increasing the pressure on constant land units, which would undermine the long-term resilience of the system (Herrmann and Hutchinson, 2005). Indeed, field studies in Inner Asia show that the resilience of these ecosystems is more a function of the degree of mobility than of the density of livestock. The need for mobility and the multi-scale connectivity of dryland ecosystems means that groups within these systems are highly interdependent. Customary rights governing the use of resources thus featured common ownership of the land or open access, with complex use and access rights to resources (pastures, water), which accounted for both seasonal and unpredictable variation and adapted to the scale of dryland variability (Fernandez-Gimenez and Batbuyan, 2004; Ensminger and Rutten, 1991), addressing the two challenges of dynamics and ecological scale outlined above.

Evidence of the importance of institutions comes from observing the long-term effects of their elimination. In a meta-analysis of 132 case studies of desertification, Geist and Lambin (2004) found that one of

the most common causal pathway of desertification in developing countries – principally Asia and Africa – involves national policies that aim at consolidating territorial control over marginal areas and expanding crop production. These policies often involve settlement of populations, changes in land tenure regimes, and the development of hydraulic infrastructure, prompting migration of farmworkers into dryland areas and erosion of soils (Bai et al., 2008).

The diverging pathways of the steppes of Inner Asia offer an excellent illustration of the consequences of changing land tenure regimes (Humphrey and Sneath, 1999). Prior to communism, these lands were held in common under the authority of monasteries or lords, and regulated via complex customary land use rights. During the period of collectivization, the Russian, Chinese, and Mongolian governments pursued different goals, the Chinese and the Russians attempting to plow the steppes, and the Mongolians pursuing mobile pastoralism. Already then, these ecologically similar grasslands started degrading in large tracts of the Russian and Chinese territories. After decollectivization, all three countries faced the difficult question of how to allocate the land. The Chinese allocated land to individual families, leading to fragmentation of the land and reduction in mobility. The Mongolians are still debating various land tenure regimes, but in the meantime much of the steppe has continued to be held in common and support mobile pastoralism. These areas share the same ecology, yet, both field and satellite observation show with high certainty that China's drylands are now considerably degraded in comparison to Mongolia's (Sneath, 2004). Humphrey and Sneath (1999) furthermore reports that areas of Mongolia feature modern mobile pastoralism, where pastoralists have access to markets, live part of the year in the city and are able to increase their standard of living, eschewing the view that mobile pastoralism is necessarily a low-productivity rural activity that keeps people in poverty.

4.3 Political Institutions and the Unsustainable Management of Drylands

According to the available, if limited, evidence, the development of modern political institutions as an exercise of state building has undermined traditional institutions, often leading to long-term degradation and lack of sustainability. While this process contributes to the development of the modern state and order, the new political institutions have not accommodated the specific needs of the socio-ecological system of drylands. The process of building the national institutions conducive to order requires that the state have control over territory and the populations that inhabits them Herbst (2000). The way many states that

encompass drylands have chosen to establish this control has been to settle populations and allocate the land (Ensminger and Rutten, 1991), indirectly constraining populations to misuse these ecosystems.

In her analysis of the political control of rural areas in Africa, Boone (2014) notes that African governments have continued the process of fixing populations initially started by colonial governments, either by strengthening the authority of colonially-designated ethnic homelands or by more statist control, involving direct settlement of people on lands by the state. In Kenya, for example, Maasai pastoralists in the Rift Valley were first displaced by white settlers. Following decolonization, the Kenyatta regime allocated this land to smallholders, as well as elite members of the regime. It also reallocated colonially-designed ethnic reserves into various ethnic land entitlement schemes via its Department of Settlement. In this process, land traditionally used by pastoralists groups in the North (e.g. the Orma) were also settled and used for development of large-scale hydraulic infrastructure, game reserves and commercial ranches Ensminger and Rutten (1991). Fratkin (2001) and Ensminger and Rutten (1991) both note that this process has triggered increased social stratification in those areas, with some gaining access to markets and others not, and in this context it has been difficult to adapt customary rights to continue managing the ecological commons. A survey of land degradation in Kenya (Bai and Dent, 2006) shows that 30 % of cropland has suffered from marked degradation between 1981 and 2003, mostly attributable to cropland that extended into marginal lands such as drylands.

The story of state consolidation via allocation of land and settlement of people is common to many frontier areas in developing countries (e.g. Scott, 2009; Boone, 2014). We see that the process of building a capable state, one of the baseline conditions for order, can thus come in tension with the sustainable use of ecosystems in these areas. Why did governments pursue land settlement schemes that eventually undermine the productivity of those lands? One reason is that the ecology of drylands is complex and for non-pastoralists, easy to misportray. In the 1970s, droughts in the Sahel led many Western observers to the conclusion that much of dryland Africa was desertifying, confusing temporary loss of productivity for an irreversible trend. These same observers applied the logic of the tragedy of the commons to these systems (Herrmann and Hutchinson, 2005). Believing that overgrazing was the main culprit, they recommended “betterment schemes”, involving enclosures to facilitate soil erosion management and limit the movement of livestock (Swift, 1996). It was only in the late 1990s that the international community realized the

paradigm was wrong.

The case of drylands illustrates that ignorance of ecological dynamics is partially endogenous to the political dynamics. As the Kenyan case exemplifies, the development of land tenure regimes in Africa has been a coercive process, where some groups have the upper hand over others. The paradigm of local resource mismanagement, initially advanced by the international community in the case of desertification (Sneath, 2004; Ostrom et al., 1999; Swift, 1996), and wildlife conservation (Peluso, 1993), put wind in the sails of government seeking reasons to control specific populations. Alternative understandings of the dynamics were thus unable to emerge given the exclusiveness of the political game. The paradigm seems to have been reinforced in international negotiations by African governments seeking funds from Northern countries to help combat desertification (Najam, 2004), at a time when no rigorous analysis of the extent of desertification actually existed.

In China, the logic of central planning dominated by Han Chinese and applied to the pastoral areas of Inner Mongolia displays the same sorts of biases (Bulag, 2010). In contrast, in Mongolia, the political elite has long resisted the possibility of privatizing land Sneath (2004). Mongolia is 80% dominated by the dry steppes and pastoralism has thus traditionally been a dominant way of life, rather than the characteristic of a minority living at the margin. Despite external pressure to title the land, members of Parliament chose instead to lease use-rights, a system closer to the historical understanding of land regulation as a custodian system of use and access rights, rather than private ownership. Nonetheless, the current pastoral system is struggling to find its modern formulation (Fernandez-Gimenez and Batbuyan, 2004).

To summarize, the sustainability of drylands is affected by land tenure regimes, which themselves often reflect the strategies by which groups holding power seek to control territory and develop the state. The complexity of ecological dynamics is such that simple models applied by foreigners or agents of the state in a distant capital can undermine sustainable management. These erroneous models can go uncorrected for decades, especially when political institutions are non-inclusive.

5 The Development of Renewable Energy in Denmark: A Positive Example

As a counterpoint to our generally negative assessment of the capacity of many political institutions to grapple with problems of sustainability, we now point to existing institutional arrangements that have helped sustain a profound renewable energy transition in Denmark. This case is important in the study of *sustainable*

energy transitions, a central topic for the political economy of sustainable development. These transitions refer to the extensive deployment of renewables to reduce the environmental burden of a country's energy infrastructure (Aklin and Urpelainen, 2013). These transitions are complex and difficult to implement for the reasons outlined above. These endeavors need to be sustained over decades, in the context of shifting political allegiances and economic change, they span many scales of decision-making and must grapple with the complexity of the energy system. Second, this case provides a concrete illustration of how institutions that address the scale problem and promote cooperation can simultaneously alleviate the dynamic problems arising from long-term horizons.

5.1 Background

In the year 2000, oil, natural gas, and coal covered almost ninety percent of the global energy mix, with non-hydroelectric renewables making up less than 2%. At the time, the International Energy Agency (IEA) saw no end to this state of affairs, predicting that by 2020, non-hydroelectric renewables would climb to only 3% (IEA, 2000). Yet, in 2010, the global share of renewables had climbed to 6%. This rapid growth hides large variation between countries. In 2010, renewables made up close to 40% of electricity generation in Denmark and Spain, around 20% in Germany, 10% in the UK and a mere 5% in the US (IEA, 2013).

Denmark is the country that is the farthest advanced in its transition to renewable energy, which now provides 40% of the country's electricity (22 % of total energy), with wind power representing about three-fourths of this total. Policies encouraging this growth go as far back as the 1980s. Institutional support for renewables withstood several shocks, such as a shock to the export of wind turbines to California in the 1990s and a period of politicization around renewables in the period 2003-2008. Is this success in part attributable to institutional features of the country, or merely to a happy alignment of economic interests around renewables? The answer is that economic factors were indeed particularly favorable in Denmark, while institutional features additionally helped sustain this long and successful transition.

Denmark has no fossil fuel deposits, except for recently discovered gas deposits in the sea. At the time of the oil shock, the country had long been dependent on energy imports. At this critical juncture, seeking means of increasing its energy independence, Denmark mostly had the choice between nuclear energy and renewable energy. Public opinion was strongly opposed to nuclear energy. This combination of factors thus spearheaded a set of policies in the 1980s to encourage investments in wind power. After these initial

policies, public opinion could have turned against renewables because of the initially high price (as seems to be the case to some degree right now in Germany). Landowners could have started a “not in my backyard” movement and opposed the proliferation of wind turbines. Proponents of greater liberalization of the energy sector could have gained in ascendance, undermining the transition. Thus, the economic factors of the 1980s are not sufficient to explain why Denmark’s energy sector is now 40% based on renewables.

5.2 Role of Political Institutions

We argue here that Denmark had one key institution that helped make the transition sustainable. This institution is that of the traditional agricultural cooperatives through which landowners collectively invested in wind turbines. These cooperatives, called *kommunes*, had been established in the 19th century as traditional agriculture transitioned to a market agriculture. A majority of landowners had small holdings and were well-educated. They established the *kommunes* with the aim of combining resources to modernize their production. The system was very successful and spread to urban enterprises as well. The *kommunes* system in turn spawned a strong tradition of local governance. In particular, public utilities are controlled by *kommunes* (Hadjilambrinos, 2000).

The significance of the *kommunes* for the energy transition is that it helped spread the benefits, as well as the nuisances of wind power, in a relatively equal way throughout the rural population. With 80% of wind projects owned locally and mostly via the *kommunes*, the benefits have continuously outweighed costs for most people (Ryland, 2010). As a result, the wind transition sustainably generated strong local support, at least as long as a majority of investments were channeled through the *kommunes*.

The *kommunes* solve part of the scale problem highlighted above. Indeed, wind turbines have some visual and auditory externalities that are borne by those living in its vicinity. Thus, in many countries, the siting of wind turbines has been fraught with local resistance, as citizens do not accept to bear the costs, while profits go to some distant utility company. The *kommunes* more or less span the area over which costs are borne, while spreading the benefits to its members. Crucial to this scheme is not only the ownership structure, but also the autonomy of the *kommune* in choosing sites and managing the facilities.

The Danish case is a good illustration of the potential of co-management schemes between society institutions and government, which several authors have advocated (Ostrom et al., 1999). First, the central government has codified the institution of *kommunes* into law, thus securing their authority. The institution

was created by agricultural stakeholders, then recognized as a useful tool of governance by the government. Second, in the case of the wind transition, government policy enabled national level coordination, by supporting the kommune investments, and by strengthening the wind manufacturing sector. Such an institutional arrangement clearly facilitates the chances of long-term cooperation, since almost if not all everyone gains and depends on the continued success of the enterprise. Denmark experienced some politicization of energy policy in the years 2003-2008, with a conservative government seeking to liberalize the energy sector (Toke, 2002). Yet, this politicization did not find enough fodder within society to truly undermine the transition.

The Danish case thus shows elements of a way forward. Of course, the success of renewables in Denmark was also highly dependent on the favorable material conditions, not just on institutions. In addition, the institutions pre-existed and it is partially luck that their structure was so well fit to the problem of governing wind power. Nonetheless, this case illustrates how institutions that facilitate broad and multi-purpose cooperation throughout civil society and have a tradition of engagement with government can facilitate social change.

6 Conclusion

The efficient functioning of institutions, as conceived in mainstream political economy, is only loosely connected to sustainability. Political institutions that maintain order, enable collective decisions, and encourage citizens to invest in productive activities often encourage practices that cannot be sustained over time. The simplest example is the difficulty of reconciling economic growth with the protection of our natural life-support systems. Long time horizons, multiple scales, and exceptional complexity conspire to counteract the beneficial effects of political institutions on the society, as described in the canonical works in positive political economy.

There are no easy solutions to the problem at hand. Our critical review has connected several strands of the literature on sustainability and governance to mainstream political economy. The former literature has focused especially on the problem of multiple scales – leading to the problem of fit between institution and natural systems – and on the problem of complexity, offering examples of and proposals for bridging institutions and adaptive management. However, it has for the most part not put these emerging governance structures in the context of the basic political institutions of capitalist democracies, and examined their

interaction with them. We suggest that we need a more solid analytical foundation for the design of political institutions that allow sustainable development, in particular to understand how the tension between the need for broad cooperation and the competitive structure of our basic institutions can be resolved. Without it, efforts to create truly sustainable societies amount to flying in the dark.

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