Restoring Balance: Pursuing Socio-Ecological Harmony Through Policy-Centric, Process-Centric, And Structure-Centric Governance

RESTORING BALANCE
PURSUING SOCIO-ECOLOGICAL HARMONY THROUGH POLICY-CENTRIC, PROCESS-CENTRIC, AND STRUCTURE-CENTRIC GOVERNANCE

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Abstract

Our planet is dying. As much as this statement might seem alarmist, it is, unfortunately, merely alarming. We have learned from recent international assessments that substantial shares of plant and animal life, about 15% of those species, are already threatened with extinction. Additionally, the biodiversity crisis is one of many interrelated challenges that we face. The scholarship of earth systems science has illustrated how our human dominated systems are falling short in obtaining important social goals, and how they are also pushing the planet's ecosystems far beyond their capacity to support life. Further, the moral imperative for action becomes even more clear with the knowledge that the effects of this socio-ecological disharmony will not be felt equally amongst human and non-human communities. Such inequity should trigger the urge to act within us all, but what form should this action take? In this dissertation, I argue that humanity will be better able to address the complexity of socio-ecological problems across the planet by adopting systems governance approaches. I address this proposal through three governance studies. First, relationships between public land trust policy characteristics and democratic support for these projects throughout the United States were examined. Next, the relationships between governance process characteristics and environmental justice conflict reports around the world were analyzed. Finally, the impact of a federated governance structure on the renewable energy transition in Vermont was explored. Through these cases, the effects of systems governance are studied by exploring how policy-centric, process-centric, and structure-centric choices, respectively, can impact socio-ecological systems.

Dedication

This dissertation is dedicated to those who lead for the greater good. May its contents inform their perspective and guide their practice.

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Introduction

For those who are interested in the harmonious functioning of our planet's socio-ecological systems, the Global Assessment Report on Biodiversity and Ecosystem Services (2019) was heard as a booming thunderclap. While it may not have been the first warning sound of the storm to come, it was deafening. The report's findings, documented by dozens of scientists and based upon the work of hundreds more, were, in a word, bleak. The current rate of species extinctions has been described as "tens to hundreds of times higher than the background extinction rate over the past 10 million years" (IPBES, 2019). Further, some estimates suggest that at least 15% of plant and animal species, or about 1 in 8, were already threatened with extinction. This translates to a near-term existential peril for more than one million unique types of life on earth, and this is likely to be an undercount.

While such a notion should be startling, even appalling, from an intrinsic value perspective, humans will also be significantly, negatively impacted by many of the same drivers of this crisis. Humanity is totally dependent upon the natural systems of the planet. For food, fiber, and fuel, for companionship, even cultural and metaphysical reasons, the relationships between humans and non-humans are inseparable (IPBES, 2019). Their fate and our own are entangled. Yet, even as humans exhaust whole ecosystems in pursuit of their treasures, we fall short of providing many with even a basic level of needs satisfaction. Further, while our social systems fail to adequately satisfy the basic obligations to the people whom they are meant to serve, they simultaneously allow a few to live among them like gods. Socially, we are falling short of fulfilling our minimum obligations to our human brothers and sisters, and, ecologically, our extraction from and conversion of natural systems jeopardizes their basic functionality—perhaps irrevocably (Dietz & Neumayer, 2007; Fanning et al., 2022; Gupta et al., 2024; Ott, 2003; Raworth, 2017; Rockström et al., 2023). Some have suggested that we are approaching, even surpassing, certain "tipping points" that, once transgressed, will make socio-ecological problems like climate change, biodiversity loss, and ecosystem toxicity inevitable (Dakos et al., 2019; Lamberson, 2012; Lenton, 2013; Ritchie et al., 2021). Unplanned and unjust systems disruptions must be avoided to prevent catastrophe for our systems' vulnerable members. Doing so will require re-grounding those systems within their safe and just operating zones (Fanning et al., 2022; Rockström et al., 2023).

This is the meta-challenge that is before us, the wickedest of wicked problems, a lived ethical and existential dilemma with outcomes at every scale (Lönngren & Van Poeck, 2021). Indeed, some scholars have even suggested that our present socio-ecological crises are so severe they should be viewed as tantamount to a "biocide," an "ecocide," and the "5th Crime against Peace" if they go unresolved (Gray, 1996; Higgins et al., 2013; South, 2010). This dissertation seeks to offer a set of proposals for addressing these aforementioned challenges. It does not proport to be the only set of ideas for doing so; however, the gravity of the problem demands that an ample variety of proposals be rendered. We must find ways to pursue greater social and ecological balance. Our planetary future is dependent upon the development of socio-ecologically harmonious systems.

A discussion of the literature that underpins the philosophy of science and practice for this project comes next. A collection of three illustrative research projects follows, each with a different focus on the local to global socio-ecological challenges ahead. Finally, a conclusion chapter considers the research findings of the body chapters and applies them to the socio-ecological challenges identified above.

Philosophical Considerations

While some might argue that the notion of socio-ecological harmony is overly utopian and unrealistic, I argue that the current natural science—and, to a lesser extent, social science—consensus is that the current trajectory is ecologically nonviable and socially untenable. As such, attempting to divine constructions of a future, more ideal state, such as one with basic socio-ecological harmony, is not just withing the realm of reasonable political thought—it is a necessity.

In his penultimate work *The Law of Peoples* (1999), political philosopher John Rawls wrote of a concept that provides an important opening to this background section. In it, Rawls refines his understanding of a "realistic utopia," which he conceived as a means to reconcile between what ought to be and what is. First, while he notes that the "fact of reasonable pluralism limits what is practicably possible here and now," he strongly asserts that "the limits of the possible are not given by the actual" because "we can… change political and social institutions and much else." He continues by arguing that what is "realistic" is only that which is constrained by "actual laws of nature" and that "constitutional and civil laws" ought to be understood "as they might be," emphasizing the malleability of the latter and the stability of the former. Those working for a more ideal socio-ecological arrangement can and should argue "that the social world we envision is feasible and might actually exist, if not now then at some future time under happier circumstances."

The temporal component of a realistic utopia enables advocates of enhanced harmony between our social and ecological spheres to consider the proposal to be a work in progress as opposed to an end to be achieved and never considered again. Böker (2017) suggests that Rawls' articulation of a realistic utopia is a temporally constrained, and more limited, utopian construction. However, I argue that Rawls' (1999) inclusion of "at some future time" within his conception of the theory addresses this critique.

Further, Rawls (1999) explicitly states that "a reasonable Law of Peoples," his version of a realistic utopia, would need to be viewed as "acceptable to reasonable peoples who are thus diverse" and that "it must be fair between them and effective in shaping the larger schemes of their cooperation," which seems to address Böker's second critique of authoritarian claims to singular validity (2017). Rawls' understanding of a realistic utopia is neither static, nor does it claim to be perfect or totally ideal. He envisions it functioning, rather, in societies "in which there is a diversity of comprehensive doctrines, all perfectly reasonable" (Rawls, 1999). Other critics of Rawls' admit that in the paradigm he articulates "all utopias get taught and disseminated on equal footing," and that "no holder of a political utopia could be banned" under his conceptualization of realistic utopia (Arnsperger, 2006) To Rawls', "real (as opposed to merely legal) opportunities for all political utopias" would exist under a conception of realistic utopia. Adopting similar pluralistic safeguards, I make no assertion that the pursuit of basic socio-ecological harmony is the only just end or is a perfect utopia. Merely one vision—albeit an important one.

Additionally, Rawls (1999) pushes back on the notion that the concept of realistic utopias necessarily constrains utopian thought to a faux realism that suits "reasonable political opinions." Rather, utopian principles that delineate right from wrong should be taken as the boundaries within which the real politic expression of power must operate. His conception of a realistic utopia should, therefore, be understood as a way of constraining cynical expressions of pure power. Consequently, I propose that the cultivation of socio-ecological harmony, as a utopian idea, should be a principle that is used to specify one of the "reasonably right and just political and social arrangements" that, under most circumstances, assists us with identifying right and wrong (Rawls, 1999).

Finally, in addition to the temporal and bounded characteristics of Rawls' construction of the realistic utopia, he highlights the importance of the institutionalization of the principles of realistic utopias (Rawls, 1999). It is through the institutionalization of these principles that they begin to impact the behavior of the governed. A similar argument was advanced by Habermas (2010) through his support for the codification and institutionalization of human dignity through "human rights covenants" in international law. Lest we be known as a people that perpetrated an ecocide by refusing to balance between the social and ecological needs of the planet, we should pursue basic socio-ecological harmony as a foundation for a realistic utopian future.

Institutional Action

Following Rawls' (1999) and Habermas' (2010) suggestion of institutionalizing the change we wish to see in the world, a review of what institutions are and why they crucial venues for pursuing greater socio-ecological balance was undertaken. Hodgson (2006) asserts that institutions–which he defines as "systems of established and prevalent social rules that structure social interactions"–are "the kinds of structures that matter most in the social realm." Hodgson's understanding of institutions as collections of rules that constrain and enable is similar to Knight (1992), who described an institution as "a set of rules that structure social interaction in particular ways". This deontic conceptualization of institutions as a quilt or mesh of rules is conceptually useful for this research because, as Hodgson (2006) describes, "rules include norms of behavior and social conventions," implying that changing institutional behavior can alter, in theory, the fabric of society itself. This is promising, as suggested by many scholars, because institutions may be the most appropriate venue for addressing environmental problems, particularly global ones.

One such theorist, Michael Green (2002), argues that the vast majority of individuals, even in consumption-heavy Western countries, are simultaneously contributing to global issues such as climate change, while having such small individual impacts that it would be difficult to identify a "complete attribution of responsibility" to any one person. While Green qualifies this idea by arguing that "some [people] in institutionally defined positions of great political or economic power" may have contributed to attributable harms, he maintains that the contribution to global harms by most people is minuscule when disaggregated. Green's alternative to individual attribution is to expand the burden of responsibility beyond individuals to "institutional agents," or "entities that can make decisions and act on them" such as "governments, corporations, labor unions, and international agencies." He argues for an institutional approach to addressing major social and environmental problems because institutions have better access to information about their impacts than individuals, and institutions have more power to shift behavior than individuals. A third point for consideration is the comparative ease of coordinating action between a few institutions versus doing so for many individuals (Frass and Greer, 1977; Kinzig et al., 2013). Understanding that it may be difficult to convince the requisite number of individuals to adopt enough individual behaviors to make large-scale environmental change on their own, it seems likely that functioning at the institutional level is most likely to produce substantial and durable change (Frass and Greer, 1977; Green, M. J., 2002; Kinzig et al., 2013).

As political ecologist Robyn Eckersley (2004) notes, “far reaching changes in both our values and institutions are required if ecological and social catastrophe is to be avoided.” Similarly, eco-theologian Thomas Berry, in his book *The Great Work: Our Way into the Future* (1999), attributes our present socio-ecological crisis to a philosophical and practical divide between humans and non-humans that is “an attitude that is shared by all four of the fundamental establishments that control the human realm: governments, corporations, universities, and religions.” One group that has supported my own research, the Leadership for the Ecozoic network, has worked to advance Berry’s focus on cultural change and an “ontology of separation” between humans and non-humans that has been a largely unchallenged assumption in foundational texts used for law, policy, economics, and even natural science education (Roncancio et al., 2019).

This ontological position enables an “epistemology of domination” in the education sector that reinforces the belief that non-humans are fundamentally distinct from and lesser than humans, and are, consequently, eligible to be used as we please (Roncancio et al., 2019). This epistemology is given an intellectual veneer through euphemisms like rent-seeking, economic development, or stocks of fish or fowl; however, the fundamental nature of each rest upon the use value of objectified and commodified beings. These notions that have been cultivated within the academy then permeate into our societies as students graduate and researchers publish. A new normal must be pursued. Through institutions, the social vehicles which influence social outcomes, appears to be the best route.

A Systems-based Approach

To reconcile these observations, the fundamental focus of this dissertation is to evaluate opportunities for institutional agents, and systems through them, to alter their practices so that we can pursue increased balance between our social and environmental systems. To that end, literature on how governance can encourage systems transitions so that socio-ecological harmony, as the preferred realistic utopia of this project, can be pursued in tangible and actionable ways was reviewed.

The interdisciplinary and holistic nature of systems theory makes it an ideal political philosophy for studying institutional behaviors and the outcomes that they influence (Bertalanffy, 1972; Cabrera, 2006). The conceptual framework that underpins systems theory—that systems are groupings of individual, interconnected entities that share a common purpose—is ideal for analyzing how norms influence group behavior (Meadows, 2008; Rutherford, 2018; Stroh, 2015). Moreover, because systems theory is not specific to any one type of governance type, it was seen as the most appropriate framework for identifying actionable findings that could be implemented by a variety decision-makers with diverse governance backgrounds. Three frameworks for analysis were considered for use including Ostrom's Socio-Ecological Systems (SES) framework, Meadow's Leverage Points for System's Transformation framework, and Keating and Katina's Complex Systems Governance (CSG) framework.

Ostrom's SES framework is particularly helpful when considering how internal and external system characteristics can influence the outcomes within particular systems (McGinnis and Ostrom, 2014; Ostrom, 2009). However, its focus on the specific actions that take place within the contexts of specific systems was viewed to be too micro in focus to serve as a broader, guiding framework for this research. Further, its discussion of governance is as a context that impacts outcomes of actions taken within a system but does not center the act of governance itself as the primary focus of analysis. Governance is treated as a system feature rather than as something that systems themselves are actively engaged. The meta-focus of this study, however, is not upon the effect of an individual's actions within a specific system; rather, this work focuses on the system steering through governance itself and how greater socio-ecological harmony can be implemented through that steering. This is not to suggest that the SES framework lacks merit. Merely that it is not the right frame for this project.

The strength of Meadow's conception of "leverage points," or system features that can be altered, is that it proposes a typology of actions that are explicitly designed to produce systems change (Abson et al., 2017; Meadows, 2008). Increasing from least to most potent drivers of change, Meadow's articulation of "changing the paradigm" of a system as the second most impactful of levers to pull is particularly intriguing to this project. It is reasonable to suggest that governing specifically to implement harmonious socio-ecological conditions, as an end goal, would constitute a substantive shift in the paradigm of governance, particularly in western traditions of governance (Berry, 1991, 1999).

Though the SES and leverage point frameworks were deemed to have merit, due to the characteristics of this particular research focus and question, Keating and Katina's CSG framework was considered the most appropriate analytic lens for this project. CSG is an attempt to synthesize the core findings from three distinct disciplines: cybernetics, systems theory, and, most helpful for this project, governance theory (Keating et al., 2014; Keating & Katina, 2016, 2019). Due to this project's focus on the institutional implementation of socio-ecological balance, I became particularly interested in the methods that complex systems use to govern themselves. In their paper "Complex System Governance: Concept, utility, and challenges" Keating and Katina (2019) summarize three primary methods of systems governance which ultimately provide a structure to the body of this dissertation. These three governance types were developed in earlier systems governance works that sought to identify how systems are governed (Calida, 2013; Calida & Keating, 2014; Keating & Katina, 2019).

The first component of governance included within the CSG framework is "policy-centric" decision-making, which is "the formulation of policies that act to inculcate the principles, norms, rules, and behaviors that produce sufficient regularity in [system] performance" (Keating & Katina, 2019). These policy choices are supposed to provide "sufficient capacity to direct/control aspects essential to achieve/maintain system performance." Policy-centric governance will be explored in the first of three content chapters that compose this project through an investigation of the democratic popularity of public land trusts for the protection and restoration of ecosystems. Land trusts, as an environmental policy tool which can be implemented to support the well-being of the humans and non-humans, are an exciting opportunity for local environmental governance. However, who and what they actually benefit and whether the voting public will support these policies at a sufficient level remains to be seen.

The second component of governance highlighted in the CSG framework is "process-centric," or the "collective decision-making processes that are based in formal, consensus seeking, and deliberative execution" that "provide effective processes that enable the act(s) of governance to be performed" (Keating & Katina, 2019). This procedural component of governance will be the primary focus of the second content chapter on evaluating environmental conflicts and 'good' governance through an exploration of the relationship between worldwide governance indicators and the prevalence of environmental conflicts in nation-states. By grappling with the impact of field accepted standards for procedural governance on the prevalence of environmental conflicts, we can begin to understand the degree to which these standards impact both human and non-human system entities.

The third type of governance is “structure-centric” decision-making and focuses on “the formulation and execution of structures that preserve order/continuity and steer the system in desired directions” (Keating & Katina, 2019). The purpose of this form of governance is to “install sufficient structure that provides and maintains [the] trajectory of a system towards [its] desired ends.” This facet of governance, how a system is constructed so that it can yield more harmonious socio-ecological arrangements, will be explored in the final content chapter that explores structure-centric governance in the context of the Vermont energy federalism.

Looking ahead

To avoid socio-ecological catastrophe, and perhaps criminality, systems change must occur. It should do so in ways that enhance both human and non-human wellbeing by ensuring a decent quality of life for all and do so without undermining the intricate web of life that is our planetary home. Such a system is a decent, if imperfect, vision of a utopian existence one our planet; a future state with a base level of socio-ecological harmony globally is more defensible—on the basis of scientific and justice-based rationales—than our present state. Furthermore, it presents a defensible test by which we can evaluate present and future governance. The test: does this choice enhance or undermine socio-ecological harmony? If basic socio-ecological harmony is to be a ‘realistic utopia,’ then its proponents must find tangible ways to transform the present system to implement this vision and such a test provides a means for qualitatively evaluating their proposals.

Over the course of the next several chapters, three discreet research projects will be presented that attempt to illustrate how policy-centric, process-centric, and structure-centric choices may impact environmental outcomes within several different contexts. In the first of three content chapters, community support for public land trusts that address wildlife habitat needs—as a form of land-use policy—was explored to see if policies that explicitly benefit non-humans are more or less popular in the United States. The second chapter explores the relationships between procedural ‘good governance’ norms and the frequency of reports of ongoing environmental conflicts in countries. The third chapter seeks to ascertain if the structural choice to use a federated system of planning agencies—as opposed to a more centralized, ‘top-down’ form of public administration—to implement the renewable energy transition in the northeastern US state of Vermont had an impact on the State’s ability to produce thematically cohesive energy plans across the state.

These three content chapters are followed by a conclusion chapter which integrates specific system policy, process, and structure findings into the broader systems governance framework. Additionally, it contextualizes the findings by drawing a common thread between them. It does so by highlighting the feedback loops between policy-centric, process-centric, and structure-centric governance choices. Understanding that there is interaction between policy, process, and structure, that they do not yield outcomes that are independent from one another, reflects both the challenges and opportunities associated with taking a broader governance approach. By doing so, this concluding chapter identifies how systems governance can meaningfully the pursue more ideal, more harmonious socio-ecological systems.

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Public Land Trusts, Wildlife Habitat, and Land-Use Policy

Abstract

Habitat loss has been identified as one of the primary drivers of biodiversity loss globally. Land-use policies that could address this troubling trend should be identified. To contribute to the conversation about the appropriate policy tools for preventing habitat loss, democratic support for public land trusts, was explored. Public land trusts have been noted to offer substantial biodiversity benefits to local communities, but do land trust projects that specifically address wildlife habitat needs enjoy greater public support? Data on support for public land trust ballot measures was sourced from the Trust for Public Land's "LandVote Database." Analysis was confined to a census of ballot measures that were voted on at the special district, municipal, and county scales between 2010 and 2019. With 95% confidence, both a binomial logistic regression and a Tweedie regression model revealed that ballot measures that support wildlife habitat received significantly more public support than those that did not when controlling for relevant vote contexts.

Introduction

The planet's biophysical systems are under substantial duress due anthropogenic drivers such as land use change, chemical pollution, and invasive species introductions. Direct conversion of ecosystems to human dominated uses such as agricultural, forest products, mining, and urban expansion is rendering land and waters uninhabitable and is one of the key drivers of biodiversity loss (IPBES, 2019). If insufficiently addressed, ongoing ecosystem degradation will likely yield increased extirpation and even mass extinction of species. To address this trend in a way that is beneficial to both humans and non-humans, expansive land and water conservation and protection initiatives are needed. The Kunming-Montreal Global Biodiversity Framework is one such proposal.

Responding to the Global Assessment Report of Biodiversity and Ecosystem Services produced by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), parties to the Convention of Biological Diversity adopted the Global Biodiversity Framework (Parties to the Convention, 2022). The national parties to the Convention, in the adoption of the Framework, note their alarm over the "continued loss of biodiversity" and the "threat that this poses to nature and human well-being." Further, they urge national governments to facilitate "participation at all levels of government" as well as the inclusion of non-governmental stakeholders in the implementation of the framework. Notably, the Framework highlights the need for "urgent and transformative action" multiple times throughout.

One land-use policy proposed by the Framework has become increasingly popular—large scale land conservation. Simple, measurable, and temporally oriented, the 30 by 30 proposal, which calls for the effective conservation of 30% of lands and waters by 2030, has diffused. Versions of this proposal have been adopted by the European Union (Directorate-General for Environment, 2024), by the Biden Administration (The White House, 2021), and U.S. states such as California (California Natural Resources Agency, 2021), New York (Department of Environmental Conservation, 2024), and Vermont (Vermont Housing and Conservation Board, 2024), among other polities (Maizland, 2024), as a means to interrupt habit loss through clear targets for land conservation.

These conservation goals are admirable attempts at addressing habitat spoilation at the international, national, and sub-national levels. They will also require extensive implementation efforts. Indeed, the amount territorial area—which includes land and water area—included in “terrestrial and marine protected areas” would need to grow significantly, roughly double, to meet the global target of 30% conserved by 2030 (World Bank Group, 2024). As of 2021, the five-year average of the global territorial area protected was 14.52%. The five-year average for the annual change in the share of territory protected globally was 1.78%. Similar estimates for the E.U. and the U.S. reveal the need for significant action as well. While both have conserved greater shares of their territory—23.55% and 23.76%, respectively—the annual change in the share of territory conserved in the E.U. is 2.14%. The situation in the U.S. is even more stark: the five-year average of the change in the share of territory conserved was -8.54% in 2021. The need to significantly increase the protected share of territory is immediate and adequate progress will likely require a herculean effort. Absent a demi-god in search of labors to fulfill, humanity will need to resort to public policy.

One potential conservation mechanism that could be used to achieve the targets proposed by the Framework are public land trusts. Public land trusts are legal entities created to maintain lands in such a way to serve communal needs (Wex, 2022). While they have been used to advance a variety of public needs, their ability to implement conservation goals has been suggested in the U.S. context since the 1970s (Rose, 2005; Sax, 1970). The extent to which land trusts can help meet these ambitious targets is an open question, particularly in regard to land protection for species habitat. Research is needed to clarify the extent of public preferences for species protection within the frame of trust governance. For example, how do the characteristics of public land trusts impact their suitability for addressing the pressing ecological concern of habitat loss? Crucially, will the public support land trusts that are designed to benefit a set of community members beyond humans? For example, is there significant variation in community support for public land trusts that specifically address wildlife habitat needs as opposed to those that do not?

Exploring the relationship between project purpose and community support is important for several reasons. Functionally, measuring public support for land trusts that improve wildlife habitat will indicate if this type of policy response could be utilized to address biodiversity loss. There are also important public finance and administration questions regarding how to pay for wildlife habitat improvement. Politically, public land trust votes often represent significant instances of local environmental governance. A better understanding of local politics could help frame policy objectives at this scale of government. Finally, from a philosophical perspective, instances of land-use policies that specifically attend to non-human needs are interesting cases of inter-species consideration in governance.

Consequently, this study addresses the question: Do public land trust ballot initiatives that specifically address wildlife habitat needs in a community enjoy greater public support when controlling for important initiative specific and relevant socio-ecological contexts? Analyzing data from the LandVote database from the Trust for Public Land, we hypothesize that ballot initiatives that funded public land trusts had a significantly greater probability of passing when they included project purpose of addressing wildlife habitat needs. Further, the measures that addressed wildlife habitat needs are also hypothesized to have a significantly greater share of voters support them.

What follows is a brief discussion of trust governance literature to historically ground this research. Highlights from the literature are followed by sections on the research means and methods used to test the hypotheses articulated above. A discussion of findings, policy relevance, and concluding thoughts then follow.

Background

Origins of Trust Governance Theory

While the origins of public trust doctrine are somewhat contested, there are some commonalities in the historical expressions of trust-based governance. Generally, the public trust doctrine is based upon the notion that the leaders of jurisdictions should "steward natural resources for the benefit of the public" (Fitzmaurice, 2009; Orangias, 2021). Some point to the Roman concept of 'res communis,' understood to mean that 'natural law' protects the air, rivers, coastal areas and large bodies of water like lakes, seas, and oceans because they are communal holdings (Ansbacher, 2014; Lazarus, 1986; Orangias, 2021; Rose, 2005; Sax, 1970). This tradition is suggested to have been expanded upon and codified in later legal codes such as the English Magna Carta and the Spanish Las Siete Partidas (Ansbacher, 2014; Drayton Jr, 1970; Orangias, 2021). Other public trust scholars point to the development of English coastal defenses in the Elizabethan era as the 'modern' origin of trust governance (Ansbacher, 2014; Orangias, 2021), and suggest that, because everyone “benefited from the security and prosperity of the seas,” the sovereign must steward certain coastal lands to that end (Ansbacher, 2014). Others point to the 17th century Dutch theorist Grotius’ conception of political sovereignty as the precursor for trust theory (Purdy & Fielding, 2007).

The sovereignty argument influenced later English political philosophers, namely John Locke, who sought to define a new relationship between the sovereign and subjects and, in doing so, merged the concepts of a ‘fiduciary responsibility’ with ‘legislative power’ and ‘popular sovereignty’ (Ansbacher, 2014; Brown, 1994; Purdy & Fielding, 2007). To Locke, a sovereign maintains their popular sovereignty by utilizing their legislative power to advance the established ‘ends’ while following the established ‘terms’ of the communal ‘trust’ (Purdy & Fielding, 2007). Failure to pursue those ends or abide by those terms would be a violation of the sovereign’s fiduciary-esque obligation to the communal trust which could justify their removal from the position.

These trust proposals, though they vested power in the hands of a sovereign, were contemporaneous proposals for reform. In particular, the English and Dutch examples proposed a means to make governments more responsive and rules-bound than they were at the time. Though trust-based governance has been characterized as being a less responsive form of government, this is at odds with some of its historical articulations. The sovereign described by Grotian and Lockean writings is more similar to what Rehfeld (2009) describes as “Madisonian lawmakers,” or “those who seek the good of the whole by relying on their own judgment and who are more responsive to sanction,” than they are to monarchs who are not traditionally responsive or subject to sanctions for their behavior.

Scholars have also suggested that Western political thought, particularly that which was articulated during the enlightenment, has borrowed from the political traditions of other global regions, often attributing those traditions to themselves (Fukuyama, 2011; Graeber & Wengrow, 2021). For example, Locke's Second Treatise takes the position that sovereigns who fail to secure basic social needs like peace and sustenance for their people could be removed, which is precisely what would cost a leader their "mandate of heaven" and be grounds for their removal in Confucian-based public administration (Drechsler, 2013). While this tension is not a focus of this paper, it appears that there is ample comparative, and perhaps corrective, political historiography that should be acknowledged (Drechsler, 2013; Fukuyama, 2011; Graeber & Wengrow, 2021; Roberts, 2018).

Regardless, various styles of trust-based governance that have emerged in multiple locations throughout human history are often characterized by the public administration of communal resources to address communal needs by a single person or group of people. Trust-styled governments have formed to address a variety of community needs in locations such as China, Rome, Germany, England, Spain, the Ottoman Empire and beyond. Indeed, public trust doctrine re-emerged in the United States as early as 1810 as a means to protect a riparian area in Pennsylvania (Blumm & Paulsen, 2013). And, as a facet of the US environmental movement of the 1970s, the public land trust doctrine was developed by legal scholars as a means to address renewed natural resource concerns (Blumm & Paulsen, 2013; Rose, 2005; Sax, 1970).

From Theory to Practice: Trust Governance and Land Trusts in the U.S.

While there are examples of public trust governance in American legal history, few scholars captured the imagination of the field regarding the use of trust-based law more than Sax (1970). Sax argued that,

> "Three types of restrictions on governmental authority are oft thought to be imposed by the public trust: first, the property subject to the trust must not only be used for a public purpose, but must be held available for use by the general public; second, the property may not be sold, even for a fair cash equivalent; and that the property must be maintained for particular types of uses."

Sax saw the public trust doctrine as a "useful tool of general application for citizens seeking to develop a comprehensive legal approach to resource management problems." He sought to ascertain whether the public, by nature of the trust doctrine, had standing to force the government to respect the trust. His work inspired future legal scholarship on and practice in stewardship of natural resources via public land trusts, specifically, as land protection required for serving public need for nature (Rose, 2005).

In the subsequent five decades, land trusts as a form of trust governance have been widely adopted throughout the United States. Blumm and Paulsen (2013), for example, note that, "forty-eight states have used trust or trust-like language in describing state authority to manage wildlife." Further, they note that "since the public trust doctrine evolves to serve public needs, it is quite appropriate to include wildlife within its ambit due to shrinking habitats and other changes that threaten populations of wild animals." Notably, this argument expands the "good of the whole" perspective of the trustee to include the well-being of non-humans as a public need. Additionally, under Blumm and Paulsen's conceptualization of the trusts for wildlife stewardship, state governments are the primary trustees, which would imply that they are eligible for sanction via elections, the courts, and other administrative mechanisms.

Yet, while it is clear that there is support for land trusts as a tool for advancing the well-being of humans and non-humans alike, there are also concerns. Merenlender et al. (2004) note that "parks and national forests, for example, have seldom been configured optimally for biodiversity conservation, and their establishment has often abused and alienated indigenous and rural residents". These concerns highlight direct violations of the trustee principle to advance the well-being of the entire community. Another critique strikes at the heart of land trusts' ability to function in perpetuity. For example, Roach (2014) highlights that "even with the generosity of community members… a common obstacle for conservancy is the issue of receiving sufficient funding to protect the land or natural habitat from the perils of nature and human pollution." The ability of land trusts to produce benefits like habitat provision only lasts as long as the land remains within the confines of the trust. Should a trust become insolvent, the protection of that space may become jeopardized by future unregulated development.

To evaluate opportunities posed by land trust development in the U.S., data regarding the practice was sought out. One invaluable resource for this study in that regard is the Trust for Public Land's LandVote database. The database, as well as its use in research, are discussed next.

Democratization of Land Trusts: The Trust for Public Land and the LandVote Database

The Trust for Public Land is an environmental conservation non-profit with a belief that the "outdoors are essential to our happiness, health, and well-being" (Trust for Public Land, 2023). The organization describes their mission as advancing equity in access to the outdoors, improving public and environmental health, addressing climate change risks, and improving communal agency by creating venues for interaction. Supporting this mission, the LandVote database is described as the “most comprehensive history available for conservation finance measures that have been placed on the ballot.” In recognition of its value for analysis, many researchers have conducted studies using data collected from the LandVote database.

Early research utilizing the LandVote database include reports produced by the Trust for Public Land (Sherer, 2003) and the Defenders of Wildlife (White & Ernst, 2003), and a dissertation (Murphy, 2003). These early works primarily used LandVote data to illustrate public adoption of public land trusts in the United States, descriptively. Sherer (2003) warned of the harmful effects to human health that arise from the inability to access natural spaces and argued that land trusts could be used as a way to preserve natural spaces in an era of dwindling public budgets for parks. White and Ernst (2003) argued that the nation’s transportation systems could be more symbiotic with wildlife populations through “integrated planning” and investigated land trusts as a tool to limit transportation impacts from urban sprawl. Murphy (2003), an early proponent of geographical information systems (GIS) in conservation planning, noted the rise of land trusts in the US, but argued that progress was insufficient to address concerns of species threatened and endangered by habitat loss.

By 2005, research utilizing the LandVote database included studies using inferential statistics. Shanahan (2005) in her dissertation and Nelson et. al. (2005) in a working paper sought to examine if the characteristics of a community impacted their support for public land trusts. Shanahan found, for example, that newer communities with more civic social capital had higher levels of support for public land trusts in the American West. Nelson et al. used "landscape, political, demographic and socio-economic variables" to analyze which municipalities were more likely to undertake land trust referendums and in which municipalities were they more likely to succeed.

While others continued to use LandVote data descriptively and primarily for problem framing (e.g., Heintzelman, 2005; Newburn et al., 2005), these early uses of the database helped build a foundation for quantitative research to follow. For example, Sundberg (2006) analyzed land trust votes and found that communities with a history of land trust adoption had higher levels of voter support for future land trust ballot initiatives. Kline (2006) found that change in socio-economic factors like population, quantity of open space land, income, and development strongly influenced communities to adopt land trusts. Replicating their earlier study, Nelson et al. (2007) confirmed that economic and social characteristics like income, unemployment, educational attainment, and "rapid growth" strongly influenced votes. Similar studies, such as those produced by Banzhaf et. al. (2007, 2010), continued to explore the relationships between community characteristics and land trust vote success. They also explored the influence of measure specific and environmental characteristics in initiative success.

Research into public land trust votes continued into the next decade with a variety of foci. Kroetz et. al. (2014) found, for example, that public land trust votes are more likely to occur in counties with high levels of biodiversity, and that, crucially, these methods could be scaled up to provide significant, nation-wide conservation planning. Heintzelman et al. (2013) used advanced statistical modeling to examine LandVote data, and found, again, that there is a strong influence between community characteristics like unemployment, education, and even gender and age composition of the community and the likelihood of a measure being proposed or accepted. Key to the methodology of the current study, Heintzelman et. al. also examined the project purpose of a proposed land trust, finding that voters were more likely to support trusts that protected farmland as opposed to recreation land. Similar works were produced by other researchers such as León-Moreta (2019) and Gammans et. al. (2021). Recent research on the LandVote database has explored the role of environmental conditions and the impact of particular events on land trust proposals, for example how flooding events (X. Liu, 2022) and extreme, anomalous temperatures (Zuhlke et al., 2024) influence a community's willingness to support land trust ballot measures.

Given its ample operationalization in the literature, the use of LandVote data to evaluate public support of land trusts in the U.S. seems apropos and it is, consequently, why this data is utilized for this study. Due to the specific research question of this paper, and mirroring similar questions asked by Heintzelman et. al. (2013), the effect of a project's purpose on public support for that land trust project was evaluated. By doing so, the ability of land trusts to address biodiversity loss in a way that is viewed as having greater democratic legitimacy can be ascertained.

Methods

Variable Selection

The primary focus of this study is to understand the level of democratic support for land trust projects that explicitly address the habitat needs of wildlife. To measure the sentiment of the voting public, two dependent variables were included in the analysis. First, a ballot initiative pass/fail dummy variable was created to identify the probability of a land trust ballot initiative passing. However, a binary variable does not indicate how broad the support for the policy was beyond the threshold for passing, which itself varies by jurisdiction. Second, the share of voters that supported the initiative was included as a pseudo-continuous variable for a more comprehensive picture of support. The purpose of a land trust ballot initiative was also sourced from LandVote database; a project with a purpose of wildlife habitat was coded as a '1' and all other purposes coded as '0.'

Selection of independent variables was informed by various studies that have used the LandVote database to explore questions around land trust design and efficacy, including analysis of public support (Banzhaf et al., 2010; Sundberg, 2006; Leon-Moreta, 2021). Several studies conducted statistical analysis of ballot specific considerations, including the type of finance mechanism proposed by a ballot initiative or the jurisdiction type that is proposing it (Clanahan, 2014; Kline, 2006; Kroetz et al., 2014; Sundberg, 2006; Szabo, 2007). Further, when research has highlighted the importance of controlling for the impact of additional system contexts such as education level, income, and other demographic variables (Banzhaf et al., 2010; Kline, 2006; Kroetz et al., 2014; León-Moreta, 2021; Sundberg, 2006). Finally, some scholars which have modeled LandVote ballot initiative outcomes have selected environmental variables for controls. For example, León-Moreta's (2021) LandVote model which builds upon understandings gleaned from Kline (2006) and Banzhaf et al. (2010) among others, extensively addresses the impact of land cover features on land trust ballot measures, which was done to reflect the ecological characteristics within which these public land votes took place.

For this study, several ballot initiative specific characteristics were selected to serve as control variables for the model, including: whether or not a bond issue was proposed to fund the project; which jurisdiction type—special district, municipality, or county—voted on the measure; and the total amount of funds proposed by an initiative (converted into 2019 US$ and then log transformed). All three of these initiative specific control variables were also sourced from the LandVote database. Table 1 summarizes these main experimental variables, along with their hypothesized relationships to the dependent variables.

Table 1. Summary of Measure-based Independent and Control Variables

Variables	Variable Descriptions	H_a	Literature
Wildlife Habitat Project Purpose	Whether or not 'wildlife habitat' was at least one of the 'Purposes' listed for a land trust measure. Coded as a categorical, dummy variable with 1 being affirmative and 0 being negative. Sourced from the LandVote database.	Positive	(Bastian et al., 2017; Nelson et al., 2005)
Bond Issue Proposed	Whether or not 'bond' was the 'Finance Mechanism' listed for a land trust measure. Coded as a categorical, dummy variable with 1 being affirmative and 0 being negative. Sourced from the LandVote database.	Positive	(Banzhaf et al., 2010; Kotchen & Powers, 2006; Nelson et al., 2005; Pompe & Lipford, 2005; Sundberg, 2006)
Jurisdiction Type	Whether or not the 'Jurisdiction Type' listed for a land trust measure was a 'Special District' (1), a 'Municipality' (2), or a 'County' (3). Coded as a categorical variable. Sourced from the LandVote database.	Negative	(Kotchen & Powers, 2006; Sundberg, 2006)
Total Funding Proposed	The natural log of the listed dollar figure for 'Total Funds at Stake' for a land trust measure. Sourced from the LandVote database.	Negative	(Gill et al., 2023; Kahn & Matsusaka, 1997)

Several, additional control variables were selected to represent important system contexts, which, while not directly related to the focal ballot initiatives, could reasonably be found to have an impact on support for land trusts between communities. These included: median household income, household income distribution (Gini index), educational attainment (share of population over 18 years old with at least a bachelor's degree), the share of population that identifies as non-white, the share of the population that identifies as female, and tree cover loss (annual net decline in number of hectares with more than 30% tree cover from a baseline). All of these variables were sourced in or transformed into their five-year averages, and some were further transformed according to field standards and to improve model output understandability. The total proposed funding by a measure and the median household income were converted into 2019 dollars through CPI adjustment. Those two variables as well as the hectares of tree cover loss variables were also transformed by taking their natural log which is helpful for addressing large, less normally distributed, and outlier influenced variables (Benoit, 2011). Finally, a simple transformation of the gini coefficient, in which it was multiplied by 100, was conducted, so that the scale of the parameter effect would be more similar to that of the other model variables.

Notably, these community-based, county-level control variables were the primary temporal limiting factors for this study. So that five-year average estimates of the American Community Survey data could be used as controls, data was sourced from 2010, the beginning of ACS's five-year estimate availability, to 2019, the final year before the pandemic interruption. Table 2 includes variable descriptions, the hypothesized effects on the dependent variables, and sources to justify those hypothesized effects.

Table 2. Summary of Community-based Control Variables

Variables	Variable Descriptions	H_a	Literature
Median Household Income	The five-year average of the median household income of a county within which a land trust ballot measure was voted upon. Sourced from the American Community Survey, which uses sample data to estimate the demographic characteristics of communities. This variable was log transformed.	Positive	(Kline, 2006; Kroetz et al., 2014; Nelson et al., 2005; Wiepking & Bekkers, 2012)
Household Income Distribution	The five-year average of the Gini coefficient of the distribution of household income within a county within which a land trust ballot measure was voted upon. Sourced from the American Community Survey, which uses sample data to estimate the demographic characteristics of communities.	Positive	(Pearson-Merkowitz & Lang, 2020; Williams, 2018)
Educational Attainment	The five-year average of the share of the population over 18 which has completed a bachelor's degree or higher within a county within which a land trust ballot measure was voted upon. Sourced from the American Community Survey, which uses sample data to estimate the demographic characteristics of communities.	Positive	(Banzhaf et al., 2010; Klenosky et al., 2015; Kline, 2006; Kroetz et al., 2014; León-Moreta, 2019; Sundberg, 2006)
Non-white Population Share	The five-year average of the share of the population that identifies as non-white within a county within which a land trust ballot measure was voted upon. Sourced from the American Community Survey, which uses sample data to estimate the demographic characteristics of communities.	Positive	(Banzhaf et al., 2010; Keller et al., 2024)
Female Population Share	The five-year average of the share of the population that identifies as female within a county within which a land trust ballot measure was voted upon. Sourced from the American Community Survey, which uses sample data to estimate the demographic characteristics of communities.	Positive	(Engelsman et al., 2016; Juda-Chembe, 2018; Keller et al., 2024)
Hectares of Tree Cover Loss	The five-year average of the number of hectares of tree cover loss (30% cover-level) experienced in a county within which a land trust ballot measure was voted upon. Sourced from the non-profit the Global Forest Watch.	Negative	(Deuffic & Ní Dhubháin, 2020; Jones et al., 2017; León-Moreta, 2019)

As can also be seen in Tables 1 and 2, a set of one tailed, directional hypotheses tests are proposed for all of the independent and control variables included within this study. The null hypotheses for these variables will be rejected if their impact is found to be significantly greater, or less, than depending on the specific effect. As has become customary with quantitative research, descriptive statistics of the model variables were produced and included within this section to reflect on the observed nature of the data used for the study. Categorical variables included within the study had the measure frequency of the various categories listed; continuous, ratio variables had the variable mean, as a measure of central tendency, reported. The descriptive statistic values for the model variables can be seen in the following table (Table 3).

Table 3. Model Variable Descriptive Statistics

Variable Types	Variable	Category	Descriptive Statistics	
Outcome	Measure Success	Yes	361	78.3%
		No	100	21.7%
	Affirmative Vote Share	N/A	461	60.8%
Independent	Wildlife Habitat Project Purpose	Yes	86	18.7%
		No	375	81.3%
Measure-specific Controls	Bond Issue Proposed	Yes	165	35.8%
		No	296	64.2%
	Jurisdiction Type	Counties	90	19.5%
		Municipalities	342	74.2%
		Special Districts	29	6.3%
	Total Funding Proposed (2019 $s)	N/A	461	9,820,670.92
County-specific Controls	Female Population Share	N/A	461	50.9%
	Non-white Population Share	N/A	461	21.7%
	Educational Attainment	N/A	461	38.2%
	Median Household Income (2019 $s)	N/A	461	66,171.16
	Household Income Distribution	N/A	461	45.8

Hectares of Tree Cover Loss	N/A	461	90.02

Note: total proposed funding, median household income, and hectares of tree cover loss variables were transformed by taking their natural log for this study; however, they are presented here in an untransformed state. The Gini coefficient of the household income distribution variable was also transformed by multiplying it by 100, which improved model cohesion by altering scale without altering data variation.

Methods of Analysis

Frequency analysis was utilized to identify the distribution of the dependent variables selected for this study. Results then informed the subsequent choices of distribution type for the regression analysis (J. A. Green, 2021). The program SPSS was used to conduct this analysis.

The first inferential method selected for analysis was the binomial logistic regression method. It was selected to analyze the effects of the model predictor variables on the probability of a land trust ballot initiative passing. This method was deemed appropriate for use because the dependent variable, if a ballot initiative had passed, is a dichotomous, dummy variable (McNabb, 2020). The general linear model (GLM) procedure in SPSS was used so that relationships between categorical, ordinal, and ratio variables predictor variables and the two-category outcome variable of interest. Because the multiple logistic regression utilizes a log link function to connect the model dependent variable to its independent variables, the exponentiated value of the effects estimate was produced.

The second inferential method selected to analyze the impact of the model predictor variables on the share of voters that voted in favor of land trust ballot initiatives was a 'Tweedie Regression,' which is a hybrid model type that can be used to model a ratio dependent variable which has a data distribution that is somewhat, although not entirely, normally distributed (Quijano Xacur & Garrido, 2015). As alluded to previously, a frequency analysis of the dependent variable data was conducted. Findings from this analysis are discussed in the following section, but they confirmed the appropriateness of Tweedie model as opposed to a traditional OLS procedure. A custom Tweedie model was created using the GLM procedure so that a custom parameter value, could be specified to address the potential for an under- or over-dispersion problem (Quijano Xacur & Garrido, 2015). After adjusting the default value of 1.5—values must be between 1 and 2—incrementally downward by .1, it was found that a parameter value of 1.2 produced favorable model fit estimates which indicated that the model with that parameter value was a 'good fit' for the outcome variable's data distribution. Additionally, a log link function was selected for parallel structure to the previous method selected. Because a log link function was used, findings were taken from the exponentiated value of the parameter estimates which, when a value of one is subtracted from them, indicates the percent change in the share of voters that supported a measure due to the impact of an experimental variable on that outcome.

Finally, both the binomial logistic regression and the Tweedie regression were bootstrapped, so that the variable relationships identified by the original models could be compared to similar models produced with resampled data. The Mersenne Twister seed was set to 2,000,000 for replicability. Initially, 5000 samples were calculated; however, several of the bootstrapped iterations of binomial logistic regression were found to be suffering from quasi-complete separation issues, which meant that fewer than 5000 samples were initially created. The number of additional samples required to hit the 5000-sample target was identified (5267) and the bootstrapping procedure was re-run. The Tweedie model did not experience this issue; its underlying data was sampled just 5000 times. The parameter p-values and confidence intervals for the bootstrapping procedures are reported along with the base-model findings.

Findings

Frequency Analysis

The frequency analysis of the first, binomial dependent variable revealed that a 78.3% of land trust ballot initiatives passed. The second, continuous dependent variable, the share of voters which voted in favor of a land trust ballot initiative, illustrated a slight negative skew. More than 50% of cases had greater than 60% of voter support share. Several frequency classes of support shares have obviously fewer and more frequent observations than would be expected for a normal distribution. This finding confirms the appropriateness of utilizing a hybrid, fitted Tweedie model for analyzing the second dependent variable of the study.

Regression Analysis

Both the binomial logistic and the Tweedie regression model were found to be statistically significantly better at predicting their respective outcome variables than the null models as reported by the Omnibus test outputs (p-value < 0.001). As such, each model was viewed as likely to contain predictor variables with significant relationships to the probability of a land trust ballot measure passing and to the percentage of voters that supported that measure. The binomial logistic regression was found to be a good fit with a χ^2/df value of 1.022, and a *d*/df value of 0.989, which indicates that the negative binomial model type reflects the outcome variable data well. The second model, the Tweedie (1.2) regression model, was also a good fit, which was to be expected due to the parameter value selection process. The Tweedie model's χ^2/df value was found to be 0.951 and its *d*/df value was 0.988. Results from this analysis can be viewed in Table 4 below.

Table 4. Significant Independent and Control Variables

	Study Models	
	Model 1	Model 2
Wildlife Habitat Project Purpose	3.29, <0.001*** (1.45 to 7.45)	14.1%, <0.001*** (8.9% to 19.6%)
Bond Finance Mechanism	2.76, <0.001*** (1.57 to 4.87)	10.1%, <0.001*** (-9.5% to 6.8%)
Educational Attainment	1.02, 0.105 (0.99 to 1.06)	0.2%, 0.034* (<0.1% to 0.5%)

Note. Results are reported in two ways. Model One results are the probability of a ballot measure passing due to a) classification as habitat enhancing or bond using project or b) a one unit increase in the share of the population with at least bachelor's beyond the model mean. Model Two reflects the percentage increase in the share of voters that supported a ballot measure due to a) classification as a habitat enhancing or bond funded project or b) a one unit increase in the share of the population with at least bachelor's beyond the model mean. 95% Confidence Intervals are also provided and are the values in parentheses. P-values are divided by two for the one-tail significance test. P-value <.05, '*'; p-value <.01, '**'; p-value<.001, '***'.

When controlling for several relevant internal and external system contexts, land trust ballot measures that included wildlife habitat as a project purpose had significantly more public support than initiatives that did not. The binomial regression model, which evaluated the probability of a ballot measure passing, revealed that land trust ballot measures that address wildlife habitat needs were 3.29 (95% CI, 1.45 to 7.45) times more likely to pass than those that did not (p-value = 0.002). Bootstrapping of this model revealed similar results. The percentile error calculating bootstrap found that projects with wildlife habitat purposes were 1.65 to 9.64 times more likely to pass (p-value .001). The BCa bootstrap found, as was expected, that wildlife habitat enhancing trusts were 1.51 to 11.88 times more likely to pass (p-value .001). A similar relationship was demonstrated by the Tweedie model of the share of voters who voted to approve the measure. The percentage of voters who supported land trust ballot initiatives was 14.1% (95% CI, 8.9% to 19.6%) greater when those initiatives addressed wildlife habitat than when they did not (p-value <0.001). Findings from both bootstrap models confirm this relationship. The percentile bootstrap method revealed, at 95% confidence, that habitat enhancing trusts received a 9.2% to 19.5% larger share of the vote and the BCa method revealed a similar 9.0% to 19.6% larger share of support (p-value <0.001 for both methods). As such, the null hypothesis, that the inclusion of wildlife habitat as a land trust project purpose does not improve public support for the projects, is rejected.

Only two of the control variables were found to potentially have significant relationships with the dependent variables modeled. Whether or not a bond issue was proposed to fund a land trust measure was found to have a statistically significant impact on the probability of a land trust ballot measure passing (p-value < 0.001). Bond funded ballot measures were more likely to pass by a factor of 2.76 (95% CI, 1.57 to 4.87). Bootstrapping confirmed this finding. The percentile calculated method found (p-value <.001) that bond-funded measures were 1.61 to 5.53 times more likely to pass and the BCa bootstrap revealed a similar confidence interval of 1.46 to 6.10. Measures which proposed bond financing of land trust projects were also found to have received a statistically significantly larger share of voters' support (p-value < 0.001). They received about 10.1% (95% CI, 6.0% 14.3%) more support than measures which proposed a different finance mechanism. This relationship was likewise confirmed by the percentile (p-value <.001) and BCa (p-value <0.001) bootstrap models. The former revealed a confidence interval of a 5.9% to 14.6% larger share of support and the latter 5.7% to 14.7% larger. Consequently, the null hypothesis, that voter support for land trusts projects that are financed by bonds was not significantly greater than it was for projects that were not, was rejected.

The five-year average of the share of the population in a county with a bachelor's degree or higher' was not found to have a significant relationship with the probability of a land trust ballot initiative passing (p-value: model, 0.105; percentile, 0.095; BCa, 0.095). The variable was significantly related to the share of voters that supported the measure (p-value: model, 0.034); however, the effect was very small. A 1% increase in the share of a county's population with at least a bachelor's degree above the variable mean (38.23%) was associated with about 0.2% (95% CI, <0.1% to 0.5%) greater support for a public land trust ballot measure. The significance indicators were mixed in the bootstrap estimates. While the p-values of the variable estimate for the percentile (0.028) and the BCa (0.028) bootstrap estimates fall below the .05 threshold for significance, the confidence intervals of both the percentile (95% CI, >-0.1% to 0.5%) and BCa (95% CI, >-0.1% to 0.5%) include zero. As such, though there is some evidence to suggest that a small, positive relationship between educational attainment and support for public land trusts exists, the null hypothesis cannot be totally rejected. Further study of the relationship between education and public support for land trust projects will need to be conducted to better understand the nature of that relationship.

The remaining null hypotheses for the remaining study control variables cannot be rejected. A second 'effects' table has been created to document the findings produced by the model and is included in the appendix (Table 13). While these variables did not demonstrate significant relationships in this study, replication of these null findings to verify their validity is encouraged.

Discussion

The Public Support for Wildlife Habitat Protection

Ballot initiative data evaluated for this study came from all U.S. census divisions, with the exception of Division 6, from 35 different states, and from 392 unique political jurisdictions between the years of 2010 and 2019. Analysis of this spatially diverse, vote tally revealed that land trust ballot initiatives with wildlife habitat purposes were significantly more likely to pass and received a substantially greater share of the vote than measures which did not. Even when controlling for a variety of ballot initiative specific and county-level demographic control variables, land trust projects that included wildlife habitat as a project purpose had far more public support. For proponents of land trusts, this is promising news because it suggests that this policy tool can be pursued to scale up the response to habitat loss.

As noted in previous research using the LandVote database, public land trust votes are often occurring in areas with higher levels of biodiversity (Crain et al., 2020). Furthermore, for those that are philosophically concerned about conflicts between democracy and trust-based governance more broadly, the ex-ante legitimation procedure that characterizes public land trust votes, and the robust positive results that it often elicits, suggests that the problem of habitat loss can be addressed in an efficacious and responsive way (Rehfeld, 2009). Consequently, finding ways to leverage this phenomenon, to scale up its use horizontally and vertically, should be explored further. Whether a land trust is intended for a half-acre lot, a city block, or hectares of protected area, all sizes have the capacity to address some sort of habitat need.

One of the better methods for doing is likely to be to leverage extant organizations and their networks. Land trust networks should emphasize to project planners that they are likely to have significantly greater public support for the projects they propose if they address species protection and habitat. Further, if land trust networks could facilitate connections between land planners, ecologists, and biologists that are familiar with the area's needs, then that would also likely help local planners to include habitat considerations within the land trust formulation process. As noted, only 18.7% of public land trust ballot initiatives proposed during the period of study included wildlife habitat as a project purpose. If that share was increased via network coordination, then it is likely that more wildlife habitat would be preserved in the US.

Finally, it is worth noting that the jurisdictional boundaries that limit the behavior of all governance institutions do not constrain nature in the same way. A forests, prairies, wetlands and rivers should not stop at the county-line. Noting the importance of reducing habitat fragmentation in addition to loss, it is worth considering the ability of land trusts to 'connect the dots' of disconnected habitats across jurisdictional boundaries. Forming regional quilts of interconnected, but locally funded and managed, habitats could address interjurisdictional needs while also addressing subsidiarity concerns.

From outright land purchasing to funding conservation easements, the public land trust mechanism could be an effective tool for pursuing land-use policy goals while also being more agnostic about specific land ownership and use prescriptions. In an era when the need for both rapid and effective land and water conservation is great, land trusts that are publicly funded, legitimated democratically, and that can be used when and where other conservation methods cannot be used should be explored to address habitat loss driven biodiversity concerns.

The Finance Mechanism of Choice

Land trust ballot initiatives which proposed the utilization of bonds to finance the cost of the land acquisition and protection were significantly more likely to pass and received much greater share of voter support than initiatives that proposed non-bond-based finance mechanisms. While a variety of non-bond measures exist, property tax proposals were the most common. In fact, property tax finance mechanisms were the most frequently proposed of all mechanisms during the time period evaluated. At 44.75% of proposals, property tax increases—which are known to be regressive—are more frequently proposed than bonds (35.5%), sales taxes (10.29%), income taxes (3.78%), real estate transfer taxes (1.26%), and a basket of other infrequently used mechanisms (4.41%) (Amornsiripanitch, 2020).

The policy relevance of the finance mechanism selection cannot be overstated. That land trust ballot initiatives which were funded by bonds are 2.76 times more likely to pass than those that are not strongly suggests that the distribution of proposed finance mechanisms should shift, to the extent that is reasonable, to include more bond usage. Holding all other conditions at their average or their reference variable, initiatives that proposed bond-based financing had about 10.1% greater voter support share than the ballot initiatives that proposed primarily tax-based mechanisms. If proposal legitimation is an important goal—and to a study that seeks to unpack the democratic potential of public land trusts, it is—then the use of bonds to pay for public land trusts is the first best public finance choice by that measure.

The Relevance of Community Educational Attainment

Educational attainment, measured and analyzed in a variety of ways, has previously been found to be positively correlated with support for land trusts (Banzhaf et al., 2010; Bastian et al., 2017; Klenosky et al., 2015; Kline, 2006; Kroetz et al., 2014; León-Moreta, 2019; Sundberg, 2006). From measuring public support for trusts obtained from communities with higher levels of educational attainment, broadly, to measuring landowner and trust organizer support for land trusts based upon their personal educational attainment, the relevance of educational attainment to support for land trusts has been widely documented. Naturally, educational attainment was viewed to be important to include within the analysis of this study.

Educational attainment was operationalized in this study by including the share of a county's population that is both over 18, and that has at least a bachelor's degree as a control variable in the models. This is similar to how other studies have explored the effect of educational attainment on countless dependent variables, including land trust support (Banzhaf et al., 2010; Bastian et al., 2017; Klenosky et al., 2015; Kline, 2006; Kroetz et al., 2014; León-Moreta, 2019; Sundberg, 2006). One land trust specific study that was reviewed for this study examined educational attainment as represented by the number of years of school that a survey respondent had completed; however, this was as a compliment to rather than supplement of degree completion (Bastian et al., 2017). Many, though not all, of the land trust specific studies that were reviewed found positive and often significantly positive relationships between educational attainment and support for land trusts. Consequently, it was somewhat surprising that the share of a county's population with a bachelor's degree was not found to be significantly related to the probability of a measure passing, and that it was so weakly related to the share of the voters that supported a measure. While this finding is perplexing, the historical findings suggest that the relationship between educational attainment and land trust support does deserve a closer look.

With adverse policy implications from both a false positive and a false negative finding, future studies should continue to explore educational attainment. Type 1 error could deter conservation investment votes, due to efficiency concerns, in areas with lower levels of educational attainment, for example, which could contribute to environmental justice concerns. Type 2 error could lead to inefficient use of limited conservation planning resources in areas where the creation and funding of a land trust through a ballot measure was less likely to be legitimated. So, while the null hypothesis for the educational attainment variable could not be rejected, the variable effect's mixed results, its position within the literature, and the applied implications of 'getting this one wrong' warrant a closer look.

Additional Contexts of Limited Interest or in Need of Further Study?

That all of the other measure specific and county-level control variables included within this study did not demonstrate significant relationships further illustrates that the project purpose and financing variables are crucial for understanding land trust ballot measure success. However, while purpose and funding were only revealed to be significant by these models, that is not to suggest that the other variables evaluated could not play a role in vote success. Other studies which include state-level votes, explore different timeframes, examine specific communities, or utilize exit polling to analyze similar theorized relationships could find that other demographic variables are significantly related to ballot measure success. As such, while this study could not reject the null hypotheses for these interesting control variables, it is likely that further research needs to be conducted before this non-finding can be generalized to public land trust votes more broadly.

Concluding Thoughts

Given ambitious policy targets to slow—perhaps even reverse—the loss of biodiversity, public support for US land trusts is encouraging. Two of the primary dilemmas addressed by this study are worth highlighting again. First, as stressed by the IPBES (2019), wildlife habitat loss is the most influential driver of biodiversity loss globally. The legal protections afforded to land trusts, as well as their flexible ownership and management models, make them ideal for addressing the public goal of habitat protection in perpetuity (Rose, 2005; Sax, 1970).

Beyond illustrating their usefulness, however, this study responds more directly to another consideration regarding land trusts as a policy tool—the need for some form of democratic legitimacy. A key finding is that public land trusts that address wildlife habitat concerns, particularly those financed through bond issues, are a way to obtain that legitimacy ex ante. The voting public can choose whether to fund the creation of a trust in their state, region, or local community. This study finds that the public across the U.S. is open, indeed eager, to support the habitat needs of their non-human neighbors. People are willing to show up to the ballot box and financially contribute to land protection.

Further, for all of the factionalized rancor that exists across numerous policy sectors nationally, including the environment, this study illustrates that some environmental policies can be less polarizing, when they are localized, tangible, and accessible to the people who will share in their cost. In our era of legislative gridlock and reduced administrative capacity at the federal level, this study suggests that designing environmental policies at local scales is a viable method to address global problems. Local governments, planning bodies, non-profits, and landowners across the U.S. should take note of these findings as they seek to identify ways to address biodiversity loss, and other concerns, with policy-centric governance mechanisms that their constituents are more likely to support.

Finally, it is worth noting that not all democratic outcomes are inherently good. To put a finer point on the critique, democratic decision-making can prevent reasonable policy choices from being implemented.(Kramer, 1994) If the needs to polity are not met because a majority of decision-makers decide not to meet them, then important policy objectives may go unfulfilled. Worse yet, democratically supported choices may cause tangible harms to minority groups. Should a land trust or other form of land conservation technique unfairly dispossess a person of their land or keep them from providing for themselves or the community, for example, the democratic nature of the decision does not absolve it from justice concerns. Such concerns are addressed further in the coming chapters.

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On the Relationship Between ‘Good’ Governance and Reported Environmental Justice Conflicts

Abstract

Conflict is a feature of all pluralistic societies. Variation in needs and norms, priorities and prescriptions lead to divergent perspectives of what ought to be done. At times conflict can be severe and, unfortunately, violent. One type of conflict, environmental conflicts, has garnered increased interest in the face of growing environmental problems. In particular, environmental justice issues, when marginalized populations experience unfair shares environmental burdens and benefits, have become a core focus. Consequently, conflict theorists have sought to identify various economic, social, and environmental factors that influence the prevalence of that phenomenon. One type of driver that has been of particular interest is the role of governments in preventing, or causing, and remedying conflicts over environmental justice. As such, this study explores patterns between well-known governance indicators and newly created data on unresolved environmental conflicts reported within 144 countries from 2004 to 2014. Following exploratory analysis of conflicts documented in the Environmental Justice Atlas, models were tested that regressed national case counts against the Worldwide Governance Indicators and several relevant control variables. Regression analysis revealed that several of the governance variables had significant relationships with the conflict counts, including indices for political voice and accountability, rule of law, and control of corruption. These findings suggest that the frequency of ongoing conflicts over environmental justice issues in the country years studied were significantly related to the perceived quality of ‘good’ governance in those country years.

Introduction

In early June 2022, reporter Dom Phillips and indigenous rights advocate Bruno Araújo Pereira, went missing in the Brazilian Amazon (Nicas et al., 2022). What transpired over the following weeks included international outrage, a missing persons search, the identification of suspects—fishermen who were illegally harvesting from indigenous territories—and, ultimately, the discovery of human remains. The loss of two individuals who had dedicated their lives to the protection of the vulnerable is a tragic event; however, this incident can also be considered to be a component of one of thousands of cases of conflict regarding the environment around the world (Scheidel et al., 2020, 2023; Temper et al., 2015, 2018).

Environmental conflicts like the aforementioned example are social conflicts (Cole & Foster, 2001). Sometimes they are characterized by the exploitation of natural resources which others may have a claim over or that imperils the environment at large. They can also emerge over concerns about pollution with both acute—toxic chemicals or radioactive waste—or chronic—ozone loss and climate change—impacts on both humans and non-humans. Unfortunately, but predictably, the impacts of these disturbances are often distributed on the basis of extant power dynamics within societies, with unfair burdens manifesting according to gender, race, income class, species, age and other relationalities. Such exploitation and pollution impacts communities' livelihoods, their sustenance, their cultural practices and lifeways, and their health and wellbeing. Some argue that the political economy of development, particularly when paired with poor or no state regulatory oversight, is particularly to blame. Arguably, a state that facilitates development that undermines the wellbeing of its people may be violating their responsibility to protect (R2P) them.

Le Billon and Duffy (2018) define environmental conflicts as “contested incompatibilities between groups in relation to ecological systems” which are characterized by acts of “persuasion,” “litigation,” and “coercion” (2018). Indeed, this appears to be the situation with the killing of Pereira and Phillips: both men were most likely murdered due to their work in resisting and documenting the resistance of illegal fishing and hunting in the Javari Valley, respectively (Nicas et al., 2022). While there are unique circumstances for individual conflicts, research on the “ecology of conflict” has started to explore the influence of root, systemic, socio-political contexts like governance systems on conflict (Brondízio et al., 2009; McGinnis & Ostrom, 2014). This includes a relatively new body of work drawing on the Global Atlas of Environmental Justice (EJ Atlas), an international platform for documenting the occurrence of environmental conflicts, which included reports of over 4100 cases in 178 countries at the time of the present study.

As Temper et al. (2015) note, the EJ Atlas provides the basis for “a deeper systematic, evidence-based inquiry into the politics, power relations and socio-metabolic processes surrounding environmental justice struggles” including the “crucial processes and relations generating environmental inequalities at broader regional, national, and global scales.” For example, Scheidel et al. (2020) investigated the importance of social movements in advancing crucial socio-ecological goals, finding that “the EJ Atlas documents … conflicts in a standardized manner” so that it can “foster systematic and comparative research on environmental conflicts.” In a follow-up study, Scheidel et al. (2023) used EJ Atlas cases to evaluate the impact of development on indigenous persons, in which they sought to “build upon comparative and statistical approaches in political ecology” by revealing “environmental conflict characteristics in a more systematic way” (Scheidel et al., 2023). A similar methodological approach was adopted by this study.

This study seeks to further explore the political ecology of environmental conflicts catalogued in the EJ Atlas by asking: to what extent are governance indicators related with the number of unresolved environmental conflicts reported in a given country? Work by Fearon (2010a, 2010b), for example, evaluated the relationship between Worldwide Governance Indicators (WGIs) and the occurrence of civil wars, finding that “the quality of a country’s governance was significantly more important than improving its economy.” Specifically, countries which experienced a decline in the “Rule of Law,” “Voice and Accountability,” and “Government Effectiveness” were at “a significantly greater risk of civil war outbreak in subsequent years” even when controlling for the country’s income level. Similarly, Hegre and Nygård (2015) found countries were less likely to experience renewed hostilities after an earlier conflict when ‘good’ governance was in effect, measured by WGI variables such as “Bureaucratic Quality,” “Rule of Law,” “Corruption,” “Economic Policies,” “Military in Politics,” and “Political Exclusion and Repression.” Other conflict theorists have also suggested connections between low quality governance, environmental degradation, and conflict (Rus, 2012, 2014; Stares, 2017). However the EJ Atlas data provides an opportunity to expand upon previous studies by considering how a wider set of governance indicators might relate to the number of unresolved environmental conflicts reported across a large sample of country-years when also controlling for multiple other social and environmental factors.

What follows is a brief discussion of the data contained within the EJ Atlas, and how these data were used to analyze the impact of good governance norms on environmental conflicts. Additional methodological considerations follow, including the quantitative content analysis procedure and model construction choices, and the findings come after. The paper concludes with discussion of the relevance of the findings to refining an ecology of environmental conflict and proposals for future research.

Modeling the Political Ecology of Environmental Conflict

Global Atlas of Environmental Justice

The EJ Atlas provides a standardized reporting process and case sheets for individual environmental conflicts from more than 178 countries. Environmental conflict case data for the Atlas is obtained collaboratively through a crowdsource collection procedure which ensures that cases that are reported to the Atlas' editors are only included in the Atlas when they can be verified through previously published reports, papers, articles, legal or regulatory proceedings, or other credible secondary sources (Scheidel et al., 2020, 2023). Temper et al. (2018) describe the EJ Atlas similarly as a "large, purposive, expert-elicited sample of recent, visible, previously reported … conflicts from around the world." While the EJ Atlas is not a global census or random sample of environmental conflicts, it has been found that similar levels of conflict are reported across World Bank country income levels classes (Scheidel et al., 2020). These aforementioned Atlas characteristics are important because there is increased support for the use of modeling techniques on purposive samples, particularly when examining count data, and when certain sample characteristics are met such as sample size (Redondo, 2016; Van Hoeven et al., 2015). Conceptually, EJ Atlas users have also argued compellingly that the global population of many socio-ecological phenomena will always be imperfectly known and so data sources like the EJ Atlas may be the only means through which broader, comparative analysis of the phenomena can occur (Scheidel et al., 2023).

For this study, case sheets were analyzed from this public database from countries with accompanying experimental and control variable data. The year in which the conflict began, the year of any resolution, and the year of the most recent update were documented for each case. Unresolved conflicts at the time of analysis were coded as 'on-going.' If the listed start or end date of a conflict was contradicted by other case sheet information—such as, when active protests have ceased or a court has ruled in favor of a contested development, but environmental justice is explicitly stated as unobtained in the case sheet—then the dates recorded reflected the earliest or latest verifiable start or end date. The year 2014 was selected for the initial end date of analysis because it was the last year in which the majority of cases could be considered 'up to date' at the time of analysis—when the initial cases were first published. If only a portion of a conflict took place during the studied period—2004 to 2014, which was selected to maximize data availability—then only the years within the 2004-2014 period were included in analysis. Any conflict which was reported to have occurred entirely outside the range of dates evaluated was excluded from analysis. Cases with unverifiable start or stop dates were also excluded. Finally, any country-years without reported conflicts were recorded as zero.

Case report data contained within the Atlas for the 144 countries selected for analysis was consulted. 3698 independent case reports were found to be accessible for those countries; however, 154 of those cases were found to have unclear start or stop dates. Ultimately, 3544 cases from the countries analyzed were deemed to have sufficient temporal data to estimate when they took place and were included within this study.

Resulting data is summarized in Table 5 below. Of the cases analyzed, 1134 were found to be ongoing in 2004. This was a net increase of 71 ongoing cases from the previous year (2003). The number of total ongoing conflicts increased each year by an average of about 143 cases through the sampled time period (2004 to 2014), with the smallest increase in unresolved conflicts occurring between 2013 to 2014 (95) and the largest increase between 2009 to 2010 (189). There were reports of an estimated 2566 unresolved environmental conflicts by 2014.

Table 5. Summary Findings of Document Analysis of EJ Atlas Case Sheets

	Study Years										
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Total Ongoing Case Reports	1134	1238	1361	1515	1640	1791	1980	2166	2338	2471	2566
% Change	7%	9%	10%	11%	8%	9%	11%	9%	8%	6%	4%
Mean	8	9	9	11	11	12	14	15	16	17	18
Std. Dev.	16	17	18	20	22	24	27	29	31	33	34
Min.	0	0	0	0	0	0	0	0	0	0	0
Max.	98	108	125	148	163	190	218	234	244	257	266

Note. Mean and standard deviation values are rounded up to the nearest whole conflict. Countries included in analysis are: Albania, Algeria, Angola, Argentina, Armenia, Austria, Bahamas, Bahrain, Bangladesh, Barbados, Belgium, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cabo Verde, Cambodia, Cameroon, Canada, Central African Republic, Chad, Chile, China, Colombia, Comoros, Democratic Republic of the Congo, Republic of Congo, Costa Rica, Côte d'Ivoire, Croatia, Cyprus, Czech Republic, Denmark, Dominican Republic, Ecuador, Arab Republic of Egypt, El Salvador, Equatorial Guinea, Estonia, Ethiopia, Fiji, Finland, France, Gabon, Gambia, Georgia, Germany, Ghana, Greece, Grenada, Guatemala, Guinea-Bissau, Guyana, Haiti, Honduras, Hungary, Iceland, India, Indonesia, Iraq, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Republic of Korea, Kuwait, Kyrgyz Republic, Lao PDR, Latvia, Lebanon, Lesotho, Lithuania, Luxembourg, Madagascar, Malawi, Malaysia, Maldives, Mali, Malta, Mauritania, Mauritius, Mexico, Morocco, Myanmar, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Niger, Nigeria, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russian Federation, Samoa, Saudi Arabia, Senegal, Sierra Leone, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sri Lanka, Suriname, Sweden, Switzerland, Tajikistan, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, Türkiye, Turkmenistan, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Uzbekistan, Vietnam, Zambia, Zimbabwe.

The average number of reports of unresolved environmental conflicts rose from about 8 ongoing conflicts/country in 2004 to 18 conflicts/country in 2014. Several countries experienced years with no reported environmental conflicts during the evaluated period, but only the Bahamas, Barbados, Burundi, Cabo Verde, Central African Republic, Comoros, Côte d'Ivoire, Estonia, Fiji, Grenada, Luxembourg, Mauritius, Oman, Samoa, Singapore, and Turkmenistan had no environmental conflicts reported as on-going in each year analyzed. Conversely, India had the largest number of reports of ongoing environmental conflicts per year (see Table 5 above for Max. values). Additionally, a frequency analysis of the national case counts was conducted, and it revealed that the mean case frequency by county/year was about 13 conflicts, but that the standard deviation of the variable was about 26 conflicts. Further, 53% of the country years analyzed had between 0 and 4 reports of environmental conflicts that were ongoing. The dependent variable, reports of ongoing environmental conflicts, thus exhibits a right-skewed, non-normal distribution. Additional statistics produced by the method of analysis—the dispersion parameter estimates—confirmed this understanding and are highlighted in the findings section.

Worldwide Governance Indicators and Control Variables

Following previous analysis of the WGIs in relation to "civil conflict incidence" (Rus, 2012), "civil war onset" (Fearon, 2010a, 2010b), and "conflict recurrence" (Hegre & Nygård, 2015), data was assembled for each country from 2002 to 2014. The WGIs include six indicators compiled by researchers for more than 200 countries that attempt to quantify the "traditions and institutions by which authority in a country is exercised" (Kaufmann & Kraay, n.d.). Indicators are formed from "several hundred variables obtained from 31 different data sources, capturing governance perceptions as reported by survey respondents, non-governmental organizations, commercial business information providers, and public sector organizations" (Kaufmann et al., 2010). Higher values are indicative of greater variable performance, varying from a minimum of -3.18 (Political Stability, Iraq, 2004) to a maximum of 2.47 (Governmental Effectiveness, Singapore, 2008).

Table 6 summarizes the six variables defined by Kaufmman and Kraay, as well as the relationships between the WGIs and the number of reports of ongoing environmental conflicts hypothesized by this study. The Voice and Accountability (VA) variable was hypothesized to be positively correlated with reports of ongoing environmental conflicts because the perception of higher levels of free speech, free assembly, and free press in a country is likely to encourage more frequent use of those freedoms by its residents (Hossain et al., 2018). Put differently countries with low VA scores are more likely to repress the kinds of civic expression that would be documented by the EJ Atlas, which would depress conflict counts in those countries (Dimitrov, 2023). This hypothesized relationship differs, somewhat, from the relationship identified by Fearon (2010a, 2010b) and Yiew et al. (2016), and this is due to the view that civil conflicts—protests as opposed to wars—might be enabled, rather than prevented, by a more open society. Further, it seems reasonable to suggest that there may be a difference in the effect of a negative change in VA from a higher to lower VA score (Fearon, 2010a), and that of lower levels of VA generally, which is how the variable was operationalized for this study. Political Stability (PS) was hypothesized to be negatively correlated with reported environmental conflicts: less civil strife, generally; less environmental strife, specifically (Fearon, 2010a; Yiew et al., 2016).

Governmental Effectiveness (GE) was hypothesized to be negatively correlated with environmental conflicts because countries with an independent civil service that can successfully design and implement governance choices were viewed to be more likely to be able to address the root causes of environmental conflicts, such as pollution (Fearon, 2010a, 2010b; Walter, 2022; Yiew et al., 2016). The Regulatory Quality (RQ) variable was hypothesized to be positively correlated with conflicts due to the potential for economic development to inadvertently encourage unsustainable or socially irresponsible projects. This differs from Hegre & Nygård's identified relationship between bureaucratic quality and conflict (2015), as well as Yiew et al.'s (2016); however, similarly to the VA variable, a different relationship was hypothesized due to differences in the respective outcome variables of interest. Unsustainable economic development is regularly cited as a driver of environmental conflicts in political ecology literature, for example (Bassett, 1988; Collier, 2004; Collier & Rohner, 2008; Ray & Esteban, 2017).

The Rule of Law (RL) variable was hypothesized to be negatively correlated with environmental conflicts because prolonged civil disagreements were viewed to be less likely in countries with greater public respect for laws and regulations, with effective venues for legal remedy, and with sufficient enforcement mechanisms to ensure compliance (Fearon, 2010a, 2010b; Hegre & Nygård, 2015; Yiew et al., 2016). Finally, Control of Corruption (CC) was hypothesized to be negatively correlated with environmental conflicts in countries where governance choices are perceived to benefit the general public rather than the private interests of those with economic, political, or social power (Hegre & Nygård, 2015; Rus, 2012, 2014; Walter, 2022; Yiew et al., 2016).

Table 6. World Governance Indicators and Hypothesized Correlation with Conflict Report Counts

Worldwide Governance Indicators (WGIs)	Description by Kaufman and Kraay	H_a
Voice and Accountability (VA)	Extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.	Positive
Political Stability (PS)	Likelihood of political instability and/or politically motivated violence, including terrorism.	Negative
Government Effectiveness (GE)	Quality of public services, civil service and the degree of its independence from political pressures, policy formulation and implementation, and the credibility of the government's commitment to such policies.	Negative
Regulatory Quality (RQ)	Ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.	Positive
Rule of Law (RL)	Extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	Negative
Control of Corruption (CC)	Extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as 'capture' of the state by elites and private interests.	Negative

To control for social, economic, and environmental characteristics of each country in the panel data, several control variables were explored. Table 7 provides a summary description, including variable name, and units (The World Bank, 2023). Due to this study's focus on the impact on governance on conflict, a more exploratory approach is taken with regard to the effects of the control variables and their hypothesized influence on reported environmental conflict cases. Findings regarding these variables are documented within a table in the appendix (Table 16) and are briefly discussed in the concluding thoughts section of this paper. The natural log of several control variables was utilized, as opposed to their untransformed state, as is common when addressing variables with large numbers, substantial variation, and the potential for outliers.

Table 7. Control Variables and Hypothesized Correlation with Conflict Report Counts

Control Variable	Variable Description	H_a
Real GDP adjusted by Purchasing Power Parity_LN (GDP, PPP_LN)	The natural log of the current purchasing power of a country's gross domestic product in international dollars.	Positive
Life Expectancy (LE)	The average age of mortality for persons living in a particular country.	Negative
Population_LN (Pop_LN)	The natural log of the total number of people estimated to be living within a particular country. Data for analysis was sourced from the World Bank's 'Open Data, by Indicator' database.	Positive
Land Area _LN (LA_LN))	The natural log of a country's land area in square kilometers. Data for analysis was sourced from the World Bank's 'Open Data, by Indicator' database.	Positive
Natural Log of Carbon Dioxide Equivalent _LN (CO_2.E_LN)	The natural log of the total amount of greenhouse gasses produced within a country converted into the equivalent number of tons of CO_2 required to produce the same amount of warming. Data for analysis was sourced from the World Bank's 'Open Data, by Indicator' database.	Positive

Note. All variables sourced from the World Bank 'Indicators' database.

One control variable selected, life expectancy, was included to explore the relationship between relative human welfare and conflict (Yazdi Feyzabadi et al., 2015). Country-level income was included due to previous consideration of country income by EJ Atlas analysts (Scheidel et al., 2020) as well as the consideration of income-based contexts by other conflict scholars (Fearon, 2010a; Hegre & Nygård, 2015; Ray & Esteban, 2017; Rus, 2012) when assessing conflict contexts. Country population estimates (Fearon, 2010a; Hegre & Nygård, 2015; Ray & Esteban, 2017; Rus, 2012; Yiew et al., 2016), land area (Arbatlı et al., 2015), and greenhouse gas emissions (Carman et al., 2024; Temper et al., 2020), were included to operationalize and control for the impact of a country's scale—how populus, how large, and how polluting—on count data with variables that have also been considered by conflict scholars to influence conflict. Descriptive statistics for the model variables selected can be viewed in Table 8 below.

Table 8. Independent and Control Variable Descriptive Statistics

	N	Min	Max	Mean	σ
Voice and Accountability$_{t-0}$	1584	-2.259	1.801	-.015	.963
Voice and Accountability$_{t-1}$	1584	-2.250	1.801	-.015	.965
Voice and Accountability$_{t-2}$	1584	-2.250	1.801	-.013	.965
Political Stability and Absence of Violence$_{t-0}$	1584	-3.180	1.620	-.103	.932
Political Stability and Absence of Violence$_{t-1}$	1584	-3.180	1.687	-.103	.940
Political Stability and Absence of Violence$_{t-2}$	1584	-3.180	1.753	-.092	.947
Governmental Effectiveness$_{t-0}$	1584	-2.083	2.470	.036	.988
Governmental Effectiveness$_{t-1}$	1584	-1.809	2.470	.034	.989
Governmental Effectiveness$_{t-2}$	1584	-1.962	2.470	.034	.990
Regulatory Quality$_{t-0}$	1584	-2.348	2.226	.065	.942
Regulatory Quality$_{t-1}$	1584	-2.349	1.964	.065	.940
Regulatory Quality$_{t-2}$	1584	-2.349	1.964	.063	.944
Rule of Law$_{t-0}$	1584	-1.870	2.125	-.024	.996
Rule of Law$_{t-1}$	1584	-1.870	1.995	-.029	.998
Rule of Law$_{t-2}$	1584	-1.870	1.995	-.029	.999
Control of Corruption$_{t-0}$	1584	-1.673	2.459	-.025	1.031
Control of Corruption$_{t-1}$	1584	-1.673	2.459	-.021	1.032
Control of Corruption$_{t-2}$	1584	-1.673	2.459	-.019	1.032
GDP, PPP (Current, International Dollars, ln)	1584	20.428	30.496	25.226	1.960
Life Expectancy (years)	1584	42.914	83.588	69.982	9.170
Population (ln)	1584	11.603	21.039	16.069	1.728
Land Area (hectares, ln)	1584	5.704	16.612	11.847	2.141
Total Green House Gas Emissions (CO_2 Equivalent, ln)	1584	12.689	23.203	17.571	1.862

Note. Values for variable descriptive statistics have been rounded up to the nearest thousandth place.

Model Development

The Generalized Linear Model (GLM) tool in SPSS was used for regression analysis. We utilized the negative binomial regression, as opposed to ordinary least squares or Poisson regression, because the dependent variable is a count and, as revealed by the frequency analysis, the variable's variance is significantly larger than its mean (J. A. Green, 2021; Laerd Statistics, n.d.; UCLA: Statistical Consulting Group, n.d.; Wheeler, n.d.). The appropriateness of this choice was verified by the dispersion parameter estimate produced by the analysis, and it is discussed in the findings section (UCLA Office of Advanced Research Computing, n.d.). A similar approach has been used by other modelers of EJ Atlas count data (Le Billon & Lujala, 2020). The modeling approach features a negative binomial distribution, a log link function, and a model parameter value which is model-estimated—

rather than pre-specified—to address potential over/under-dispersion of the outcome variable (IBM, 2021). Additionally, a robust estimator was utilized to address any remaining heteroskedasticity-based model fit issues (Carroll et al., 1998; Y. Liu et al., 2019; Olvera Astivia & Zumbo, 2019; Zeileis, 2006). Finally, a bootstrapping procedure was used to construct additional confidence intervals for each parameter. This was done was as a way to evaluate the veracity of the relationships identified by the base model against models constructed with different samples of the data (Campbell, 2008; Carroll et al., 1998; Fan, 2003; Olvera Astivia & Zumbo, 2019; Puth et al., 2015; Tamborrino M, 2015). The Mersenne Twister was set at 2000000, for replicability, and 5000 bootstrap samples were computed and subsequently regressed (Puth et al., 2015). Noting that there is some disagreement in the literature regarding standard error calculation preferences when bootstrapping regression models, both the 'percentile' and 'bias-corrected, accelerated' (BCa) confidence intervals were calculated and reported in the findings (Cheung et al., 2023; Jung et al., 2019; Puth et al., 2015).

Three model specifications were explored, including: (1) an intra-year model (a separate negative binomial regression for the count of ongoing conflicts within each year of the study); (2) a pooled model with all country-years and a one-year lag of the WGI variables; and (3) a pooled model with a two-year lag. All models controlled for the basket of economic, social, and environmental considerations, described above in Table 7. Model goodness of fit was evaluated by the Pearson goodness-of-fit (χ^2) and deviance goodness-of-fit (*d*) scores, with values of χ^2/df and *d*/df closer to 1 (i.e., a lack of significance) indicating better fit (J. A. Green, 2021). Model dispersion parameter estimates are also reported to evaluate over/under dispersion issues. A 95% confidence level was selected for all statistical tests, with a single tailed, <0.05 p-value threshold used to test the model parameter coefficients' estimates for significance. The regression coefficients for the associations between predictors and the outcome (count of conflict reports) for all models are exponentiated and reported as incident rate ratios, which can be interpreted as the percent change in reported environmental conflicts for a 1-unit increase in the predictor variable.

Findings

All three models were found to be significantly better at predicting the outcome variable than the null model, as reported by the Omnibus Test for the respective GLMs ($p<0.001$). They also were reasonably 'good fits' for the data. The intra-year model exhibited both χ^2/df and d/df close to 1 (χ^2/df=1.054, d/df =1.069) as did the pooled model with a one-year lag applied to WGI variables (χ^2/df =1.057, d/df =1.071) and the model with a two-year lag (χ^2/df =1.057, d/df =1.071). See Tables 6 and 7 in the appendix for these and other model fit statistics. The negative binomial dispersion coefficients produced by the regression analysis are .460 (95% CI, .415 to .509), .460 (95% CI, .416 to .509), and .461 (95% CI, .416 to .510) for Models 1, 2, and 3, respectively. These 'dispersion parameter estimates' reveal that the dependent variable, as is frequently the case with count variables, is over-dispersed, and that, consequently, the negative binomial model selection was the superior to the Poisson model for this study (UCLA Office of Advanced Research Computing, n.d.). Tables detailing these findings can be found in the Appendix (Tables 14 and 15)

A table of the estimated effects of the WGI variables on the counts of ongoing environmental justice conflicts reported in the EJAtlas, Table 9, follows this paragraph. A similar table was included for the parameter effects of the control variable types included in the model; however, as they were not the main focus of this study, their findings are more exploratory and are discussed in the concluding section (see Table 16 in the Appendix). A brief description of the findings for the governance variables follows and it includes a description of the identified variable effect, the significance of the effect, and its 95% confidence interval (CI), as well as comparable information produced by the bootstrapping procedure.

Table 9. The WGIs and Counts of Reports of Ongoing Environmental Conflicts

	Study Models		
	Model 1 WGIs$_{t-0}$ Panel	Model 2 WGIs$_{t-1}$ Panel	Model 3 WGIs$_{t-2}$ Panel
Voice and Accountability	115.6%, <0.001*** (95.9% to 137.4%)	114.9%, <0.001*** (95.3% to 136.4%)	113.6%, <0.001*** (94.2% to 134.9%)
Stability and Lack of Violence	1.3%, 0.383 (-6.9% to 10.2%)	-1.7%, 0.341 (-9.5% to 6.8%)	-4.6%, 0.129 (-12.1% to 3.5%)
Governmental Effectiveness	11.8%, 0.130 (-7.9% to 35.7%)	12.2%, 0.122 (-7.5% to 36.0%)	12.7%, 0.110 (-6.9% to 36.3%)
Regulatory Quality	-2.5%, 0.381 (-17.5% to 15.1%)	-2.1%, 0.406 (-17.4% to 16.2%)	-1.9%, 0.415 (-17.4% to 16.6%)
Rule of Law	-54.9%, <0.001*** (-45.1% to -62.9%)	-54.8.%, <0.001*** (-45.1% to -62.7%)	-53.1%, <0.001*** (-43.2% to -61.3%)
Control of Corruption	-17.4%, 0.011* (-2.9% to -29.7%)	-15.9%, 0.018* (-1.2% to -28.4%)	-16.6%, 0.012* (-2.3% to -28.8%)

Note. Results are reported as the percent increase or decrease in reported environmental conflicts due to a one unit increase in the predictor variable value above the mean. 95% Confidence Intervals are also provided and are the values in parentheses. P-values are divided by two for the one-tail significance test. P-value <.05, '*'; p-value <.01, '**'; p-value<.001, '***'.

Voice and Accountability (VA) was found to be correlated with the counts of ongoing environmental justice conflicts reported in the EJAtlas in the country years evaluated. In each of the three models constructed, the significance of the effect of VA on the outcome variable was measured at a p-value of <0.001. In the intra-year model, a one unit increase in VA above the variable mean (about -0.015) was associated with 115.6% (95% CI, 95.9% to 137.4%) more reported environmental conflicts per year in a country.

The bootstrapped VA parameter estimates were also significant (p-value <.001). The percentile and BCa 95% confidence intervals were found to be 96.0% to 138.0% and 95.6% to 138.5%, respectively. A similar relationship was demonstrated in the one-year lag model. A one unit increase in VA above the variable mean (about -0.015) was associated with 114.9% (95% CI, 95.3% to 136.4%) more ongoing environmental justice conflicts reported per country year. As with the previous model, the relationships between the one-year lagged VA parameter and the dependent variable in the bootstrapped models were also significant (p-value <.001). The confidence intervals, 95%, for the percentile and BCa estimates were 95.6% to 136.1% and 95.0% to 137.3%. In the third, two-year lag model, a one unit increase in VA above the variable mean (about -0.013) was associated with 113.6% (95% CI, 94.2% to 134.9%) more ongoing environmental justice conflict reported per country year. Bootstrapped relationships for VA were also significant in the two-year lag model (p-value of <0.001). The parameter confidence intervals from the percentile estimates ranged from 94.5% to 135.1% and the BCa estimates ranged from 94.1% to 135.6%. Consequently, we deemed it reasonable to reject the H_0 that there was not a significant, positive relationship between the Voice and Accountability variable and the counts of environmental justice conflicts reported to be ongoing.

Rule of law (RL) was found to be negatively correlated with the counts of ongoing environmental conflicts reported in the country years evaluated. In each of the three models constructed, the significance of the effect of RL on the outcome variable was measured at a p-value of <0.001. In the intra-year model, a one unit increase in RL above the variable mean (about -0.024) was associated with 54.9% (95% CI, 45.1% to 62.9%) fewer ongoing environmental conflict reports per year in a country. The bootstrapped RL parameter estimates were also significant (p-value <0.001). The percentile and BCa 95% confidence intervals were found to be -45.3% to -63.1% and -45.5% to -63.0%, respectively. A similar relationship was demonstrated in the one-year lag model. A one unit increase in RL above the variable mean (about -0.029) was associated with 54.8%, (95% CI, 45.1% to 62.7%) fewer reported environmental conflicts per year. Similarly, the relationships between the one-year lagged RL parameter and the dependent variable in the bootstrapped models were also significant (p-value <0.001). The confidence interval estimates for the percentile and BCa bootstraps of the RL were -44.9% to -62.8% and -45.3% to -62.6%. In the third, two-year lag model a one unit increase in RL above the variable mean (about -0.029) was associated with 53.1% (95% CI, 43.2% to 61.3%) fewer reported environmental conflicts per year. The bootstrapped relationships for the RL variable were also significant in the two-year lag model (p-value of <0.001). The parameter confidence intervals from the percentile estimates ranged from -43.1 to -61.4% and the BCa estimates ranged from -43.3% to -61.2%. As such, we rejected the H_0 that there was not a significant, negative relationship between the Rule of Law variable and the counts of environmental conflicts reported to be ongoing.

Control of corruption (CC) was found to be negatively correlated with the reported counts of unresolved environmental conflicts in the country years evaluated. In all three of the models created, the effect of CC on the outcome variable was significant at $p<0.05$ (.011, .018, .012, respectively). In the intra-year model, a one unit increase in CC above the variable mean (about -0.025) was associated with 17.4% (95% CI, 2.9% to 29.7%) fewer reported environmental conflicts per year in a country. The bootstrapped CC parameter estimates were also significant (p-value = 0.012). The percentile and BCa 95%

confidence intervals were found to be -2.9% to -30.0% and -3.3% to -29.7%, respectively. A similar relationship was demonstrated in the one-year lag model. A one unit increase in CC above the variable mean (about -0.021) was associated with 15.9% (95% CI, 1.2% to 28.4%) fewer reported environmental conflicts per year. Likewise, the relationships between the one-year lagged CC parameter and the dependent variable in the bootstrapped models were also significant (p-value = 0.022). The confidence interval estimates for the percentile and BCa bootstraps of the CC were -1.0% to -29.0% and, again, about -1.0% to -29.0%. In the third, two-year lag model a one unit increase in CC above the variable mean (about -0.019) was associated with 16.6% (95% CI, 2.3% to 28.8%) fewer reported environmental conflicts per year. The bootstrapped relationships for the CC variable were also significant in the two-year lag model (p-value = 0.014). The parameter confidence intervals from the percentile estimates ranged from -2.0% to -29.3% and the BCa estimates ranged from -2.4% to -28.9%. We elected, therefore, to reject the H_0 that there was not a significant, negative relationship between the Control of Corruption variable and the counts of ongoing environmental justice conflicts reported in the EJ Atlas.

Unlike the previously addressed variables, the political stability and absence of violence (PSAV), governmental effectiveness (GE), and regulatory quality (RQ) variables were not demonstrated to have significant relationships to with the counts of ongoing environmental justice conflicts reported in the EJ Atlas in the country years analyzed for this study. All three of these predictor variables' effects on the outcome variable, in all three models created, were significant at $p>0.05$. The inability to reject these three variables' H_0 was confirmed by the bootstrapping procedure: all three had p-values above the 0.05 significance threshold and confidence interval ranges that include zero.

Discussion

After identifying which WGI indicators had significant relationships to ongoing environmental justice conflicts per country year reported in the EJ Atlas, a follow up exploration of the literature regarding the significant variables was conducted. This was done in an effort to engage in further theoretical development and meaning making by rehydrating the specific, quantitative governance indicators into more descriptive, qualitative governance characteristics. Understanding what voice and accountability, rule of law, and control of corruption indices are meant to represent, conceptually, and why they are important, beyond the numbers, was viewed to be helpful in illustrating why their relationship with environmental justice conflicts is so meaningful.

Voice and Accountability – Illuminating Injustice

Due to the nature of the voice and accountability variable—that it is intended to indicate the degree to which the norms of "freedom of expression, freedom of association, and a free media" are reflected within a country—it seems intuitive that higher values for the VA variable were found to be correlated with more reported environmental justice conflicts in the countries studied (Kaufmann & Kraay, n.d.). Upon consideration, this finding seems to suggest that governance conditions that are more tolerant of civic expression may encourage more frequent reports of environment-oriented civic expression. Conversely, governance conditions which impede civic expression—chosen, perhaps, due to a concern that "opposition" will inevitably "serve as a catalyst for political destabilization"—are likely to limit public acts of contestation of environmental disagreements as well as the documentation of those acts of contestation (Dimitrov, 2023).

A crucial understanding which informs the interpretation of this finding is that conflict, in addition to being an outcome, is also considered by many political ecologists to be an important process. Some have argued that environmental justice conflicts can have "transformative and emancipatory effects" by challenging and undermining "structural and cultural forms of violence" (Peet & Watts, 2004). Other political ecologists have described environmental conflicts as a "symptom of injustice and uneven power relations" and argue that they represent an opportunity for the liberation of "marginalized and oppressed populations and their ecosystems" (Le Billon & Duffy, 2018). Environmental justice in particular highlights these inequities in the distribution of environmental goods and bads, lack of equal engagement in environmental decision making (Agyeman et al., 2016; Bullard, 2005, 2018; Cole & Foster, 2001; Schlosberg, 2013). That environmental justice conflicts can be viewed as articulations of opposition to real and perceived environmental incompatibilities does suggest that these conflicts have "constructive potential, rather than a universally destructive one" (Le Billon & Duffy, 2018). They can empower communities, serving as a means by which they can express their communal agency, which can be used to prevent future and redress current harmful environmental practices. As such, though higher levels of voice and accountability may be correlated with more unresolved environmental conflicts being reported in a given country year, this pattern should be tolerated so that conflicts can be revealed, and then, through conflict management strategies, pathways for their constructive resolution can be identified and pursued (Kriesberg & Dayton, 2017).

Additionally, it is necessary to highlight the instrumental role of activists, journalists, and mobilized community members in contesting environmental disagreements. They are the human side of conflict reports and are the actors and groups that constitute the global movement for environmental justice (Cole & Foster, 2001; Le

Billon & Lujala, 2020; Scheidel et al., 2020). That ongoing environmental justice conflicts were reported to be more frequent in places with more open expression, speech, and media environments is additional evidence in support of previously articulated findings regarding the role of protesters, advocates, and journalists in socio-ecological movements (Escobar, 2008; Peet & Watts, 2004; Scheidel et al., 2020). These individuals' hardships and successes should be recognized and remembered. Just as importantly, the root causes of their grievances should be understood so that they can be fairly resolved. Through earnest accountability to the voice of environmental defenders, governments can govern in a way that reveals and responds to the distributive and procedural justice concerns of the environmental justice movement.

Rule of Law – Of, Not By, Environmental Laws

Legal scholars have praised the rule of law, stating that there "appears to be widespread agreement, traversing all fault lines, on one point, and one point alone: that the 'rule of law' is good for everyone" (Tamanaha, 2004). They have also critiqued preferences for legalism by suggesting, as Li Shuguang has, that "the law can serve as a mere tool for a government that suppresses in a legalistic fashion" (Mufson, 1995). The rule of law has been described as both a "star in a constellation of ideals that dominate our political morality" (Waldron, 2011) and has also had the cautionary wisdom "too much, even of a good thing, is bad for you" applied to its exercise (Marmor, 2004). Rule of law was also revealed to have a significant, negative relationship between its expression as a WGI and the number of unresolved environmental conflicts reported in a country year. Due to its relevance and the theoretical ambivalence, it seems reasonable to suggest additional investigation into its relationship with environmental conflicts. Several interesting, substantive legal proposals for consideration already exist, however, and are worth highlighting here.

For example, the dissent offered by US Supreme Court Justice Douglas in the case Sierra v. Morton, the rights of nature contained within in Ecuador's national constitution, and Bolivia's Law of Mother Earth are all interesting legal conventions that explicitly promote the prevention and reconciliation of environmental conflicts by awarding nature, indirect, legal standing (Boyd, 2018; Mariqueo-Russell, 2017). Further, the explicit prohibition of acts of aggression against nature during armed conflict that was included in the 1977 update to the Geneva Conventions, to which hundreds of countries are parties or signatories, is also deserving of further review (Gasser, 1995; Office of the High Commissioner on Human Rights, 2023). The articulation of the duty of nation-states to protect nature contained within the 'Protocol Additional' should be reviewed, and an extension its protections to other governance sectors considered. Even traditional environmental laws such as the US National Environmental Policy Act, Endangered Species Act, Clean Air Act, Clean Water Act, Resource Conservation and Recovery Act, and comparable laws in other countries should be considered to be a part of the legal mesh which constitutes the environmental rule of law (Brinkley, 2022). While these laws are not without criticism, with some suggesting that they have mixed success and that they are too anthropocentric, their enforcement and reform could yield tangible environmental quality improvements (Kotzé & French, 2018). As long as their use does not grow to constitute a form of eco-legalistic autocracy, these environmental laws and others can be helpful for formally designating which interactions with environment are and are not acceptable conduct within a particular society in a non-abusive way (Scheppele, 2018).

While generally supportive of the rule of law, particularly in its idealized construction, it is crucial to note that legal systems can and have perpetuate injustices. As mentioned within the first paragraph of this section, the law can be and has been applied in an abusive way (Marmor, 2004; Mufson, 1995). Scheppele (2018) refers to this practice as "autocratic legalism," or "constitutional and legal change" that is undertaken "in the service of an illiberal agenda." This might be classified as a misuse of the law critique, one which does not challenge the role of the law itself but rather when it is applied or the rationale behind its application.

Others strike deeper at the concept of the rule of law and offer a critique of the law itself. They suggest that governments, and the laws that they propagate and enforce, are the source of socio-ecological problems because they create and reinforce the system contexts which cause those problems. Critical environmental justice scholar David Pellow (2018), for example, suggests that "the state is one of the primary forces contributing to environmental injustice and related institutionalized violence." This would seem to challenge the notion that institutional agents will be good faith partners in addressing socio-ecological and environmental justice problems. Indeed, Pellow compellingly notes that "some people and communities might not want to be included in a political process that has meted out so much punishment and brutality to their groups." Others suggest a more balanced approach. David Purucker (2021), for example, argues that environmental justice advocates need a framework that enables them to identify when resistance of or cooperation with the state is more likely to yield more just outcomes.

It is worth noting the compliment of statutes and regulations contained within the concept of rule of law—effective and consistent enforcement (Bedner, 2010). Bingham

(2011) wrote of the need for enforcement in his book *The Rule of Law* very succinctly: "laws publicly made" should be "publicly administered in the courts" (2011). There must be a venue and process, according to Bingham, for resolving "disputes which the parties [to the dispute] themselves are unable to resolve." Extending this logic, to advance environmental justice through the rule of law will require sufficient venues and processes for resolving environmental disputes justly. While the UK's court-based model was Bingham's preference for resolving conflicts by enforcing compliance with "publicly made law," it would be wrong to assume that similar, place-based alternatives to courts do not or could not exist which could accomplish the same function (Charpleix, 2018; Segall, 2006; Sternlight, 2014; Tushnet, 2018). If these local bodies are able to make decisions that are "binding on the parties and enforceable by the process" that meet "minimum standards of fairness" and that are "equally enforced and independent" from inappropriate influence, then these alternative venues and processes could assist in just environmental conflict resolution while also contributing to the rule of law (Bingham, 2011).

Finally, as noted in the methods section, the end of legal proceedings in a case were not viewed to be sufficient, by themselves, for indicating when an environmental justice conflict had been resolved. If a law is insufficient or unjust, then rulings that result from it are also likely to be inadequate to obtain just outcomes. If conflicting parties continue to resist one another, then a conflict remains. In this study, however, conflicts were only considered to be resolved when the conflict reporters indicated that environmental justice had been satisfied in the focal case. This is why the negative relationship between the rule of law indicator and environmental justice conflicts is so interesting and important. Due to the way that the dependent variable was operationalized, a court's application of the law to an environmental conflict would only be associated with the end of that conflict if it resulted in a just end according to activists. In this study, the rule of law is correlated with environmental justice conflict prevention and resolution—not legalistic oppression.

Control of Corruption – Power, Capture, and Conflict

As noted in previous sections, control of corruption has frequently been considered by conflict theorists as a potential driver of conflict (Fearon, 2010b; Hegre & Nygård, 2015; Rus, 2014). Further, the perception that public entities are making public decisions for their own profit or that they have become captured by economic elites has received ample public condemnation. Writing in the forward of the United Nations Convention Against Corruption (UNCAC), former Secretary General of the UN Kofi Annan described corruption as an “insidious plague” with a “wide range of corrosive effects on societies” (United Nations Office on Drugs and Crime, 2004). Current Secretary General of the UN António Guterres, reflecting on a 2018 release of a World Economic Forum (WEF) report on the costs of corruption, articulated similar views. Speaking fifteen years after the adoption of the UNCAC, Secretary General Guterres argued that corruption “rots institutions,” “deprives people of their rights,” “despoils the environment,” and is “often at the root of political dysfunction and social disunity” (Office of the Secretary General of the UN, 2018). Yet, in spite of progress made toward implementing the UNCAC, the scale and impact of corrupt acts, globally, is still large. In the same speech, Secretary General Guterres notes that “corruption is present in all countries, rich and poor, North and South, developed and developing” and that, corrupt acts likely cost global society about $2.6 trillion (US)—every year. The relationship between the control of corruption variable and reported environmental justice conflicts suggests that the deprivation of rights and environmental despoilation made possible through corrupt acts are unfairly distributed as well.

While there is wide support for control of corruption, others have articulated a more nuanced understanding. Perhaps one of the starkest arguments offered in favor of a corrupt act was articulated by Rose-Ackerman (1978) *Corruption: A study in political economy*. A notable anti-corruption scholar, she notes that there are circumstances in which "an individual, unable to affect overall government policy, may in some situations, pay a bribe without moral opprobrium". She invokes the experience of victims of the Shoah, stating that "one does not condemn a Jew[-ish person] for bribing his way out of a concentration camp". For genuinely repressed individuals or communities, 'corrupt' behavior such as this has the grand outcome of subverting that oppression and the functional outcome of increasing the likelihood of survival. For non-oppressed peoples who possess agency, however, this argument does not hold.

Others have adopted what could be viewed as a more relativist understanding of corruption, arguing that overly universalized or moralistic interpretations of corruption suffer from a lack of "historical and cultural contextualization" and suggest that while "corruption has in itself a corrosive effect on economies and rule-based institutions," its expression may be "part of the fabric of social and political relationships" that provide organization and order to a particular society (Johnston, 1986; Le Billon, 2003). Similar sentiments have been offered by Larmour (2008) in *Corruption and the Concept of Culture: Evidence from the Pacific Islands*, in which he notes that "ideas about culture still seem useful in understanding how people recognize and respond to what is judged to be corrupt behavior." This suggests that there is a need for an expanded understanding of what constitutes corruption, one which adopts a more pluralistic, place-based perspective. Such a conception would center the important system contexts that shape what is and is not perceived as corrupt behavior in a specific locale while also identifying common pathologies for particular types of institutions. Johnston's (1986) typology of corruption, which delineates between "criminal" versus "legitimate" corruption is one early attempt at crafting such a perspective.

Political Stability, Governmental Effectiveness, and Regulatory Quality—A Role to Play?

It seems intuitive that crucial governance contexts like political stability and absence of violence, governmental effectiveness and regulatory quality should be connected to reported environmental conflict counts. All three of these governance norm types—the 'how' of political organization—appear to address important governmental functions and serve important public needs. As such, these variables should not be dismissed as irrelevant to environmental conflict ecology; however, their relevance cannot be confirmed by this study. Perhaps future research, suggestions for which are included in the final, concluding section, can shed new light on these important but less understood governance contexts.

Concluding Remarks

The goal of this project was to identify potential relationships between several established governance contexts as measured by the Worldwide Governance Indicators and newly created counts of unresolved environmental conflicts that were reported within a group of 145 countries between 2004 and 2014. Three of the WGI contexts demonstrated significant relationships to these case counts in all three estimated models, including voice and accountability, rule of law, and control of corruption. Consequently, it seems reasonable to conclude that these contexts should be considered when developing an ecology of environmental conflict. Specifically, the ‘openness of civil society and the tolerance of dissent,’ the ‘presence and perceived legitimacy of rules and a dispute resolution process,’ and ‘the extent to which public actions are inappropriately influenced by those with power’ within a country are likely to be important governance contexts to consider when developing understanding about a specific environmental conflict or about environmental conflicts generally within that country. They are also connected to the pursuit of environmental justice with countries.

By enabling environmental contestations that feature justice concerns to take place and be documented, states can elicit opportunities for enhancing justice directly from their people and be more accountable to them in the process. By tailoring environmental laws, regulations, and enforcement mechanisms so that they are explicitly designed to advance environmental justice, marginalized communities—both human and non—will be better situated to protect their environmental interests through the formal legal process. By ensuring that those aforementioned environmental laws and regulations are not subverted by powerful actors at the expense of those with less agency, states can pursue environmental decision-making that benefits the public good as opposed to, unjustly, the particular, private interests of the few.

Future research should be conducted into the influence of governance on environmental conflicts to replicate or compliment the findings of this study. Similar research could be expanded to include a more inclusive group of countries, a longer time period, and the effects of sub-national governance contexts on conflicts. Further analysis of the EJ Atlas case sheets could also identify specific, qualitative references to WGI variables or similar governance contexts on the documented conflicts. These strategies could replicate and expand the research into the identified governance effects on reported conflicts, which could assist in confirming their validity (Hubbard et al., 2019). This is important analysis to conduct: the identification of governance processes that can impact environmental conflicts in countries could yield insights into opportunities for substantively improving the lived experience of many adversely affected humans and non-humans globally by providing pathways for Just conflict prevention, transformation, or resolution.

Additionally, future research that specifically focuses on the relationships between the model control variables and reported environmental conflicts would also likely be fruitful (see Table 16). Though not the main focus of this study, these controls represent important socio-ecological characteristics of the countries that they represent and could, if altered, have potentially significant effects on reported environmental conflict prevalence. Furthermore, the expansion of the socio-ecological contexts considered, beyond those included in this study, to include additional contexts would also be welcome when possible because their inclusion would provide a more holistic picture of the drivers of environmental justice conflicts.

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Federalism, Sovereignty, and the Renewable Energy Transition in Vermont

Abstract

To address the threat of climate change, the State of Vermont has adopted a Comprehensive Energy Plan and enabled regional and municipal planning bodies to develop their own energy plans that contribute to larger state goals of energy conservation and renewable energy development. This approach to decarbonization at the state-level is somewhat unique. By authorizing regional planning commissions and towns to develop energy plans for their jurisdictions, the state has enabled a type of federalist approach to the renewable energy transition—a federal state for energy planning. This case of energy federalism is composed of the energy planning of over 120 planning bodies across the state. Federalist approaches to governance are often described as means to coordinate governance between multiple centers of power, to produce a cohesive response for the whole, while also respecting the autonomy of the parts. They have been described as laboratories for policy experimentation and defenders of minority rights; they have also been described as threats to universalized rights and as obstacles to popular policy. In democratic polities, such as Vermont, the ability of federalist systems to address popular sovereignty goals is also an open question. To assess the extent to which a federalist approach to the renewable transition in Vermont was able to produce cohesive energy planning, state-wide, energy plans from around the state were analyzed for themes of affordability, reliability, and environmental impact. Data from content analysis was then analyzed through a one-way ANOVA test to determine if the thematic coverage was similar or statistically different between state, regional, and municipal level planning bodies. Due to theorized difficulty

of coordinating multi-level governance structures, it was hypothesized that there would be significant variation in the energy theme frequency between planning body scales. Findings suggest that federalist approaches to energy planning for the renewable energy transition can produce cohesive responses between governance levels; however, it is much more likely to occur when those approaches are bounded with standards and oversight by the state-level body.

Introduction

Vermont is on course to be the second state in the United States to source all electricity from renewable energy sources. Vermont's Comprehensive Energy Plan (CEP) sets a goal of sourcing 90% of all energy sources from renewables by 2050. However, for electricity the target is much sooner, with the 2024 revision to Vermont's Renewable Energy Standard (RES) requiring 100% renewable generation by 2035. While much of this near-term generation will come from out of state, the revised standard requires 20% percent of renewable electricity be sourced from Vermont, a doubling of the previous requirement.

Sourcing 20% of renewable electricity from in-state presents some planning challenges, not least of which is public opinion on the local costs and benefits of siting decisions. Authority for siting solar, wind, and other renewable energy sources was previously delegated, in part, to regional planning commissions (RPCs) and local municipalities through the Energy Development and Improvement Act (EDIA). Through a "determination of compliance" process with the state CEP, local towns can create their own "enhanced" energy plans or otherwise default to one of the eleven approved RPC plans.

A natural tension between local and regional planning to meet statewide mandates presents interesting challenges in an era of increasingly distributed energy production. To assess public sentiment to local determination of state-wide goals, in 2023 the Vermont Department of Public Service (SDP) commissioned a public opinion survey and focus groups, resulting in the report "Vermont Weighs In: Public Opinion on Renewable Electricity" (2023). The intent of the survey was to capture a citizen "voice in the conversations and decision-making processes leading to renewable energy policies." The report details responses to questions regarding the electricity generating priorities of Vermonters, including considerations such as the reliability and affordability of electricity service, as well as the economic, social, and environmental impacts of the state's transition to renewable energy. A majority of survey respondents rated 6 of 8 factors as "very important", but with the strongest preference for reliability (87%) and affordability (82%), followed by protecting natural resources (67%), supporting jobs and economic development (66%), reducing carbon emissions (55%), renewability (55%), generation of on-site electricity (41%), and in-state production (21%).

Set against the emergence of a novel energy governance structure in Vermont, this research set out to better understand differences between state, regional, and local priorities over Vermont's renewable energy transition. An empirical analysis of energy planning in Vermont was conducted with a focus on reliability, affordability, and environmental impact identified as high priority areas in the DPS survey and focus groups. A content analysis of 123 approved regional and town energy plans found significant thematic variation for affordability and reliability between the state, regional, and municipal scales of governance. However, inclusion of environmental impact considerations was found to have much less variance. What follows is a brief description of the emergent energy federalism in Vermont, a survey of governance structure theory to ground the analysis, a summary of the study methods, and findings and study relevance for structure-centric energy governance more broadly.

Background

This study explores a question of governance structure in energy systems transitions through an analysis of the products of the Vermont Act 174. Due the distributed and place-based characteristics of the case, literature on federalism served as starting point. While there are many, many works on federalism, law professor Larry Kramer (1994) once compared its study to the parable of blind men analyzing an elephant, and noted that “it's such a big topic, one can't possibly hope to grasp more than a small part of the beast”. The “taxonomy of political systems” created by John Law (2013) was viewed as particularly helpful for this project. In addition to providing insights into the concept of federalism, his taxonomy provides a foundation for examining alternative governance structures. Further, it provides a theoretical basis for contextualizing Act 174, specifically, as a structure-centric governance choice.

Governance Structure: Composition, Division of Power, Equality of Status

Using what has been described as the “ladder of abstraction” (Law, 2013; Sartori, 1970), Law created a typology of structures by ascending and descending the ladder as structure concept attributes were added or removed from consideration. Law ultimately selected three governance structure attributes for type delineation in his framework. He suggests that, to know a governance structure, one needs to identify: (1) Whether it is a single or multiple state system (horizontal diversity); (2) Whether there is a single level or there are multiple levels of power within the system (vertical diversity); and (3) If there are multiple levels of governance within the system, do they enjoy equal or unequal standing in the system (vertical independence). Treating each question as a simplified, yes or no response enables the creation of six categories of governance structure: (1) A loose grouping of many small states; (2) A confederation of states; (3) A federal union of states; (4) A federal state; (5) A "devolved" government; or (6) A single large state (Law, 2013). This is a significant expansion and refinement of governance types beyond the confederation/federation and confederation/federation/centralization spectrums of power concentration that constitute similar theories on structure (Diamond, 1961; Downs, 2011; George, 2008; Heuglin & Fenna, 2006; King, 1982).

In a testament to the explanatory power of Law's structure typology, the case of Act 174 in Vermont is relevant to types four and five in his framework. It takes place within a single state system, Vermont, and so it is horizontally homogenous. There are multiple levels of governance that participate within the focal system enabled by Act 174—State-level, Regional-level, and Municipal-level—and so it is a vertically heterogenous system. Furthermore, in an attempt to be more responsive to concerns that the renewable energy transition in Vermont would be incongruous with local land-use preferences, the State of Vermont delegated substantive energy planning authority from the singular, state-level to the regional and local planning committees.

This statutory expansion of sub-state planning powers to include state-level deference to the plans produced at the regional and local levels suggests a transition from a "devolved government," or one in which the state-level government maintains a tight control over subordinate lower levels of government, to a more federal state in which there are formalized spheres of responsibility that exist between the vertical governance structures (Elazar, 1987; Law, 2013; Wheare, 1946). Having classified the governance structure choice that is represented within the case, a shift from devolved to federated planning authority, a body of theory, federalism, and its relationship to energy is explored next.

Act 174 as Energy Federalism

In 2016, the State of Vermont passed Act 174, the Energy Development and Improvement Act, which mandated that the state's 11 Regional Planning Commissions (RPCs) "undertake studies and make recommendations on the conservation of energy and the development of renewable energy resources" for their region (Energy Development Improvement Act, 2016). Upon receiving an "affirmative determination" from the Commissioner of the Department of Public Service (DPS), regional energy plans are then afforded "substantial deference" in new renewable energy siting proposals in each RPC's jurisdiction. Additionally, Act 174 allowed municipal planning commissions (MPCs) to develop energy plans of their own. Once a municipal plan receives its own affirmative determination of compliance with the State's energy goals, it too shall receive "substantial deference" in new renewable energy development decisions.

This de-centralized, delegated authority for energy planning was in contrast to earlier implementation of Vermont's Comprehensive Energy Plan (CEP), first legislated in 1998 and since updated three times, most recently in 2022. Referred to as the "90 by 2050 plan", the CEP has a main goal of meeting 90% of total state energy consumption with renewable resources by 2050. Early supporting policy was more centralized and top down. For example, the Clean Energy Development Fund (CEDF) was created through Act 74 in 2005 with "the purpose of developing local renewable energy generation in supporting of the State's goal of transitioning away from nuclear power dependency." During the initial 5-year strategic plan period, the CEDF provided over $27 million of state funding to support over 1000 new renewable energy projects, but with little regional or local governance oversight.

As the CEDF was phased out, the Vermont General Assembly established a Renewable Energy Standard (RES) under Act 56 in 2015. In a similar, top-down fashion, the legislation directed the Public Utility Commission (PUC) to establish standards that require Vermont electric distribution utilities to procure a defined percentage of total retail electric sales from renewable energy. The standard is specified in three tiers, with overall Tier I goals from any source of renewable energy to reach 75% by 2032, Tier II with additional requirements to procure energy from new distributed renewable generation, and Tier III allowing for investment in fossil-fuel energy savings projects to account for as much as 12% of the 2032 target.

The passage of Act 174 substantively altered the implementation strategy of energy planning in the state by allowing for a bounded decentralization of renewable energy development planning. Obtaining substantial deference in the renewable energy development process was viewed as a significant opportunity for local voice to influence the energy transition and capture more economic benefits at town and regional scales. As such, one might classify it as an attempt at "energy federalism," in which the benefits of local energy preferences for generation and transmission siting, for example, are balanced with regional and state-wide renewable energy needs (Engel, 2015; Lyons, 2014; Mormann, 2015; Stokes, 2022).

This more recent decentralization of energy planning in Vermont via Act 174 begs an interesting question. In the absence of centralized governance, how do Vermonters know that cohesive energy planning is taking place across their state? Will energy plans that were produced independently from one another have similar or different policy goals, and, if so, will they cover the preferences of the people?

<u>Popular Sovereignty and Energy Federalism</u>

Since the writing of Rousseau, who supported sovereignty on the basis of satisfying the "general will," those who support democratic forms of government have asserted that the source of sovereignty is not divine, nor is it located within governments themselves (Bourke & Skinner, 2016). Instead, sovereignty is seen as flowing from the people that compose a state, which is then allocated by them to the state because the aggregated power of the polity provides greater benefits and protections to the individual than when sovereignty is exercised by the individuals themselves (Law, 2013). This is known as "popular sovereignty" and, while it is not the only conceptualization of sovereignty, it is commonly accepted as it maintains individual agency and also explains how it is distributed by—but not removed from—the people who seek to pursue communal goals through shared, state-based action.

The question of sovereignty in a federalist system, generally, and in the Vermont Act 174 context, is whether this distributed governance structure is capable of reflecting the general will of the sovereign—the people—as it exercises its newly found planning authority. One of the proposed strengths of a federalist system is that it is closer to the people it seeks to benefit and that, consequently, it is better able to reflect their governance preferences. (Dahl, 1983; Hills Jr, 2005; Kramer, 1994). Interestingly, several energy policy scholars identified Act 174 as an important opportunity for increased energy democracy (Stephens et al., 2018) Whether the opportunity was acted upon is another question. As mentioned within the introduction, a survey of Vermonters was conducted to ascertain their preferences for electricity planning within the state. By evaluating the state-level, regional-level, and municipal-levels plans for their treatment of core energy concerns to Vermonters, energy concerns that are not unique to this time and place, the extent to which the federalist approach in Vermont was able to produce cohesive energy plans and reflect the general will of the people can be analyzed. Consequently, this study is relevant to conversations of energy democracy in addition to energy federalism.

Looking ahead

To operationalize this concern, this study asks the following: Is there a significant difference in how frequently municipal, regional, and state-level energy plans produced after the passage of Act 174 included affordability, reliability, and environmental impact policy themes? Answering this question provides insights into the extent to which a federalist approach to energy planning in Vermont can effectively coordinate itself to accomplish shared goals and respond to shared challenges. Whether or not this structure is able to respond to the polycentric problem of independent agent behavior to obtain polycentric harmony, or cohesive group behavior, is a key question to answer (Aligica & Tarko, 2012; Polanyi, 2013). The renewable energy transition is going to take place at the local level, but can the policy that governs it be developed there too? Does the scale of the planning body involved in developing an energy plan have an impact on the inclusion of different types of energy policy considerations? Answering these questions will provide insights into the structural impacts of governance systems on system outcomes.

What follows is a discussion of the methods used to answer these questions, an articulation of the findings produced by those methods, and a discussion of their relevance. It was hypothesized that there is likely to be significant variation in the frequency of energy policy theme inclusion—affordability, reliability, and environmental impact—in the municipal, regional, and state-level energy plans of Vermont (Jordan & Schout, 2006). Findings that there are significant differences in the frequency with which plans addressed the analyzed policy themes would seem to suggest that energy federalism in Vermont is not producing cohesive group behavior. Findings which suggest that there is not a significant difference in policy theme frequency by governance-level type would suggest that concerns regarding the affordability, reliability, environmental impact of renewable energy development are similarly addressed throughout the state.

Methods

In this section the data analyzed for this study will be discussed as well as the empirical, qualitative and quantitative methods used for the analysis. The energy plans analyzed as data, and the characteristics and protocols of the thematic analysis and hypothesis testing used to evaluate thematic discordance between the plan types.

The State, Regional, and Municipal Energy Plans of Vermont

The data analyzed by this study are the municipal, regional, and state-level energy plans that were legitimated between the years of 2016—after the passage of Act 174—and May of 2024. The word 'legitimated' is used here to capture the three different pathways for plan acceptance present within the renewable energy planning process in Vermont (Vermont Department of Public Service, 2024). Plans produced by municipal planning commissions (MPCs) had two pathways for receiving an 'affirmative determination.' First, MPCs could receive affirmative determination for their plans directly from the Department of Public Services (SDP). This option was no longer available after 2018, however. Second, MPCs could receive affirmative determination for their plans from their respective Regional Planning Commissions (RPCs); however, MPCs can only pursue this second pathway after their respective RPC's own energy plan has been approved by the SDP. In practice, the vast majority of MPCs sought plan approval through their second pathway.

According to the Vermont Association of Planning and Development Agencies, 116 municipalities sought and received affirmative determinations from their RPCs by the end of May in 2024. In contrast, three MPCs attempted to receive determinations directly from SDP; only two of the three were ultimately successful. The RPCs only pathway for plan approval is through the SDP. All 11 RPCs of Vermont had energy plans that had received affirmative determinations by the time analysis for this study was concluded. The third and final legitimation pathway is that of the Vermont Comprehensive Energy Plan, which is merely that it is produced and released by the SDP.

Crucially, energy plans for the MPCs and RPCs could either be sections of the municipal or regional plans, respectively, or they could be separate, enhanced energy plans that were produced specifically to receive substantial deference. Some MPCs and RPCs produced enhanced energy plans, and then removed previously existing energy planning language from their broader municipal plans. Others produced enhanced energy plans, had existing energy planning language in the main plans, and left that language in. To analyze these plans, PDF formatted versions of all energy plan materials were downloaded for the state, each of the 11 RPCs, and 111 of the 116 the MPCs that were listed as having received affirmative determinations. Five MPCs that were excluded from analysis because (a) general plan materials could not be obtained at all or (b) energy specific plan materials could not be obtained.

Once downloaded, the plan materials were cleaned to remove pages that were not relevant for analysis because: (a) they did not pertain to energy planning or (b) they were primarily visual, figure-based pages, which, in this case, were almost exclusively siting maps. After deleting irrelevant plan pages, the energy plan data from MPCs and RPCs that had both main plan and enhanced energy plan data was combined into one document. Upon completing this final step of data cleaning, whereby the only pages remaining were plan title pages and pages to be analyzed, the data was ready for thematic content analysis.

Thematic Content Analysis

Thematic content analysis is a form of analysis which is "a quantitative method [for] analyzing the content of written documents" (McNabb, 2020). Content analysis is a class of methods that has been characterized as "any technique for making inferences by objectively and systematically identifying specified characteristics of messages" (Holsti, 1969; McNabb, 2020; Pennings, P., Keman, H., & Kleinnijenhuis, 2006). The method is best used when the content analyzed is "clear, straightforward, obvious and simple" (McNabb, 2020) and involves identifying the frequency of a "mutually exclusive set of themes" (Pennings, P., Keman, H., & Kleinnijenhuis, 2006).

Content analysis has been critiqued for "isolating bits of information from their context;" however, two method choices adopted by this study should address some of this "built-in bias." While one does not wish to miss the trees for the forest, content analysis "provides the researcher with a structured method for quantifying the content of a qualitative or interpretive text" that is "simple, clear and easily repeatable," considerations which are crucial for advancing the replicability and transparency of qualitative research (McNabb, 2020). Qualitative analysis software enables researchers to conduct analysis of large blocks to text to for hundreds of documents simultaneously for increased "reliability, rigor, and replicability" (Allsop et al., 2022). The particular software package utilized for this study is NVivo. While some have criticized the use of NVivo and other content analysis software for creating separation between the researcher and the artefact under examination, this has been rebutted by others who have suggested that the software is not "meant to analyze the data, but to aid in the analysis process" (Allsop et al., 2022).

As noted previously, several method choices were made to improve the validity of this study by addressing these critiques. First, thematic selection is an important component of content analysis. It shapes the findings of the study and is likely to be the most interpretive component of the method procedure. Themes should be important, and they must be independent. For this study, themes for analysis were not selected from the data being analyzed. This study incorporated themes and their constituent codes from the language that was used in the "Vermont Weighs In" survey. A simple question was asked during this process: what is the common understanding of the energy considerations identified in the statewide survey? Put differently, would an reasonable observer think that the thematic code selection choices were facially reasonable?

Table 10 identifies which codes constitute the three themes that were selected for analysis. While they may not cover all of the plan language which could speak to the selected themes, they were viewed as balancing between theme independence and facial validity. "Stemmed words" were also included in the initial analysis to cast a broad net.

Table 10. Theme and Code Selection

Theme Analyzed	Code Selections
Affordability	"Affordable" and "Affordability"
Reliability	"Reliable" and "Reliability"
Environmental Impact	"Natural Resource," "Natural Resources," "Forest," "River," and "Wildlife"

More codes were selected for environmental impact than were for the reliability or affordability themes. While this might impact empirical comparisons of the theme frequencies to one another, this is not an issue because the comparison being made is not inter-theme, but rather intra-theme. This study is examining the difference in thematic frequency between planning commission scales for each of the three themes. After selecting these codes, a text search procedure was conducted in which NVivo identified and documented each mention within all 123 plans evaluated.

The second methods step, and perhaps the more important one, was to review each instance of coded language identified by NVivo to verify that it did match the intended theme. This procedure ensured that each initially identified instance of a thematic code was actually relevant to the study by observing it with its specific context. For example, affordable housing, while important, is not traditionally understood to be an energy affordability consideration. It also meant that NVivo was utilized as a 'tool to assist' analysis rather than conducting it outright.

Upon re-analyzing and verifying the thematic frequencies, the thematic frequencies for each plan were documented in a spread sheet. Next, the theme frequencies were divided by the number of pages within each plan to normalize the dependent variable and provide the relative thematic importance per plan. The Vermont State Energy plan is several hundred pages long, while some municipal energy plans were in the single digits.

Finally, an additional consideration was identified in the content analysis literature which influenced the methods procedure utilized here. As highlighted by Allsop et al. (2022), every researcher should ask themselves some version of the following question: "Is your research method 'science' and if so, why?" For this study the answer was simple: it responds to specific research questions and does so by conducting hypothesis testing. That testing was conducted via the ANOVA statistical analysis procedure which enabled correlation analysis and simple hypothesis testing of the thematic frequencies between the energy plan development bodies of Vermont (McNabb, 2015). The ANOVA procedure, and theory behind it are discussed next.

Analysis of Variance of Mean Thematic Inclusion by Plan Class

To determine if the dependent variables that were created via the thematic document analysis were similarly or dissimilarly distributed between governance levels, one of "the most commonly used [methods] in political science research" was selected—the analysis of variance in specified group means or ANOVA (McNabb, 2020). McNabb identifies the ANOVA method as a "powerful tool for comparing differences in the variation between means of any number of groups." Keman, and Kleinnijehhuis concur, noting that the ANOVA method is suitable for "exploring the relationship between a dependent variable with an interval level measurement" and an "independent variable consisting of a few 'groups'". As such, it was viewed as an appropriate tool to test the hypothesis that there would be significant differences in the energy policy themes included in the plans produced by the municipal, regional, and state planning bodies in Vermont.

The ANOVA test works by using the F-test to "compare the variances in each groups mean" dependent variable—in this, the per page frequency of energy policy themes in analyzed plans—to the "overall variance found in the sample." Interpretation of the ANOVA test results are also straight forward. If the p-value produced by the test is less than the threshold selected for significance in a given study—p-value of < 0.05 in this study—then the null hypothesis should be rejected because the mean dependent variable has been found to be significantly different between the independent governance level classes (McNabb, 2015, 2020). Conversely, should the p-value produced be above the 0.05

threshold established for this study, then the null hypothesis of no significant difference between means cannot be rejected (Curini & Franzese, 2020). Put simply, the differences in the average theme frequency/page of plans produced by municipal, regional, and state planning bodies would not be considered statistically significant if the p-value produced by the ANOVA test was > 0.05. What follows are the descriptive statistics of plan data created via the thematic content analysis which was subjected to ANOVA testing for this study.

Descriptive Statistics

Descriptive statistics of the data that was produced via the thematic content analysis, and which was analyzed via the ANOVA procedure, are summarized in Table 11. The average theme frequency/page, standard deviation, and variable minimums and maximums for the three classes were included for multiple measures of data tendency.

Table 11. Descriptive Statistics for the Energy Plans Theme Frequency

Theme Type	Class	N	Mean	Std. Dev.	Min	Max
Affordability Theme	Municipal	111	.059	.066	.000	.300
	Regional	11	.044	.042	.000	.115
	State	1	.317	.	.317	.317
	Total	123	.060	.068	.000	.317
Reliability Theme	Municipal	111	.041	.059	.000	.333
	Regional	11	.052	.036	.000	.118
	State	1	.451	.	.451	.451
	Total	123	.045	.068	.000	.451
Environmental Impact Theme	Municipal	111	.645	.420	.000	1.875
	Regional	11	.526	.288	.061	1.017
	State	1	.218	.	.218	.218
	Total	123	.631	.411	.000	1.875

While the differences between the mean thematic frequency/page of the three planning body classes are substantial, the significance of that variation will be revealed in the following sections.

Findings

The ANOVA test procedure produced a mix of significant and nonsignificant results. Table 12 below contains the output of the ANOVA procedure. In particular, F-test statistics and p-values were utilized to evaluate significance as was recommended by the literature. The theme specific responses follow, as well as an indication of how each result contributes to the hypothesis testing of this paper.

Table 12. Analysis of Variance Results

		Sum of Squares	df	Mean Square	F	Sig.
Affordability Theme	Between Groups	.069	2	.035	8.426	<.001
	Within Groups	.492	120	.004		
	Total	.561	122			
Reliability Theme	Between Groups	.167	2	.083	24.881	<.001
	Within Groups	.402	120	.003		
	Total	.568	122			
Environmental Impact Theme	Between Groups	.312	2	.156	.924	.400
	Within Groups	20.266	120	.169		
	Total	20.578	122			

Affordability Theme: the municipal and regional plans mention 'affordability' significantly less frequently than the state energy plan. With a large F Score of 8.426 and p-value of <0.001, it is reasonable to assume that the variation between municipal, regional, and state plan classes' average affordability theme frequency is statistically significant. While ANOVA does not reveal the directionality of that difference, it can be inferred from Figure 1 (see appendix) that the state-level plan mentioned 'affordability' much more frequently on a per page basis than regional and municipal plans. Consequently, the null hypothesis, that the variation in theme frequency by planning body scale is not significantly different, should be rejected.

Reliability Theme: the municipal and regional plans mention ‘reliability’ significantly less frequently than the state energy plan. With a very large F Score of 24.881 and inversely small p-value of <0.001, it is reasonable to suggest that the variation the between municipal, regional, and state plan classes’ average ‘reliability’ theme frequency is statistically significant as well. Again, while ANOVA does not tell us which class(es) are driving the variation between groups, this can also be inferred by examining the graphical representation of the classes’ means (see Figure 2 in the appendix). From that rendering it is clear that reliability themes/plan page averages for both municipal and regional plans are much lower than the state plans. Regardless, the null hypothesis, that the variation in theme frequency by planning body scale is not significantly different, should be rejected again here.

Environmental Impact Theme: the municipal and regional plans do not mention the impacts on the environment significantly more or less frequently than the state energy plan. Unlike the affordability and reliability themes, a very low F Score of 0.924 and a correspondingly large p-value of 0.400 indicate that the variation between municipal, regional, and state plan classes’ average environmental impact theme frequency is statistically insignificant. This lack of substantive difference can also be seen in the environmental impact means plot included in the appendix (Figure 3). As such, the null hypothesis, that the variation in theme frequency by planning body scale is not significantly different, cannot be rejected in the case of the environmental impact theme.

Summarizing, there was significant variation between planning body scales in thematic frequency for two of the three themes analyzed by this study—affordability and reliability—but the inter-group, thematic variation was not significant for the environmental impact theme. The importance of these results to energy planning in Vermont and to governance network theory more broadly, are addressed in the next section.

Discussion

There is a great deal of interest in distributed energy planning in Vermont. This governance preference is illustrated in the case of Act 174 by the widespread participation of the regional and municipal planning committees in energy planning via their newfound, formal planning powers. While there appears to be ample interest in such an approach to energy planning, the expression of this structural choice revealed potential implementation challenges.

As revealed by this study, while the state-level Comprehensive Energy Plan frequently mentions energy affordability and reliability themes, the regional and municipal energy plans produced via Act 174 authority do not discuss these two considerations with a similar frequency. Identifying shared energy policy goals and ensuring that they are similarly represented throughout the state is an ongoing challenge, as is illustrated by these findings. The significantly different coverage of affordability and reliability concerns between the governance scale classes in distributed governance in a federal state can struggle to implement cohesive, shared policy goals (Jordan & Schout, 2006).

However, the environmental impact theme frequency finding could be viewed as a confounding result to that narrative, and it at least paints a more complicated picture about the coordination of energy planning in Vermont. Various centers of governance were able to produce a more similar group response to the environmental impact concerns of new energy development. This is an exciting outcome because federalized states that delegate governance abilities, in a distributed way, often struggle with intersectoral policymaking and “environmental policy integration” in particular (Jordan & Schout, 2006). So why did this federal state have a more similar treatment of some themes and not others?

Answering this causal question is beyond the scope of this study; however, insights into cause as well as illumination of additional relevant factors could still be obtained through more analysis. Future research should be conducted into why these particular themes were or were not thematically included within the regional and municipal energy planning. For example, qualitative document analysis of enabling statutes, structured interviews of system principals, or more advanced, quantitative, regression analysis could reveal additional explanations.

Conclusion

The distributed energy planning exhibited by the case of Act 174 in Vermont is an interesting case of energy federalism that should be examined further. There appears to have been structural impacts on the energy theme frequency of two of the three themes analyzed for this study. However, the thematic variation between plan classes became insignificant when planning participants were (a) presented with clear signals about the requirements for plan approval, and (b) when state-level entities had to verify that those requirements had been satisfied before plan approval. Future studies which look at different energy governance structures, policy themes, or geographies should explore these structural features to replicate this study’s findings.

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Conclusion

The policy, processes, and structures of systems have, in numerous ways, been found to be connected to socio-ecological conditions of those systems. Such an understanding is not new. Further, the perspectives adopted, the phenomena explored, and the methods used in the creation of this dissertation are not themselves unique either. Indeed, ample and diverse materials, that contain valuable insights, from a variety of geographies, and that span millennia have amply influenced this project. What is more novel about this body of work is that it is an attempt to create a reinforcing set of studies on how we can actively govern our systems in such a way so that the policy-centric, process-centric, and structure-centric choices made are all advancing socio-ecological balance a core system goal.

There were three primary goals of this dissertation. First, I sought to add to the chorus of voices calling for robust and creative action to address the variety of socio-ecological challenges that we are confronted with. I viewed the functional and normative implications of this meta-problem to be so grand that I felt called to contribute to the effort to address it. Second, I sought to construct a theoretical, yet actionable, set of science-based governance responses to do so. Third, I sought, more generally, to advance the development of systems theory as a form of governance theory that is capable of responding to these types of challenges. Through the consideration of issues such as biodiversity loss, land conservation, environmental justice, the renewable energy transition, and climate change action and with the identification of means to address them, systematically, this project accomplishes these goals.

What follows is a synthesis of the findings from the previous content chapters, re-organized by the governance framework used by Keating and Katina's Complex Systems Governance Framework.

On Policy: Democratic Policymaking

Public policy, or 'what should be done,' is often the component of governance with which people are most familiar. Identifying how to respond to a socio-ecological problem, regardless of this greater familiarity, is still quite complicated and often there is not one right answer. Technocratic policy analysis may provide us with a basket of more or less effective solutions to our challenges, but ascertaining which choices are acceptable by those that are subject to them is another matter.

While not every important and necessary decision will be popular, systems stewards must be conscious of avoiding deeply unpopular decisions. If a large enough segment of a population disagrees with a policy choice, then it may be rendered unimplementable, which negates the benefit that the policy was intended to produce. The colloquial phrase of 'shoot, shovel, and shut-up,' suggested as a means for avoiding compliance with the Endangered Species Act, should not be interpreted as merely an unfunny joke. Additionally, there may be justice concerns involved when such deeply unpopular policies are pursued. The broader public may not have the same level of expertise in policy analysis or regulatory construction as a government agency employee, but, when put in an accessible enough format, the public is capable of making adaptive decisions.

Ballot initiatives, referenda, and even voting more broadly are obvious examples in which democratic choice, directly and indirectly, is already accepted as a means to conduct public policy. The ability of these mechanisms to support policymaking by direct democracy is further enhanced by the expansion of ranked preference voting, which enables voters to move beyond simple yes/no choice infrastructure and for the choice with the broadest public support to be selected. Ranked order ballot initiatives appear to be a particularly interesting way to allow for a balancing between technocratic policy suggestions and democratic policy choices, and systems stewards would be wise to explore how these measures can afford their preferred policy choices greater democratic legitimacy.

On Process: Revelation and Response, Rules Enforcement, and the Public Good

Hiding from truths, particularly painful ones, on the other hand is not adaptive behavior. In the same way that avoiding the oncologist will not cure one of cancer, suppressing or repressing the various social mechanisms that humans possess for revealing the socio-ecological problems that they are experiencing will not resolve those problems. It is far more likely to exacerbate them. Moreover, and regrettably, the nature of power distribution within non-egalitarian societies—the layered effect of social privileging along the lines of race and ethnicity, gender, income-level, indigeneity, and nativity among other characteristics—leaves some with a great deal of power and many with substantially less. This often means that that the socio-ecological problems faced by marginalized communities are more frequent, more severe, and are taken less seriously. These dynamics of power, and their impact on individual and communal agency, create the conditions within which unequal sharing of environmental burden and benefit occurs. They are the causes of environment injustices.

While avoiding all environmental burdens may not be possible, the guarantors of our collective wellbeing, our social institutions, must identify when the scale or distribution of socio-ecological problems have become intolerable, and they must be responsive to those concerns. Protests or news articles that are critical may be disruptive, but the disruption of unjust conditions produces positive outcomes for those that were made to suffer them. Tolerating the types of civil expression that reveal those conditions and being responsive to those revelations is a more adaptive and just way to govern.

When laws are violated, particularly in a grand rather than petty way, significant harms can be done to humans and non-humans alike. While some laws, perhaps many depending on the polity, are themselves are unjust, the ideal purpose of the law is to establish an equally enforceable code for legitimate conduct in a society. Laws are, or at least should be, designed so that they clearly delineate what conduct is not acceptable within a system. If a legal code provides sufficient protections to those that are subject to it, and if it is respected by those subjects, then many accidental and purposeful harms can be avoided through the deterrence of harmful behavior. Further, contained within the ambit of 'the law' are mechanisms for resolution, for obtaining justice, when the deterrent ability of the law is insufficient. Due to its preventive and restorative capacity, systems governance theorists and practitioners should strongly consider how improvements to the rule of law can reduce the number of socio-ecological problems that emerge within their systems and how it can help resolve the ones that are unavoidable in just ways.

The general will of the many, rather than private, particularized interests, should be the purview of public institutions. When doing the peoples' business, all of the people—and the non-humans as well—should be considered. Yet, the corruption of public institutions through their capture by private interests is still a global phenomenon. It occurs with frequency, its scale is gargantuan, and its impact is severe. Corruption rots public institutions by creating perverse incentives to make governance choices that benefit those with power in a society at the expense of those that lack power. While each society may have its own understanding regarding which specific behaviors constitute corruption, creating culturally specific, place-based versions of anti-corruption protections is a far superior path to ignoring the phenomenon.

Systems governance practitioners would be wise to identify best practices for addressing corruption within their systems. These practices may differ between systems, but the end goal should be clear. Those that are charged with stewarding the public interest should not profit irregularly from that position of trust, nor should they allow others get ahead by allowing them to bend the rules and cut corners. The people perceive when the government is not acting in their best interest. Sometimes this leads to disillusionment, jadedness, and cynicism. Sometimes it leads to rebellion. By reducing bribery, graft, and extortion—among other offenses—system stewards can demonstrate to their people that they work for and are responsive to their needs and the needs of all that they are charged with protecting.

On Structure: Coordination in Federated Systems

From a devolved form of governance structure to a federated state, the renewable energy transition within Vermont is an exciting example of energy federalism. It should be studied further. The structure-centric choice represented by the Act 174 case is interesting for two primary reasons. Through Act 174, the energy planning structure was made significantly more inclusive than before, benefiting from the inclusion of local perspectives and preferences in the process. At the same time, the structural choice did not impede the implementation of non-energy goals that are important to Vermonters and to the state. The intersectoral inclusion of environmental considerations was demonstrated to have taken place comprehensively across the planning structure.

Yet the federated approach, while it yielded positive environmental considerations, struggled with several social considerations, namely, affordability and reliability. Both of these considerations are common energy policy themes, are themes that the State of Vermont has included substantially within its Comprehensive Energy Plan, and are the first and second most import electric energy considerations among Vermonters. It appears as if proximity to the popular sovereign is not always sufficient for ensuring that its will is met. It is reasonable to conclude that few people—planners and otherwise—would want to pay more for electricity or tolerate it being less available than needed. Systems governance researchers should explore this tension in structure-centric governance. Identification of structure-centric designs or the requisite, complimentary processes and policies to better coordinate federated and even more distributed governance systems is warranted.

Governance Type Interaction: A Scenario

As noted in the chapter on the use of land trusts as a land use policy, the creation of land trusts was very popular within the U.S. between 2010 and 2019. They were particularly popular when proposed at the local level—special districts, municipalities, and counties—and enjoy broad support in those venues. About 78% of public land trust ballot measures voted on at these local levels passed during the time period analyzed, and the share of voters that supported those measures was about 61%. Further, with intentional policy design, they can enjoy even broader support. Land trusts which were proposed as a means to address local wildlife habitat concerns as well as those that utilized debt-financing via bond issues—as opposed to tax increases—were several times more likely to pass and received significantly larger shares of the vote as well. As a land use policy, public land trusts in the U.S. are somewhat remarkable for their ability to localize and democratize land conservation. They allow for communities to engage in an exercise of participatory policymaking on the core issue of terrestrial and aquatic habitat loss. Yet, while democratizing land-use policy choices is a means for ensuring that the majority of people within a community support that policy, rarely do they obtain universal support. A minority of people may object to these attempts at land conservation due to siting, access, and lifeway interruption concerns. Additionally, some communities—such as non-citizens and non-humans—are excluded from the voting process entirely.

This communal divergence over land-use policies could very well lead to an environmental conflict. If people perceive the land trust as incompatible with their abilities to nourish, house, or make meaning for themselves, then they may oppose the development of the land trust outright or undermine it more subversively. If the aggrieved individuals or communities are already marginalized within the systems that they live, then an inopportune land trust development could replicate and exacerbate the injustices that they are already experiencing. While democratized policy choices can remedy some of these concerns—ideally a polity would not vote in favor of a measure that directly harmed their neighbors—that is not always the case. There are cases contained within the Environmental Justice Atlas, for example, in which nature preserves are the very developments resisted by parties to the conflict. The protection of wildlife, particularly endangered wildlife, is an important environmental policy goal; however, that goal will likely be undermined if the creation of preserves causes the eviction of peoples from their land or keeps them from accessing traditional means of sustenance without providing sufficient remedy. In such a case, socio-ecological harmony is also undermined. While democratizing policy choices, such as creating a public land trust by ballot initiative, can ensure that they receive majority public support, the tyranny of the majority should be guarded against so that democratized policy choices do not unfairly burden, intentionally or unintentionally, marginalized peoples.

In addition to more democratized policy decision-making, some types of governance procedures can be applied to address this problem. Tolerance for environmental civil disobedience may lead to more frequent reports of environmental justice conflicts in a system, but those reports can reveal when a policy choice has gone wrong and opportunities for righting that wrong. Further, if systems adopt reasonable environmental laws and regulations and they commit to the fair enforcement of those rules, then groups who might be harmed, illegally, by a democratically popular land-use policy, such as the creation of a land trust, will have legal basis and venue for remedying that harm.

Furthermore, by ensuring that the policy choice to deploy a land trust within an area is due to a justifiable belief that it would benefit the whole community and not just an empowered group within it, policymakers can alleviate concerns that the choice was a corrupt one. While democratic policymaking can improve the legitimacy of conservation policies that systems develop, concerns about the ability of all system residents to participate within that democratic choice, as well as the potential for undue benefits and harms to be democratically allocated, should not go unaddressed in systems governance. When decision-makers adopt the aforementioned procedural choices of amplifying and accounting for the voices of all, ensuring legal protections for the whole community, and preventing the capture of public institutions by powerful actors who use them to advance their private interests, they will likely reduce the potential for lasting environmental justice conflicts over their decisions.

Finally, governance structure choices could also impact, both positively and negatively, the risk of conflict regarding a land-use or conservation choice. Through the adoption of a federalized structure for policymaking, more localized preferences can be reflected within policy choices made. The public land trust votes analyzed in land trust chapter of this dissertation are made possible through this very structure-centric choice in the United States. Local governments' ability to raise funds for conservation easements, even outright land purchase in some cases, is possible because of to the distinct authorities provided to the distributed centers of governance in the country.

The energy planning analyzed in the Vermont energy planning chapter is another example of federalized governance structure choices. Yet, localizing governance is not a panacea. Perhaps regional or local actors may have the means and desire—or requirement—to pursue governance choices that generally benefit the broader public. As reflected by the cohesive treatment of environmental considerations within the distributed energy planning approach in Vermont, a federalized structure can pursue the preferences of the public even across policy sectors. But it can also fall short of reflecting those interests, particularly when not every governance level is required to do so, as is likely to be the situation with affordability and reliability energy concerns from the Vermont case. Should a federalized structure be imbued with more democratic characteristics, if it listens and is responsive to the voice of its constituents, if it fairly applies the system rules throughout the structure, and has ability to ensure that its governance choices are not the product of corrupt acts, then it is more likely that its choices will advance the needs of the ultimate sovereigns' of the system: the body politic. Further, if governance practitioners were to use layered approaches that are similar to the aforementioned one to address other instances of the numerous, interconnected social and environmental challenges that our systems face, then their actions should bring greater balance to the socio-ecological systems that they govern.

Closing the Loop

As revealed by studies produced for this dissertation, governance policy, process, and structure choices do impact system outcomes. Further, the types of outcomes revealed by these studies strongly suggest that systems governance, when sufficiently tailored to do so, can improve socio-ecological conditions. People will volunteer for land conservation within their communities, will contest and seek to resolve conflicts over environmental justice issues, and will include environmental considerations in their energy planning. As such this dissertation finds that systems governance reasonable framework for pursuing the realistic utopia of a more harmonious socio-ecological system. In a variety of ways and in a variety of settings, systems governance can tangibly address many of the conditions that are pushing our systems outside of their safe operating zones, improve justice within them, and walk us back from the brink of collapse by doing so.

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Appendix

Chapter 1—System Policy

Table 13. Non-Significant Control Variables

	Study Models	
	Model 1	Model 2
Jurisdiction Type (County)	0.80, 0.377 (1.45 to 7.45)	4.8%, 0.122 (-3.2.% to 13.6%)
Jurisdiction Type (Municipal)	0.52, 0.162 (1.45 to 7.45)	4.0%, 0.155 (-3.5.% to 12.0%)
Total Funds Proposed (2019)_LN	1.01, 0.439 (0.881 to 1.16)	0.6%, 0.139 (-0.4% to 1.6%)
Median Household Income_LN	1.17, 0.413 (0.3 to 4.57)	1.8%, 0.365 (-8.0% to 12.6%)
Household Income Inequality (Gini)	1.06, 0.144 (0.95 to 1.19)	0.4%, 0.140 (8.9% to 19.6%)
Share of Population Identifying as Female	0.99, 0.461 (0.76 to 1.29)	-1.1%, 0.131 (-2.9% to 0.8%)
Share of Population Identifying as Non-White	1.00, 0.431 (0.98 to 1.03)	0.1%, 0.077 (<0.1% to 0.3%)
Hectares of Tree Cover Loss_LN	0.98, 0.372 (0.86 to 1.12)	0.2%, .334 (-0.7% to 1.1%)

Note. Results are reported in two ways. Model One results are the probability of a ballot measure passing due to a) jurisdiction classification b) a one unit increase in the variable beyond the model mean. Model Two reflects the percentage increase in the share of voters that supported a ballot measure due to a) jurisdiction classification b) a one unit increase in the variable beyond the model mean. 95% Confidence Intervals are also provided and are the values in parentheses. P-values are divided by two for the one-tail significance test. P-value <.05, '*'; p-value <.01, '**'; p-value<.001, '***'.

Table 14. Goodness of Fit Test Results for Study Models

Model Fit Indices	Model 1 WGI Intra-year Panel			Model 2 WGI One-Year Lag			Model 3 WGI Two-Year Lag		
	Value	df	Value/df	Value	df	Value/df	Value	df	Value/df
Deviance	1680.178	1571	1.069	1682.495	1571	1.071	1682.931	1571	1.071
Scaled Deviance	1680.178	1571		1682.495	1571		1682.931	1571	
Pearson Chi-Square	1655.841	1571	1.054	1660.322	1571	1.057	1660.983	1571	1.057
Scaled Pearson Chi-Square	1655.841	1571		1660.322	1571		1660.983	1571	
Log Likelihood[b]	-4287.469			-4289.268			-4290.073		
Akaike's Information Criterion (AIC)	8600.939			8604.535			8606.145		
Finite Sample Corrected AIC (AICC)	8601.171			8604.767			8606.377		
Bayesian Information Criterion (BIC)	8670.719			8674.315			8675.925		
Consistent AIC (CAIC)	8683.719			8687.315			8688.925		

Note. 'Value/df' values that are closest to '1' are best. A value of <1 indicates under-dispersion of outcome variable data based on the model type selected; a value of >1 indicates over-dispersion of outcome variable data based on the model type selected.
Model Dependent Variable: Number of Unresolved Environmental Conflicts Reported in a Country Year
Model: (Intercept), Voice and Accountability, Political Stability and Absence of Violence, Governmental Effectiveness, Regulatory Quality, Rule of Law, Control of Corruption, the Natural Log of GDP (PPP, 2023 International Dollars), Life Expectancy, the Natural Log of Population, the Natural Log of Land Area, the Natural Log of the CO_2 Equivalent of Green House Gasses Produced.

Table 15. Omnibus Test Results for Study Models

Model Fit Index	Model 1 WGIs$_{t-0}$ Panel			Model 2 WGIs$_{t-1}$ Panel			Model 3 WGIs$_{t-2}$ Panel		
	Value	df	Sig.	Value	df	Sig.	Value	df	Sig.
Likelihood Ratio Chi-Square	2147.368	11	<.001	2143.772	11	<.001	2142.162	11	<.001

Model Dependent Variable: Number of Unresolved Environmental Conflicts Reported in a Country Year
Model: (Intercept), Voice and Accountability, Political Stability and Absence of Violence, Governmental Effectiveness, Regulatory Quality, Rule of Law, Control of Corruption, the Natural Log of GDP (PPP, 2023 International Dollars), Life Expectancy, the Natural Log of Population, the Natural Log of Land Area, the Natural Log of the CO_2 Equivalent of Green House Gasses Produced.

Table 16. Exploratory Control Variables Analysis

	Model 1 WGIs$_{t-0}$ Panel	Model 2 WGIs$_{t-1}$ Panel	Model 3 WGIs$_{t-2}$ Panel
Life Expectancy	4.8%, <0.001*** (3.7% to 5.8%)	4.7%, <0.001*** (3.9% to 5.6%)	4.7%, <0.001*** (3.7% to 5.8%)
GDP, PPP (Current, International $s)_LN	64.1%, <0.001*** (44.3% to 86.6%)	63.1%, <0.001*** (40.9% to 79.6%)	62.1%, <0.001*** (42.5% to 84.5%)
Population_LN	76.9%, <.001*** (61.0% to 94.5%)	76.5%, <.001*** (58.1% to 88.4%)	76.2%, <.001*** (60.2% to 93.8%)
Land Area_LN	35.7%, <.001*** (30.4% to 41.2%)	35.9%, <.001*** (30.5% to 42.0%)	36.2%, <.001*** (30.7% to 41.8%)
CO_2 Equivalent of GHGs_LN	-44.9%, <.001*** (-38.4% to -50.7%)	-44.9%, <.001*** (-38.4% to -50.7%)	-44.9%, <.001*** (-38.4% to -50.7%)

Note. Results are reported as the percent increase or decrease in reported environmental conflicts due to a one unit increase in the predictor variable value above the mean. 95% Confidence Intervals are also provided and are the values in parentheses. Unlike the model independent variables, a two tailed test of significance was used due to the exploratory nature of the interest in the relationships between the control and dependent variables. Still, all displayed significance: the H_0 that the impact is not different from zero would be rejected.