administrative sciences

MDPI

Article

A Polycentric Approach for Addressing Wicked Social Problems

Jordan K. Lofthouse * and Leah Kral

Mercatus Center at George Mason University, Fairfax, VA 22201, USA; lkral@mercatus.gmu.edu
* Correspondence: jlofthouse@mercatus.gmu.edu

Abstract: Most social problems are "wicked", meaning that they are highly complex, intractable, open-ended, and multi-dimensional. In wicked learning environments, information is ambiguous, feedback may be slow, or causes and effects are difficult to ascertain. Using the insights from the Bloomington school of political economy, this paper argues that a polycentric approach is the most effective way to address wicked social problems. Polycentric systems are characterized by multiple, overlapping decision-making centers that have varying degrees of independence and interdependence. When decision-makers in governments, markets, and civil society tackle complex social problems simultaneously, various forms of cooperation and contestation emerge. These interactions subsequently produce the relevant knowledge and incentives to address wicked social problems on a variety of margins. Centralized, one-size-fits-all approaches are less likely to succeed because they have weaker epistemic and incentive-related qualities. We use two examples to illustrate our argument, including post-disaster recovery and climate change mitigation.

Keywords: polycentricity; institutional analysis; institutions; wicked problems; learning; adaptation; Elinor Ostrom; cooperation; contestation

1. Introduction

Societies across the globe face many large-scale problems simultaneously, such as poverty, drug abuse, environmental degradation, natural disasters, and pandemics. These kinds of social problems are difficult to address precisely because they are complex, overlapping, nested, multifaceted, costly, and subjective. This complexity causes most social problems to be "wicked", meaning that the knowledge necessary to address them is not clear, available, or explicit. Wicked environments make learning and adaptation difficult because information is ambiguous, feedback may be slow, or causes and effects are difficult to ascertain. This paper argues that polycentric governance systems (i.e., a constellation of multiple, overlapping decision-making centers that have varying degrees of independence and interdependence) are more likely to produce the knowledge and incentives that are necessary to address wicked social problems effectively.

Even though decision-makers in the public and private spheres may genuinely want to solve wicked social dilemmas, they face large epistemic limitations that hinder their ability to accomplish their ends. In more precise terms, individuals and communities have a difficult time solving wicked social problems because (a) they do not fully understand a problem's root causes, (b) they do not know the most effective or efficient means to solve the problem, and (c) they cannot foresee the full set of consequences that will arise from attempted solutions (Hogarth, 2001; Hogarth et al., 2015; Alford & Head, 2017; Lönngren & van Poeck, 2021; Hayek, 1945; Lavoie, 2016; Ikeda, 2005). To make matters more complicated, the scale and complexity of most wicked social problems means that a single organization does not have the resources to make a meaningful impact individually.

check for updates

Received: 7 August 2024
Revised: 20 December 2024
Accepted: 7 January 2025
Published: 9 January 2025

Citation: Lofthouse, J. K., & Kral, L. (2025). A Polycentric Approach for Addressing Wicked Social Problems. *Administrative Sciences*, *15*(1), 22. https://doi.org/10.3390/admsci15010022

Additionally, people often face perverse incentives when attempting to address wicked social problems, such as the incentive to free ride on the efforts of others or engage in socially wasteful but personally beneficial rent-seeking behaviors (Olson, 1965; Holcombe, 2018).

Thus, this paper asks: What is the most effective means for individuals and organizations to address wicked social problems? Our answer is that a polycentric approach—as opposed to a monocentric, top-down, centralized approach—can and does address wicked social problems, even in the presence of epistemic limitations and perverse incentives. Each node in a polycentric system has a large degree of independence on many margins but is interdependent on other margins. One center does not strictly dominate the others in a hierarchy. The decision-making centers form an entangled web in which the various nodes can cooperate with and contest against one another in myriad ways (Ostrom, 2005; Aligica & Tarko, 2012, 2013). The Bloomington school of political economy, founded by Nobel Laureate Elinor Ostrom and Vincent Ostrom, has extensively developed a theory of polycentric governance and an empirical literature on how polycentric governance systems effectively address social problems (see McGinnis, 1999a, 1999b, 2000; Aligica et al., 2019; C. J. Coyne & Goodman, 2020; Lofthouse & Herzberg, 2023).

The overlapping interactions among individuals and organizations in the private and public spheres constitute a meta-polycentric order, which can effectively address wicked social problems by facilitating the strengths and mitigating the weaknesses of each sphere. An overlapping institutional configuration of markets, governments, and civil society facilitates contestation and cooperation along countless margins, which promotes the discovery and communication of knowledge, as well as providing checks and balances on various forms of power (see Lofthouse & Herzberg, 2023). Market firms compete against and cooperate with one another to deliver goods and services to willing customers, as opposed to pure monopoly (i.e., a monocentric market). Federalist systems of government have power dispersed among different branches and at different levels, as opposed to a dictatorship (i.e., a monocentric government). Civil society is composed of many associations, clubs, and nonprofit organizations that sometimes cooperate with one another but also occasionally contest against each other. Wicked social problems demand complex solutions, and a meta-polycentric order tends to provide those complex solutions. The epistemic and incentive-related characteristics of a meta-polycentric order gives a reason for optimism because individuals, organizations, and communities can find and are finding creative ways to address complex problems across many sectors.

To illustrate how polycentric governance systems can address wicked social problems, this paper explores two real-world examples: post-disaster recovery and climate change mitigation. We have chosen these two case studies because they are two of the "hardest" cases of wicked social problems. Many post-disaster recovery scenarios are especially dire, and in many cases, it is truly life or death. Climate change is perhaps the largest-scale problem, and its causes and consequences affect nearly every aspect of human life. Thus, if a polycentric approach can address these large-scale wicked problems, then such an approach can be applied widely to other scenarios.

Post-disaster recovery has been successful when many entities have provided the various goods and services that people in distress require. Empirical evidence has shown that societies have successfully bounced back after a disaster through the combination of activities in markets, government, and civil society (see Chamlee-Wright, 2010; Storr & Haeffele-Balch, 2012; Grube & Storr, 2014; Storr et al., 2015). Second, coping with human-caused climate change is a herculean task, but the combination of many government policies, innovations in market firms, and advocacy by nonprofits has yielded many successes so far. Of course, climate change is still a pressing problem, but the sheer scale and complexity of climate change necessitates an institutional configuration that promotes

the discovery of new knowledge and provides the necessary incentives for adjustments (see Ostrom, 2014, 2012; Cole, 2015; Jordan et al., 2018; Lofthouse & Herzberg, 2023).

Our paper's unique contribution is to synthesize the literature on the Bloomington school's approach to polycentricity with the literature on wicked social problems. The well-established literature regarding wicked problems and wicked learning environments has discussed action across multiple sectors and multiple levels of government. However, little scholarship has explicitly tied the Bloomington school's frameworks and theories to the existing work on wicked social problems. This paper is intended to help fill that gap. By explicitly tying together wicked problems/wicked learning environments to the Bloomington school's conception of polycentricity, we hope to bring together scholars and literatures that have not yet been connected, leading to a fruitful synergy. In particular, this paper outlines a theoretical framework and aims to set the stage for further research by defining key issues, methodologies, and perspectives.

This paper contributes to at least three bodies of literature. First, we build on the theoretical and empirical literature of the Bloomington school of political economy, and second, we expand the literature that examines wicked social problems and wicked learning environments (Rittel & Webber, 1973; Hogarth, 2001; Hogarth et al., 2015; Lönngren & van Poeck, 2021; Batie, 2008; Ferlie et al., 2011; Clarke & Steward, 1997; Crowley & Head, 2017). Third, we contribute to the literature in administrative sciences regarding the epistemic and incentive-related characteristics of for-profit, government, and nonprofit enterprises. Market firms, government agencies, and nonprofits each play a role in addressing wicked social problems, but there is no panacea. The complex interactions between these various entities yields the necessary knowledge and incentives to address complex social issues (see Taylor, 2015; Greller, 2015; W. Brown, 2017; Jaskyte Bahr, 2019; Leitão & Capucho, 2021; Mangai et al., 2023; Van Eijk et al., 2023).

This paper proceeds as follows. In Section 2, we define and analyze the characteristics of wicked social problems and wicked learning environments. In Section 3, we describe the properties of polycentric governance systems and apply those properties to wicked social problems. In Section 4, we use the examples of post-disaster recovery and climate change mitigation to discuss how polycentric governance systems can address real-world issues. Then, we conclude with the implications of this research.

2. Wicked Social Problems and Wicked Learning Environments

The term "wicked problem" has several competing definitions, but despite some ambiguity, the various definitions have some commonalities. The primary issue that characterizes wicked problems is complexity. Relatedly, such problems are intractable, open-ended, and multi-dimensional. There is some element of unpredictability and uncertainty, especially in an environment of changing rules. The causes and effects are difficult to identify and model. The problems are often dynamic and interconnected with other problems, leading to a lack of consensus on what the problem is. A clear "right" answer often does not exist because of subjective (and often conflicting) values among stakeholders, and relevant knowledge and interests are fragmented. Wicked problems often lack immediate feedback systems, and attempted solutions can exacerbate the problems. Any attempted solution to a wicked problem—of which there are nearly infinite possibilities—will not have immediate or ultimate results, but instead, results will lag and be ongoing (see Rittel & Webber, 1973; Skaburskis, 2008; Lönngren & van Poeck, 2021; Alford & Head, 2017; Batie, 2008; Crowley & Head, 2017; Ferlie et al., 2011; Clarke & Steward, 1997). Most social problems are wicked, such as improving educational outcomes, reducing crime, promoting economic growth, and addressing human-caused climate change, just to name a few.

The opposite of a wicked problem is a "tame" problem—one that is clearly defined and has a single goal with a well-defined system of rules (R. Coyne, 2005). In other words, a problem is tame when the "problem and the solution are clear, and stakeholders readily share knowledge and have congruent interests" (Alford & Head, 2017, p. 404). Examples of tame problems include solving mathematical equations or calculating the trajectory of a ballistic missile because the problems and the solutions are unambiguous, even with subjectivity of preferences and knowledge. However, problems are not dichotomized into wicked or tame; instead, the wickedness or tameness of a problem is on a spectrum, and any problem can have different qualities of wickedness to different degrees (Alford & Head, 2017).

Wicked problems occur in wicked learning environments. A learning environment is an epistemic situation in which an individual acts, receives feedback on that action, and adapts future actions based on the feedback. In a wicked learning environment, feedback is absent, unclear, ambiguous, highly subjective, or misleading, which makes it difficult to adapt correctly. The opposite is a "kind" learning environment, which provides feedback in ways that are accurate, plentiful, and unambiguous, meaning that adaptation is a relatively straightforward process (Hogarth, 2001; Hogarth et al., 2015). Wicked learning environments are characterized by many interrelated, interconnected, and multi-dimensional factors that affect outcomes. Wicked learning environments are also highly unpredictable and dynamic, implying that solutions at one time may not work in the future. This constant change makes it hard to apply past learning to new situations. Wicked learning environments do not have a clear "right" answer and are context-dependent, and the interpretation of feedback might be highly subjective and based on value judgments, making it difficult to adapt when stakeholders in a group have conflicting views on what constitutes a successful outcome. Additionally, wicked learning environments lack immediate feedback, making it difficult to assess how an action has improved or worsened a situation.

Thus, unintended consequences are a large concern in wicked learning environments. Due to complexity and interconnectedness, any action will spur other outcomes that were not intended, but addressing those actions is difficult because those actions will then spur other unintended outcomes. Knowing the exact cause of any unintended consequence is not clear, and even if the source of the problem can be known, it is not clear what approach is appropriate, given the likelihood of creating more unintended consequences.

A study of wicked problems and potential solutions cannot be separated from the study of institutions. Institutions are "rules of the game" that structure human interactions, ranging from formal to informal (North, 1990; Ostrom, 2005). Examples of formal institutions include constitutions, legislation, and regulations. Informal institutions are social conventions, norms, and mores. Both kinds of institutions are critical for structuring human interaction, and different kinds of rules channel human behavior in different ways. All human action takes place in institutions, and different institutions have different epistemic and incentive-related qualities.

Some types of institutions are better suited to address certain forms of wicked social problems than others. A social problem can be solved through the market mechanism, government administration, or voluntary action within civil society, or some combination of the three. Since wicked social problems are fraught with shortcomings in terms of knowledge and incentives, solutions to any specific problem will need to be situated in an institutional environment that has appropriate epistemic and incentive-related qualities. In other words, a learning environment will need to yield helpful feedback (i.e., epistemics) and induce people to incorporate that feedback into their action in an accurate and timely fashion (i.e., incentives). Thus, addressing any wicked problem necessitates an institutional

analysis to determine the relative strengths and weaknesses of approaches within markets, governments, and civil society.

3. A Polycentric Approach to Addressing Wicked Social Problems

In what follows, we discuss the theoretical insights from the Bloomington school of political economy, which focuses on the epistemic and incentive-related properties of polycentric institutional arrangements.

3.1. Definition and Properties of a Polycentric System

One of the core areas of study in the Bloomington school is polycentric governance systems, which have multiple, overlapping decision-making centers that are both independent and interdependent. Decision-making occurs at a variety of scales and scopes and in many locations. The various decision-making centers engage in cooperation and contestation among one another (see Ostrom, 2005; Aligica & Tarko, 2012; Aligica et al., 2019; McGinnis, 1999a, 1999b, 2000). Examples of polycentric systems include federalist systems of government, the scientific community, competitive markets, and civil society.

The opposite of a polycentric system is a monocentric system, meaning that there is one centralized, top-down decisionmaker. Examples of monocentric systems include highly centralized bureaucratic organizations or centralized public utilities in which a single entity controls essential services without alternative providers. However, few truly monocentric systems in the world exist on large scales. Centralized national governments like the Soviet Union, or authoritarian regimes with strong central leadership like North Korea attempt to function as a monocentric system, but due to the real-world constraints on the centralization of control, their actual functioning becomes polycentric (Roberts, 1969; Boettke & Candela, 2018). Therefore, the relevant margins of analyzing large-scale social systems are the degree of polycentricity and the meta-rules of a society that determine the interactions between the nodes. Polycentric systems can—and often do—successfully address social problems, but polycentricity is not a panacea (see Ostrom, 1990; McGinnis, 1999a, 1999b, 2000). A polycentric system with institutional rules that hinder the discovery, aggregation, and communication of new knowledge will yield socially harmful results. Relatedly, poorly instituted rules in a polycentric system can sometimes create worse social outcomes than more centralized systems.

Polycentricity is not synonymous with decentralization. There will be a large degree of decentralization in many respects, but some decisions will still be made at higher levels. Complex social problems often necessitate many overlapping approaches to find workable solutions (Aligica & Tarko, 2012; Aligica et al., 2019). For example, in the United States, education is governed in a polycentric way because decisions are made at many levels and in many locations. The federal, state, and local governments all play a role. The decision-makers at these various levels cooperate with one another on many margins, but sometimes they push back against one another. The lowest levels (e.g., teachers, school administrators, and local school boards) have specific knowledge about the individual needs of students and their unique circumstances. Higher levels (e.g., state-level departments of education and the U.S. Department of Education) have access to experts or more funding that can improve the teaching process. Pure decentralization would miss out on the benefits of the higher levels, and pure centralization would neglect the benefits of the lower levels. Markets and civil society also play a role in education. Parent–teacher associations are private groups that supplement the learning process and provide resources for students and teachers. In the for-profit realm, tutors or after-school lessons supplement student learning in a variety of ways.

Below, we describe four socially useful properties of polycentric systems. Polycentric systems can aid in coping with and addressing wicked social problems because the complex interactions in the systems yield the requisite knowledge and incentives for individuals to accomplish their ends successfully. Four general properties of polycentric systems are (a) the discovery and communication of knowledge, (b) the creation of socially beneficial incentives, (c) resilience to shocks or failures, and (d) emergent outcomes that do not require central planning (see Ostrom, 2005; McGinnis, 1999a, 1999b, 2000; Aligica & Tarko, 2012; Aligica et al., 2019; Lofthouse & Herzberg, 2023). The broad literature on polycentric systems has analyzed other properties, but we have limited ourselves to these four, which are most relevant to addressing wicked social problems.

First, polycentric systems are well-suited to the discovery and communication of relevant knowledge because many different groups can work on similar social problems, meaning that they can engage in simultaneous experimentation. Due to human fallibility, institutions need means of discovering and correcting errors. The different nodes in the system can mutually observe the different means and ends that other nodes have chosen, and then they can learn from the apparent successes and failures. Market firms watch their competitors and innovate to out-compete them. Nonprofits and philanthropies test out their own approaches and learn from the successes and failures of others. In federalist systems, jurisdictions can see the effects of policies and learn what not to do if the policies fail to achieve the stated goals. Since polycentric systems have many decision-makers, entrepreneurship, innovation, and creativity can take place to a larger degree at different levels and locations.

Second, competition among entities in polycentric systems often provides incentives for decision-makers to act in socially beneficial ways by providing discipline to decision-making processes. Market competition induces producers to create higher quality goods at lower costs (Bresnahan & Reiss, 1991; Berry & Waldfogel, 2010). Nonprofits and philanthropies compete among themselves for donors' money, meaning that decision-makers in these organizations feel pressure to provide the services that donors want in efficient and effective ways (Storr et al., 2015; Novak, 2021). In government, interjurisdictional competition constrains the harmful impulses of policymakers because some citizen-taxpayers are likely to flee to other jurisdictions with preferable policies (Tiebout, 1956; Rhode & Strumpf, 2003). Of course, "voting with one's feet" by moving to another jurisdiction is not costless, both financially and socially, and many people may not be able or willing to do so. However, the polycentricity literature emphasizes that a competitive political environment in which (at least some) citizen-taxpayers can sort themselves provides a stronger incentive for policymakers to respond to the desires of their constituents when compared to a scenario with no competition (see McGinnis, 1999a, 1999b, 2000; Aligica et al., 2019). Additionally, polycentric systems provide checks and balances, as well as backstops, against abuses of power or imprudent choices. For example, the separation of powers in government mitigates the chances of tyranny from one branch, and the vertical division of power in a federalist system means that the lower levels can challenge the higher levels, and vice versa, when power is abused.

Third, polycentric systems are more resilient to shocks or failures than more centralized systems because a failure at a smaller scale or a lower level only affects a subset of a system instead of the whole thing. In this case, a "failure" is simply the difference between a stated end and an actual outcome that diverges from that end. For instance, if policymakers claim that they want to make housing more affordable, but they mistakenly choose a means that makes housing more expensive, they have failed to achieve their stated goal. Any given decision-making center in a polycentric system will occasionally fail, but failures can be more easily detected early and fixed quickly when the scale is relatively small. A centralized

approach implies that failures are large, if not systemwide, making it difficult, slower, and more costly to recover from a failure. Thus, polycentric systems may seem to have too much redundancy at first glance, but redundancy is a feature, not a bug in the system (see Ostrom et al., 1978; Boettke et al., 2016). Relatedly, different nodes can cooperate on an ad hoc basis, which facilitates the ability to address localized problems or failures that are not systemwide. For example, interstate compacts allow public policies to span multiple states without needing the federal government to be involved. Market firms and nonprofit organizations often create a wide variety of mutually beneficial contractual relationships that help all parties involved accomplish their ends more effectively and efficiently. The cooperation between various entities promotes both resilience and knowledge discovery (Aligica et al., 2019).

Fourth, socially beneficial outcomes can emerge from the complex interactions of many independent entities without a central planner. The various forms of cooperation and contestation in a polycentric system aggregate into large-scale outcomes. Although many social problems are on a global scale, such as human-caused climate change or a pandemic, global-level consensus is not necessary. In other words, many local actions can translate to global outcomes, without needing a global-level policy to coordinate everyone. Scholars in the traditional literature in public finance argue that large-scale externalities, such as climate change, should be governed at the higher levels (i.e., national or global governance systems) (Oates, 2011; Nordhaus, 2006). From a polycentric perspective, however, this argument is only partially right. Large-scale problems will likely have some degree of governance at high levels, but the combination of many medium-level and local-level actions is likely to produce more effective results than relying solely on a high-level action. Despite the benefits of the combined actions at many levels and in many locations, the bottom-up, emergent properties of polycentric governance systems have undeniable tradeoffs. For instance, coordination across polycentric units can—and often does—have high transaction costs. Relatedly, polycentric units can be at odds with one another, which can be a benefit in terms of experimentation and resilience, but contestation and conflict between nodes impose costs for overarching, systemwide coordination.

One of the clearest examples of the emergence of socially beneficial outcomes is in markets. Without central planners, billions of people interact each day to produce the goods and services that lead to human flourishing. In other words, the spontaneous order of the market allows supply to meet demand by coordinating the actions of producers with the desires of consumers. The processes of innovation and competition in a market generally tend to benefit consumers by increasing choice, lowering prices, and improving quality (see Hayek, 1945; Kirzner, 1997, 2018; Ikeda, 2005; Lavoie, 2016). When some countries, like the Soviet Union or Maoist China, engaged in central economic planning, the knowledge problems and incentive problems were insurmountable, and millions of people starved because food could not be efficiently produced and allocated (Boettke, 1990; Dikötter, 2010; Boettke & Candela, 2018).

In the nonprofit world, many other socially beneficial outcomes arise spontaneously from the dispersed actions of many individuals who are not centrally coordinated. Consider Wikipedia, a free, online encyclopedia that is written and revised collaboratively by its users, which is perhaps the largest compendium of human knowledge ever assembled (see Cummings, 2020).

Similarly, another nonprofit called E-NABLE—short for "Enabling the Future"—brings together individual volunteers from across the globe to share designs for 3D-printed prosthetics, often for children and even for injured animals. Rather than profit from their own design, the founders of E-NABLE opted to make it open source and launched a nonprofit. With the open-source approach, the community has since grown to 30,000 volunteers, 140

chapters, and hundreds of schools that have designed and gifted approximately 7000 3D-printed hands and arms in over 100 countries (see Thierer, 2020; Enabling the Future, n.d.). Thus, E-NABLE has provided a means for many people to contribute to a socially beneficial outcome without a highly centralized leader directing the outcome. Of course, some degree of centralized direction exists within E-NABLE, such as setting up the platform and coordinating among the various volunteers/contributors. E-NABLE's approach demonstrates how there is no strict binary between centralization and decentralization, which can vary even within the same organization.

As mentioned above, polycentric approaches are not panaceas, and the more polycentric a governance system becomes, there will also be costs and trade-offs. For example, as the number of nodes increases in a polycentric system, coordination costs will likely increase, as well as a potentially higher chance for conflicts between jurisdictions. Scholars in the Bloomington tradition—as well as the associated public choice tradition—are careful to engage in comparative institutional analysis between different types and levels of decision-making. No governance system is perfect, and recognizing limits and trade-offs is crucial.

3.2. The Meta-Polycentric Order of Society and Wicked Social Problems

Human action takes place in government, markets, and civil society, and the complex interactions of entities in all three of these arenas constitutes a meta-polycentric order—a high-level polycentric system composed of smaller polycentric systems (see Lofthouse & Herzberg, 2023). Since wicked social problems are characterized by complexity, the meta-polycentric order of society can cope with that complexity by providing useful epistemic and incentive-related qualities that allow individuals, organizations, and communities to create ways to address problems across many sectors. Markets, governments, and civil society each have their own strengths and weaknesses, but the cooperation and contestation among decision-makers in these three spheres leads to effective ways to address wicked social problems. Useful knowledge can be discovered, aggregated, and communicated. Decision-makers face stronger incentives to solve problems. There is more resilience to shocks or failures. Workable solutions emerge from the various interactions without requiring centralized coordination.

The Bloomington school's approach to polycentric governance is associated with a normative political philosophy of democratic self-governance that emerges from the literature in classical liberalism (Aligica et al., 2019). The Ostroms and many scholars in their tradition have relied on analytical and normative frameworks of the Austrian and Virginia schools of political economy, which also have their roots in classical liberalism. However, one does not necessarily have to ascribe to classical liberalism's normative views to appreciate the epistemic and incentive-related characteristics of a meta-polycentric order. Markets, governments, and civil society can all succeed and fail on many margins. One of the most important insights from the Bloomington school is that the combination and interactions of markets, governments, and civil society can mitigate the unique pathologies of each sector and bolster their strengths as well.

Markets are a complex spontaneous order that is composed of many cooperative and competitive interactions. Under a framework of the rule of law and private property rights protection, entrepreneurs produce and distribute the goods and services that consumers desire. Markets function well when prices exist and profits can be made, and markets do not function well in non-priced or nonprofit environments. Nobel Laureate F. A. Hayek argued that many important forms of knowledge are dispersed, tacit, and inarticulable, meaning that no central authority can make economically efficient decisions due to these epistemic limitations. Market prices are a critical epistemic feature of markets because prices are

signals that aggregate and communicate dispersed knowledge (Hayek, 1945). Thus, market firms can solve and have solved problems in which monetary prices exist and profits can be made, but entrepreneurs have weak incentives to solve problems that lack profit opportunities (Kirzner, 1997, 2018). For-profit firms excel at filling the needs and wants of consumers on many margins. For example, the inflation-adjusted price of televisions has gone down over time due to increased competition and the discovery of more efficient production processes (Delouya, 2023). When markets are relatively unencumbered, the lure of profit and competitive pressures induce entrepreneurs to provide goods and services at higher qualities and at lower prices, ceteris paribus. Under institutions that protect private property rights and a culture that facilitates experimentation, markets have led to the "Great Enrichment" in which billions of people today have vastly more wealth than their ancestors only a few generations ago (McCloskey, 2010, 2016).

However, despite the many benefits, markets are ill-equipped to deal with the provision of public goods or cope with negative externalities, among other market failures. In economics, the technical definition of a pure public good is one that is both nonexcludable (i.e., it is costly or impossible for one user to exclude others from using a good) and non-rivalrous (i.e., the use of a good by one individual does not prevent others from using the same good). Under this technical definition, many forms of knowledge are public goods because once knowledge is discovered, one person's use of it does not reduce its availability to others (i.e., non-rivalrous) and it is difficult to prevent others from using it (i.e., nonexcludable) (see Aligica et al., 2019). Others can then "free ride" on the knowledge production of those who have directly borne the costs, like those engaging in research and development. Thus, to overcome the public goods problem of knowledge, countries have instituted intellectual property regimes that give a government-granted monopoly called a patent, providing a stronger incentive for people to engage in research and development. Additionally, negative externalities, such as pollution, arise when property rights to air or water are not well defined or well enforced. Markets function well only under a system of private property rights, so other kinds of interventions are often necessary to cope with these negative externalities.

Governments are unique in that they have coercive power, and their most basic function is to protect life, liberty, and property, such as police, courts, and national defense. When those basic functions are achieved, governments can provide goods and services that are difficult to provide in markets, such as pure public goods or other goods that face large costs for voluntary collective action. Some common examples include national defense, flood control infrastructure, freeway systems, and public health initiatives, among others. Governments can also use their coercive power to tax and regulate in order to address market failures, such as the provision of public goods, addressing negative externalities, breaking up natural monopolies, correcting information asymmetries, maintaining macroeconomic stability, etc. Thus, government interventions or other public policies may be necessary to rectify market failures or other social problems. Many examples exist of governments providing public goods and sparking innovations that have improved the functioning of markets, such as the internet, GPS systems, biotechnology advancements, renewable energy technologies, etc. (see Mazzucato, 2013, 2018).

Interventions in the functioning of markets can be a double-edged sword because they are likely to distort price signals, which then induces producers and consumers to change their behavior, leading to economic inefficiencies and misallocations of resources (Kirzner, 2018). For example, when policymakers intervene, the complex and entangled nature of markets leads to unintended consequences, which then necessitates that policymakers intervene further to accomplish their desired ends. Thus, interventions into markets often

spark a metaphorical game of "whack-a-mole" in which one action sparks another problem that pops up elsewhere (Ikeda, 2005).

The literature in public choice economics provides much theoretical and empirical evidence of the weak incentives for policymakers to spend money prudently or work efficiently towards specific goals, yielding government failures. Additionally, policymakers have a strong incentive to concentrate benefits on favored groups while dispersing the costs across the general population, making many policies socially wasteful (Buchanan, 1999; A. C. Smith & Yandle, 2014; Holcombe, 2018). In other words, relying on government is a Faustian bargain because it can devolve into predation in which officials face an incentive to use their coercive power to redistribute wealth on a concentrated minority while dispersing the costs on a much larger group (Buchanan, 2000). Government officials also face epistemic limitations, so their ability to provide public goods or solve market failures, even assuming benevolent intentions, is limited (Lavoie, 2016; C. J. Coyne, 2013, 2015).

Civil society groups take many forms, such as clubs, philanthropies, community organizations, civic associations, mutual aid societies, and other nonprofits. Civil society can also take the form of unpaid voluntary efforts to improve society, unaffiliated with any formal organization, such as child rearing, or caring for aging parents. Such groups and organizations provide many goods and services that both markets and governments are not well-equipped to provide, including the conveyance of social values and a sense of belonging (Chamlee-Wright & Storr, 2011; Storr & Haeffele-Balch, 2012; Storr et al., 2015). These groups help generate and sustain social movements, which bring about social change (Novak, 2021). The literature gives many examples of how civic associations and nonprofits, including philanthropies, community organizations, and mutual aid societies, have helped people cope with disasters and crises (Chamlee-Wright & Storr, 2011; Storr et al., 2015).

Civil society groups face shortcomings too, such as the lack of relatively clear feedback based on profit and loss, like for-profit firms. In market firms, profits indicate success in satisfying consumer preferences, while losses signal a misallocation of resources. Losses provide a strong incentive for market firms to align their activities with market demands. Even without the profit-and-loss mechanism, civil society groups have some useful feedback mechanisms to guide behavior, such as donor satisfaction, community satisfaction, measurable outputs, etc. (Storr et al., 2015; C. J. Coyne, 2013). Feedback in the form of donations, grants, or volunteer contributions can give some indication of how well a nonprofit's activities are performing, but they are often less clear-cut than true profit and loss. Without market prices and the profit-and-loss mechanism, there is no way to ascertain the economic efficiency of a nonprofit's activities. Additionally, some nonprofits have broad objectives and ambiguous metrics of success, such as "improving well-being" or "increasing stability", meaning that it can be challenging to assess effectiveness (see C. J. Coyne, 2013). In other cases, nonprofit staff may struggle with prioritizing which actions to take, and they may experience burnout. Nonprofits and charities can suffer from the "fog of good intentions", referring to the confusion and challenges that arise when well-meaning efforts lead to unintended negative consequences (for examples, see C. J. Coyne, 2013; Easterly, 2013). In a nonprofit setting, results and impacts can be costly and difficult to assess. Another potential issue with many nonprofits is a dependence on government funding, which can often lead to a number of pathologies, such as principal–agent problems, mission drift, communication breakdowns, and catering to funders' whims rather than their core mission. When nonprofits and charities are bureaucratized to a large degree, inefficiencies in terms of time and money are exacerbated (see C. J. Coyne, 2013; Grube et al., 2017).

To cope with the various potential pathologies in both the private and public spheres, private–public partnerships (hereafter, PPPs) can be one potential polycentric institutional structure that promotes the best of both spheres while mitigating the shortcomings. The

three sectors mentioned above are made distinct for analytical tractability, but in practice they are often heavily interconnected. A growing literature has discussed how PPPs foster collaboration so that different entities can share resources and complementary expertise, making them more effective in many cases (e.g., Brinkerhoff, 2002; Brinkerhoff & Brinkerhoff, 2002; O'Regan & Oster, 2000; Witesman & Fernandez, 2013; Incite, 2017). Social entrepreneurs are critical components of making functional PPPs, and the literature indicates that social entrepreneurs who incorporated multi-sector collaboration have facilitated effective collective action. In particular, social entrepreneurs can catalyze social learning and drive community-oriented innovations by using their diverse, localized knowledge to supplement actions in government or markets (e.g., Dees & Anderson, 2006; Frank & Shockley, 2016; Light, 2006; Moulaert et al., 2013).

However, if the rules setting up a PPP arrangement are not done well, a PPP can become a corrupt rent-seeking opportunity that is socially wasteful at the taxpayers' expense (Lv et al., 2021; Mulyani, 2021). For instance, Canada has been relatively successful at implementing PPPs, and between the early 1990s and 2018, provincial governments across Canada have developed and completed over 200 infrastructure projects through PPPs (Warsen et al., 2020). However, in other places, PPPs have become a boondoggle because the institutional rules did not have effective oversight, or there was collusion between government officials and private entities (Rybnicek et al., 2020; Schomaker, 2020).

A meta-polycentric order, however, is also more than just an assortment of PPPs. PPPs constitute part of a meta-polycentric order in which many kinds of entities collaborate with, contest against, and mutually adjust to one another. PPPs represent some of these centers but are joined by other entities, including community organizations, local governments, businesses, and civil society groups. Under certain institutional conditions, PPPs embedded in a broader polycentric order compete for influence, funding, or the pursuit of distinct goals, which can drive innovation and prevent stagnation (see Ostrom, 2005; Aligica & Tarko, 2012; Aligica et al., 2019; McGinnis, 1999a, 1999b, 2000).

Thus, wicked problems are best addressed with a combination of resources, knowledge, and skills from both the private and the public spheres. As wicked social problems evolve over time, institutional structures must be adaptable to cope with various forms of complexity and ongoing change. A meta-polycentric governance structure tends to provide long-term adaptability to wicked social problems because it creates a learning environment, mitigates abuses of power, promotes resilience, and accommodates a diversity of subjective preferences/worldviews.

4. Examples of Polycentric Governance in Action

In what follows, we describe how polycentric governance systems have functioned in two contexts: (1) post-disaster recovery and (2) climate change mitigation and adaptation. We have chosen these two contexts because they are especially difficult wicked social problems. The contexts of post-disaster recovery and climate change are characterized by intractability, open-endedness, and multi-dimensionality, as well as being highly unpredictable and uncertain. Although these two case studies are relatively short, they are intended to suggest how and why a meta-polycentric order can be useful even in the hardest cases. This section is intended to highlight how the interactions among governments, markets, and civil society can produce the relevant knowledge and incentives to address wicked social problems.

We analyze how polycentric systems have successfully addressed these problems in the past, and we discuss how further polycentric action can lead to more success in the future. The term "success", however, is fraught because different people define success differently. Following in the Bloomington school's tradition, we take a subjectivist approach

in which the people being governed define success for themselves. A wicked social problem will undoubtedly include individuals with a wide diversity of preferences and opinions. For instance, one person might deem a post-disaster recovery effort a success, but another person might consider the same action unsuccessful. One of the benefits of a polycentric approach to solving wicked social problems is that there is space for both a diversity of preferences and approaches to accommodate those preferences. There are, however, generally widespread sentiments about what constitutes success in situations of post-disaster recovery and climate change mitigation/adaptation. For post-disaster recovery, success is often defined as victims receiving the goods and services they need, as well as rebuilding communities to their former operations. For climate change, successes are often defined as reducing greenhouse gas emissions and making people more resilient to the effects of climate change.

4.1. Post-Disaster Recovery

Recovering from a disaster, such as a hurricane, earthquake, or pandemic, is a wicked social problem because of the complexity of the needs of an affected population and the means to address those needs. Nearly every aspect of a post-disaster situation is characterized by uncertainty on some margin. The scale and scope of a post-disaster scenario is overlapping and multifaceted because many interrelated concerns arise simultaneously, like housing, infrastructure, healthcare, economic recovery, etc. There is no clear or definitive point at which a community has recovered from a disaster. The effectiveness of an approach or intervention is subjective, with different stake holders viewing some as legitimate and just, while others do not. The results of any approach or intervention will also be evaluated subjectively by different individuals or groups. All disasters are unique because of differences in human populations, physical geography, and pre-existing social and economic conditions. Thus, even disasters that seem superficially similar, such as hurricanes, will require different responses depending on where they strike.

Despite the diversity and complexity of disasters, many communities have been able to bounce back successfully due to the cooperation and contestation among for-profit firms, various levels of government, and civil society organizations. Perhaps the most conspicuous entities in post-disaster recovery are government agencies. In the context of the United States, the federal government has several agencies that provide resources and services for recovery. The Federal Emergency Management Agency (FEMA) allocates financial assistance and other resources to lower levels of government, individuals, and communities (Knapp, 2020). Especially after hurricanes, the Coast Guard uses resources and expertise to rescue people in flooded areas (Horwitz, 2010). Businesses, homeowners, and renters can receive low-interest disaster loans from the US Small Business Administration to repair and replace property damaged by disasters (Davis et al., 2018). The US Army Corps of Engineers builds, maintains, and repairs infrastructure, like levees and dams, which is meant to mitigate the chances of catastrophic flooding (Rosati et al., 2015). Additionally, each state has an emergency management agency to help when a crisis strikes. State agencies collaborate with FEMA and other federal agencies to provide necessary public services and rescue missions (Hoekstra & Montz, 2017; Williams, 2023). At the local level, emergency management offices are often the first to respond to disasters because they are closest a crisis and have the most local knowledge, but higher levels of government can sometimes crowd out or displace local-level responders (LePore, 2020).

Chamlee-Wright (2023) provides an intellectual framework for determining when government entities have a comparative advantage for post-disaster recovery compared to markets and civil society. In her framework, governments should focus only on post-disaster activities that are essential, big, simple, and for which government is comparatively

capable (which she calls the EBS-Cap Framework). The characteristic of "essentialness" may be self-explanatory, meaning that governments should not engage in post-disaster activities that are clearly superfluous, as defined by the people needing help. It is important to note that what one group or individual sees as superfluous may be a necessity for another group or individual, but often individuals in communities have socially shared preferences. Since governments generally have access to larger amounts of resources, they are relatively more well equipped to undertake "big" projects in a post-disaster scenario than civil society groups or market firms. Perhaps the most counterintuitive part of Chamlee-Wright's argument is that governments should prioritize simple tasks rather than complex ones when helping after a disaster: "The more elaborate, the more complex, the more complicated the project, the less likely it will be that government is well-situated to achieve success. [. . .] In the wake of Hurricane Katrina, the first impulse was to create a government commission and charge it with the task of redeveloping the City of New Orleans so that it would be rebuilt better than it ever was before the storm. What emerged instead was a thicket of bureaucratic roadblocks, delays in relief assistance, and uncertainty about the rules and regulations that would govern the recovery process. All of this left displaced residents, business owners, and social service providers on the sidelines, exacerbating the crisis" (Chamlee-Wright, 2023, p. 25). Lastly, governments are well-positioned to accomplish certain tasks compared to market firms or nonprofits, such as providing cash quickly to individuals and service providers. Since government bureaucracies often have blunt, as opposed to precise, capabilities, government should focus on the large-scale blunt tasks that they are relatively capable of doing.

Chamlee-Wright's framework is not anti-statist in favor of bottom-up reconstruction. Instead, governments, especially at the highest levels, can (and often do) play a critical role in post-disaster recovery, but that role is best suited for particular types of activities. If federal agencies did not engage in "EBS-Cap" activities, it is unlikely that successful reconstruction could happen. Due to the foundation of a centralized federal decision-making apparatus, bottom-up action from markets and civil society can more effectively take place. Thus, a polycentric approach to post-disaster recovery often relies heavily on federal government-led projects, even with bureaucratic inefficiencies.

Market firms, although motivated by making profits, are an indispensable component of post-disaster recovery. After a crisis, firms sell necessary goods and services for a profit, and many firms also have a philanthropic wing that provides aid at no cost to consumers. For example, Walmart is known for opening up quickly after a disaster and shipping merchandise to meet customers' needs with food, water, and other necessities. Walmart also donates millions of dollars and essential supplies to affected communities (Horwitz, 2009; Linnenluecke & McKnight, 2017). The Home Depot is also known for opening quickly after a disaster so that people can buy necessary goods, including construction materials, electricity generators, plumbing materials, etc. On the philanthropic side, The Home Depot also donates supplies and funding to repair homes and rebuild other damaged structures (Ergun et al., 2013; Grube & Storr, 2018). Airbnb is a critical source of housing for people who flee a disaster before it strikes, and it also provides shelter for people who are displaced afterward. Airbnb has also offered to cover the costs of displaced residents and relief workers in some instances (Kaniadakis et al., 2022; Seddighi & Baharmand, 2020).

Civil society organizations, including nonprofits, philanthropies, churches, and community groups, are critical to post-disaster recovery because they provide necessary funding, resources, and social capital (Simo & Bies, 2007; Mathias et al., 2022). The American Red Cross and the Salvation Army are some of the largest and most well-known nonprofits, and they provide disaster survivors with emergency shelters, food, medical care, and psychological support (S. L. Smith & Grove, 2017; Hamner, 2008; Jellets, 2008; Hicks, 2014).

However, these large organizations are not without shortcomings. The Red Cross has been criticized for becoming increasingly bureaucratic over time as it has become entangled with governmental responsibilities, leading to a more centralized and rigid approach (Grube et al., 2017). Nonprofits like Habitat for Humanity engage in long-term rebuilding projects, helping to repair and reconstruct homes and infrastructure, thus enhancing resilience to future disasters (Chen, 2015). Feeding America distributes meals to those affected by disasters by partnering with local food banks. The organization is concerned with food security in both the short and long terms (MacNabb & Fletcher, 2019; Casellas Connors et al., 2023). Team Rubicon recruits military veterans as volunteers to provide disaster response services, including debris removal, home repair, and medical aid (Fraser, 2020). World Central Kitchen provides fresh meals to disaster survivors and emergency workers all over the globe (Firth, 2022). Local religious organizations help communities bounce back after a disaster by leveraging their social capital to provide the goods and services that parishioners need (Chamlee-Wright & Storr, 2011; Storr et al., 2015).

Of course, these examples of civil society organizations are just a few of the bigger groups that have engaged in post-disaster recovery. However, many lower levels of governments, for-profit firms, and nonprofit organizations provide important goods and services. Thus, a full picture of how nonprofits, governments, and for-profit entities work together requires analyzing action at various levels and sizes. A growing literature has examined the multifaceted, multilayered approach to post-disaster recovery in a variety of scenarios (see Chamlee-Wright & Storr, 2011; Storr & Haeffele-Balch, 2012; C. J. Coyne, 2013; Storr et al., 2015; Grube & Storr, 2018; Chamlee-Wright, 2023).

Thus, the literature on post-disaster recovery makes it clear that the meta-polycentric arrangement of society has allowed many communities to rebuild and revive themselves. Different entities, such as nonprofits and for-profit firms, have learned from the successes and failures of one another and adapted their own practices. If an organization or agency is tempted to engage in corrupt or wasteful practices, people have alternatives that can fulfill their needs, which disciplines how much corruption and waste is likely to happen. If one entity fails to achieve its goals, other entities have picked up the slack, leading to more resilience in a society overall. The wide variety of for-profit firms, government agencies, and nonprofits has accommodated a diversity of subjective preferences, which has allowed different communities to define and achieve their own kind of "success".

In contrast, a truly monocentric approach to post-disaster recovery would be limited to aid provided by a single, high-level government agency. Such an agency would likely lack local, context-dependent knowledge that is relevant for coping with a disaster, and actors within such a high-level bureaucracy often have weak incentives to act effectively and efficiently. One such example is the failures of the Federal Emergency Management Agency to provide necessary goods and services after Hurricane Katrina (see Pierre & Stephenson, 2008; Farazmand, 2009; Storr et al., 2015).

4.2. Climate Change Mitigation and Adaptation

Human-caused climate change is another wicked social problem, and perhaps the biggest humanity has experienced. Climate change is highly complex because of many interrelated factors, such as greenhouse gas emissions from large-scale agriculture and fossil-fuel energy consumption, as well as deforestation and other industrial activities. Any of these factors is complex, so each one requires a unique approach. Therefore, the causes of and potential solutions to climate change cannot be comprehensively defined.

When looking at both mitigation practices and adaptation techniques, the climate change issue because even more multifaceted. There is no clear cut-off point when climate change has been "solved", and individuals widely disagree on the acceptable level of trade-

offs associated with mitigation and adaptation approaches. Any techniques or strategies of mitigation or adaptation will have slow, ambiguous feedback, meaning that adjusting is a murky process. Furthermore, climate change has differential impacts on different locations depending on their physical geography, as well as other economic, social, and political contexts.

There is no world government, so a truly global monocentric system does not exist. However, some scholars and activists have called for national governments to adopt highly monocentric approaches within their countries, such as comprehensive and non-comprehensive forms of top-down economic planning to combat climate change (Bartels, 2001; L. B. Brown, 2009; Delina, 2016; Klein, 2020; Malm, 2020). These scholars explicitly and implicitly argue that a polycentric governance approach to climate change will be ineffective because they are composed of many fragmented decision-makers pursuing their own contradictory objectives.

In response to concerns like these, Elinor Ostrom (2012, 2014) and other scholars in her vein (see Cole, 2015; Jordan et al., 2018; Lofthouse & Herzberg, 2023; Goodman et al., 2024) have argued that no centralized organization can orchestrate a consensus on the seriousness of climate change's existential threat or implement effective solutions. It is precisely because of the complexity of the geophysical processes and the socio-political dynamics that a polycentric approach is useful for climate change mitigation and adaptation. If an idealized form of a centralized, top-down approach could be implemented, then climate change could be effectively addressed. However, the Bloomington school's approach focuses on the real-world considerations of limited knowledge, preference heterogeneity, and disconnects between private incentives and social welfare. A well-constituted polycentric approach can generate new knowledge and provide a learning environment that facilitates adjustment. A polycentric approach can also accommodate a variety of preferences and promote "buy-in" from the people being governed, which aligns incentives for socially productive action.

Despite the complexity of the causes and consequences of climate change, the cooperation and contestation among for-profit firms, various levels of government, and civil society organizations has led to many improvements for mitigation and adaptation. For instance, governments across the world have implemented a variety of policies. Sweden and Canada have carbon taxes that have incentivized reductions in emissions (Sterner, 2020; Winter, 2020). The European Union created the Emissions Trading System, which is one of the largest carbon cap-and-trade programs in the world (Bayer & Aklin, 2020). In the United States, the Investment Tax Credit (ITC) provides funding and support for solar energy projects, especially for private households (Morgan, 2021). Many U.S. states have adopted Renewable Portfolio Standards policies, which set mandates or goals for how much of a state's energy must come from renewable sources (Joshi, 2021). China has implemented ambitious renewable energy targets, which has succeeded on some margins, but China's carbon emissions have still grown sharply in the recent past (Zheng et al., 2021). The U.S. federal government has long implemented Corporate Average Fuel Economy standards, and the European Union has implemented carbon emissions standards, which are meant to induce more fuel-efficient vehicles, and thus lower carbon emissions (Wang & Miao, 2021; Haas & Sander, 2020). Through the Paris Agreement, a majority of the world's countries have committed to reducing their carbon emissions, but the enforcement mechanisms lack stringency (Roelfsema et al., 2020).

Since entrepreneurs in market firms cater to consumers' desires, the competitive pressures of the market—as well as some pressures from public policies—have led firms to innovate cleaner, more efficient products (Anderson, 2021). Internal combustion engines have continued to become more fuel efficient and emit fewer pollutants, largely at the behest of consumers who want to pay less for fuel (Johnson & Joshi, 2018). Electric vehicles

have longer battery life and higher efficiency, also due largely to the demands of consumers (Feng & Magee, 2020). Energy storage technologies are improving electrical grid reliability, which is important for the proliferation of non-dispatchable types of renewable energy like wind and solar. Emerging technologies include pumped hydro storage, compressed air energy storage, and advanced grid-scale batteries (Ali et al., 2021; Huang & Li, 2022; Matos et al., 2022). Innovations with smart thermostats and HVAC systems have reduced energy consumption in domestic and commercial spaces, ultimately reducing carbon emissions (Stopps & Touchie, 2021). Agricultural innovations are allowing farmers to use less water, require fewer fertilizers/pesticides, and produce larger yields, which means fewer environmental impacts (Duncan et al., 2021). Innovations in carbon-capture-and-storage technologies are becoming more economical, which helps reduce atmospheric carbon that has already been emitted (Beck, 2020).

Civic associations and nonprofit organizations have played pivotal roles in the mitigation of and adaptation to human-caused climate change through various initiatives and actions. Their contributions span advocacy, education, policy influence, and direct action. Among the Sierra Club's many activities, it has lobbied policymakers to reduce greenhouse gas emissions, promote renewable energy, and protect natural habitats. Since the Sierra Club is one of the largest environmental groups in the United States, it influences how its members view the world and vote (Coley & Schachle, 2021). The Natural Resources Defense Council influences policymakers and engages in legal action to enforce environmental laws (Blair, 2023). The Nature Conservancy engages in reforestation, wetland restoration, and sustainable agriculture to promote ecosystem resilience and carbon sequestration (Mccarthy, 2012). The Environmental Defense Fund uses intensive litigation to advance a variety of environmental causes, including climate change and climate justice (Luke, 2024).

Several creative and strategic cross-sector partnerships have included innovative financial arrangements known as "blended finance", which is meant to reduce the risk involved in certain investments. In other words, this approach strategically injects funds into high-potential but high-risk projects so that the private sector will be less hesitant to invest. Civil society organizations, such as private foundations or charities, may identify certain goals that they want to help achieve, such as cleaner energy or other mitigation efforts. However, these organizations may not have the resources, wealth, or expertise to address the issues on their own. These private organizations then enter into collaboration with government agencies, commercial investors, and/or other types of investors to design a blended finance structure, which may include grants, concessional loans, guarantees, and equity investments. These potential finance structures are meant to de-risk the projects that the private organizations would like to see accomplished. For instance, private foundations may provide first-loss capital to protect investors from potential downsides by absorbing some initial losses. Foundations and nonprofits may also provide guarantees and insurance to offset certain risks like currency fluctuations, credit risk, or other forms of political instability. Blended finance can take a wide variety of institutional forms, but they are all meant to be de-risking mechanisms to facilitate certain desired outcomes (Rode et al., 2019; Farber & Reichert, 2023; Ostojić et al., 2024). For example, the Hewlett Foundation implemented a blended finance approach to jump-start the clean energy sector in developing countries (Waite, 2018, 2020). Of course, blended financing is not a panacea, but it is one potential set of approaches within a broader meta-polycentric order. Some forms of blended financing may succeed on some margins and fail on others. Within a meta-polycentric order, many different philanthropies and foundations can experiment with different types of blended financing schemes, which contributes to system-wide resilience and an environment of mutual learning.

To many people, it may seem that a global problem like climate change cannot be dealt with effectively with countless actors working at cross-purposes. However, the theoretical and empirical evidence from the Bloomington school indicates that a polycentric approach, if well constituted, can effectively address a global problem, even with a large degree of preference heterogeneity. Since the United Nations does not have binding power, and since national governments are sovereign, the world exists in a polycentric arrangement. Worldwide agreements that all countries voluntarily uphold are unlikely to arise in the short or long term. Thus, the real question is how to constitute or reconstitute a meta-polycentric order so that various governments, market firms, and civil society organizations drive each other towards effective climate action while also mitigating social harms. The most effective structure of such a meta-polycentric order is open to debate, and future research should focus on different institutional arrangements that generate the necessary knowledge and provide the correct incentives for effective climate action.

5. Conclusions and Implications

Most social problems are wicked because they are complex, ambiguous, multifaceted, and subjective. These problems lack straightforward answers, and feedback processes are unclear and slow, making adaptation difficult. A polycentric approach, rather than centralized, one-size-fits-all methods, tends to be the most effective way to cope with wicked social problems because of the associated epistemic and incentive-related characteristics. Governments, markets, and civil society can try different ideas, techniques, and institutional structures. Since no entity in the system fully dominates the other, various forms of cooperation and contestation can arise. These interactions produce necessary knowledge and induce socially beneficial behavior, which are essential to tackle wicked problems. Post-disaster recovery and climate change mitigation are just two examples of how a polycentric approach can address wicked social problems.

One of the main insights that comes from applying the Bloomington school's frameworks and theories to wicked social problems is that there must be an emphasis on the epistemic and incentive-related characteristics of different sectors. For example, actors in government will have different kinds of knowledge and different institutionally contingent incentives than actors in markets or civil society. If scholars and policymakers neglect the key differences among these sectors as they relate to knowledge and incentives, then attempts to address wicked social problems will be limited. As such, one recommendation for policymakers is to avoid placing too much emphasis on government approaches. As the Bloomington school's theoretical and empirical research finds, different spheres of human action have different epistemic and incentive-related qualities. To the degree that government action crowds out market-based or civil society action, useful forms of knowledge and incentives will be displaced or neglected.

Elinor Ostrom (2007) cautioned against the temptation to use panaceas to address complex social issues, and polycentric governance itself is not a panacea. The Bloomington school's work on polycentricity is intimately tied to institutional analysis, meaning that different institutional configurations will have different epistemic and incentive-related properties. In some cases, perverse polycentric governance systems can emerge, meaning that certain arrangements of overlapping institutions hinder the discovery of knowledge, obstruct adaptation, or promote unproductive incentives. Thus, when attempting to address wicked social problems, a well-constituted monocentric approach could outperform a poorly constituted polycentric approach. However, the growing literature on institutional analysis seems to suggest that there is a general tendency for polycentric approaches to outperform monocentric ones over time (see Ostrom, 2005, 2012, 2014; Aligica & Tarko, 2013; Aligica et al., 2019).

This paper has three implications. First, civil society organizations, particularly nonprofits and philanthropic groups, may often need to be at the forefront of addressing particular kinds of wicked social problems. In many cases, due to their unique kinds of knowledge, it may be most appropriate to rely on civil society organizations to address significant issues, such as post-disaster recovery or climate change. While civil society organizations offer many practical advantages, too much reliance on them may also be unwise. We do not want to describe civil society as a panacea. However, in cases where civil society organizations have the relevant knowledge, incentives, and resources, they should not be afraid to experiment with a variety of approaches. Civil society organizations are embedded within the communities they serve, allowing them to gather detailed and specific knowledge about the needs, preferences, and dynamics of those communities. Nonprofits and philanthropic groups can quickly respond to emerging issues, experiment with innovative approaches, and adjust their strategies based on feedback and changing circumstances. Nonprofits and philanthropic groups often facilitate the building of social capital and foster trust within communities. These civil society groups sustain collective action and community resilience because the community members are intimately involved in the decision-making processes, meaning that they "co-produce" the outcomes that they want to see.

Second, all too often, there is a natural tendency in organizations toward silo thinking and myopic thinking. If leaders in nonprofits are aware of polycentric thinking, they may be able to see the "big picture" more clearly, which helps them to be more effective in their mission. Even in nonprofits, leaders and workers can act entrepreneurially by being alert to and discovering alternative institutional arrangements that may improve learning and adaptation processes, find new means of collaboration with external organizations, and navigate complexity more effectively. By incorporating the principles of polycentric governance into organizational strategies, for-profit and nonprofit entities can better achieve their goals. Further research could develop practical guidance on how to improve mindsets and guiding principles by applying the Bloomington school's insights.

Third, a polycentric approach can be used within organizations to facilitate bottom-up empowerment. With some degree of decentralized decision-making, individuals at all levels of an organization can be empowered to innovate and act entrepreneurially. This distribution of leadership can increase engagement and motivation among staff and volunteers, fostering a sense of ownership and responsibility. Furthermore, polycentric governance enables nonprofits to be more responsive to local needs and contexts. This local responsiveness can enhance community engagement and support, leading to more effective and sustainable outcomes.

Future research should apply the logic of polycentric governance systems to a wide variety of other wicked social problems, like housing affordability, homelessness, water management, species conservation, public health crises, education reform, and energy production, among others. The combination of multiple overlapping government policies, market firms, and nonprofit organizations is likely to generate the relevant knowledge and incentives to address these wicked social problems. Centralized, one-size-fits-all approaches hamper our ability to find solutions to complex problems.

Author Contributions: Writing—original draft preparation, J.K.L.; writing—review and editing, L.K. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: No new data were created for this paper.

Acknowledgments: We would like to thank Christopher J. Coyne for his helpful feedback during the drafting process.

Conflicts of Interest: The authors declare no conflicts of interest.

References

Alford, J., & Head, B. W. (2017). Wicked and less wicked problems: A typology and a contingency framework. *Policy & Society*, *36*(3), 397–413.

Ali, S., Stewart, R. A., & Sahin, O. (2021). Drivers and barriers to the deployment of pumped hydro energy storage applications: Systematic literature review. *Cleaner Engineering and Technology*, *5*, 100281. [CrossRef]

Aligica, P. D., Boettke, P. J., & Tarko, V. (2019). *Public governance and the classical-liberal perspective*. Oxford University Press.

Aligica, P. D., & Tarko, V. (2012). Polycentricity: From polanyi to ostrom, and beyond. *Governance*, *25*(2), 237–262. [CrossRef]

Aligica, P. D., & Tarko, V. (2013). Co-Production, polycentricity, and value heterogeneity: The ostroms' public choice institutionalism revisited. *The American Political Science Review*, *107*(4), 726–741. [CrossRef]

Anderson, T. L. (2021). *Adapt and be adept: Market responses to climate change*. No. 719. Hoover Institution Press, Stanford University.

Bartels, D. (2001). Wartime mobilization to counter severe global climate change. *Journal of Human Ecology*, *10*, 229–232.

Batie, S. S. (2008). Wicked problems and applied economics. *American Journal of Agricultural Economics*, *90*(5), 1176–1191. [CrossRef]

Bayer, P., & Aklin, M. (2020). The European union emissions trading system reduced CO_2 emissions despite low prices. *Proceedings of the National Academy of Sciences*, *117*(16), 8804–8812. [CrossRef]

Beck, L. (2020). Carbon capture and storage in the USA: The role of US innovation leadership in climate-technology commercialization. *Clean Energy*, *4*(1), 2–11. [CrossRef]

Berry, S., & Waldfogel, J. (2010). Product quality and market size. *The Journal of Industrial Economics*, *58*(1), 1–31. [CrossRef]

Blair, J. J. A. (2023). Natural Resources Defense Council (NRDC). In R. Brinkmann (Ed.), *The palgrave handbook of global sustainability* (pp. 2525–2532). Springer International Publishing.

Boettke, P. J. (1990). *The political economy of soviet socialism: The formative years, 1918–1928*. Kluwer Academic.

Boettke, P. J., & Candela, R. A. (2018). Lessons on economics and political economy from the soviet tragedy. *Journal of Global Initiatives: Policy, Pedagogy, Perspective*, *12*(1), 32–47.

Boettke, P. J., Lemke, J. S., & Palagashvili, L. (2016). Re-Evaluating community policing in a polycentric system. *Journal of Institutional Economics*, *12*(2), 305–325. [CrossRef]

Bresnahan, T. F., & Reiss, P. C. (1991). Entry and competition in concentrated markets. *The Journal of Political Economy*, *99*(5), 977–1009. [CrossRef]

Brinkerhoff, J. M. (2002). Government–nonprofit partnership: A defining framework. *Public Administration and Development: The International Journal of Management Research and Practice*, *22*(1), 19–30. [CrossRef]

Brinkerhoff, J. M., & Brinkerhoff, D. W. (2002). Government–nonprofit relations in comparative perspective: Evolution, themes and new directions. *Public Administration and Development: The International Journal of Management Research and Practice*, *22*(1), 3–18. [CrossRef]

Brown, L. B. (2009). *Plan B 4.0: Mobilizing to save civilization*. W.W. Norton & Co.

Brown, W. (2017). Classification of program activities: How nonprofits create social value. *Administrative Sciences*, *7*(2), 12. [CrossRef]

Buchanan, J. M. (1999). Politics without romance: A sketch of positive public choice theory and its normative implications. In *The logical foundations of constitutional liberty* (Vol. 1, pp. 45–59). The Collected Works of James M. Buchanan. Liberty Fund.

Buchanan, J. M. (2000). *The limits of liberty* (Vol. 7). The Collected Works of James M. Buchanan. Liberty Fund.

Casellas Connors, J. P., Safayet, M., Rosenheim, N., & Watson, M. (2023). Assessing changes in food pantry access after extreme events. *Agriculture and Human Values*, *40*(2), 619–634. [CrossRef] [PubMed]

Chamlee-Wright, E. (2010). *The cultural and political economy of recovery*. Routledge.

Chamlee-Wright, E. (2023). Social coordination in a complex society: A framework for action. In *Social coordination and public policy: Explorations in theory and practice*. Lexington Books.

Chamlee-Wright, E., & Storr, V. H. (2011). Social capital as collective narratives and post-disaster community recovery. *The Sociological Review*, *59*(2), 266–280. [CrossRef]

Chen, T. Y. S. (2015). Habitat for humanity's post-tsunami housing reconstruction approaches in Sri Lanka. *International Journal of Mass Emergencies & Disasters*, *33*(1), 96–117.

Clarke, M., & Steward, J. (1997). *Handling the wicked issues: A challenge for government*. University of Birmingham, Institute of Local Government Studies.

Cole, D. H. (2015). Advantages of a polycentric approach to climate change policy. *Nature Climate Change*, *5*(2), 114–118. [CrossRef]

Coley, J. S., & Schachle, J. (2021). Growing the green giant: Ecological threats, political threats, and U.S. membership in sierra club, 1892–Present. *Social Sciences*, *10*(6), 189. [CrossRef]

Coyne, C. J. (2013). *Doing bad by doing good: Why humanitarian action fails*. Stanford University Press.

Coyne, C. J. (2015). Lobotomizing the defense brain. *The Review of Austrian Economics*, *28*(4), 371–396. [CrossRef]

Coyne, C. J., & Goodman, N. P. (2020). Polycentric defense. *The Independent Review*, *25*(2), 279–292. [CrossRef]

Coyne, R. (2005). Wicked Problems Revisited. *Design Studies*, *26*(1), 5–17. [CrossRef]

Crowley, K., & Head, B. W. (2017). The enduring challenge of 'wicked problems': Revisiting Rittel and Webber. *Policy Sciences*, *50*(4), 539–547. [CrossRef]

Cummings, R. E. (2020). Writing knowledge: Wikipedia, public review, and peer review. *Studies in Higher Education*, *45*(5), 950–962. [CrossRef]

Davis, M., Hansen, M. E., & Husted, T. (2018). The impact of political influence on appointees: Evidence from the small business administration disaster loan program. *Southern Economic Journal*, *84*(3), 771–785. [CrossRef]

Dees, J. G., & Anderson, B. B. (2006). Framing a theory of social entrepreneurship: Building on two schools of practice and thought. In R. Mosher-Williams (Ed.), *Research on Social Entrepreneurship: Understanding and contributing to an emerging field* (pp. 39–66). Association for Research on Nonprofit Organizations and Voluntary Action.

Delina, L. L. (2016). *Strategies for rapid climate mitigation: Wartime mobilisation as a model for action?* Routledge.

Delouya, S. (2023, December 16). Everything seems more expensive, so why is a big new TV cheaper than ever? *CNN*. Available online: https://www.cnn.com/2023/12/16/business/why-are-tvs-so-cheap/index.html (accessed on 8 January 2025).

Dikötter, F. (2010). *Mao's great famine: The history of China's most devastating catastrophe, 1958–1962*. Walker and Company.

Duncan, E., Glaros, A., Ross, D. Z., & Nost, E. (2021). New but for Whom? Discourses of innovation in precision agriculture. *Agriculture and Human Values*, *38*(4), 1181–1199. [CrossRef] [PubMed]

Easterly, W. (2013). *The tyranny of experts: Economists, dictators, and the forgotten rights of the poor*. Basic Books.

Enabling the Future. (n.d.). *About us*. Available online: https://enablingthefuture.org/about/ (accessed on 8 January 2025).

Ergun, Ö., Karakus, G., Kerl, P., Keskinocak, P., Swann, J. L., Villarreal, M., & Drake, M. J. (2013). Disaster response planning in the private sector and the role of operations research. In *Handbook of operations research for homeland security* (pp. 197–217). International Series in Operations Research & Management Science; Springer.

Farazmand, A. (2009). Hurricane Katrina, the crisis of leadership, and chaos management: Time for trying the 'surprise management theory in action'. *Public Organization Review*, *9*(1), 399–412. [CrossRef]

Farber, V., & Reichert, P. (2023). Blended finance and the SDGs: Using the spectrum of capital to de-risk business model transformation. In S. Kacanski, J. K. Dreyer, & K. J. Sund (Eds.), *Measuring sustainability and CSR: From reporting to decision-making* (pp. 37–48). Springer International Publishing.

Feng, S., & Magee, C. L. (2020). Technological development of key domains in electric vehicles: Improvement rates, technology trajectories and key assignees. *Applied Energy*, *260*, 114264. [CrossRef]

Ferlie, E., Fitzgerald, L., McGivern, G., Dopson, S., & Bennet, C. (2011). Public policy networks and 'wicked problems': A nascent solution? *Public Administration (London)*, *89*(2), 307–324. [CrossRef]

Firth, J. K. (2022). Crisis caring: Chef foundations, branding, and responsibility in foodscapes. *Food, Culture, & Society*, *16*, 1–16.

Frank, P. F., & Shockley, G. E. (2016). A critical assessment of social entrepreneurship: Ostromian polycentricity and hayekian disbursed knowledge. *Nonprofit and Voluntary Sector Quarterly*, *45*(Suppl. S4), 61S–77S. [CrossRef]

Fraser, R. J. (2020). *Mission first, greyshirts always: An exploration into the reintegration experiences of short-term volunteers following disaster response operations* [ProQuest Dissertations and Theses]. University of Delaware. Available online: http://mutex.gmu.edu/login?url=https://www.proquest.com/dissertations-theses/mission-first-greyshirts-always-exploration-into/docview/2455588892/se-2?accountid=14541 (accessed on 8 January 2025).

Goodman, N. P., Lofthouse, J. K., & Novak, M. (2024). Militarized climate planning: What is left? *The Review of Austrian Economics*, Online first.

Greller, M. M. (2015). Leasehold: An institutional framework for understanding nonprofit governance in a civil society context. *Administrative Sciences*, *5*(3), 165–176. [CrossRef]

Grube, L. E., Haeffele-Balch, S., & Davies, E. G. (2017). *The organizational evolution of the American national red cross: An Austrian and Bloomington approach to organizational growth and expansion* (Vol. 22, pp. 89–105). Emerald Publishing Limited.

Grube, L. E., & Storr, V. H. (2014). The capacity for self-governance and post-disaster resiliency. *The Review of Austrian Economics*, *27*(3), 301–324. [CrossRef]

Grube, L. E., & Storr, V. H. (2018). Embedded entrepreneurs and post-disaster community recovery. *Entrepreneurship & Regional Development*, *30*(7–8), 800–821.

Haas, T., & Sander, H. (2020). Decarbonizing transport in the European union: Emission performance standards and the perspectives for a European green deal. *Sustainability*, *12*(20), 8381. [CrossRef]

Hamner, M. P. (2008). Organizational transformation: Impact of redesigning the American red cross disaster services human resource system. *Journal of Homeland Security and Emergency Management*, *5*(1), 28. [CrossRef]

Hayek, F. A. (1945). The use of knowledge in society. *The American Economic Review*, *35*(4), 519–530.

Hicks, T. D. (2014). *The salvation army's emergency disaster services and the ever-present tension of saving souls and saving lives* [ProQuest Dissertations and Theses]. Asbury Theological Seminary. Available online: http://mutex.gmu.edu/login?url=https://www.proquest.com/dissertations-theses/salvation-armys-emergency-disaster-services-ever/docview/1658782337/se-2?accountid=14541 (accessed on 8 January 2025).

Hoekstra, S., & Montz, B. (2017). Decisions under duress: Factors influencing emergency management decision making during superstorm sandy. *Natural Hazards (Dordrecht)*, *88*(1), 453–471. [CrossRef]

Hogarth, R. M. (2001). *Educating intuition*. University of Chicago Press.

Hogarth, R. M., Lejarraga, T., & Soyer, E. (2015). The two settings of kind and wicked learning environments. *Current Directions in Psychological Science: A Journal of the American Psychological Society*, *24*(5), 379–385. [CrossRef]

Holcombe, R. G. (2018). *Political capitalism: How economic and political power is made and maintained*. Cambridge University Press.

Horwitz, S. (2009). Wal-Mart to the rescue: Private enterprise's response to hurricane Katrina. *The Independent Review (Oakland, Calif.)*, *13*(4), 511–528.

Horwitz, S. (2010). Chapter 4: Making hurricane response more effective: Lessons from the private sector and the coast guard during Katrina. In *The political economy of hurricane Katrina and community rebound* (pp. 46–71). Edward Elgar Publishing.

Huang, Y., & Li, J. (2022). Key challenges for grid-scale lithium-ion battery energy storage. *Advanced Energy Materials*, *12*(48), 2202197. [CrossRef]

Ikeda, S. (2005). The dynamics of interventionism. *Advances in Austrian Economics*, *8*, 21–57.

Incite. (2017). *The revolution will not be funded*. Duke University Press.

Jaskyte Bahr, K. (2019). An exploratory study of types of innovation in US foundations. *Administrative Sciences*, *9*(4), 93. [CrossRef]

Jellets, J. (2008). Enduring Katrina: A firsthand look at the salvation army's disaster relief efforts. *Weatherwise*, *61*(5), 14–19. [CrossRef]

Johnson, T., & Joshi, A. (2018). Review of vehicle engine efficiency and emissions. *SAE International Journal of Engines*, *11*(6), 1307–1330. [CrossRef]

Jordan, A. J., Huitema, D., Van Asselt, H., & Forster, J. (Eds.). (2018). *Governing climate change: Polycentricity in action*. Cambridge University Press.

Joshi, J. (2021). Do renewable portfolio standards increase renewable energy capacity? Evidence from the United States. *Journal of Environmental Management*, *287*, 112261. [CrossRef] [PubMed]

Kaniadakis, A., Hayakawa, C., & Farmaki, A. (2022). Airbnb host responsibilities and community resilience: The case of Japan. In *Peer-to-peer accommodation and community resilience implications for sustainable development* (pp. 30–39). CABI.

Kirzner, I. M. (1997). Entrepreneurial discovery and the competitive market process: An Austrian approach. *Journal of Economic Literature*, *35*(1), 60–85.

Kirzner, I. M. (2018). *Competition, economic planning, and the knowledge problem*. Liberty Fund.

Klein, S. (2020). *A good war: Mobilizing Canada for the climate emergency*. ECW Press.

Knapp, H. (2020). Managing an administrative emergency: Establishing FEMA as an independent agency. *Colorado Natural Resources, Energy & Environmental Law Review*, *31*(1), 231–264.

Lavoie, D. (2016). *National economic planning: What is left?* Mercatus Center at George Mason University.

Leitão, J., & Capucho, J. (2021). Institutional, economic, and socio-economic determinants of the entrepreneurial activity of nations. *Administrative Sciences*, *11*(1), 26. [CrossRef]

LePore, A. (2020). The role of the local emergency manager in a centralized system of disaster management. In *Government responses to crisis* (pp. 45–59). Palgrave Macmillan.

Light, P. C. (2006). Searching for social entrepreneurs: Who they might be, where they might be found, what they do. In R. Mosher-Williams (Ed.), *Research on social entrepreneurship: Understanding and contributing to an emerging field* (pp. 13–38). Association for Research on Nonprofit Organizations and Voluntary Action.

Linnenluecke, M. K., & McKnight, B. (2017). Community resilience to natural disasters: The role of disaster entrepreneurship. *Journal of Enterprising Communities: People and Places in the Global Economy*, *11*(1), 166–185. [CrossRef]

Lofthouse, J. K., & Herzberg, R. Q. (2023). The continuing case for a polycentric approach for coping with climate change. *Sustainability*, *15*(4), 3770. [CrossRef]

Lönngren, J., & van Poeck, K. (2021). Wicked problems: A mapping review of the literature. *International Journal of Sustainable Development & World Ecology*, *28*(6), 481–502.

Luke, T. W. (2024). The environmental defense fund: Fighting the system by guarding the lifeworld as a defensively funded environment. *New Political Science*, *46*(1), 61–80. [CrossRef]

Lv, J., An, T., Tan, X., & Zou, Q. (2021). How to alleviate rent-seeking behaviour in performance appraisal of government-paid PPP projects? Tripartite evolutionary game approach. *Discrete Dynamics in Nature and Society*, *2021*, 5266167. [CrossRef]

MacNabb, E., & Fletcher, B. J. (2019). Chapter 5—Hurricanes, disasters, and food insecurity: The intersection of two social events. In F. I. Rivera (Ed.), *Emerging voices in natural hazards research* (pp. 121–144). Butterworth-Heinemann.

Malm, A. (2020). *Corona, climate, chronic emergency: War communism in the twenty-first century*. Verso Books.

Mangai, M. S., Pillay, A. C., Masiya, T., & Lubinga, S. (2023). The police and citizens as co-producers of crime prevention in Johannesburg. *Administrative Sciences*, *13*(6), 138. [CrossRef]

Mathias, J., Burns, D. D., Piekalkiewicz, E., Choi, J., & Feliciano, G. (2022). Roles of nonprofits in disaster response and recovery: Adaptations to shifting disaster patterns in the context of climate change. *Natural Hazards Review*, *23*(3), 04022011. [CrossRef]

Matos, C. R., Silva, P. P., & Carneiro, J. F. (2022). Overview of compressed air energy storage projects and regulatory framework for energy storage. *Journal of Energy Storage*, *55*, 105862. [CrossRef]

Mazzucato, M. (2013). *The entrepreneurial state: Debunking public vs. private sector myths*. Penguin Books.

Mazzucato, M. (2018). Mission-oriented innovation policies: Challenges and opportunities. *Industrial and corporate Change*, *27*(5), 803–815. [CrossRef]

Mccarthy, P. D. (2012). Climate change adaptation for people and nature: A case study from the U.S. southwest. *Advances in Climate Change Research*, *3*(1), 22–37. [CrossRef]

McCloskey, D. N. (2010). *Bourgeois dignity: Why economics can't explain the modern world*. University of Chicago Press.

McCloskey, D. N. (2016). *Bourgeois equality: How ideas, not capital or institutions, enriched the world*. The University of Chicago Press.

McGinnis, M. D. (Ed.). (1999a). *Polycentric governance and development: Readings from the workshop in political theory and policy analysis*. University of Michigan Press.

McGinnis, M. D. (Ed.). (1999b). *Polycentricity and local public economies: Readings from the workshop in political theory and policy analysis*. University of Michigan Press.

McGinnis, M. D. (Ed.). (2000). *Polycentric games and institutions: Readings from the workshop in political theory and policy analysis*. University of Michigan Press.

Morgan, K. (2021). The economic and efficiency benefits of expanding the Sec. 25D investment tax credit. *Tennessee Law Review*, *88*(3), 615–648.

Moulaert, F., MacCallum, D., Mehmood, A., & Hamdouch, A. (2013). *The international handbook on social innovation: Collective action, social learning and transdisciplinary research*. Edward Elgar.

Mulyani, S. (2021). Critical success factors in public-private partnership. *Journal of Accounting Auditing and Business*, *4*(1), 81–86. [CrossRef]

Nordhaus, W. D. (2006). Paul samuelson and global public goods: A commemorative essay for paul samuelson. In M. Szenberg, L. Ramrattan, & A. A. Gottesman (Eds.), *Samuelsonian economics and the twenty-first century*. Oxford University Press.

North, D. C. (1990). *Institutions, institutional change, and economic performance*. Cambridge University Press.

Novak, M. (2021). *Freedom in contention: Social movements and liberal political economy*. Lexington Books.

Oates, W. E. (2011). *Fiscal federalism*. Edward Elgar.

Olson, M. (1965). *The logic of collective action: Public goods and the theory of groups*. Harvard University Press.

O'Regan, K. M., & Oster, S. M. (2000). Nonprofit and for-profit partnerships: Rationale and challenges of cross-sector contracting. *Nonprofit and Voluntary Sector Quarterly*, *29*(Suppl. S1), 120–140. [CrossRef]

Ostojić, I., Petrović, P., & Kelić, V. (2024). Blended finance as a sustainable development support mechanism. In *Legal insights into environmental sustainability* (pp. 170–194). Institute of Social Sciences.

Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge University Press.

Ostrom, E. (2005). *Understanding institutional diversity*. Princeton University Press.

Ostrom, E. (2007). A diagnostic approach for going beyond panaceas. *Proceedings of the National Academy of Sciences*, *104*(39), 15181–15187. [CrossRef]

Ostrom, E. (2012). Nested externalities and polycentric institutions: Must we wait for global solutions to climate change before taking actions at other scales? *Economic Theory*, *49*(2), 353–369. [CrossRef]

Ostrom, E. (2014). A polycentric approach for coping with climate change. *Annals of Economics and Finance*, *15*(1), 97–134.

Ostrom, E., Parks, R. B., & Whitaker, G. P. (1978). *Patterns of metropolitan policing*. Ballinger Publishing Company.

Pierre, J. K., & Stephenson, G. S. (2008). After Katrina: A critical look at FEMA's failure to provide housing for victims of natural disasters. *Louisiana Law Review*, *68*(2), 443–496.

Rhode, P. W., & Strumpf, K. S. (2003). Assessing the importance of Tiebout sorting: Local heterogeneity from 1850 to 1990. *The American Economic Review*, *93*(5), 1648–1677. [CrossRef]

Rittel, H. W. J., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy Sciences*, *4*(2), 155–169. [CrossRef]

Roberts, P. C. (1969). The polycentric soviet economy. *The Journal of Law & Economics*, *12*(1), 163–179.

Rode, J., Pinzon, A., Stabile, M. C. C., Pirker, J., Bauch, S., Iribarrem, A., Sammon, P., Llerena, C. A., Alves, L. M., Orihuela, C. E., & Wittmer, H. (2019). Why 'blended finance' could help transitions to sustainable landscapes: Lessons from the unlocking forest finance project. *Ecosystem Services*, *37*, 100917. [CrossRef]

Roelfsema, M., van Soest, H. L., Harmsen, M., van Vuuren, D. P., Bertram, C., den Elzen, M., Höhne, N., Iacobuta, G., Krey, V., Kriegler, E., Luderer, G., Riahi, K., Ueckerdt, F., Després, J., Drouet, L., Emmerling, J., Frank, S., Fricko, O., Gidden, M., . . . Vishwanathan, S. S. (2020). Taking stock of national climate policies to evaluate implementation of the paris agreement. *Nature Communications*, *11*(1), 2096. [CrossRef]

Rosati, J. D., Touzinsky, K. F., & Lillycrop, W. J. (2015). Quantifying coastal system resilience for the US army corps of engineers. *Environment Systems and Decisions*, *35*(2), 196–208. [CrossRef]

Rybnicek, R., Plakolm, J., & Baumgartner, L. (2020). Risks in public–private partnerships: A systematic literature review of risk factors, their impact and risk mitigation strategies. *Public Performance & Management Review*, *43*(5), 1174–1208.

Schomaker, R. M. (2020). Conceptualizing corruption in public private partnerships. *Public Organization Review*, *20*(4), 807–820. [CrossRef]

Seddighi, H., & Baharmand, H. (2020). Exploring the role of the sharing economy in disasters management. *Technology in Society*, *63*, 101363. [CrossRef]

Simo, G., & Bies, A. L. (2007). The role of nonprofits in disaster response: An expanded model of cross-sector collaboration. *Public Administration Review*, *67*(Suppl. S1), 125–142. [CrossRef]

Skaburskis, A. (2008). The origin of 'wicked problems'. *Planning Theory & Practice*, *9*(2), 277–280.

Smith, A. C., & Yandle, B. (2014). *Bootleggers and baptists: How economics forces and moral persuasion interact to shape regulatory politics*. Cate Institute.

Smith, S. L., & Grove, C. J. (2017). Bittersweet and paradoxical: Disaster response volunteering with the american red cross. *Nonprofit Management & Leadership*, *27*(3), 353–369.

Sterner, T. (2020). The carbon tax in Sweden. In *Standing up for a sustainable world* (pp. 59–67). Edward Elgar Publishing.

Stopps, H., & Touchie, M. F. (2021). Residential smart thermostat use: An exploration of thermostat programming, environmental attitudes, and the influence of smart controls on energy savings. *Energy and Buildings*, *238*, 110834. [CrossRef]

Storr, V. H., & Haeffele-Balch, S. (2012). Post-disaster community recovery in heterogeneous, loosely connected communities. *Review of Social Economy*, *70*(3), 295–314. [CrossRef]

Storr, V. H., Haeffele-Balch, S., & Grube, L. E. (2015). *Community revival in the wake of disaster: Lessons in local entrepreneurship*. Palgrave Macmillan.

Taylor, K. (2015). Learning from the co-operative institutional model: How to enhance organizational robustness of third sector organizations with more pluralistic forms of governance. *Administrative Sciences*, *5*(3), 148–164. [CrossRef]

Thierer, A. (2020). *Evasive entrepreneurs and the future of governance: How innovation improves economies and governments*. Cato Institute.

Tiebout, C. M. (1956). A pure theory of local expenditures. *Journal of Political Economy*, *64*(5), 416–424. [CrossRef]

Van Eijk, C., Van der Vlegel-Brouwer, W., & Bussemaker, J. (2023). Healthy and happy citizens: The opportunities and challenges of co-producing citizens' health and well-being in vulnerable neighborhoods. *Administrative Sciences*, *13*(2), 46. [CrossRef]

Waite, M. (2018). *A year in review and what's ahead for our climate finance strategy*. William and Flora Hewlett Foundation. Available online: https://hewlett.org/a-year-in-review-and-whats-ahead-for-our-climate-finance-strategy/ (accessed on 8 January 2025).

Waite, M. (2020). *Blending philanthropic, public and private capital to finance climate infrastructure in emerging economies*. William and Flora Hewlett Foundation. Available online: https://hewlett.org/blending-philanthropic-public-and-private-capital-to-finance-climate-infrastructure-in-emerging-economies/ (accessed on 8 January 2025).

Wang, Y., & Miao, Q. (2021). The impact of the corporate average fuel economy standards on technological changes in automobile fuel efficiency. *Resource and Energy Economics*, *63*, 101211. [CrossRef]

Warsen, R., Greve, C., Klijn, E. H., Koppenjan, J. F. M., & Siemiatycki, M. (2020). How do professionals perceive the governance of public–private partnerships? evidence from Canada, The Netherlands and Denmark. *Public Administration (London)*, *98*(1), 124–139. [CrossRef]

Williams, B. D. (2023). The role of the emergency manager in disaster and homeland security: Navigating the challenges of intergovernmental relationships through networks. In *The distributed functions of emergency management and homeland security* (pp. 11–25). CRC Press.

Winter, J. (2020). Carbon pricing in a federal state: The case of Canada. *Ifo DICE Report*, *18*(1), 13–19.

Witesman, E. M., & Fernandez, S. (2013). Government contracts with private organizations: Are there differences between nonprofits and for-profits? *Nonprofit and Voluntary Sector Quarterly*, *42*(4), 689–715. [CrossRef]

Zheng, H., Song, M., & Shen, Z. (2021). The evolution of renewable energy and its impact on carbon reduction in China. *Energy*, *237*, 121639. [CrossRef]