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Essays on Environmental Protection and Democracy

A dissertation submitted in partial satisfaction of the
requirements for the degree Doctor of Philosophy

in

Political Science

by

Austin James Beacham

Committee in charge:

Professor Christina J. Schneider, Chair
Professor Emilie M. Hafner-Burton
Professor Stephan Haggard
Professor David A. Lake
Professor Gordon C. McCord

2024

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University of California San Diego

2024

EPIGRAPH

‘The best thing for being sad,’ said Merlin, beginning to puff and blow, ‘is to learn something. That’s the only thing that never fails. You may grow old and trembling in your anatomies, you may lie awake at night listening to the disorder of your veins, you may miss your only love, you may see the world about you devastated by evil lunatics, or know your honour trampled in the sewers of baser minds. There is only one thing for it then — to learn. Learn why the world wags and what wags it. That is the only thing which the mind can never exhaust, never alienate, never be tortured by, never fear or distrust, and never dream of regretting. Learning is the only thing for you. Look what a lot of things there are to learn.’

T.H. WHITE, *The Once and Future King*

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Chapter 1, in part, has been submitted for publication of the material. The dissertation author was the sole author of this material.

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Chapter 3 is co-authored with Hafner-Burton, Emilie M. and Schneider, Christina J. It is, in part, currently being prepared for submission for publication of the material. The dissertation author was the primary investigator and author of this material.

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ABSTRACT OF THE DISSERTATION

Essays on Environmental Protection and Democracy

by

Austin James Beacham

Doctor of Philosophy in Political Science

University of California San Diego, 2024

Professor Christina J. Schneider, Chair

The world is in the midst of upheaval resulting from existing institutions and power structures struggling to deal with new phenomena. In this dissertation, I examine how institutions and interests interact in the face of powerful environmental and technological changes.

The first project is an exploration of the relationship between natural resource dependence and environmental protection. I argue that because resource dependence causes environmental degradation, it can lead to political mobilization that results in greater protection. In democracies pro-protection pressures are more likely to influence policy, so adverse effects of resource dependence mainly apply to less democratic countries where extractive interests are more able to steer policymaking. To test this argument, I employ a novel panel regression discontinuity design

at all terrestrial country-border pairs from 1992—2020, using geospatial data on protected area designation. I find that the effect of natural resource dependence on protected areas is conditional on democratic institutions.

The second project examines the effectiveness of international agreements in the face of biodiversity loss. The literature is mixed on whether international agreements are effective at producing domestic policy change, but there can be wide subnational variation in both policy changes and the strength of countervailing pressures. I apply this framework to protected areas. Using an original geospatial dataset on 846 ecoregions worldwide from 1992—2020, I find that when a democracy becomes more deeply embedded in the international environmental regime, it is more likely to protect more land. However, local economic pressures exert downward influence on protection.

The third project turns to technological change, focusing on the rise of the internet. My co-authors and I argue that the spread of the internet has contributed to recent trends in democratic backsliding, especially through its effect on political polarization. We test the empirical implications of our theory with a mixed-methods approach that combines a large-n quantitative comparative analysis of democratic backsliding in 97 democracies with a typical case study to trace the underlying causal mechanisms of the theory. Together, the findings indicate that with growing access to the internet has come increased likelihood of democratic backsliding.

Chapter 1

Extraction, Green Mobilization, and Conservation: Natural Resource Dependence and Protected Area Designation

Abstract
Biodiversity decline and ecosystem loss are among the gravest transnational crises facing the planet, with important implications for climate change. What determines how different countries choose to protect nature? Previous work has argued that economic dependence on natural resources undermines green policies. I argue that because resource dependence causes environmental degradation, it can lead to political mobilization that results in greater protection. Although mobilization occurs across regimes, in democracies pro-protection pressures are more likely to influence policy, helping to stem biodiversity loss. The adverse effects of resource dependence mainly apply to less democratic countries where extractive interests are more able to steer policymaking. To test this argument, I employ a novel panel regression discontinuity design at all terrestrial country-border pairs from 1992 to 2020, using geospatial data on protected area designation. I find that the effect of natural resource dependence on protected areas is conditional on democratic institutions.

1.1 Introduction

The world has experienced tremendous environmental degradation in recent decades, including unprecedented loss of species and ecosystems (Ceballos, P. R. Ehrlich, and Raven 2020). The global extinction rate is currently one hundred to one thousand times that expected

under normal ecological conditions (Ceballos, P. R. Ehrlich, Barnosky, et al. 2015), and many of the remaining natural places on earth are under threat (WWF 2022). Intact nature provides countless services to humanity, including fresh water, flood protection, carbon sequestration, medicines, and other resources (Sala 2020). There are also ethical reasons to slow the loss of intact natural ecosystems. Along with climate change, biodiversity loss is one of the greatest transnational threats the international community faces. In response, governments have created protected areas (PAs), which are locations set aside for the long-term conservation of nature. The total area of land-based PAs has grown steadily over the last several decades, now sitting at almost 17 percent of earth's land. While this growth is impressive, different countries have established PAs at widely differing rates.

What determines how and when different countries choose to protect natural ecosystems? Decisions over land use, such as establishing a PA, are deeply political because they create winners and losers at the local and global levels. Research that has focused on factors that incentivize governments to protect land has established two key findings. First, while the relationship between democracy and green policies is complicated, democracies tend to establish more PAs (Kashwan 2017; Midlarsky 1998; Neumayer 2002a). Second, for both green policies generally and PAs specifically, scholars have argued that the influence of "brown," or natural-resource-reliant, interests is usually detrimental for environmental outcomes (Aklin and Mildenberger 2020; Alger 2023; Boyce 1994; Cooper, Kim, and Urpelainen 2018; Mangonnet, Kopas, and Urpelainen 2022; Mildenberger 2020; Sanford 2023).

My work builds on these findings by examining how the relationship between resource dependence and protection interacts with institutions. Previous findings lead to the conclusion that natural resource dependence (NRD) decreases the amount of land that a country protects,[1] because the government and interest groups wish to leave land open for exploitation. I instead

[1] I will use NRD to mean both "natural resource dependence" and "natural resource dependent." By natural resources, I mean materials or substances like minerals, forest, water, and fertile land that occur in nature and can be used for economic gain. I include agriculture in this definition because although it is a productive activity, it entails extraction of minerals and use of other resources in ways that can deplete the land. It also almost always entails the destruction of more biodiverse ecosystems in order to establish farms.

argue that resource dependence can create conditions that cause domestic and international mobilization in favor of protection. Citizens experience the negative consequences of environmental degradation and ecosystem loss, and concerned domestic advocacy groups and international actors take notice. These "green" interests mobilize and push for protection in response to environmental threats. Although mobilization occurs across different political contexts, in democracies they can more effectively advocate for protection. While extractive groups have the capacity to lobby and exert influence, they are more likely to be countered by environmental interests than in non-democracies. The adverse effects of resource dependence on protection, therefore, mainly apply to less democratic countries where extractive interests are most able to steer policymaking, and mobilization efforts are less likely to succeed.

To test this argument, I use a novel two-step panel regression discontinuity design. Research has made clear that underlying geography is critical in explaining how different places are protected (Adams 2004; Joppa and Pfaff 2009; Venter, Fuller, et al. 2014; Venter, Magrach, et al. 2018). This means that testing my argument in a standard cross-national regression would introduce serious confounders, because countries have different geographic characteristics that explain much of the variation in PA extent. I account for geography by comparing PA extent across national borders, where geography is more similar than across countries as a whole. I employ geographic regression discontinuities at each terrestrial country border in each year from 1992 to 2020, leveraging geospatial data on over 280,000 PAs to measure protection of more than 2.2 million 100 square kilometer grid cells. This design allows me to test for the causal impact of being on one side of the border versus the other on PA designation. It accounts for the characteristics of land that make it inherently more or less likely to be protected. In the second step, I use the treatment effects from the regression discontinuities as the dependent variable in a dyadic panel regression model, explaining differences in PA extent across neighboring countries using differences in political-economic variables like democracy and resourcce dependence. This design provides a better-identified test of the theory than a standard cross-national design.

My findings support the theoretical argument: The effect of resource dependence is

contingent on democracy. When democratic institutions are weaker, natural resource dependence is associated with less protection. When democratic institutions are stronger, natural resource dependence is associated with more protection. I validate these findings using a number of robustness checks in both parts of the research design. I also provide descriptive evidence of degradation leading to mobilization at the local, national, and international levels, and a case study of Costa Rica to demonstrate the mechanisms.

The findings provide new insight into the politics of PAs, a critical part of environmental policy that has been understudied in political science.[2] They show that the relationship between natural resource extraction and environmental protection is not as simple as we might expect. Extractive interests may be able to prevent PA designation in places they have the most interest, as previous work suggests. But my findings demonstrate that their activities may actually lead to more PAs, even if they are not optimally located for biodiversity conservation (Jung et al. 2021).

I also contribute to the debate on the relationship between democracy and the environment (Bättig and Bernauer 2009; Buitenzorgy and P. J. Mol 2011; Kashwan 2017; Mangonnet, Kopas, and Urpelainen 2022; Midlarsky 1998; Neumayer 2002a; Povitkina 2018; Povitkina and Jagers 2022; Sanford 2023). Recent literature has made it clear that democracy is not beneficial for the environment in all contexts and can sometimes be a negative. I apply this work to PAs and provide new insights by focusing on the conditional relationship between resource dependence and protection. I show that democracy and natural resource endowments interact in surprising ways and that PAs are another policy area where the democratic boost is not as straightforward as previously thought. Resource-dependent democracies protect more, but the overall effect of democracy diminishes under conditions of low resource dependence. Distributional bargaining within democracies can shift in favor of protection, but the threat of significant environmental degradation is often pivotal for this change to occur.

Finally, this paper is one of the first to employ rich global data on PAs to understand

[2]There are some exceptions that explore the politics of PAs and biodiversity (Alger 2023; Gibson 1999; Hawkins and Goodliffe 2023; Mangonnet, Kopas, and Urpelainen 2022; Ulloa 2023)

political determinants of PA designation. I leverage the geographic nature of PAs in a novel research design that allows me to better test for the impact of national political-economic dynamics.[3] This design could be used in other settings where localized variation near borders is impacted by broader factors (e.g. Burke, Heft-Neal, and Bendavid 2016). Areas with spatial data where cross-national variation is of interest to scholars could include immigration, health politics, and other environmental policy areas.

1.2 Biodiversity Decline, Resource Extraction, and Protected Areas

Biodiversity refers to diversity of life across three levels: genes, species, and ecosystems (Farnham 2007, p. 6). For much of history, most societal and economic development has directly led to biodiversity decline, as diverse places like forests and marshlands are converted to less diverse but more "valuable" alternatives like farms and mines (Swanson 1994).[4] According to the Living Planet Index, global populations of non-human or human-domesticated species have declined by approximately 70 percent since 1970 (see Figure 1.1). Many scientists believe we now live in a "10 percent world," in that only 10 percent of species and populations now exist that existed before humans (MacKinnon 2013).

The loss of biodiversity has profound consequences not just for the species and habitats that are destroyed, but also for humans. Biodiversity loss reduces the land's resilience to natural disasters and flooding, accelerates climate change through loss of carbon sinks, prevents future medical breakthroughs by reducing species and gene stocks, and risks collapse of agricultural food systems (Barnosky et al. 2011; Beattie and P. R. Ehrlich 2004; Duncanson et al. 2023; Sala 2020). If current trends continue, biodiversity loss threatens the foundations of the global economy and perhaps civilization itself (P. R. Ehrlich and A. H. Ehrlich 2013).

[3] To the best of my knowledge, only one other paper has employed a similar two-step regression discontinuity design, and the model was not geographic (Bernhardt and Wunnava 2020).

[4] The degree of decline varies across cultures and forms of development. However, evidence suggests that even the most nature-conscious cultures have reduced biodiversity in the long run (MacKinnon 2013).

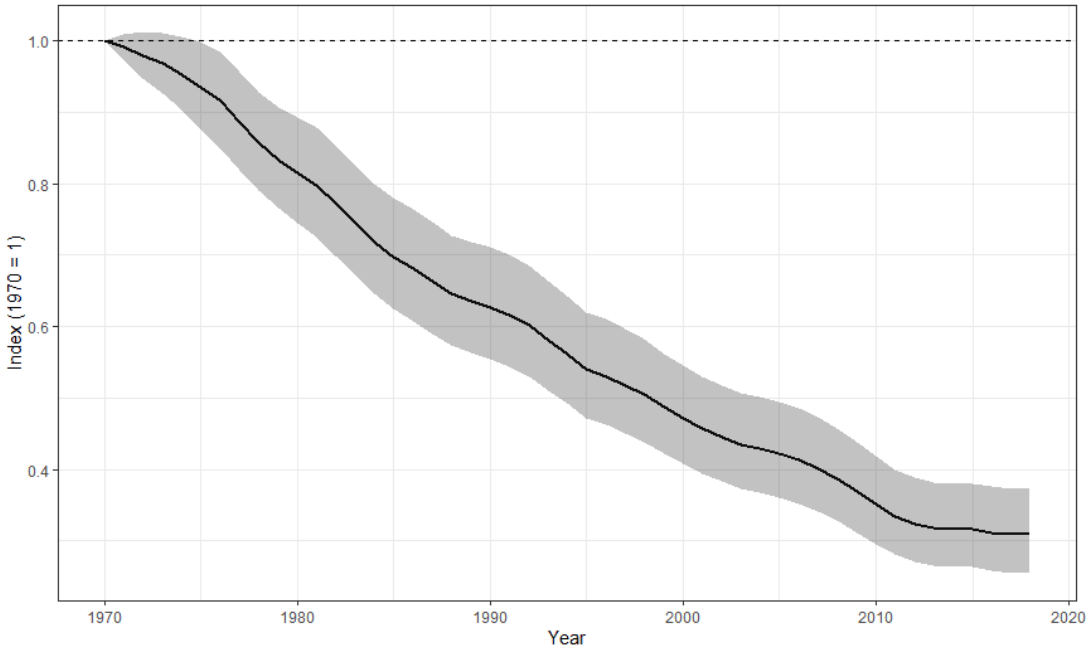


Figure 1.1. Living Planet Index Showing Biodiversity Loss 1970—2018. The Living Planet Index "tracks changes in the relative abundance of wild species populations over time...for tens of thousands of terrestrial, freshwater, and marine vertebrate populations" using 1970 as a baseline (WWF 2022, p. 32).

While no single policy can solve the crisis of biodiversity loss, PAs are one of the best solutions available (IUCN 2010). The National Parks system in the United States is perhaps the best known example of PAs, but their scale varies (see Figure 1.2). The level of protection depends on PA category and the country that creates the PA, but traditional economic development, such as clearing forests for agriculture, is generally limited or prohibited within PAs. This is one of the main ways that PAs can help preserve biodiversity by preventing habitat destruction, but they also reduce poaching and wildlife trafficking, in comparison to non-protected land. In sum, PAs have been shown to benefit biodiversity by reducing pressures (Geldmann, Manica, et al. 2019; C. L. Gray et al. 2016; Nepstad et al. 2006).[5] While a new global agreement increasing commitments to protect 30 percent of the world by 2030 was recently reached (Einhorn 2022),

[5]This is not to say that PAs do not have negative consequences. There is a robust debate about their negative effects on local populations, especially depending on the type of PA and level of consultation with local communities. For the purposes of this paper, I focus on the biodiversity benefits of PAs on average, rather than the significant variation in their effectiveness and equity.

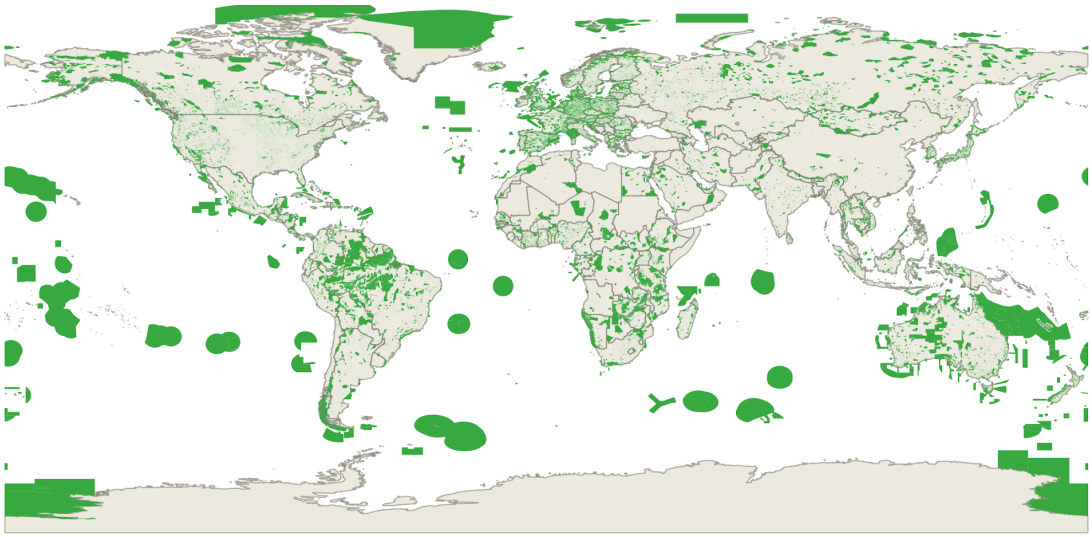


Figure 1.2. Global Protected Area Network as of December 2020. Data on PAs from Protected Planet (UNEP-WCMC and IUCN 2022).

there remain major differences in PA coverage across countries. What explains this variation?

1.3 Theory

The theory starts from the observation that "professions of concern and affection for the environment have been most powerful among the eras, nations, and people that have most successfully subjected and consumed it" (Peterson Del Mar 2006, p. 2). I build on this intuition by examining the relationship between democracy, natural resource dependence, and environmental protection through PAs. In resource-dependent countries, there are more brown interests pursuing extractive activities. Extraction activates local, national, and international green interests that advocate for protection. The environmental "threat" posed by resource dependence leads to greater salience of green interests and gives them more political capital, even though NRD also implies that brown interests are powerful. Green mobilization is both more likely to take place in democracies, because it is permitted, and more likely to influence policy outcomes, because democracies better represent diverse interests. In other words, NRD leads to more mobilization in more democratic countries, and that mobilization is more likely to be effective

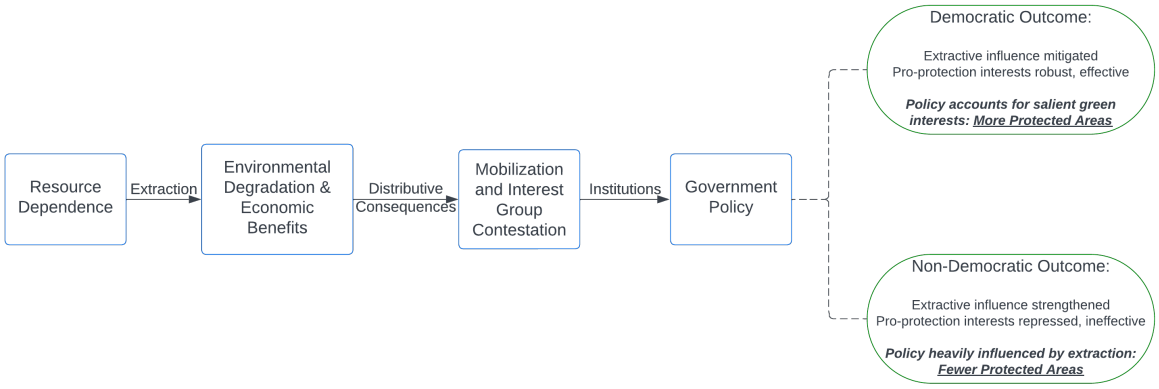


Figure 1.3. Relationship between Resource Dependence, Institutions, and PA Policy.

in more democratic countries.[6] PA policy is determined, in part, by the gross power of green interests, rather than net power between green and brown interests. Resource extraction generates more gross green power through mobilization. Figure 1.3 summarizes the theory.

There are two key mechanisms for my argument. First, higher dependence on natural resources must lead to more mobilization and advocacy for protection. Second, these pressures must be more effective in democracies. Before examining each of these mechanisms, I emphasize that NRD in a democracy does not mean that green interests always get the policy they want, or that extraction ends. It simply means that the net result of the distributive conflict over land can shift from the status quo in favor of protection. NRD combined with democracy provides more opportunities for the distributive conflict to result in protection rather than exploitation. It does mean that it always will.

1.3.1 Mechanism 1: NRD Leads to Mobilization

NRD tends to lead environmental degradation. That degradation activates concerned domestic and international green groups as well as the broader citizenry, who are able to connect degradation at home to broader global patterns of environmental destruction. Publics and green

[6]By "mobilization" both here and throughout, I do not mean only mass mobilization. The theory relies on increased activity on the part of green-minded citizens, domestic interest groups, and international actors. This could take the form of mass protest, and indeed sometimes does, but can also be through lobbying, elite influence, citizen persuasion, voting, or other channels.

groups are more likely to be concerned in the places that are most actively degrading.

Some people benefit from economic opportunities provided by extraction, but the average person is also likely to experience, or at least be aware of, negative consequences. For example, rubber tappers who sustainably use the Brazilian Amazon for their livelihoods suffer when the forest is clear-cut to make room for pastureland (Garcia-Navarro 2015). Research has also shown that living near a mine is associated with anemia and child growth stunting across 44 developing countries, because of toxic pollution (Goltz and Barnwal 2019). Even less obviously degrading activities, like agriculture, can result in serious negatives for the communities around them and the broader public: Modern farming practices lead to significant air pollution, which result in almost 18,000 deaths per year in the United States alone (Domingo et al. 2021).

People do not simply accept these negatives. Degradation results in mobilization by concerned citizens and interest groups who value environmental protection more highly than the benefits of resource extraction. To illustrate this point, consider the Timber Wars that took place in the Pacific Northwest of the United States in the 1980s and 1990s. The area is home to redwoods, the tallest trees in the world. The U.S. Forest Service permitted excessive logging, resulting in accelerating deforestation in old-growth forests. A protest movement erupted, with protesters blocking logging roads and living at the tops of marked trees for months. This movement demanding government action would not have occurred if extraction had not been actively taking place. Extraction led to mobilization.

Mobilization often concentrates in areas near environmental degradation where it is most salient. After all, "awareness of the existence of [environmental] problems is a condition for local political mobilization" (Gould 1993, p. 176). The more resource dependent a country, the more opportunities there are for localized mobilization to occur in response to degradation. Mobilization requires mobilizing agents (Cameron 1974), and these are more likely to be found where more degradation is taking place.

NRD also makes actors from across the country more likely to be concerned with degradation. Many of the protesters in the Timber Wars traveled across the country to join the

movement, eventually leading President Clinton to pass the Northwest Forest Plan (Johnson, Franklin, and Reeves 2023). Part of the reason for this national-level mobilization was the United State's historical reliance on the timber industry and its publicized dwindling supply of old-growth forest (Dietrich 2010; Rutkow 2013). In Indonesia, hundreds protested in the capital after the country's environment minister criticized global plans to end deforestation, even though these citizens lived far from their country's intact rainforests (Asprihanto 2021). Green-minded citizens and interest groups care about the fate of natural places and the prevention of environmental degradation across their country.[7] NRD countries experience more environmental degradation, and thus create more causes for concern.

Degradation also leads to mobilization from without. Deforestation of the Amazon increased dramatically under former Brazilian President Jair Bolsonaro, leading to massive wildfires. The global community, including international organizations and transnational non-governmental organizations put financial, normative, and political pressure on the Brazilian government to slow deforestation and take a more proactive approach to wildfire prevention and management (Genot 2020). Similar to country-wide mobilization, international actors invest more resources in places that are actively degrading their environments, since the issue is most pressing there. These actors work to shift public opinion (Dai 2005), directly lobby the government (Goes and Chapman 2024), coordinate with domestic groups (Abbott et al. 2015; Jessica F Green and Hadden 2021), and directly fund the creation of PAs (Adams 2004).

Since the modern environmental movement became relevant, people have been able to "link changes close to home with worldwide pressures" (Warde, Robin, and Sörlin 2018, p. 1). It is precisely in NRD countries where these changes are most prominent. This causes mobilization at the local, national, and international levels. Green interests are most active in NRD countries due to ongoing degradation.

[7] I am not claiming that all citizens or voters change their preferences in a systematic way. My claim is that NRD changes enough citizens' behavior and empowers enough interest groups to shift the equilibrium policy toward more protection.

1.3.2 Mechanism 2: Mobilization Is More Effective in Democracies

I further argue that mobilization and interest group contestation caused by degradation is more effective in more democratic countries, for three reasons. First, more democratic countries allow more mobilization and contestation in general. They are permissive of the types of protests and advocacy that pro-protection groups employ. More democratic countries have more robust civil societies across most issues, including environmental protection (Nur and Andersson 2016; Institute 2023). Recent research shows that interest group mobilization in autocratic regimes favors brown interests, because popular mobilization demanding environmental protection is more difficult in closed systems (Carlitz and Povitkina 2021).

Environmental degradation can lead people to want to demand protection across regime types, and sometimes they do. For example, in authoritarian Vietnam, there have been protests against several environmentally destructive policies (Bruun 2020, p. 176). However, mobilization is less likely overall because of the repressive tendencies of less democratic countries: Poulos and Haddad (2016) find that non-democracies are more likely to repress environmental protests violently. Citizens may have the same pro-protection desires across regimes, but they calculate that mobilization is not worth the risks in less democratic settings. After all, "movements tend to emerge and have a better chance of sustaining themselves and exerting influence when the configuration of institutional power is broadly receptive to their interests" (McAdam 2017, p. 195). These conditions are more likely to hold in countries with stronger democratic institutions.

Second, even if a less democratic country were to permit mobilization, it is unlikely to be effective compared to a more democratic country. Leaders in democratic countries must listen to the concerns of a broader portion of the citizenry to stay in power, whereas "autocracies... are less open to a variety of interests. Unlike in democracies, citizens concerned with environmental degradation in authoritarian regimes often lack opportunities to demand responses from their governments and hold them accountable if they fail to act" (Carlitz and Povitkina 2021, p. 2). While powerful brown interests are often part of the "winning coalition" in both democratic and

non-democratic settings, it is much more likely that pro-environmental movements and interest groups are also included in more democratic countries.

This dynamic also helps explain why pro-extraction mobilization is not as important in determining PA policy. The interests of the extractive groups are already being taken into account in most settings (albeit to differing levels), so increased mobilization on their part does not matter as much as increased mobilization on the pro-protection side. Their increased lobbying has a smaller marginal effect than increases on the green side, boosting the chance that the policy equilibrium shifts toward more protection (even if extractive activity still continues elsewhere or in a more limited form). The fact the country is resource dependent and experiencing degradation as a result means that their preferences were being met in the status quo.[8]

Last, more democratic countries are more susceptible to pressures from IOs and TNGOs. Many of the mechanisms for international pressure that the literature describes work through civil society (Dai 2005; Finnemore and Sikkink 1998; Mansfield, Milner, and Rosendorff 2002). It logically follows that pressure will be more effective in countries with more robust civil societies. Another school of mechanisms for international policy diffusion works through socialization and persuasion in international fora (Checkel 2001; Holmes 2011). If democracies engage in more international cooperation, as the literature has found,[9] they also have more opportunities to be persuaded and socialized in favor of PAs. In sum, I argue that (1) mobilization is more likely in more democratic countries, and (2) mobilization is more likely to be effective in more democratic countries. Putting the logics of the two mechanisms together, I propose the follow hypotheses:

Hypothesis 1 *In countries with weaker democratic institutions, resource dependence decreases the likelihood of establishing PAs.*

[8]Countermobilization does also matter, of course. The employment effects from extractive industries are important, especially when extraction is part of a regional identity, such as coal mining in the Appalachian region of the United States. However, my argument centers on the equilibrium outcome shifting toward more protection, rather than extractive interests not taking action or having no effect at all.

[9]See Mattes and Rodriguez (2014) for an overview of this literature.

Hypothesis 2 *In countries with stronger democratic institutions, resource dependence increases the likelihood of establishing PAs.*

It is true that research has shown that democracies often suffer from an environmental collective action problem, and sometimes fail to translate policy commitments into policy outputs (Bättig and Bernauer 2009; Tørstad, Sælen, and Bøyum 2020). However, while collective action problems may exist, there is still robust evidence that democracies have more active environmental civil societies. The theory rests on them having success at least some of the time, not on a lack of collective action difficulties. Second, protecting land through establishing a PA is, in effect, a policy commitment. It is a signal, albeit a costly one, that the land is intended to be protected. The degree to which that protection is fully enforced would be a policy "output," and measuring that is beyond the scope of this paper.[10] Lastly, readers may be concerned that resource endowments and regime type are endogenous, because of the "resource curse." I address this concern in the Robustness Checks section by excluding natural resources that are typically associated with the resource curse.

1.4 Research Design

To test my theory, I employ a novel two-step research design. I use differences in PA extents across country borders as the dependent variable and differences in political institutions and economic structures between countries as the independent variables. To construct the dependent variable, I perform geographic regression discontinuities at country borders each year from 1992—2020, measuring the causal effect of land being on one side of the border versus the other on PA establishment. In a second step, I use the estimated differences in protection as the dependent variable, explaining them with political-economic differences across countries.

[10] I take steps in the Robustness Checks to build confidence that my design compares "like units." Additionally, systematic global evidence confirms that PAs do improve environmental outcomes on average, although there is heterogeneity across management regimes and countries (Andam et al. 2008; Geldmann, Manica, et al. 2019; Geldmann, Barnes, et al. 2013; C. L. Gray et al. 2016; Leverington et al. 2010).

Leveraging country borders has two main advantages. First, the design uses the geographic nature of PAs to allow for inference on political-economic dynamics in the second step. The design allows me to measure the associations of differences in political-economic structures in countries with causal differences in protection, something that is very difficult to do in most research designs. The main assumption is that land is "as if equal" on covariates on either side of the border. There are certainly examples of country borders where this does not seem to be the case, such as the Himalayas forming the border between China and Nepal, or the Atacama Desert in Chile near lush forests to its east. The primary intuition, though, is that even borders where this is the case have quite similar natural features immediately near the border. If the border dissects a mountain range, as with China and Nepal, the land immediately proximate to the border (say, within 10 kilometers, which is the smallest bandwidth used in the regression discontinuity) is still similar — much of it is in the mountains.[11] I also take empirical steps to ensure these cases do not threaten inference. Robustness checks include covariate balancing, varying RD bandwidth, weighting borders by straightness, and dropping border pairs that are not plausibly exogenous.

A second, related benefit of the design is that a common explanation outside of the political science literature for where PAs are designated is simple underlying geography: PAs are often created where there are few accessible resources, where they will benefit ecotourism, or to protect biodiversity hotspots or natural monuments (Adams 2004; Joppa and Pfaff 2009; Venter, Magrach, et al. 2018). Since I focus on areas close to country borders, the design accounts for heterogeneity across national geographies that make land more or less likely to be protected. Land on either side of a border is more similar than land across the entirety of neighboring countries, meaning that geographic characteristics that affect likelihood of protection, such as high biodiversity or economic value, are also more similar. Therefore, differences in protection likely stem from differences in political priorities across the two countries. Figure 1.4 below

[11] In fact, China and Nepal illustrate the theory well. Nepal is resource dependent but relatively democratic compared to China, and it protects much more of the land near its border.

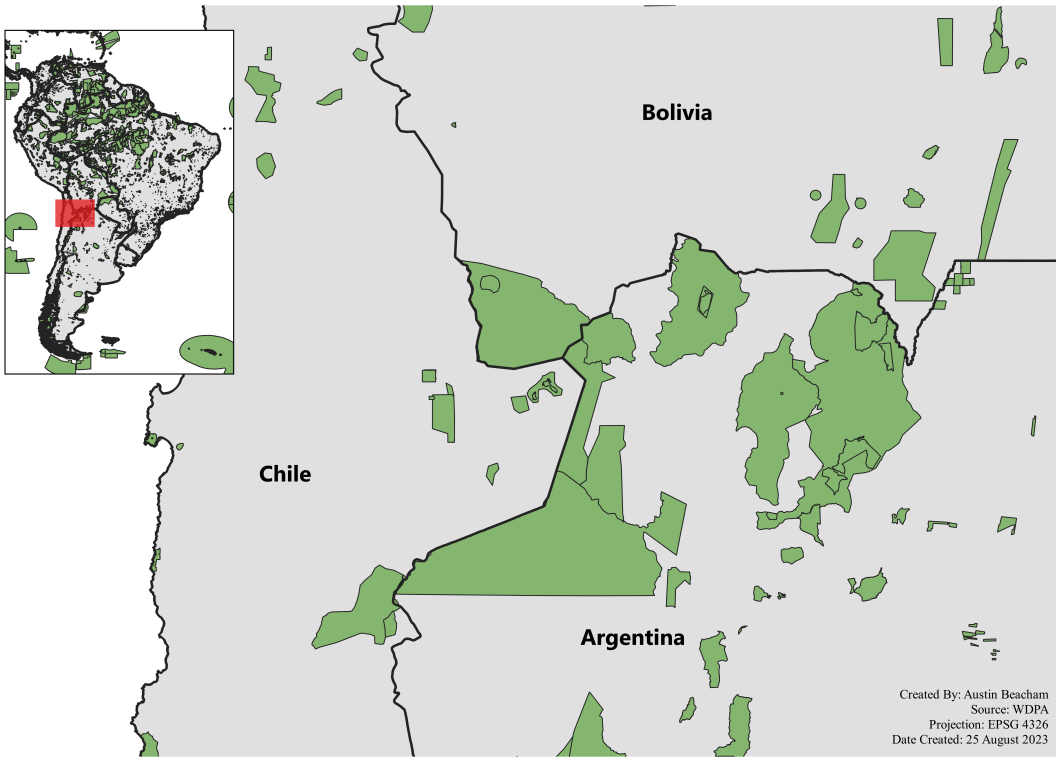


Figure 1.4. Argentina, Bolivia, Chile Border Area with 2020 Protected Areas. Data sources are WDPA and GADM.

shows an example of differing protection across borders in the Chile, Bolivia, and Argentina tri-border area. The entire area is comprised of dry grass and shrublands known as puna. Bolivia and Argentina both had significant protection in 2020, but Chile did not. My design leverages these sorts of differences in protection across similar geographies and ecosystems.

1.4.1 Regression Discontinuity Sample and Dependent Variable

The regression discontinuity data is comprised of a global grid of 100 square kilometer terrestrial cells. The proportion of each cell that is covered by a PA is then measured in each year from 1992—2020, resulting in a dataset at the grid cell-year unit of analysis. The dependent variable is the proportion of a grid cell's area covered by a PA. Spatial data on PAs come from the World Database on Protected Areas (WDPA), a comprehensive database from the UN Environmental Programme (UNEP) and the International Union for the Conservation of Nature

(IUCN). To identify variation in the dependent variable over time, I created subsets of the WDPA for PAs established during or before each year from 1992 to 2020, resulting in 28 spatial datasets of PA locations.[12] Each year's global PA network was then overlaid with the global grid and each grid cell's coverage was calculated. Figure 1.5 gives an example of what the grid cells and PAs look like in Indonesia and Papua New Guinea.

Using a grid cell unit of analysis may raise concerns about spatial autocorrelation: A grid cell's likelihood of being protected is partially a function of its neighbors' protection. This is not a major concern for my design for two reasons. First, the most common way of dealing with spatial autocorrelation is to correct for inference in the standard errors (such as through Conley standard errors). However, the nature of my design means I only extract average treatment effect point estimates from the regression discontinuities, meaning the standard errors are not biasing or attenuating the second step (see below). Second, the type of spatial regression discontinuity design that I implement is actually in and of itself a solution to problems of spatial autocorrelation; it was designed in part to correct of this issue (L. J. Keele and Titiunik 2015; Lehner 2024a).[13]

1.4.2 Regression Discontinuity Running and Treatment Variables

The running variables for the RDD are the geographic coordinates for each grid cell in a country, which are used to calculate distance to each unique border a that country has. The "treatment" is simply a binary indicator if a grid cell is on one side of the border or another.

[12] A limitation of the data is that it only includes PAs that currently exist, meaning any PAs that have ever been degazetted are not included. However, degazetting is relatively rare and there is no alternative dataset that does not have this limitation.

[13] This is not true of "naive" geographic regression discontinuities (see footnote 15). To further ameliorate concerns with spatial autocorrelation derived from the choice of grid cell size, I also re-run the analysis using 400 square kilometer and 900 square kilometer grid cells (see Table A.1). Results are robust to these alternative grid cell sizes.

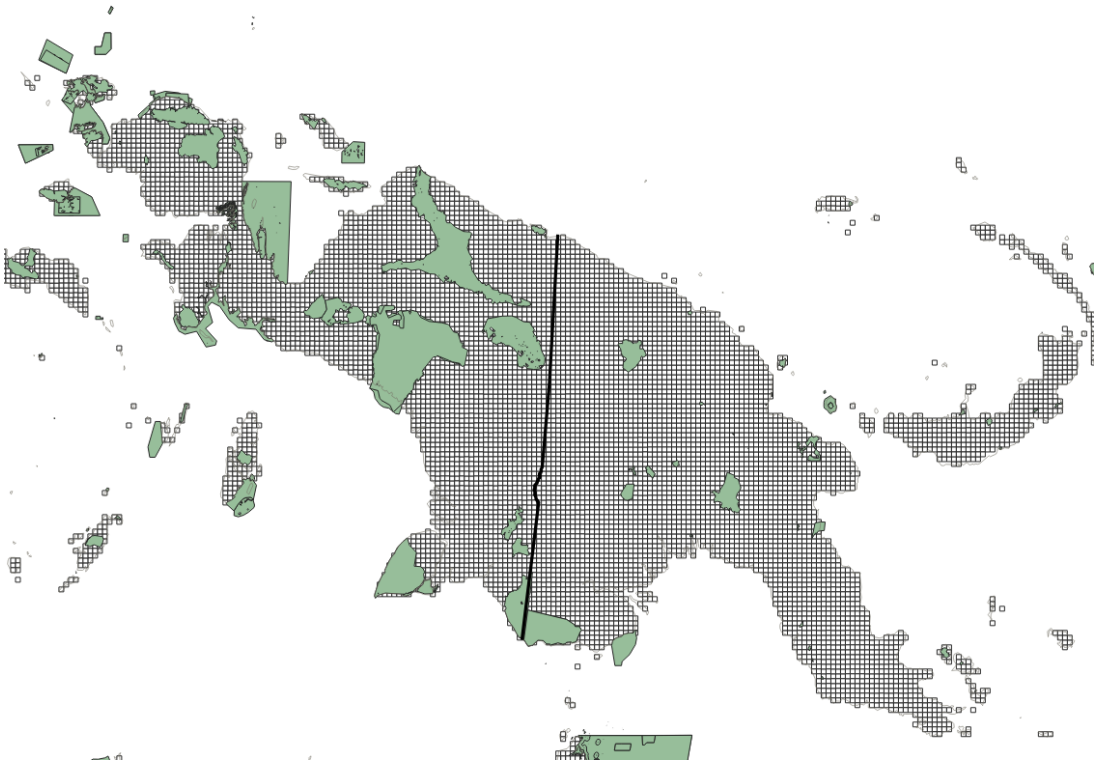


Figure 1.5. Indonesia and Papua New Guinea with 100 sq km grid cells and 2012 PA networks. Data source is WDPA. International border in dark black. Indonesia has more PAs both overall and near the border.

1.4.3 Regression Discontinuity Estimation

At each border pair and for each year, I estimate a Geographic Regression Discontinuity (GRD) design, using the "SpatialRDD" R package (Lehner 2024b) and drawing from Keele and Titiunik (2015). GRDs implement a nonparametric procedure that does not assume the functional form of geographic location. The design creates a pre-determined amount of "boundary points" along the border (in this case fifty, although results are robust to other choices), then fits separate spatially-weighted local linear regression discontinuities for each of the points. I then take the mean of each of these fifty treatment effects to arrive at the average treatment effect for the border.[14] By calculating treatment effects at each of the points, GRDs better account for the multidimensional nature of geography by comparing units that are both close to the border and at a similar place in geographic space. In other words, the design estimates the causal effect of a grid cell being close to the border in Country A compared to a nearby grid cell in Country B. Positive treatment effects mean that there is more predicted protection in A than in B. I use a 150 kilometer bandwidth on either side of the boundary in the main model, to balance between including more data and ensuring that geography is still similar across the treatment and control areas.[15] Repeating the RD exercise on each of the 314 terrestrial border pairs and for each year between 1992—2020 results in 8792 separate regression coefficients. Differences in the average treatment effect from year to year come from PA establishment in one of the countries, so the design measures changes in the PA network through PA establishment, even though it is directly measuring area.

To help make the design clearer, I present an example of the results from a single GRD below in Figure 1.6. Figure 1.6 shows the regression result for each boundary point between

[14] I do not present an estimation equation here due to space constraints and the complex, multi-step nature of the procedure, but see Keele and Titiunik (2015) for a detailed discussion and https://axlehner.github.io/SpatialRDD/articles/spatialrdd_vignette.html for an example of implementation in R (accessed 18 March 2024).

[15] Results are robust to smaller bandwidths of thiry and ten kilometers. A more common version of spatial regression discontinuities uses simple Euclidean distance as the forcing variable. This design has issues, but I include both linear and quadratic regression discontinuities using "naive distance" as robustness checks, with Imbens and Kalyanaraman (2012) optimal, 25, 50, 75, and 100 kilometer bandwidths.

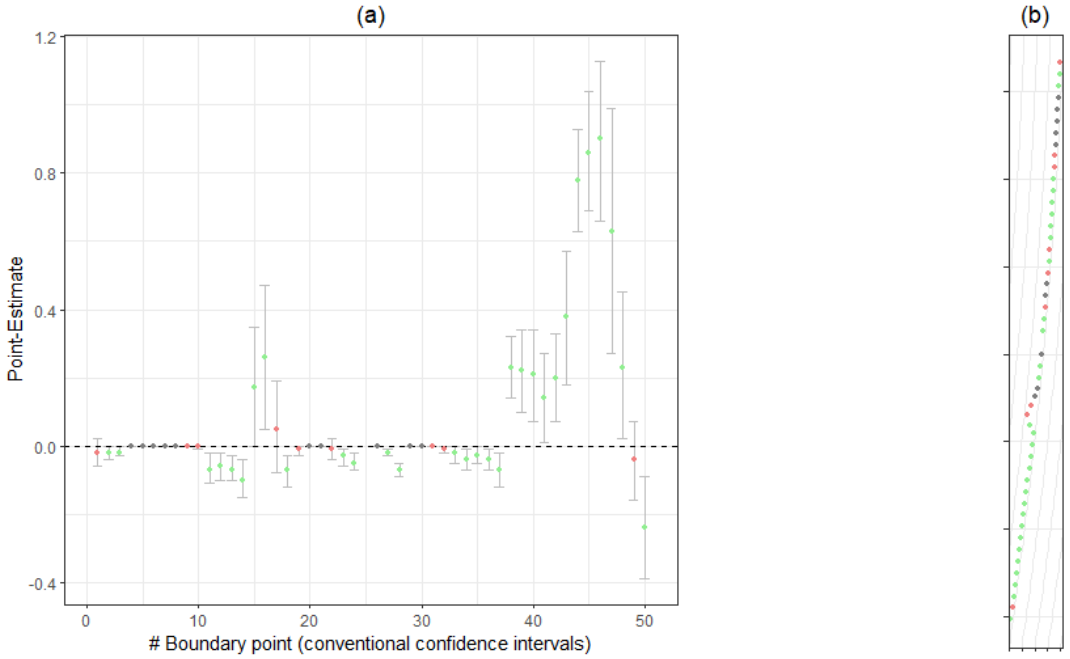


Figure 1.6. RD Example of Indonesia and Papua New Guinea in 2012. (a) represents the results for each boundary point's local linear regression. (b) plots the results onto physical space. Green indicates a significant result for that boundary point (significant difference in protection), while red indicates an insignificant result (insignificant difference in protection).

Indonesia and Papua New Guinea in 2012, and maps the results onto the geographic border seen in Figure 1.5 above. Indonesia was more likely to protect grid cells near the Indonesia-Papua New Guinea border than Papua New Guinea. The average treatment effect (0.085), calculating from the mean of the treatment effect at each of the boundary points, is positive, because being in Indonesia rather than Papua New Guinea results in more protection. This matches what we see in Figure 1.5.

1.4.4 Main Test Sample and Dependent Variable

In the main test, I explain differences in protection across national borders using differences in political-economic factors across countries derived from the theoretical framework. The unit of analysis is the country dyad-year and the time coverage is also 1992—2020. The dependent variable in the dyadic panel regression is the annual average treatment effect for each country border-pair from the regression discontinuities (**difference in protection**). While these

estimates, the nature of the RD exercise means that the error is classical, and because the variable is used as the dependent variable the resulting coefficient estimates on the independent variables in the second step are not attenuated by the dependent variable's error term.

1.4.5 Main Test Independent Variables

Because the dependent variable is in the unit of country-pair and measures differences across countries, the independent variables are structured in the same way. The general form of the independent variables in the second step is the following:

$$XDiff_i = X_{i,c} - X_{i,c} \tag{1.1}$$

Where i is the year and c indexes either Country A or B. Because of this structure, positive values mean that the value for the variable in Country A is higher than in Country B (e.g., Country A is more democratic). All variables below are measured in differences.

To measure NRD, I rely on a combined measure of **natural resource rents** and **agriculture, forestry, and fishing value added** as percents of GDP, taken from the World Bank, which I call **resource dependence**. The natural resource rents variable includes oil, natural gas, coal, mineral, and forest rents. Higher values indicate a higher economic dependence on natural resources at the national level. Since both of the measures are aspects of overall natural resource dependence, I include both in the main measure. However, since this may double count the influence of forestry, I also test each separately. Testing separately can also alleviate concern about certain types of resource dependence being co-determinate with democracy. Results are robust to each specification. To measure democracy, I use the **polyarchy index** from V-Dem. Results are robust to alternative measures of democracy that capture its specific characteristics that make mobilization more likely to be successful. Figures 1.7 and 1.8 show country-level distribution of the main independent variables in 2016 plotted against the percent of a country's land covered by PAs, to give an idea of the variation and relationship with protection in a single

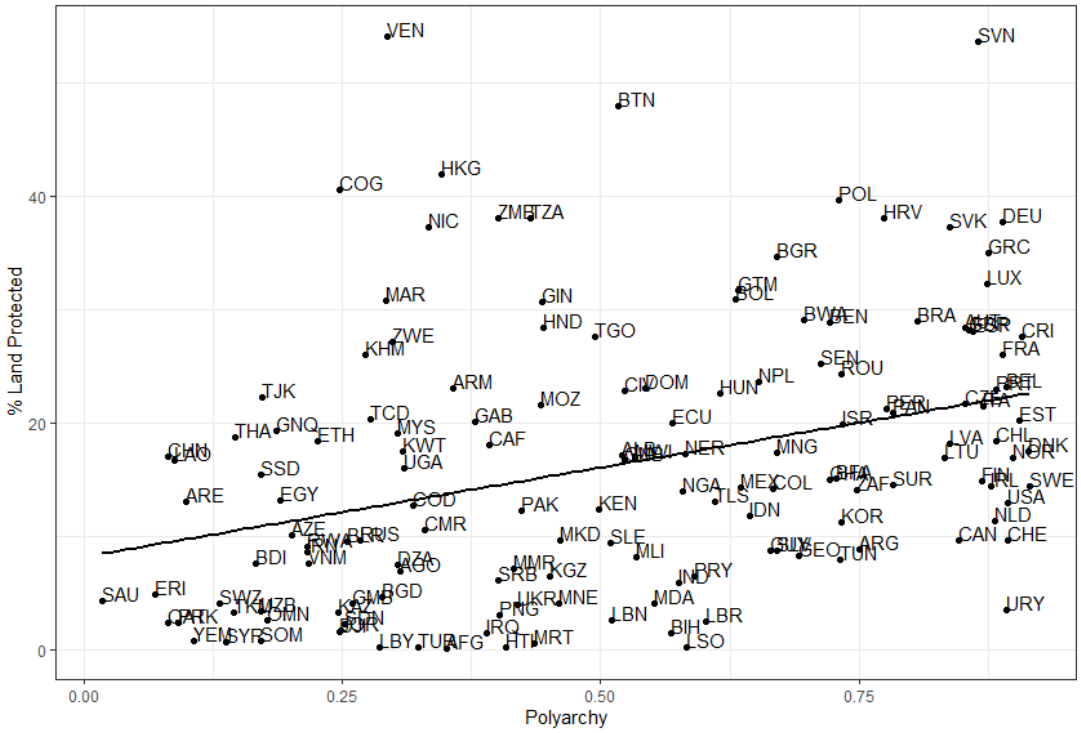


Figure 1.7. Distribution of Polyarchy in 2016 and Percent of Land Protected by Country

year.

I also include several control variables. I include GDP per capita, since richer countries may have more resources to allocate to protection than poorer countries; population density, since more densely populated countries may have more difficulty allocating space for PAs; and the percent of the population living in rural areas, since countries with more rural people may also have difficulty establishing PAs because of local resistance. These variables come from the World Bank Development Indicators.

1.4.6 Main Test Estimation

The main model can be expressed as follows:

$$\begin{aligned} Y_{d,y} = \beta_0 + \beta_1 ResDepDiff_{d,y} + \beta_2 DemDiff_{d,y} \\ + \beta_3 ResDepDiff_{d,y} * DemDiff_{d,y} + X_{d,y} + \varepsilon_{d,y} \end{aligned} \tag{1.2}$$

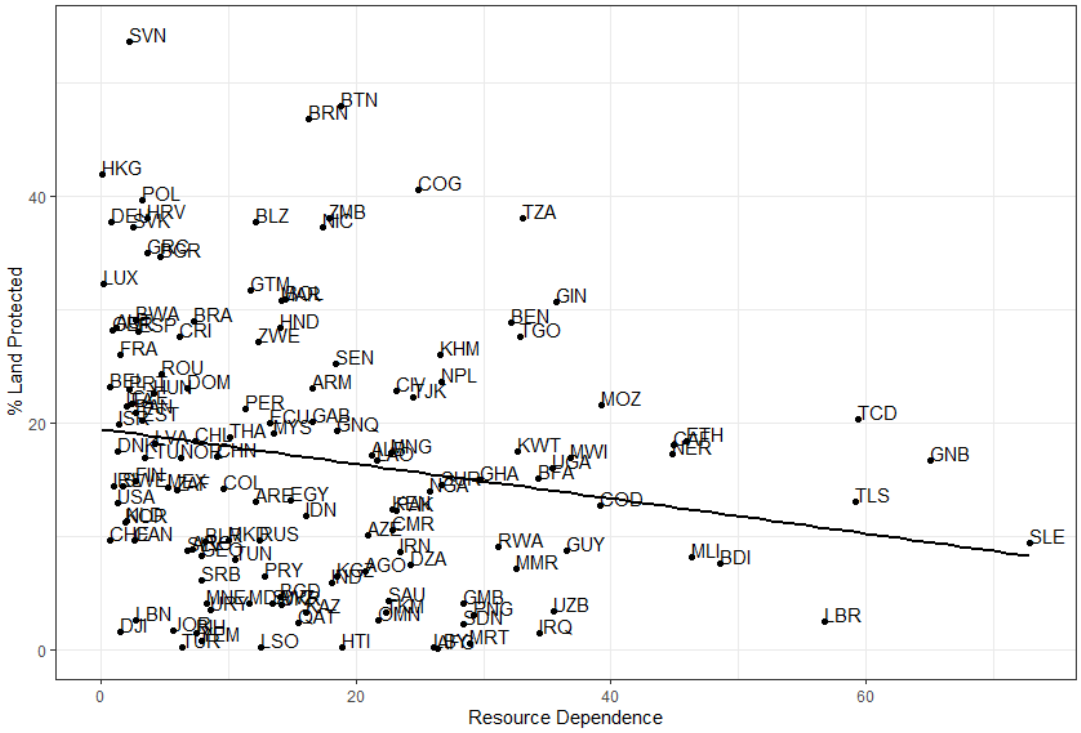


Figure 1.8. Distribution of Resource Dependence in 2016 and Percent of Land Protected by Country

Where d indexes country dyads, y indexes years, Y is the predicted difference in protection, $ResDepDiff$ is the difference in resource dependence across the dyads, $DemDiff$ is the difference in polyarchy index across the dyads, and X is an index of other control variables. I use linear OLS models with dyad and year fixed effects, although results are also robust to linear and quadratic time trends. I use heteroskedasticity-robust standard errors.[16]

1.5 Results

Table 1.1 presents estimation results. As a reminder, because of the structure of the data, a positive coefficient is interpreted as "more predicted protection in Country A." For example, if

[16]Recent research shows that clustering standard errors in research designs where a large portion of the population of interest is sampled can create incorrectly conservative standard error estimates (Abadie et al. 2023). Results remain significant at the 10% level when standard errors are clustered by a randomly chosen country from each dyad, and the p-value of the interaction is 0.15 when clustered at the dyad level (see Table A.2). This, the fact that this is a hard test given spatial correlation of the independent variables, and the likely overly-conservative nature of clustering standard errors in this context according to recent research make this not a concern about inference.

Table 1.1. Main Regression Results

Dependent Variable:	Predicted Difference in Protection			
Model:	(1)	(2)	(3)	(4)
Variables				
Resource Dependence	-0.0025*	-0.0017	-0.0019	-0.0011
	(0.0013)	(0.0013)	(0.0013)	(0.0013)
Polyarchy	0.0069***	0.0066***	0.0076***	0.0073***
	(0.0017)	(0.0017)	(0.0018)	(0.0018)
Res. Dep. x Poly		0.0056***		0.0058***
		(0.0013)		(0.0013)
GDPPC			-0.0016	-0.0013
			(0.0018)	(0.0019)
Pop. Density			0.0602***	0.0617***
			(0.0126)	(0.0126)
Rural Pop.			-0.0009	-0.0014
			(0.0050)	(0.0050)
Fixed-effects				
Country Dyad	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Fit statistics				
Observations	7,667	7,667	7,593	7,593
R^2	0.86718	0.86756	0.86821	0.86861
Within R^2	0.00298	0.00588	0.00522	0.00823

Heteroskedasticity-robust standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

A being more democratic than B results in more protection in A, the coefficient for $DemDiff$ will be positive, because it means that there is more protection when a grid cell is "treated" by being in A rather than B. Additionally, all independent variables are standardized to a mean of 0 and standard deviation of 1 to ease interpretation. I present four models in the main results, without and with the interaction term, and without and with controls. In the first and third models, the coefficient on democracy difference is positive and significant ($p < 0.01$), meaning that when a country gets more democratic than its neighbor, we expect more protection in it than in its neighbor. The effect is substantively significant: A one standard deviation increase in democracy difference results in 0.76 percent more protection of the average grid cell in Country A compared to Country B. Considering the global average of a country's area covered by PAs is only 14 percent, an almost 1 percent increase is a meaningful change that would make a real difference in species and ecosystem outcomes in the aggregate.

The second and fourth models show that the interaction between natural resource dependence difference and democracy difference is also significant ($p < 0.01$) and in the expected direction. To make this clear, Figure X shows an interaction plot with the difference in polyarchy on the x-axis and the predicted coefficient of natural resource difference on the y-axis. When Country A is much less democratic than Country B, the effect of increased NRD is less protection in A and more in B. **Less democratic, more dependent countries protect less.** However, when Country A is more democratic and more dependent, the effect of increased NRD is more protection in A and less in B. **More democratic, more dependent countries protect more.** This supports my theoretical expectations from Hypotheses 1 and 2. The predicted coefficients of the interaction are also substantively significant: When there are significant differences in democracy across the countries, a standard deviation increase in resource dependence predicts around 1.5 percent more or less protection.

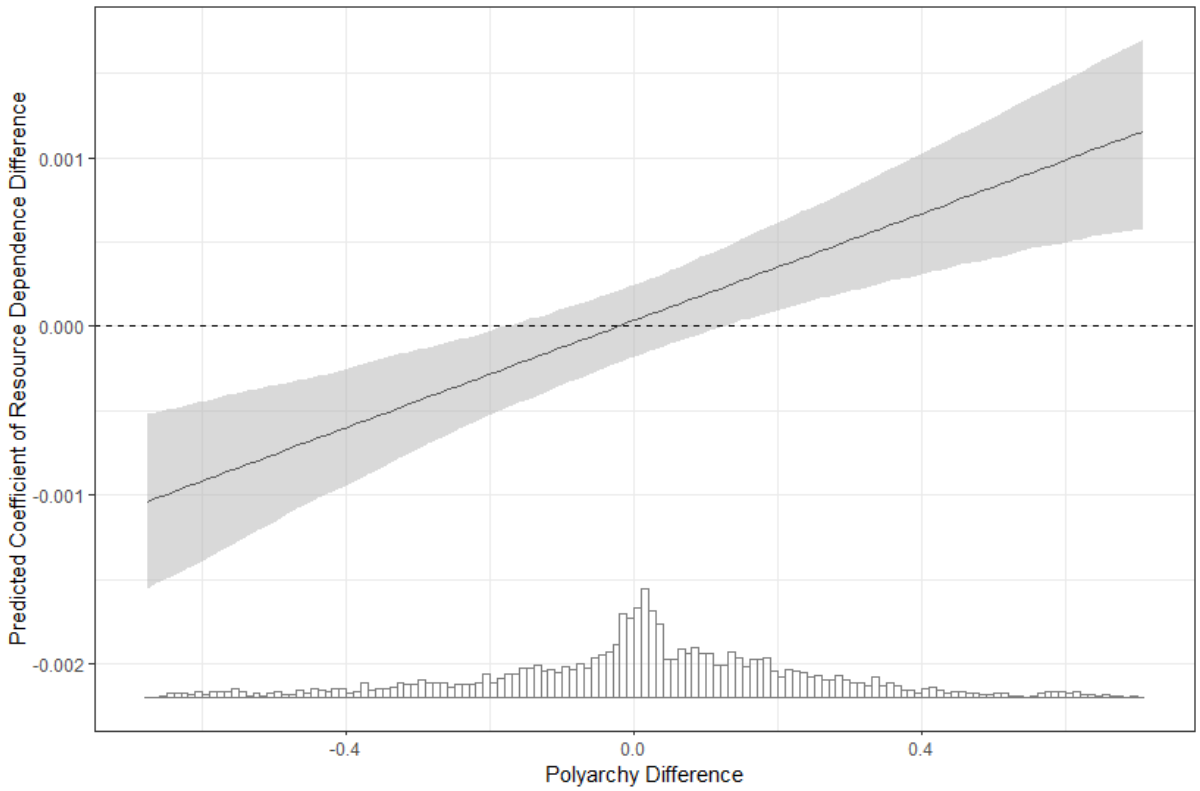


Figure 1.9. Interaction between Polyarchy Difference and Natural Resource Difference. Results from Model 4. Histogram shows the distribution of the Polyarchy Difference variable.

1.6 Robustness Checks

To test the robustness of my results, I make changes to the models in both the first and second steps of the research design.[17] In the GRD step, I specify the bandwidth of distance away from the border more stringently, at 10 and 30 kilometers (Appendix Table A.3. I do this to increase confidence that the landscape under analysis is truly balanced on covariates on either side of the border. Next, I perform similar analyses using linear and quadratic "naive distance" as the forcing variable in the regression discontinuity (L. J. Keele and Titiunik 2015). The hypotheses are supported across these alternative specifications (Appendix Tables A.4 and A.5).

I also probe the assumption of covariate balancing in the RDD step directly by measuring average rainfall in January and July, average temperature in January and July, elevation, agricultural opportunity cost, and biodiversity levels at the 100 square kilometer grid cell level (Appendix Table A.6). While there are differences across the sample, the average differences are not substantively meaningful in terms of the type of ecosystems that would be located there, especially in the smaller bandwidths. Covariate balancing tests within each of the RDs reveal some with statistically significant differences, but this is a product of the statistical power derived from the number of observations the grid cell-level data provide. For example, I can detect that a 10-meter difference in average elevation is statistically significant, but ecologies do not change across such small magnitudes. Statistical significance, in this case, does not generally equate to ecological or geographic significance in the real world.

In the second step, I perform three further tests to build confidence in the RD model. First, I inverse weight dyads by the average "squiggliness" of their borders (Appendix Table A.7). Taken from Alesina, Easterly, and Matuszeski (2011), the idea is that a more squiggly border is more likely to be based on natural features rather than artificially created. By inverse weighting, I give more explanatory power to artificial borders. I also drop all country dyads except those

[17] Robustness checks available in the Appendix.

whose borders are mostly or entirely straight lines, presumably established either by treaty or as part of colonial state drawing (Appendix Table A.8). While there may still be concerns that borders are not exogenous to geography, straight-line borders that were drawn for convenience are more certainly exogenous. Although this reduces my sample size significantly and biases the sample towards states in Africa and the Middle East,[18] I still find support for my hypotheses. Third, because some readers may have concerns that the dependent variable is estimated with known uncertainty, I bootstrap new predicted differences in protection by randomly sampling new predicted differences based on their standard errors and running the main dyadic model again 10,000 times (Appendix Figures A.1 and A.2). The p-value of the primary interaction term is less than 0.05 in 99.96 percent of cases, and the coefficient is always it the expected direction.

Beyond adding robustness to the RDD, I probe the sensitivity of the dyadic panel regression in four ways. First, I apply inverse weighting to country pairs based on how many neighboring countries the pair has in total (Appendix Table A.9). This is to ensure that my results are not biased by overweighting countries with many neighbors like Russia or Brazil. Second, I use alternative measures of natural resource dependence and democracy, as mentioned in the preceding section (Appendix Table A.10). This is especially important because there could be concerns that natural resource dependence and the strength of democratic institutions are interrelated, based on the resource curse hypothesis (Dunning 2008; Ross 2013). By using the agriculture, fishing, and forestry measure, I can ameliorate this problem, since these are generally not considered to be part of the resource curse (Ross 2015). Third, while the main model uses the same year for all independent variables, it is feasible that the mobilization processes that underlie the main hypotheses would take time to manifest. For example, if a country democratizes, it would take some time for its civil society to successfully mobilize and start to demand protection. For this reason, I lag the main independent variables for 1—5 years (Appendix Tables A.11 and A.12). Fourth, I limit the sample to only dyads where both countries were in the top or bottom half of the GDP per capita distribution for that year, to build confidence I am comparing "like

[18] Sample size is reduced to 84 dyads.

units" with respect to the type and stringency of protection in the PAs (Appendix Table A.13). Results are robust to all of these alternative specifications.

1.7 Evidence for Mobilization Mechanism

My primary empirical tests are of the relationship between resource dependence and protection, conditioned by democratic institutions. However, I also provide evidence for the degradation $\rightarrow$ mobilization mechanism because it is the "weaker" of the two, given the large body of evidence in the literature for the mobilization and democracy mechanism. My theory relies on mobilization at three levels: local, around the sites of degradation/extraction; national, where more NRD countries experience more mobilization; and international, where concerned environmental actors put resources into more dependent countries.

At the local level, I draw on the Social Conflict Analysis Database, which includes geolocated information about social conflict in Africa, Central America, and the Caribbean as well as descriptions of the issue over which conflict occurred. I hand-code each event based on its description, and show that environmental conflict is most common about local issues, rather than more diffuse issues like climate change. Figures 1.10 and 1.11 show the geographic distribution of environmental social conflicts across the regions. In Africa (Figure 1.10), 46 percent of conflicts are about local environmental degradation, which is the largest single category according to my coding. Although relative frequency of protest about local issues is not a necessary condition for my theory, it is clear that mobilization over local issues is prevalent: The next largest category is violent conflict over oil (n = 15, 22 percent), with climate change making up a much smaller portion (n = 3, 5 percent). In Central America and the Caribbean (Figure 1.11), the picture is even more stark, where 72 percent of all environmental conflict is about local environmental degradation, according to my coding.

Other work also makes clear that mobilization and environmental conflict occur around degradation. (Scheidel et al. 2020, p. 10) find that "bottom-up mobilizations in response to

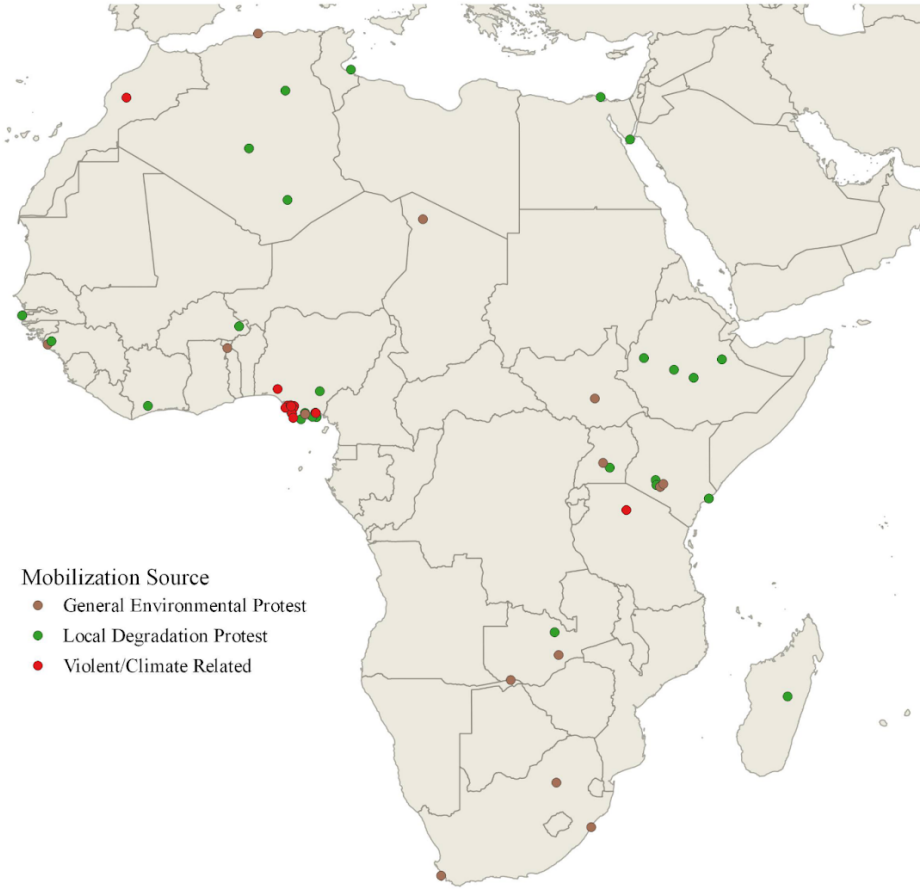


Figure 1.10. Distribution of Environmental Social Conflict in Africa (n = 67). Data on protests from Social Conflict Analysis Database. Categories from author coding based on event description.

adverse environmental and social impacts of economic activities and development projects occur worldwide across all income groups," with approximately 75 percent of those conflicts arising over issues that are easily traceable to the area where the conflict takes place. From this evidence, it seems likely that local degradation leads to mobilization.

As I discussed, it also leads to more broad national mobilization, both through aggregated local mobilizations and through the broader public becoming concerned. To provide evidence for this, I leverage the World Values Survey (WVS). Figure 1.12 shows the percentage of survey respondents who are active or inactive members of environmental groups plotted against natural



Figure 1.11. Distribution of Environmental Social Conflict in Central America and the Caribbean (n = 58). Data on protests from Social Conflict Analysis Database. Categories from author coding based on event description.

resource dependence by country, for survey waves 5 (2005—2009), 6 (2010—2014), and 7 (2017—2022). A simple regression shows a positive and statistically significant relationship between the variables (p ¡ .05). This is suggestive evidence of the degradation → mobilization mechanism. If citizens were purely focused on economic outcomes, they would not be more likely to join an environmental organization in more resource-dependent contexts, because the economic well-being of the country depends in larger part on environmental exploitation (at least in the short term). These correlations show that resource dependence is associated with mobilization.

Similar relationships exist between NRD and responses to questions about the respondent feeling similar to a person for whom protecting the environment is important, as well as NRD and participating in environmental demonstrations: There is no negative relationship, as one

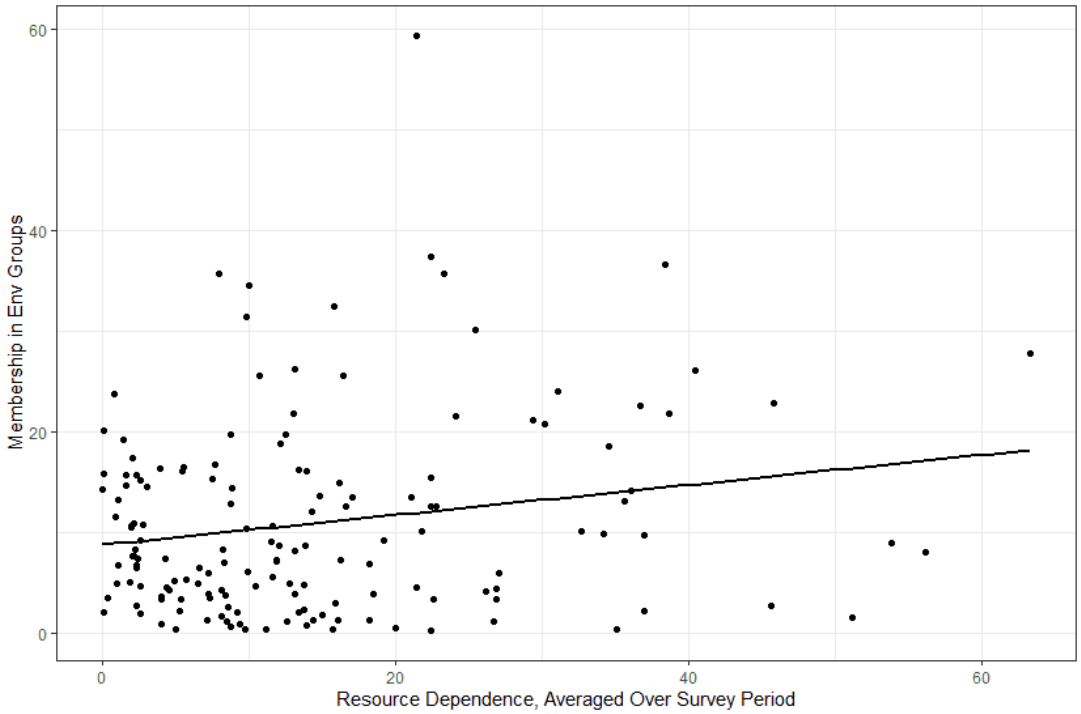


Figure 1.12. Environmental Organization Membership Plotted Against Resource Dependence

might expect if NRD led to solely to valuing the economic benefits derived from extraction, and in some survey waves there is a positive relationship. Figure 1.13 shows these results for available survey waves.

Finally, I provide evidence that international actors are more likely to mobilize resources in more NRD countries. I leverage the Global Environmental Facility's (GEF's) projects. The GEF is a multilateral environmental partnership of 18 agencies, including international nongovernmental organizations (NGOs) and UN agencies, that works with over 180 countries to fund environmental programs across the world (Nations 2017). Its investment priorities demonstrate the priorities of a variety of international actors, so it is a good institution through which to test the degradation $\rightarrow$ mobilization mechanism. To do this, I collect data on project target countries and year of project approval. I then create a dataset at the country-year level for each of the 185 member countries of the GEF and create a count variable for how many projects were approved in each country and each year. Figure 1.14 shows the total number of projects

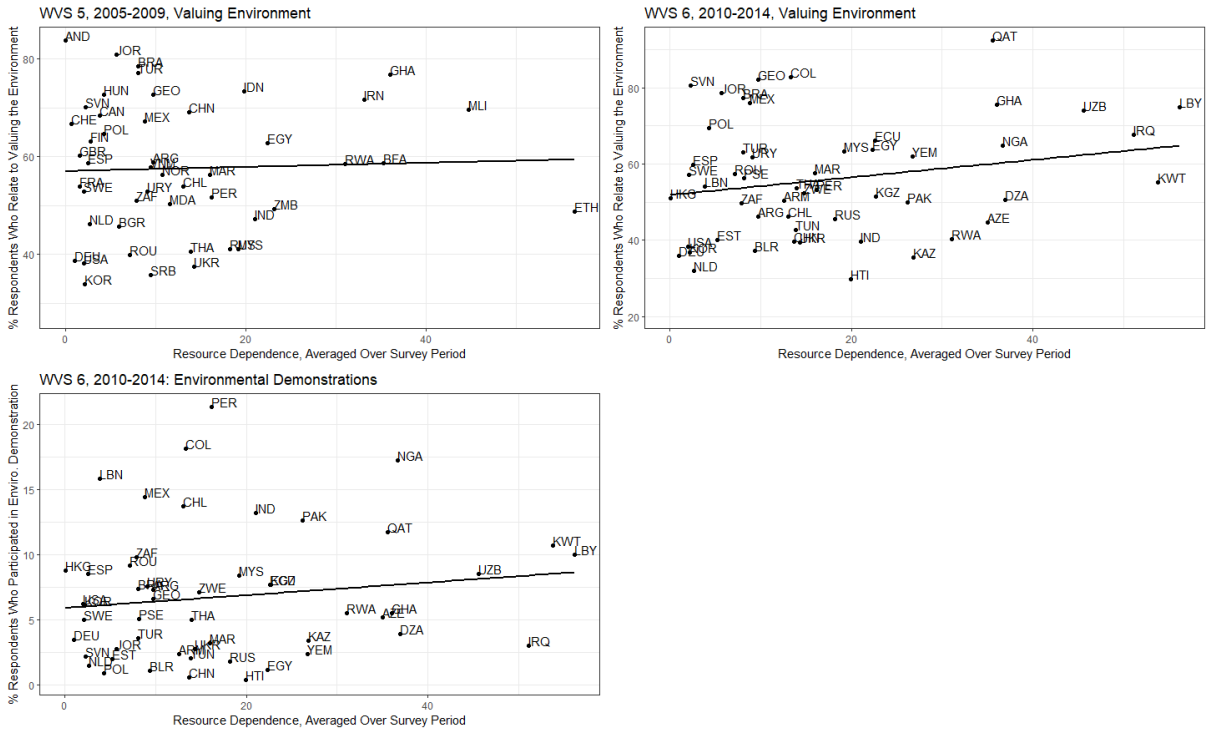


Figure 1.13. Other WVS Results

approved for each country. I then run a simple negative binomial regression with project count as the dependent variable and resource dependence as the independent variable. I add country population as a control variable, since Figure 1.14 makes clear that larger countries like India, China, and Brazil have more projects. I find a positive and significant ($p < 0.001$) relationship between resource dependence and international mobilization: Country-years with higher resource dependence tend to have more projects approved. This brief test is not meant to prove causality, but it does provide more evidence of Mechanism 1, that NRD leads to mobilization. In total, this collection of descriptive evidence is meant to show that this mechanism does manifest in the world.

1.8 Case Study

From the quantitative analysis, I have found that resource dependence can lead to more protection depending on the strength of democratic institutions. To trace the underlying

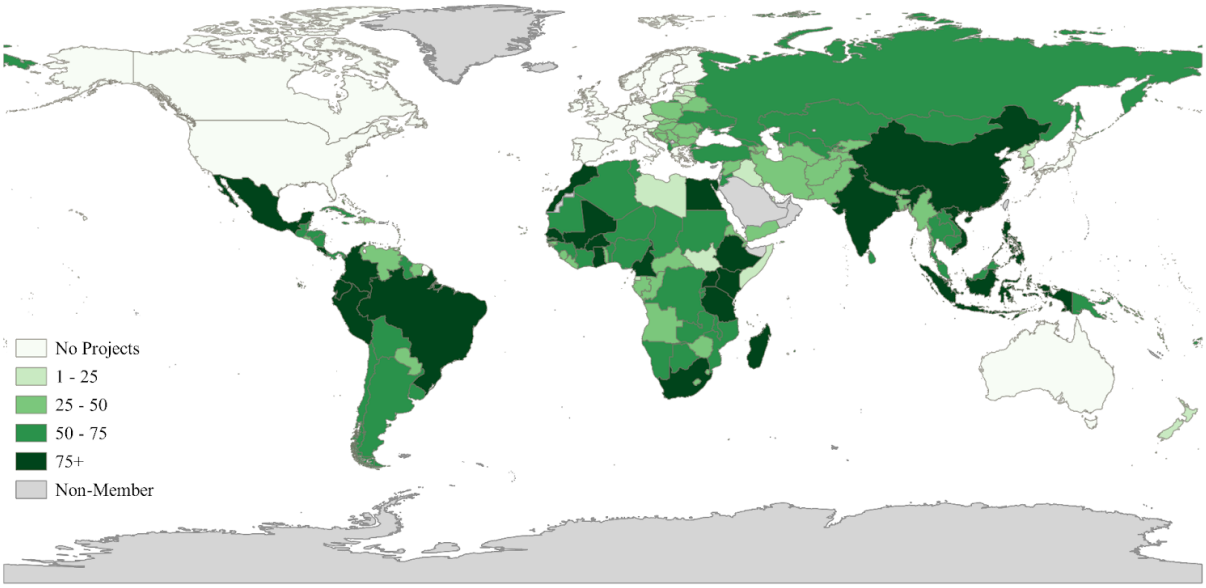


Figure 1.14. Count of GEF Projects Approved 1991—2022, By Country. Data from projects from the Global Environmental Facility

mechanisms, I focus on the history of PAs in Costa Rica. Costa Rica had high natural resource dependence and strong democratic institutions for most of the 20th century, so we should expect to see high(er) protection. This is a "high on X, high on Y" case (Seawright 2016), with the goal of exploring the casual mechanism (Goertz 2017). If my theory is correct, I would expect:

- Costa Rica to experience political mobilization in favor of protection at the local, national, and international levels, because for the period of study it is democratic and permits this form of mobilization.
- Environmental degradation stemming from resource extraction will be the impetus for political mobilization, rather than simply a desire to protect a non-threatened beautiful area, for example.
- Pushback from extractive interests, including potentially local communities, may occur. This pushback, however, should be counteracted in at least some cases by multilevel pro-protection mobilization, which will result in more PAs being established in the aggregate.
- Costa Rica's democratic institutions were important for channeling mobilization into

policy outcomes. If democratic institutions were not important, we would see executives acting alone more often than not, or that mobilization does not affect outcomes.

I rely on a range of primary materials (such as interview quotes from people directly involved and legislative text) and secondary sources (including academic articles, books, newspaper reports, and web pages). I find evidence that environmental degradation led to pro-protection mobilization at multiple levels and that this mobilization had an effect on policy through Costa Rica's democratic institutions.

1.8.1 Background

Costa Rica is one of the most biodiverse countries in the world, containing 5 percent of the world's biodiversity on only 0.03 percent of the world's landmass (Jordan 2022). Until recently, it was also highly reliant on natural resources for its economy: In 1992, the beginning of data coverage for my quantitative analysis, almost 15 percent of its GDP originated from natural resources (Bank 2023). In previous years it had been even higher (see Figure 1.15). Its resource dependence has declined in more recent years, in part because of its creation of PAs and transition to an eco-tourism and services-based economy, which I discuss later. In spite of (or perhaps, as I argue, because of) this historical reliance, Costa Rica has been one of the world leaders in PA designation. It had already established PAs covering over 25 percent of its territory by 1999 (Evans 1999), a much higher rate than any of its neighbors and well above the global average. Its PA network has remained steady, sitting at 26.6 percent today. Lastly, Costa Rica has been a relatively healthy democracy since José Figueres Ferrer and a military junta-led constitutional assembly approved a constitution with universal suffrage in 1949. This constitution also abolished the Costa Rican military, something that many claim allowed Costa Rica to have the budget to prioritize environmental protection (Hornblower 1979). There was, importantly for theory, a significant jump in the strength of democratic institutions in the late 1970s (see Figure 1.16). This allowed Costa Ricans to more effectively demand protection as a response to the environmental degradation that resource dependence caused, resulting in the

rapid proliferation of PAs seen in the case.

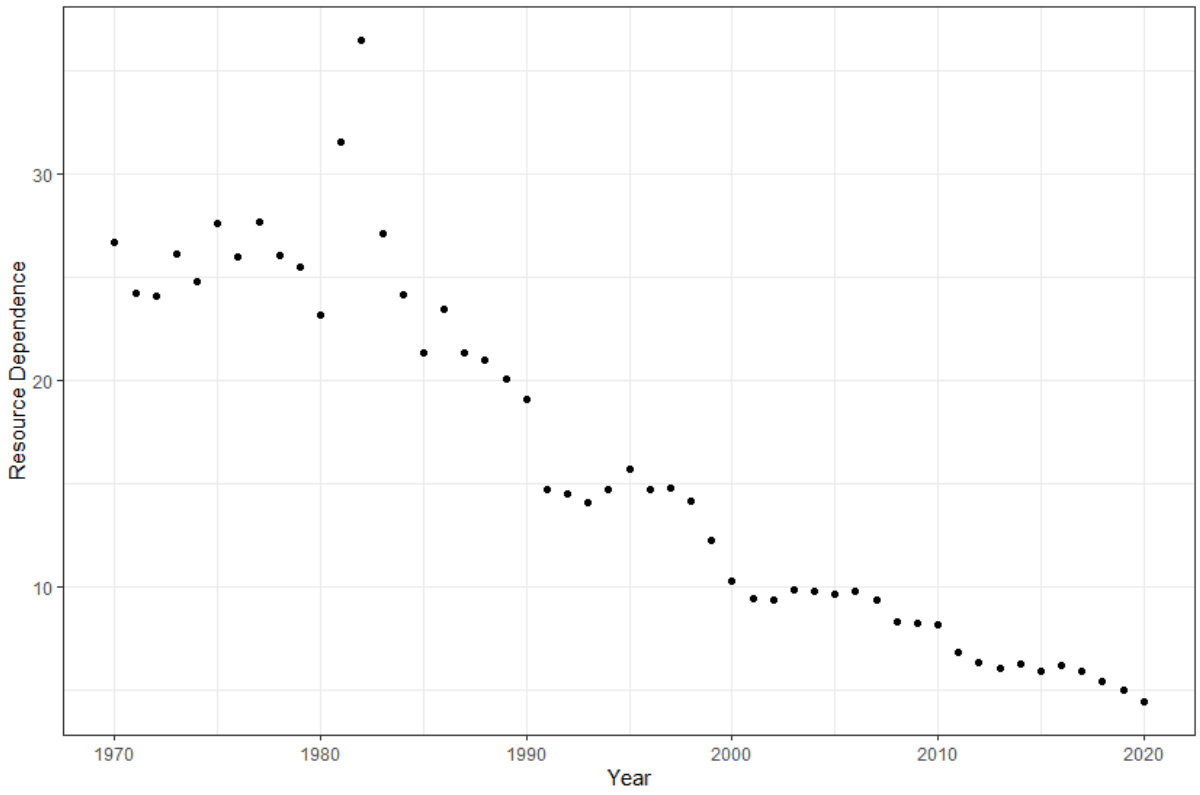


Figure 1.15. Resource Dependence in Costa Rica over Time.

The above serves to show that Costa Rica fits the criteria of a "high on X, high on Y" case (Goertz 2017; Seawright 2016): It has historically scored highly on both independent variables—strong democratic institutions and high resource dependence. It also has the presence of the expected outcome: high protection. The goal of this case study is to show that pro-protection mobilization (1) occurred as a direct consequence of environmental degradation that resulted from Costa Rica's high reliance on resource extraction and land conversion, and (2) this mobilization had an effect on protection through Costa Rica's democratic processes. This can help build confidence about the proposed causal pathway (Seawright 2016).

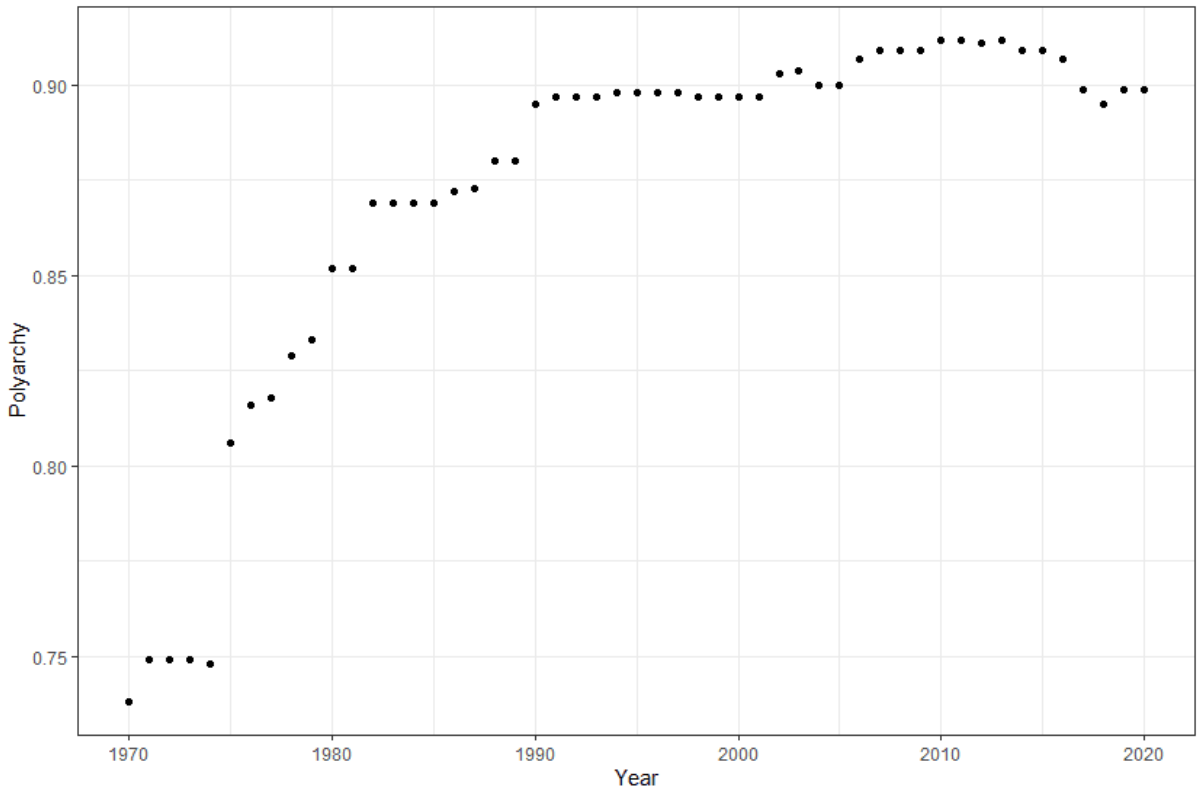


Figure 1.16. V-Dem Polyarchy Index for Costa Rica over Time.

1.8.2 Resource Dependence, Export Agriculture, and Deforestation

In 1940, 75 percent of Costa Rica was covered by forest. By 1990, that number stood at 29 percent (Nygren 1995). The primary reason for this loss was export-oriented agriculture. The development of farm and pastureland necessitated clearing huge swaths of forest, which was encouraged through a taxation system in which "holders of uncleared land paid higher taxes than those with cleared land" (Brockett and Gottfried 2002, p. 14). While this economic model led to a boom in Costa Rica, it also caused massive environmental problems. Beyond deforestation itself, other environmental problems included soil erosion, overuse of pesticides and fertilizer, and large amounts of nonbiodegradable waste. Eventually, these issues led to a change in perceptions: "As agricultural conditions and international markets dictated, more and more forested land was turned into croplands, plantations, and pastures. This dangerous exploitation of natural resources, however, aroused a dormant ecological awareness in many Costa Ricans to address the need to

protect what remained of the nation's natural heritage" (Evans 1999, p. 7). It took the threat of losing its forests, and the negative environmental consequences that resulted, for Costa Ricans to take action.

Deforestation "became a significant rallying call in the conservationist community, urging the government of Costa Rica to legislate against forest abuse" (Evans 1999, p. 49). Their advocacy eventually led to the passage of the Ley Forestal (Forestry Law) in 1969, which first established Costa Rica's national PA system and began to regulate the timber industry (Brenes Castro 2022). Before its passage, the legislature asked for comment on the proposal and received messages of support from a wide range of actors, including from international conservation experts, college students, school children, mayors of rural and urban municipalities, and the media (Evans 1999). This demonstrates that Costa Rica's democratic system allowed for advocacy to have an effect both in bringing the issue to the spotlight and in making widespread support for the law clear. It also shows that actors from each of the levels that I discuss were mobilized.

After the Ley Forestal's passage, deforestation continued to give urgency to establishing national parks and other reserves, with the national parks service chief, Alvaro Ugalde, saying in 1976 that "the situation is extremely critical" and that the country was in a "state of true ecological catastrophe" in a letter to the Legislative Assembly (quoted in Evans 1999, p. 106). Further legislation was eventually enacted to more strictly regulate the timber industry and encourage preservation and reforestation (Rodricks 2010), and PAs rapidly grew even as forest loss continued to be a major issue. By 1981, over 8 percent of the country's land was under some form of PA, which was well above the global average at the time and only continued to grow.

As of 2024, Costa Rica has 167 PAs in total covering nearly 27 percent of its land surface and almost 29 percent of its marine area (*Protected Planet — Costa Rica* 2023). Of these, thirteen are considered national parks (*Parques Nacionales* 2023), listed in Table 1.2. I discuss four of them here, which were established relatively early in Costa Rica's history, as well as the first PA in Costa Rica (shown in Figure 1.17). These examples highlight the role of mobilization at

Table 1.2. List of Costa Rican National Parks. * indicates that park is discussed in case.

Park Name	Date Established	Establishment Type
Tortuguero	1970	Executive Decree
Cahuita*	1970	Executive Decree
Manuel Antonio*	1972	Law
Rincón de la Vieja	1974	Law
Barra Honda	1974	Law
Chirripó	1975	Law
Corcovado*	1975	Executive Decree
Isla de Pájaros Biological Reserve	1976	Executive Decree
Isla de Caño	1978	Law
Braulio Carrillo	1978	Law
Hitoy Cerere Biological Reserve	1978	Executive Decree
Palo Verde*	1978	Executive Decree
Carara	1978	Executive Decree

multiple levels in establishing Costa Rica's PA network, and complement the discussion of the broad pattern of protection in Costa Rica. The "cases within the case" are also emblematic of the relationship my theory proposes. They allow me to analyze the mechanisms more directly and with greater specificity by analyzing individual events rather than the country's PA history as a whole (Seawright 2016).

1.8.3 Local and International Mobilization: Cabo Blanco

The first conservation area in the country was the Cabo Blanco Nature Reserve. It was established in 1963, long before the national park system was created, thanks in large part to the efforts of a Scandinavian couple who lived in the area (Tjäder 2014). Olaf Wessberg and Karen Mogensen emigrated to Costa Rica in 1955 and lived outside the small village of Montezuma on the western Nicoya Peninsula. They quickly developed a passion for the wildlife and forests of their adopted home and were alarmed when rapid deforestation of the southern part of the peninsula took place in the late 1950s. This deforestation was a consequence of government policy encouraging "development" of the peninsula (NicoyaPeninsula.com 2023)



Figure 1.17. Costa Rica with Protected Areas Discussed in Case Highlighted. Map by author. Spatial PA data from WDPA; country boundaries from GADM.

and also resulted in hundreds of squatters moving into the area (Evans 1999). Wessberg began a campaign to raise awareness and funds to protect the remaining forest. He eventually contacted international conservation organizations, who responded positively but wanted to direct their contributions to a government agency responsible for conservation. At the time, the only agency with the power to set aside land for conservation was the development agency that had facilitated the deforestation of Nicoya in the first place. However, over the course of three years, Wessberg and the international groups convinced the government to establish Costa Rica's first nature reserve in the area (Tjäder 2014). The couple then continued to advocate for more stringent conservation, including creating a questionnaire used to screen park security guards (Evans 1999, p. 61).

This example demonstrates the importance of both local and international mobilization.

Wessberg and Mogensen were members of the local community who became alarmed by environmental degradation. They mobilized and advocated for protection in response. By highlighting the potential loss of biodiversity from continued degradation, they got international conservation actors interested in the area and were able to secure the funds necessary to purchase and protect the land. Without degradation, the area would not have been established as a national park when it was, because no one would have advocated for it. Without Costa Rica's democratic institutions, Wessberg would not have been able to petition the government directly "over twenty" times (Evans 1999, p. 62), and the government would have likely been more suspicious of receiving international funds for that purpose.

1.8.4 Local Mobilization: Manuel Antonio and Cahuita National Parks

Manuel Antonio National Park was established in 1972 and is a mixed marine and terrestrial PA, as seen in Figure 10. Its creation was the result of local mobilization, particularly by citizens of the town of Quepos. They wanted to protect the land because they were concerned about foreign capital turning it into a resort, which would entail significant deforestation and development (SINAC 2023). The land had been owned by United Fruit Company, a firm responsible for much of the deforestation that Costa Rica was experiencing, before being sold to other foreign owners (Evans 1999). This gave locals grounds for concern that the land would be degraded for resource extraction. That impression was not helped when Noel Thomas Langham, an American who owned the beach area and part of the forest, tried to block access to the beach from locals as part of a move toward creating a resort (Fumero 2020). The local community protested these efforts. They saw the establishment of a national park as the best chance to save their access to the beach as well as the forest and biodiversity that resides there.

The mobilized local residents created the Grupo Pro-parque (Pro-park Group), which protested limited access to the beaches and demanded the creation of a park in order to save the natural environment of Manuel Antonio. This group was joined by students, teachers, progressive political activists, feminist groups, and others in advocating for the park at the 1972 legislative

assembly (Fumero 2020). They eventually got the attention of Mario Boza, the first director of Costa Rica's National Parks System, who drafted a bill declaring Manuel Antonio a national park, which was sponsored by a legislator from Quepos. When a delegation from the National Assembly visited the proposed site, they "saw the destruction started by the construction firm, and rallied for the bill's approval" (Evans 1999, p. 90). It was signed into law by then-President Figueres, and is now Costa Rica's smallest national park.

The history of Manuel Antonio clearly demonstrates the mechanisms of my theory. The local community was concerned about environmental destruction and rallied to demand protection in response. They were joined by a range of other civil society actors which are more commonplace in countries like Costa Rica with strong democratic institutions. Their efforts, in turn, were successful because of Costa Rica's democratic policymaking process.

This is not to say that local communities are always pro-protection. Cahuita National Park on the southeastern coast was initially resisted by the local community because they were concerned that it would harm their livelihoods and lead to their town turning into a beach resort (R. Cahn and P. Cahn 1979). However, as national parks chief Antonio Ugalde later told, "after I explained to [the] Cahuitans that the real threat came from the land developers and wealthy people from San Jose who wanted beach-front vacation homes or land for speculation, the local people realized that the park would give them the best protection of their way of life" (quoted in Evans 1999, pp. 104–105). They subsequently voted in near-unanimous fashion to support the creation of the park in a consultation poll (R. Cahn and P. Cahn 1979). This example shows that local resistance was grounded more in fear of extractive development than against the park itself, but it does show the potential economic threat discussed in the theory that PAs can pose to local communities. In this case, and many others in Costa Rica, pro-protection mobilization won out against economic livelihood concerns, because locals saw the alternative as worse.

1.8.5 National and International Mobilization: Corcovado and Palo Verde National Parks

National and international actors have also been critical in Costa Rica's conservation history. Corcovado National Park was the result of a campaign primarily led by Costa Rican and foreign biologists and conservation scientists. The Osa Peninsula in northwestern Costa Rica is home to unique, densely forested ecosystems that became the target of logging companies. By 1972, "many letters from conservationists around the country in support of making Corcovado a nationally protected area started pouring in to the national parks office" (Evans 1999, p. 98). Olof Wessberg, the emigrant responsible for the creation of Costa Rica's first PA, was eventually sent to the area by the parks service for a park feasibility study. While there, he was killed by his guide. Many saw the crime as part of a conspiracy to allow continued resource extraction in the area, and this rallied even more people to support the park and drew international attention. Despite the significant economic incentives of continued extraction, the president of Costa Rica even spoke about the murder, saying "The Swede gave his life to protect our forests. Now, it's Costa Rica's responsibility to realize his dream of a national park in Corcovado!" (quoted in Tjäder 2014, pp. 42–43).

Within two months, the area was declared a national park. The president had been convinced that the park was worthwhile by national mobilization, started by scientists. He also likely believed protection would appeal to voters, given the significant public pressure campaign that resulted from Wessberg's death. This case also clearly supports my proposed theoretical mechanisms: Mobilization resulted from resource extraction and subsequent environmental harms, and democratic pressures allowed that mobilization to result in protection.

The power of civil society can also be seen in the "Palo Verde controversy." Palo Verde National Park was established in the 1978 as a wildlife refuge before eventually becoming a national park. Its current size, seen in Figure 1.17, is smaller than the original wildlife refuge. This is because President Rodrigo Carazo degazetted, or disestablished, some of the original

park in 1981 because its land apparently had been illegally confiscated from local farmers. This move provoked a tremendous uproar among Costa Ricans and international actors, including street protests, petitions, letters from international conservation organizations, and complaints from within the ministry responsible for executing the decision (Evans 1999). It even resulted in Boza's resignation from the parks service.

Importantly for my theory, the movement was truly national: "People were not fighting to preserve their favorite lake to go boating on or some other popular recreational destination; they were fighting to save the country's most important system of wetlands... Most of the participants in the movement, to be sure, probably had not ever visited the area. Just knowing its ecological value, however, served as incentive enough to be involved" (Evans 1999, p. 139). While the decision was not reversed, the national and international reaction clearly affected the administration, causing it to release a report showing that President Carazo had designated more PA acreage than his predecessor, and that he planned to do more. The reaction also likely depressed other efforts by agribusiness to "release" more land near PAs.

1.8.6 Discussion

The history of conservation in Costa Rica makes it clear that the country's dependence on natural resource exploitation, and the degradation that resulted, were major causes of its eventual prioritization of conservation. As Mario Boza said: "A series of environmental problems like deforestation, poaching, erosion and pollution seriously threatened the conservation of the cultural and natural heritage of the nation." The national parks were then an attempt "to preserve at least representations of this heritage" (quoted in Evans 1999, p. 75). It is unfortunate that it took massive forest loss for mobilization to occur and have an effect, but "as powerful a problem as deforestation is in Costa Rica, in many ways it did help wake up a nation to its environmental responsibilities" (Evans 1999, p. 51). Costa Ricans mobilized to conserve nature close to their communities and around the country. Throughout the development of Costa Rica's PA system, international actors were also involved both in pressuring the government and in funding its

conservation efforts. The foreign aid departments of the United States, Canada, Sweden, Finland, Denmark, Norway, Germany, and the United Kingdom all funded the PA system at some point, in addition to at least twenty-six international NGOs (Evans 1999). Overall, it is clear from the qualitative evidence that Costa Rica's experience with resource dependence and the resulting environmental degradation was fundamental in shifting it to be a global conservation leader, and that Costa Rica's strong democratic institutions were key to translating mobilization into policy.

This local, national, and international mobilization has been a success. Costa Rica is now also a world leader in reforestation (Konyn 2021) and has enshrined the right to a healthy environment in its constitution (Boyd 2018). Costa Rica's protection even resulted in reduction of its economic dependence on natural resources by creating an ecotourism industry that now powers its economy. This suggests interesting potential cyclical dynamics that future work could explore. Overall, it is clear from the qualitative evidence that Costa Rica's experience with resource dependence and the resulting environmental degradation was fundamental in shifting it to be a global conservation leader and that Costa Rica's strong democratic institutions were key to translating mobilization into action.

1.9 Conclusion

Protected areas represent a long-term investment in ecosystems and the services they provide. Understanding the political dynamics that lead countries to differing levels of investment is an important path for research, especially as new international goals lead to accelerated PA network growth. The relationship between natural resource extraction and ecosystem preservation is more complicated than we might think. In this paper, I have argued that strong democratic institutions can reverse the assumed negative relationship between NRD and protection, causing more dependence to be associated with more protection because citizens and other interest groups demand it. In less democratic countries, natural resource dependence does indeed lead to less protection. To test my argument, I employed novel geospatial techniques. The findings shed new

light on the political economy of environmental policymaking and biodiversity conservation. They show that institutions can mediate the distributive conflict that undergirds land use policy and PA designation in unexpected ways. This has important implications for addressing the climate change and biodiversity crises, especially in an age of democratic backsliding.

The findings also provide several avenues for future work. First, I provided an array of qualitative and quantitative evidence that environmental degradation leads to mobilization at multiple levels. While previous work has found support for this mechanism in other contexts (e.g., Nuamah and Ogorzalek 2021), future work could probe the environmental aspect even more directly than was possible in the scope of this paper, using survey experiments or broader event analysis. Second, this paper has been agnostic about the quality of enforcement in PAs. As an underlying assumption for this type of analysis, it is reasonable to say that investment in PAs of almost any type is more environmentally beneficial than lack of a PA. Future work, though, could explore PA outcomes more directly. Does the boost from natural resource dependence in PA designation also lead to better PA enforcement? Or are resource-dependent countries more likely to create "paper parks" where enforcement is weak? Third, the paper only briefly mentioned the checkered history of PAs in terms of displacement of local populations and possible negative effects on local economies. These dynamics merit closer attention, especially in the context of PAs established in resource-dependent countries or countries with historically contentious land distribution. Fourth, the country-border regression discontinuity design to test the effect of national-level dynamics could be applied to other geographically-specific political outcomes. For example, scholars could test the influence of national-level dynamics on European Union elections, holding constant the local concerns of citizens near borders in the Schengen Area.

More broadly, while this paper focuses on the relationships between democracy, mobilization, and natural resource dependence, there are likely other important factors at play in determining PA policy. Understanding what drives these critical land use decisions is increasingly important as climate change and the biodiversity crisis accelerate, so future scholarship on protected areas broadly would be welcome.

Chapter 1, in part, has been submitted for publication of the material. The dissertation author was the primary investigator and author of this material.

Chapter 2

Conserving What's Left: The International Environmental Regime and the Politics of Subnational Compliance

Abstract
A long-running debate in the international relations literature is whether international agreements are effective at producing domestic policy change. Much of this research focuses on national-level indicators of policy and the domestic political interests that are thought to influence it. However, there can be wide subnational variation in both policy changes and the strength of countervailing pressures. I apply this framework to protected areas, a key policy response to the biodiversity and climate crises that has significant distributive consequences over land use. Using an original geospatial dataset on 846 ecoregions worldwide from 1992—2020, I find that when a democracy becomes more deeply embedded in the international environmental regime, it is more likely to protect more land. However, local economic pressures do exert downward influence on protection. This subnational framework helps synthesize findings in the literature, and deepens our understanding of a critical area of environmental and land use politics.

2.1 Introduction

Can international cooperation induce domestic policy change? This question has been a central concern of the international relations literature for decades. Debates have centered on both international and domestic factors. Internationally, scholars have focused on management (A. Chayes and A. H. Chayes 1993; Levy, Keohane, and Haas 1993), the tradeoff between broad

support and deep cooperation (Downs, Rocke, and Barsoom 1996; Gilligan 2004; Bernauer, Kalbhenn, et al. 2013), agreement design (Mitchell 1994; Fearon 1998; König and Mäder 2014; Gilligan 2006), and the role of international organizations and agreement secretariats in actively influencing state behavior (Goes and Chapman 2024; Donno 2010; Fang and Stone 2012; Kelley and B. A. Simmons 2015; Koliev, Sommerer, and Tallberg 2021). On the domestic side, research examines domestic constituencies that desire cooperation (Dai 2005; B. Simmons 2009), the presence of domestic veto players (Peritz 2020), state capacity (J. Gray 2013), and regime type (Bättig and Bernauer 2009), among others. However, findings generally remain mixed.

The literature that tries to assess compliance with international environmental agreements is a good example of a field where domestic policy change is inherently important to solve a global policy problem but where findings have been mixed. A common thread in much of the work on environmental agreements and beyond is that cooperative behavior is empirically measured with policy or outcomes at the national level, such signing an agreement (Bernauer, Kalbhenn, et al. 2013), emissions trends (Bättig and Bernauer 2009), or indicators of human or labor rights (Koliev, Sommerer, and Tallberg 2021; Kelley and B. A. Simmons 2015). The same is true of the countervailing, anti-cooperation pressures that are thought to make cooperative behavior less likely (Genovese 2019; Peritz 2020). While this approach makes sense given the scope of many international agreements, it obscures cases where cooperative behavior—i.e. policy change—and the distributional conflict that determines it vary subnationally. For example, a country may sign an international agreement requiring it to modify its labor standards, but implementation of the policy depends on local business's willingness to do so and the government's varied capacity to enforce the regulation in different places. The country may be "complying" in some places but not in others based on the strength of local, countervailing interests. From an outside, removed perspective, this might look like noncompliance overall even if standards on average have improved.

Recent evidence suggests that global cooperation is sometimes more effectively modeled as a domestic distributive conflict rather than an international prisoner's dilemma or freeriding

problem (Aklin and Mildenberger 2020; Colgan, Jessica F. Green, and T. N. Hale 2021). If this is the case, we should expect the strength of countervailing interests to vary subnationally in addition to across countries: Different regions within the country might be subject to more intense pressure against or for cooperation. At the same time, shifting analysis of cooperative outcomes to the subnational level allows opportunities to measure progress toward cooperative goals, even if national-level legislation has not completely cleared the bar to be coded as cooperative in an indicator. Some literature addresses implementation of international agreements at the subnational level (Gagnon-Légaré and Prestre 2014; Puppim de Oliveira 2009; Betsill and Bulkeley 2006), but does so by focusing on subnational actors, like local governments, doing the implementation. What I have in mind is broader: policy change stemming from the influence of international agreements that varies subnationally in general—be it from the national government or other actors.

In this paper, I develop a theory on the subnational politics of international regime effectiveness in the context of protected areas (PAs), which are locations set aside for the long term conservation of nature. PAs are a primary policy response to the biodiversity crisis, and have a large influence on climate change mitigation and adaptation. They also, however, have significant distributive consequences. Since they limit or prohibit economic activity, economic interests that want to use the land for other purposes do not want them.

I argue that a country becoming more deeply embedded in an international regime can lead to policy change, but that domestic pressures shape subnational variation in that change. In countries where the government is susceptible to domestic political pressure from pro-cooperation interest groups, they can use the state's participation in the regime as a means to influence it. However, anti-cooperation groups will have influence in places where they have more interest in maintaining the status quo. In the context of PAs, I predict that as a state becomes more deeply embedded in the international environmental regime, it will establish more PAs. However, the likelihood of protection should decrease as the economic value of land increases. I expect to see subnational variation on PA establishment based on the particular strength of

countervailing pressures in different places. Local politics affects the subnational implementation of internationally cooperative behavior.

To test these theoretical expectations, I create a new time-series dataset of the coverage of ecoregions by PAs over time. For all countries from 1992-2020, I measure what proportion of each ecoregion within that country is covered by a PA, as well as the potential economic value of each ecoregion over time.[1] This data collection effort represents, to the best of my knowledge, the first global dataset of ecoregion protection by countries over time. By using this data rather than measuring country-level protection, such as percent of total land area protected, I can better measure subnational variation in the environmental and economic value of land. I supplement the ecoregion data with political-economic variables at sub-national and country levels to probe the implications of the distributive model I propose, and undertake several strategies to address endogeneity concerns around my independent variables. The findings support my theoretical arguments. Greater participation in the international environmental regime is associated with more protection across ecoregions, while higher economic value of an ecoregion is associated with less protection.

This paper makes several contributions. First, it contributes to the literature on the influence of international actors and agreements on domestic politics (Dai 2005; Fang and Stone 2012; Goes and Chapman 2024; Hafner-Burton and Tsutsui 2005; Kaiser and J.-H. Meyer 2019; B. Simmons 2009), and specifically on the effectiveness of the environmental regime (Bernauer 1995; Bernauer, Kalbhenn, et al. 2013; Helm and Sprinz 2000; Ward 2006; Young 2009). I show that measuring subnational variation can detect a large influence of IEAs, especially when they are considered in the aggregate rather than measuring the effect of one particular agreement.

My findings also speak to the debate about models of global environmental politics. Many scholars have seen environmental challenges as a global collective action problem (Keohane and

[1] Ecoregions are defined as "relatively large units of land containing a distinct assemblage of natural communities and species, with boundaries that approximate the original extent of natural communities prior to major land-use change" (D. M. Olson et al. 2001, p. 993), and are commonly used to measure PA networks' effective location (e.g. Dinerstein et al. 2017).

Victor 2016; Underdal 2017). More recently, scholars have argued that domestic distributive conflicts matter as much as international free-riding concerns (Aklin and Mildenberger 2020; Colgan, Jessica F. Green, and T. N. Hale 2021; Genovese 2019; Kennard 2020). I synthesize these approaches by proposing a distributive conflict, but one that cannot be understood without considering the role of international politics (Bernauer, Kalbhenn, et al. 2010). This paper attempts to model a subnational environmental distributive conflict empirically.

Last, while the study of environmental politics has become more mainstream in political science, the majority of work is focused on climate change (Hadden and Prakash 2023), even though other environmental crises interplay with climate in addition to deserving attention in their own right (Jessica F. Green and T. N. Hale 2017). This paper focuses squarely on the politics of biodiversity and land use. Despite the political nature of PAs, relatively little political science work has focused on them. Existing approaches have focused primarily on economic incentives or used coarse measures of PAs within broader arguments (Kashwan 2017; Neumayer 2002a; Neumayer 2002b). Newer work has provided rich theoretical insight into the politics of PA creation, but empirically focused on one or two countries to build their broader arguments (Alger 2023; Mangonnet, Kopas, and Urpelainen 2022). My findings build on this work by capturing important differences among PA networks by introducing the coverage of ecoregions as an outcome, and conducting empirical analysis on a global scale.

2.2 Subnational Policy Change and Protected Areas

While the framework could apply to a wide range of policy areas with global agreements managing domestic implementation (labor, health, human rights, other environmental policies), I focus on the policy area of protected areas (PAs), which are locations set aside for the long term conservation of nature. PAs are a primary policy response to the biodiversity crisis, and have significant influence on climate change mitigation and adaptation. Protecting diversity of life on earth is critical, and decisionmakers have had tools to do so for generations. However,

biodiversity loss has been part of human development for millennia. This is because for most of the last 10,000 years, and particularly starting in the industrial revolution, development has been driven by converting land from diversity-rich to diversity-poor (Swanson 1994).[2] The fundamental dynamic is that diverse resources like old-growth forests or marshlands are not valued as highly as the low-diversity alternative, such as a farm or a mine. When this is the case, land conversion occurs, with accompanying biodiversity and species loss.

PAs restrict the method of development where biodiversity is replaced with more "productive" alternative uses of space. When governments create a PA, they make a conscious decision to restrict conversion in exchange for more diffuse benefits from intact ecosystems such as biodiversity conservation, flood resistance, increased productivity in adjoining areas, tourism, or international prestige (Mangonnet, Kopas, and Urpelainen 2022; Sala 2020).[3] This creates winners and losers and divides preferences on PAs between those who prefer shorter term, conversion-derived benefits, and those who place more value on diffuse, long-term benefits (Mangonnet, Kopas, and Urpelainen 2022).

This dynamics makes PAs a good case to measure subnational compliance and local politics. They have significant distributive consequences, since they limit or prohibit economic activity. Local economic interests that want to use the land for other purposes do not want them, meaning that they have a clear countervailing interest that can be measured locally. At the same time, the implementation of many international environmental agreements' provisions can be assisted through the establishment of PAs (e.g. biodiversity conservation, ecosystem preservation, reduction in wildlife trafficking/poaching, pollution reduction, natural disaster resilience). There

[2]Even before land was being converted, the spread of humans around the world led to precipitous decline of biodiversity, especially large mammals that were a plentiful food source (MacKinnon 2013). Environmental degradation has been a major concern of societies throughout history, often leading to their collapse (J. Diamond 2011).

[3]Governments are critical to the provision of PAs: "without government intervention and support, these areas probably would not exist in the same form and the benefits they provide would be greatly diminished or lost" (Dixon and Sherman 1991, p. 68). The International Union for the Conservation of Nature (IUCN) identifies four types of PA governance, three of which require recognition and cooperation from national governments (Borrini-Feyerabend et al. 2013). PAs are usually established by executive agencies or legislatures, meaning they are subject to the same influences on policymaking as other government decisions.

simultaneously exists significant international cooperative pressure to establish PAs, but important local pressures against them. Additionally, PAs have an inherent spatial component, meaning that they can be measured subnationally in a systematic way. Last, while subnational actors and administrative units do establish PAs, they generally "do not commit themselves directly" to multilateral agreements in the same way as national governments (Gagnon-Légaré and Prestre 2014, p. 230).[4] This setup makes this policy area a good place to focus in building and testing my argument about subnational compliance with multilateral international agreements.

Understanding the politics of PAs is also important in its own right. They are a dominant conservation policy response by states and cover almost 18% of the planet's land surface. Their primary purpose is to preserve ecosystems and slow the biodiversity crisis, which is on par with the climate crisis in urgency. Each also exacerbates the other: intact ecosystems store much of the carbon that humans emit, while climate change can help to drive habitat loss and species decline. Research shows that PAs are effective at slowing biodiversity loss (Geldmann, Manica, et al. 2019; C. L. Gray et al. 2016; Nepstad et al. 2006), and that they already make significant contributions to carbon sequestration (Duncanson et al. 2023).

The importance of PAs, despite their relatively low profile compared to other environmental issues like carbon reduction, has not gone wholly unnoticed: the UN recently agreed to a framework increasing global commitments to protecting 30% of the world by 2030. The recent Conference of Parties for the UN Convention on Climate Change also aligned itself with these goals, in an unprecedented move (Watts and Greenfield 2023). Many major donors, including states, are looking to PAs as a way to slow environmental degradation globally and prevent carbon emissions via deforestation, particularly in heavily publicized places like the Amazon. The UN Sustainable Development goals directly address biodiversity conservation, and the Convention on Biological Diversity was one of the landmark agreements in the international environmental regime. PAs are substantively important, on the international policy agenda, and a

[4]There are a vast array of transnational governance structures where subnational and nonstate actors do commit themselves to various forms of agreements (T. Hale 2020; Andonova 2014; Hadden and Jasny 2019), but I am focusing on and measuring formal, interstate agreements.

good case for applying the model of subnational cooperation.

2.3 The Political Economy of Biodiversity Conservation and Protected Areas

Overall, the government is being pushed in multiple directions because of the global, national, and local nature of PAs' costs and benefits. I focus on how the international environmental regime can create pressure on governments to establish PAs, who then must contend with local distributive politics in deciding when and where to do so.

2.3.1 International Environmental Pressure

At the global level, healthy stocks of biodiversity slow climate change, allow for innovations due to genetic diversity, provide resilience against global agricultural collapse, and provide nonmaterial benefits (Wilson 1984; Sala 2020). This is why governments, civil society, and individuals care about the fate of biodiversity in faraway countries and often advocate for protection.[5] Research does show that individual countries tend to underinvest in global public goods.[6] This means that although governments are pressured by the international community, they also have incentives to freeride off others' efforts. However, because the biodiversity stock within a particular country is unique, one country's protection of biodiversity is not directly exchangeable with another's. Endemic species are lost forever across the entire world if they are lost in the one country that they live.[7] This incentivizes the global community to invest in cooperation on biodiversity conservation across borders. It also means that governments will

[5]The plethora of international NGOs that advocate for conservation in places far from their headquarters speaks to this tendency (Adams 2004). These organizations are usually based in rich countries, leading credence to the idea that environmental protection is a post-materialist priority (Inglehart 1971; Inglehart 1997), but there are also often domestic environmental organizations with whom these groups work (Haynes 1999).

[6]This has especially been the conventional wisdom on environmental issues like climate change, although as referenced in the introduction this framework has recently started being more heavily debated, with country-level distributive conflicts being suggested as being more important (see Aklin and Mildenberger 2020; Kennard and Schnakenberg 2023; Aklin and Mildenberger 2023).

[7]Endemic species are species that are found in a single defined geographic location. The Galapagos tortoise is an example.

experience pressure for PAs in specific places within their country, in addition to overall.

Governments have experienced international pressure to expand their PA networks for decades. Beginning in the 1970s, PAs became one of the most widespread policy responses to environmental problems. Creating PAs became accepted as "what states do," in the vein of the World Society approach (J. W. Meyer et al. 1997). This helps to explain the vast proliferation of PAs across states starting in this time period, although growth was initially quite slow. International agreements beginning with the Convention on Biological Diversity (CBD) in 1992 started including targets for the percentage of a country's land area that is covered by a PA. Even before the CBD, many other international conservation regimes also existed and pushed countries to protect more, including the UNESCO World Heritage Site program and the Ramsar Convention on Wetlands. Such goals give a rallying point for interested parties, which in the aggregate can shift interests in the country. These agreements often also include more specific targets about ecosystem representation within the PA network,[8] which creates subnational variation in the degree to which establishing a PA will further "compliance" with international agreements. Governments are both pressured to establish more PAs generally and to do so at specific places within their borders.

Additionally, it may not even take direct participation in agreements with specific targets to create pressure. States are socialized by the international community to view certain policies as mainstream and beneficial (Checkel 2001; Pevehouse 2002)—this likely happens across many interactions with the international environmental community, even if the event or interaction in question is not specifically addressing PA policy. Association with the international regime complex around these issues, which states may join for related or unrelated reasons to PA and biodiversity policy itself, can increase a state's propensity to implement these policies (Hironaka 2014). Foreign governments can also take part in this socialization, diffusion, and pressure

[8]For example, Sustainable Development Goals SDG Target 15.1 commits to "ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services…" is measured by indicator 15.1.2, "proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type" (Goals 2022).

process: they could want more protection globally, or be trying to externalize policy change rather than make it within their own country.[9] For example, Norway signed an agreement with Guyana in 2009 to accelerate efforts to stop deforestation in the latter country (Butler 2009).

International actors can also become involved beyond regime membership. They can provide information, such as through scientific research on the state of biodiversity. The Millenium Ecosystem Assessment (MA) was published by a collection of IOs and NGOs in 2005, and involved input from over one thousand scientific researchers around the world. The report was widely covered in the news and helped shift public opinion in favor of biodiversity conservation, as well as empowering pro-biodiversity environmental groups.[10] Information provision by international actors can have an especially pronounced effect in concert with domestic experts, where they can mutually reinforce conclusions and policy recommendations (Fang and Stone 2012). Domestic interest groups in general are critically important in turning international information and commitments into policy change at the domestic level (Dai 2005; B. Simmons 2009). They try to shape the specifics of the implementation of PAs.

These channels are likely to be more effective as a country deepens its involvement with the international environmental community. It will be more likely to receive information, be socialized, and be susceptible to pressure from other states and international actors, because it has legal commitments through its agreements and is part of fora designed to implement and manage these agreements. Through these avenues, the international environmental regime can both empower domestic pro-biodiversity domestic interests and directly shift the government's understanding of the relative utility of pro-PA policy compared to the interests of extractive groups. Thus, I posit my first hypothesis:

[9]This could be a form of public goods freeriding, but it can also be a matter of directing resources and attention where PAs can have the most effect. Many developed countries have already converted most of their biodiversity-rich areas to biodiversity-poor alternatives. The remaining biodiversity hotspots in the world are primarily located in developing countries, so because there is only so much pro-environment governments in developed countries can do domestically, they have an incentive to pressure other countries (Swanson 1994).

[10]One major legacy of the MA was the popularization of the term "ecosystem services" to refer to the value and benefits of nature (Carpenter et al. 2009), an idea that while controversial (Vadrot 2014) has provided the baseline for many policies that aim to preserve ecosystems.

Hypothesis 1 *Increased state involvement in the international environmental regime complex is associated with more protection of an ecoregion within a country, all else equal.*

I expect this effect to manifest especially in countries where domestic groups are able to effectively use the pressure points, commitments, and information created by the international environmental regime to advocate for protection. That is, the regime is most likely to have an impact in states where both the direct and indirect (through domestic groups) channels of influence are available. The international environmental regime creates pressure on governments to establish more PAs in general, and provides guidelines about specific areas to prioritize.

2.3.2 Economic Incentives and Extractive Interests

However, the influence of the global environmental regime must contend with local politics that pressure the government against protection. Governments must contend with distributional politics when determining where to establish PAs, because they exclude economic actors from accessing resources and can create significant local and national costs in addition to the benefits of biodiversity. Extractive interests do not want PAs, especially when the land that may be protected is economically valuable. They have been the dominant force undertaking the global conversion process of land in the last fifty years, and push against PA creation in economically valuable areas.[11] Extractive interest groups are firms and industries that are interested in land use for resource extraction such as mining, logging, and most agricultural practices.[12] They prioritize the short-term economic windfalls that can be gained from this sort of placement, eschewing the long-term benefits that biodiversity can provide (Sanford 2023). Organized agricultural interests, such as large landowners or multinational agricultural

[11] For a detailed discussion of this group and its role in PA policymaking, see Alger (2023).

[12] There are limited cases where an extractive firm would prefer a PA to be established because it believes it will be able to gain exclusive access to resource extraction in that area, for example by winning a government contract for sustainable extraction or via illegal extraction. The argument presented here is for extractive firms on average; any individual firm is unlikely to be confident that it would be in that position.

corporations, would clearly prefer this type of placement. These actors can be few in number but great in power, due to economic strength and advantage in overcoming the collective action problem (M. Olson 1965). Consolidation of agricultural industry is becoming more prevalent throughout the world (Ceddia 2019).

Beyond agricultural interests, other resource extractive industries would also prefer that PAs not be placed in areas that would complicate their business. Examples of this sort of industry would be oil extraction, mining, or logging. Even if some PAs still allow resource extraction, the process generally requires more bureaucratic hurdles if it is within a PA than outside of it. These groups have been successful during the expansion of the global PA network: while PA networks have grown, they have varied widely in breadth of coverage, because such breadth conflicts with continued economic extraction and land conversion. Extractive interests are resource-powerful, have persuasive economic arguments for national governments, and are more consolidated and better organized than groups that desire a PA network that protects more broadly. I expect extractive interest to be most strong in places with significant potential for economic opportunity, which would concentrate protection in low-opportunity cost areas. They have less interest in low-economic opportunity areas, and so they do not push as hard against PAs created there. In other words, countervailing pressures against the globally cooperative policy of establishing PAs vary subnationally. Where they have more interests, they will pressure governments harder against PA expansion. This leads to my second hypothesis:

Hypothesis 2 *The more economically valuable an ecoregion is, the less that ecoregion will be protected, all else equal.*

From the perspective of the government, they may wish to establish PAs in order to satisfy international goals and domestic environmental interests, but also feel pressured to heed the powerful economic interests that do not want protection in certain places. Policy change will vary subnationally based on the strength of local interests.

2.4 Research Design

Because of the nature of PA politics and subnational compliance, variation at both the ecoregion level and national level are important both theoretically and empirically. The unit of analysis of the dependent variable is the country-ecoregion-year. Independent variables vary at both the ecoregion and country-year level. I limit the sample to liberal and electoral democracies according to V-Dem's coding scheme, since I expect my hypotheses to hold in countries where domestic and international pressure can effectively combine to influence policy.[13] The full sample includes over 26,000 country-ecoregion-years across 116 countries and 28 years, although data availability on the independent variables constrains the sample in most models.

To test the empirical implications of my argument, I analyze the **proportion of each country-ecoregion** (that is, all ecoregions within each country, splitting ecoregions by national boundaries where appropriate) that is **covered by a PA** each year between 1992 and 2020. The variable captures how each state's PA network expands over time. An example of how this variable can change is shown in Figure 2.1.

Data on ecoregions is sourced from Ecoregions 2017 (Dinerstein et al. 2017). Spatial data on PAs come from the World Database on Protected Areas (WDPA), a comprehensive database from the UN Environmental Programme (UNEP) and the IUCN (UNEP-WCMC and IUCN 2022). The database is updated monthly, but for my purposes I limit it to PAs designated by the end of 2020. One potential issue is that if a PA is degazetted, or abolished, it is removed from the WDPA data entirely, rather than having a date created and date degazetted field. However, the WDPA data is still by far the most comprehensive and representative dataset we have for PAs, and degazetting is a relatively rare occurrence.[14] To split cross-national ecoregions by country, I

[13] As an empirical extension, I test the hypotheses with the sample limited to Closed and Electoral Autocracies, as well as middle regimes. I do not find support for the model in the first group, and find weaker in the second. This provides evidence for the importance of interest group contestation and policy pressure. See Appendix Table B.1

[14] Recent research identified 543 instances of PA downgrading, downsizing, or degazetting (PADDD) in 57 African countries from 1962-2009 (Mascia, Pailler, et al. 2014; Mascia and Pailler 2011). There are over 300,000 PAs in the global dataset, so PADDD does not seem to be a systematic occurrence even if we extrapolated the results outside of Africa.

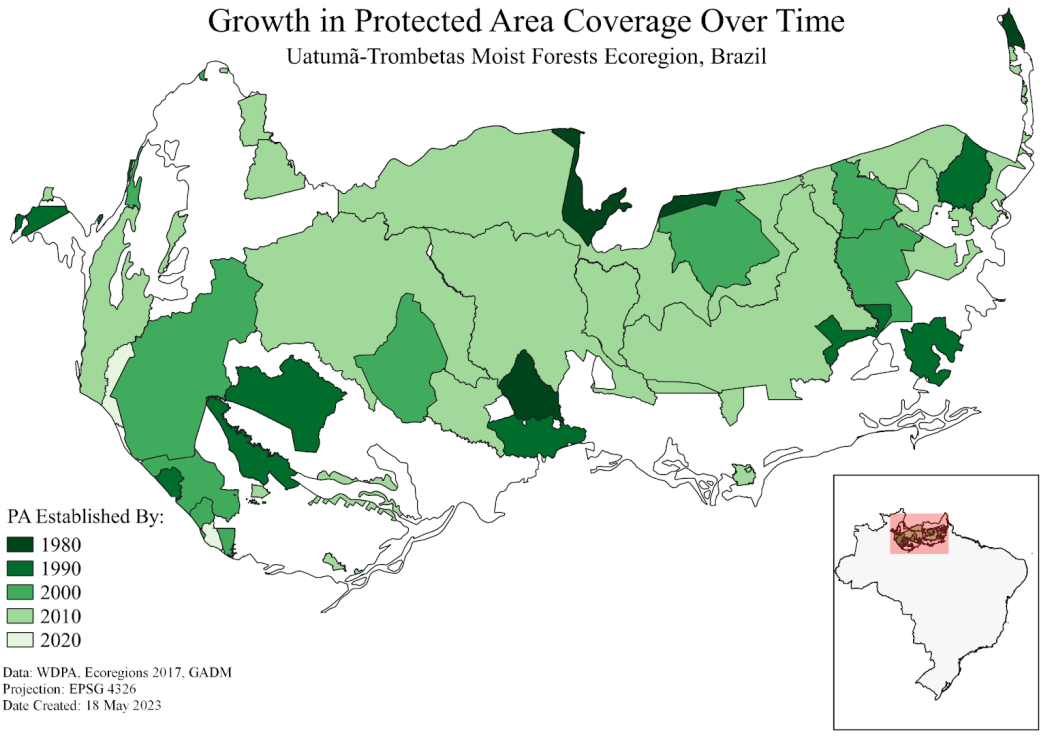


Figure 2.1. Dependent Variable Example. Data on PA establishment has longer period than full sample in this figure in order to demonstrate growth over time.

use Database of Global Administrative Areas (GADM) at level 0 (national boundaries).

To summarize the data processing procedure,[15] I removed all marine PAs from the WDPA dataset and filtered out PAs with no data on what year they were established. Marine PAs are an important form of conservation, but the subnational variables, including ecoregions, economic opportunity, and biodiversity data are only available for terrestrial areas. I then subdivided the data into PAs created in 1992 or earlier, 1993 or earlier, and so on, to create an annualized dataset of the global PA network. Next, I dissolved each year's PA network into a single polygon object in order to not double-count areas where two PAs are co-located.[16] The global network's growth over time during the period of analysis can be seen in Figure 2.2 (with marine PAs included). To create the country-ecoregion level of analysis, I intersected the Ecoregions 2017 spatial data with GADM country borders. Then I could combine the data by intersecting the

[15] See Appendix B, page 118 for a more detailed discussion of geospatial processing to create dependent variable.
[16] This can occur when, for example, a National Park is located inside of a National Forest.

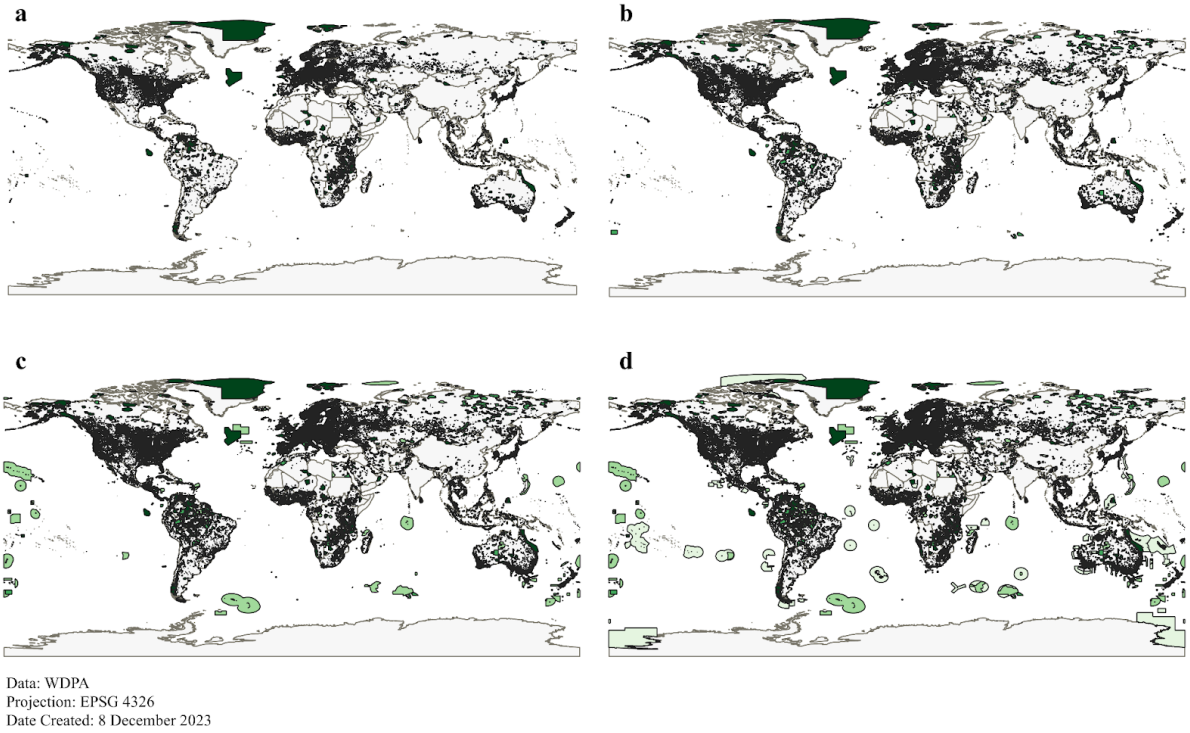


Figure 2.2. Variation in Global PA Network Over Time. Panels *a*, *b*, *c*, and *d* display the global PA network in 1992, 2002, 2012, and 2020, respectively. Displaying the global PA network with easy visualization is difficult, so these maps are intended only to demonstrate that the network has grown over time and to highlight particular spots of growth. For example, between 1992 and 2002 a clear growth in Northeast Asia can be seen.

country-ecoregions data with the annualized PA data and calculating the area of each PA network within each ecoregion, in each country, and in each year. After dividing that by the total area of the ecoregion, I had all country-ecoregion-year observations where any protection had occurred. I supplemented this using a similar process to identify country-ecoregion-years that were not protected from 1992-2020, in order to have the full sample. To my knowledge the dataset created and used here is the first that can measure how ecoregion coverage has changed within countries, across the entire world, and over several decades. The distribution of the dependent variable is shown below in Figure 2.3. Across time, very little protection is common, with frequency

decreasing steadily until a jump at complete protection.[17]

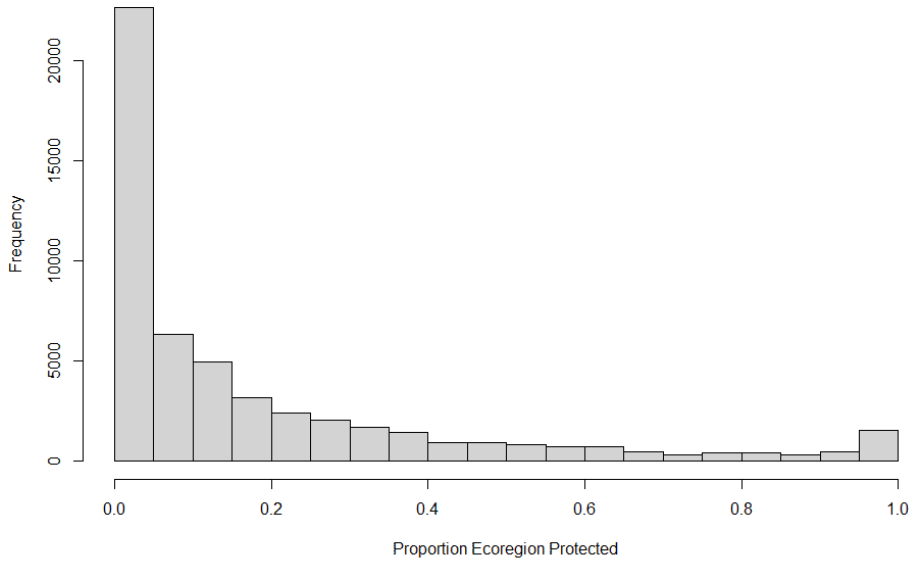


Figure 2.3. Histogram of Dependent Variable (Country-Ecoregion-Year Protection).

Integration into the international environmental regime (H1) is measured using the **total number of international environmental agreements** (IEAs) in force for a particular state. This measure is used elsewhere in the literature as a proxy for participation in global environmental governance, and is appropriate for the same purposes here.[18] This variable is at the country-year unit of analysis.

To measure the impact of extractive interests, I proxy for economic potential with the annual potential value of crops grown in each ecoregion. To construct this measure, I first sum the total production of seventeen staple crops within each country-ecoregion from the year 2000. Derived from Monfreda, Ramankutty, and Foley (2008), I leverage high-resolution spatial data on the distribution of crops to measure the unique mix of agriculture activity within each

[17]Full protection is most common with small country-ecoregions, which is accounted for empirically by controlling for ecoregion size. The mean of the dependent variable across the entire sample is 18.05%. Many of the occurrences of low protection in the histogram occur in earlier years, which is logical since total protection has risen from 4% to almost 17% of terrestrial land area.

[18]Data from the International Environmental Agreements Database (IEADB). See Mitchell et al. (2020) for a review of uses and Andonova, Hale, and Roger (2017) for an example of similar use.

country-ecoregion (see Figure 2.4 for a sample of the distribution of one crop). I then measure the shifting value of those crops over time using World Bank Commodity Price data, taking a weighted sum of each crop multiplied by its price in each year, for each ecoregion. The intuition here is that the more valuable the types of crops that can be grown within an ecoregion are, the more pressure there will be against PA expansion because agricultural interests will seek to convert potentially protectable land into profitable farmland. Because this pressure may take some time to manifest, I take care to include lags of this variable in robustness checks. An example of how this variable changes is shown in Figure 2.5.

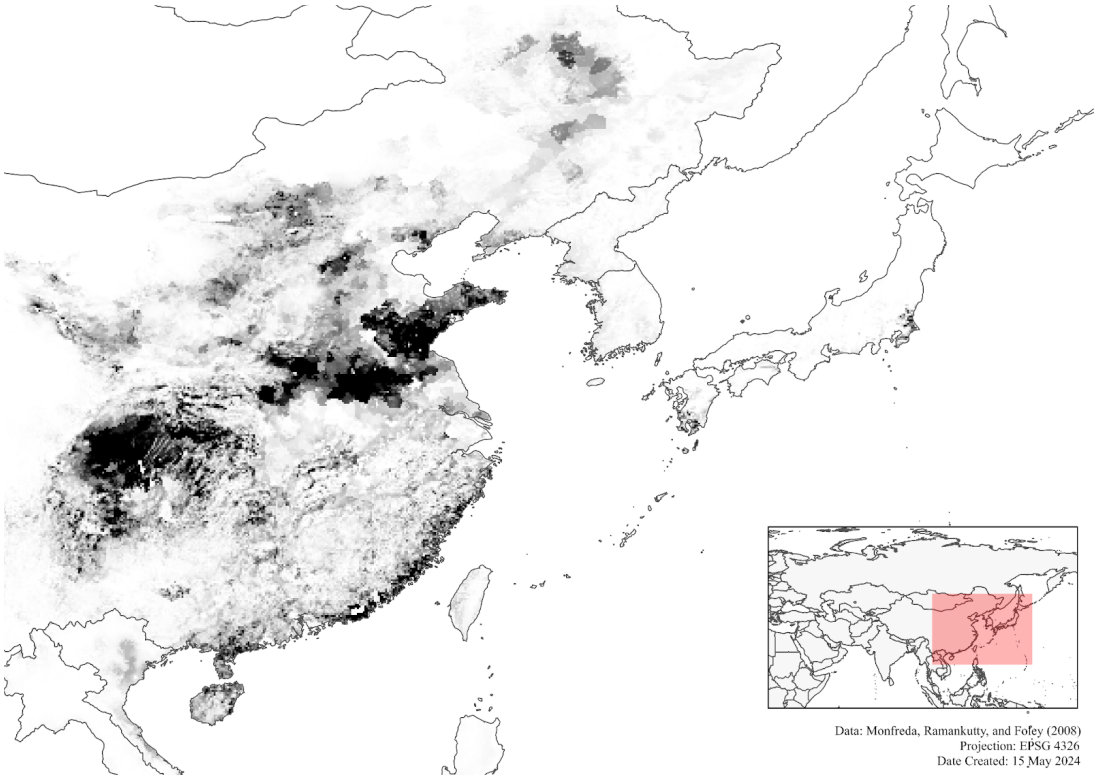


Figure 2.4. Distribution of Sweet Potato Production in East Asia in 2000. Darker colors indicate high density of sweet potato production.

This empirical approach to measuring local pressure against protection relies on two main assumptions. First, it uses agricultural pressure as the main driver against PA establishment. There is an empirical case for this assumption, given that agricultural expansion is "associated with 90% of observed cases of habitat conversion" (Venter, Magrach, et al. 2018, p. 129). While

mining, timber, oil drilling, and other forms of extraction also clearly matter, they are usually either more geographically concentrated than agriculture or difficult to measure across countries and time in a systematic way. The other assumption is that a similar mix of crops will be grown in the ecoregion over time. There is likely to be some shifting based on changes in world prices, but I assume that the mix is unlikely to change substantially, given that the ecoregion has specific climatic and soil conditions that led to those crops being grown there in the first place. Time-varying data on crop distribution is not available for my entire sample, to the best of my knowledge, so extrapolating the year 2000 mix is a reasonable approach. My results are robust to alternative measures of geographically-specific economic opportunity cost that do not vary over time but rather measure the fixed extractive potential of land, including for pastureland.[19]

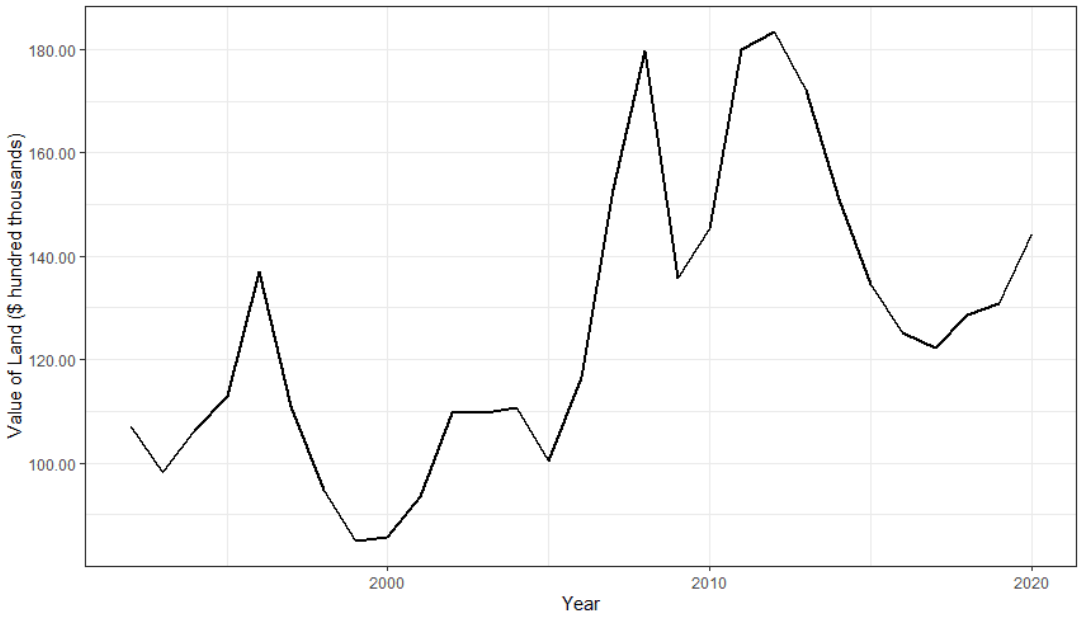


Figure 2.5. Variation of Potential Land Value in Altai Montane Forest and Forest Steppe in China.

I also include a number of control variables. First, I include natural resource dependence at the country-year level to account for the changing strength of extractive influence. I believe that the underlying agricultural potential for land will be more important than overall natural resource

[19]I also leverage spatial agricultural economic opportunity cost data, from Naidoo and Iwamura (2007) and land suitability for staple crops (Ramankutty et al. 2002). See Appendix Table B.2.

rents, which can be spatially concentrated in areas like oil reserves: Land-based extractive interest in a particular ecoregion will be powerful in the distributive conflict regardless of their overall importance to the economy. However, to account for changes over time and other types of extraction, I combine total natural resource rents and agriculture, forestry and fishing value added as percents of GDP (Bank 2023). I also control for GDP per capita to account for the fact that plentiful economic resources may make effective PA creation easier. In robustness checks I include the square of GDP per capita to account for the environmental Kuznets curve hypothesis (Grossman and Krueger 1991), but results remain unchanged. I also control for the total percent of a country's land area that is covered by each ecoregion, since a larger ecoregion is inherently more difficult to protect. At the ecoregion level, I calculate the median biodiversity level of each ecoregion. This measure is taken from Jung et al. (2021), whose data includes a global measure of conservation importance for biodiversity.[20] I modify this data by resampling it to vary from 1 to 100 within each country, so that it measures biodiversity density within each country relative to the total amount of biodiversity within that country. I also rescaled the variable so that 1 represents least biodiversity and 100 represents most. While research from ecological economics shows that avoiding high economic value is more important in explaining variation in PA location than biodiversity (Joppa and Pfaff 2009; Venter, Magrach, et al. 2018), including this is still important to rule it out as a potential alternative explanation.

Lastly, I control for the Polyarchy index from V-Dem, to measure democratic institutions that allow for the participation of civil society in public life. There is a long debate in the literature on whether or not democracy leads to better environmental outcomes (Bättig and Bernauer 2009; Buitenzorgy and P. J. Mol 2011; Midlarsky 1998; Sanford 2023). The answer seems to depend on the particular environmental issue under investigation, measurement strategy, and time period. Following selectorate theory (Bueno De Mesquita et al. 2003), democracy can lessen the power of the extractive interests discussed above by expanding the selectorate to

[20]The Jung et al. data is a spatial raster at 10 km resolution. I used Zonal Statistics within QGIS to calculate the median biodiversity level within each country-ecoregion.

include more groups (i.e. green groups).

However, other groups gain access in democracies that can either counteract or overpower these green groups. Workers in brown industries, agricultural workers, and individuals who rely on more basic natural resource exploitation such as hunters and loggers would likely prefer less protection, because it would threaten their livelihood. Additionally, there is some evidence of the "not in my backyard" phenomenon in the case of PAs, where those most directly affected by the creation of a PA do not want it near them. Therefore, my theoretical expectations about changes in democracy within a country are unclear, and I leave it as a control variable.

2.4.1 Model Specification

I use ordinary least squares (OLS) in the main model, with country and year fixed effects, and clustered standard errors at the country level. The general expression for testing Hypotheses 1-2 is as follows:

$$P_{ecy} = \alpha_c + \gamma_y + \beta_1 IEAs_{cy} + \beta_2 CropValue_{ey} + CX_{cy} + EX_e + \varepsilon_{ecy} \tag{2.1}$$

Where e, c, and y index ecoregion, country, and year, P_{ecy} is the proportion of ecoregion e in country c covered by PAs in year y. $IEAs_{cy}$ and $CropValue_{ey}$ represent the main explanatory variables for H1-2, X_{cy} is a vector of country-level controls, EX_e is a vector of ecoregion-level controls, α represents country fixed effects, γ represents year fixed effects, and ε_{ecy} is the remaining error term. In robustness checks, I also take several steps to address potential endogeneity in the independent variables, particularly the *IEAs* variable.

Because I am using country fixed effects, I am analyzing whether changes within a country, rather than across countries, matter. This will be important when discussing my findings. Country fixed effects are appropriate here because my theory is based on international and domestic factors interacting within countries to influence subnational cooperative behavior, so I am interested in changes within countries over time, rather than comparing across countries.

The Hausman test indicates a significant difference between models with and without fixed effects. I use a one-year lead of the dependent variable to avoid simultaneity bias. As a final note, independent variables are standardized with a mean of 0 and standard deviation of 1 in the tables below so that magnitude is comparable across covariates.

2.5 Results

The results in Table 2.1 provide strong support for the hypotheses. I test each individually (Models 1-2) and together (Model 3) with controls, with similar results across models. In the main model, Model 3, the IEAs variable is significant ($p < 0.01$) and in the expected direction: an increase in IEAs in force in a country is associated with an increase in PA coverage of an average ecoregion in that country. Substantively, a standard deviation increase in a country's integration into the international environmental regime is associated with an 8.3 percentage point increase in PA coverage. Supporting Hypothesis 2, the coefficient for potential crop value is negative and significant ($p < 0.05$), providing evidence that increased pressure for conversion of land for economic gains is associated with less protection. A standard deviation increase in the potential value has a smaller, but still meaningful, substantive effect of 2.7 percentage points less protection. Considering the median for protection across the sample is less than 22%, these are substantively meaningful differences.

With respect to the control variables, which have the same results across all models, democracy is not significant, which is in line with the mixed impact of democracy that I conjecture in addition to the fact that it does not vary much in most countries. Ecoregion size is significant ($p < .001$) and in the expected direction—a larger ecoregion tends to be less protected, even as the distributive conflict changes over time. Other control variables do not achieve significance. It is notable that natural resource dependence is not associated with less protection as one might expect. This points to the overwhelming influence of interest in land conversion that is accounted for with the land suitability variable.

Table 2.1. Regression Results

Dependent Variable:	Proportion Ecoregion Protected		
Model:	(1)	(2)	(3)
Variables			
IEAs	0.0857***		0.0838***
	(0.0198)		(0.0197)
Ecoregion Econ. Potential		-0.0341***	-0.0339***
		(0.0072)	(0.0072)
Ecoregion Biodiversity	0.0068	0.0023	0.0021
	(0.0120)	(0.0127)	(0.0127)
Resource Dependence	0.0198	0.0139	0.0191
	(0.0149)	(0.0148)	(0.0148)
GDPPC	-0.0179	-0.0164	-0.0181
	(0.0117)	(0.0123)	(0.0114)
V-Dem Polyarchy	0.0010	0.0046	-0.0006
	(0.0263)	(0.0257)	(0.0259)
Ecoregion Size	-0.2936***	-0.2572***	-0.2568***
	(0.0442)	(0.0440)	(0.0442)
Fixed-effects			
Country	Yes	Yes	Yes
Year	Yes	Yes	Yes
Fit statistics			
Observations	23,719	23,765	23,719
R^2	0.26646	0.27321	0.27617
Within R^2	0.03559	0.04471	0.04836

Clustered (Country) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

2.6 Robustness

I perform several robustness checks to build confidence in my main empirical results, which I report in the supporting information. First, I include linear and quadratic time trends instead of year fixed effects. Results are unchanged (Appendix Table B.3). Second, I use fractional logit regression instead of OLS. There is evidence that fractional logit regressions with fixed effects in panel data may produce biased estimates because of the incidental parameters problem, but the dependent variable does vary between 0 and 1. Results are robust to these specifications, with similar substantive effects to those discussed above (Appendix Table B.4). Third, I include several alternative measures of key variables. I use potential agricultural rents (Naidoo and Iwamura 2007) and land suitability (Ramankutty et al. 2002) at the ecoregion level, instead of the time-varying potential crop value (Appendix Table B.2). While potential crop value is the preferred measure, it may be the case that the fixed extractive potential of an ecoregion is more important than market fluctuations. In addition, the opportunity cost measure includes pastureland, which is an especially common driver of land use change, particularly in the developing world.

I also use squared GDPPC, to account for an environment Kuznets curve (Torras and Boyce 1998; Grossman and Krueger 1991), as well as more fine-grain measures of extractive groups via oil rents, agricultural rents, and natural resource rents (all from the World Bank Development Indicators). I further include an emissions trend variable from the Environmental Performance Index to account for a country's overall pro-environmental policy orientation, as well as tourism as a percent of GDP, to account for ecotourism that may drive PA establishment.[21] The main results remain robust to all of these alternative specifications (Appendix Table B.5. Next, I address autocorrelation by including models with HAC standard errors and clustering

[21] EPI's CO2 growth rate (CDA). "The CO2 growth rate is calculated as the average annual rate of increase or decrease in raw carbon dioxide emissions... It is then adjusted for economic trends to isolate change due to policy rather than economic fluctuation" (Wolf et al. 2022). I do not include these variables in the main models because they are plausibly endogenous to the outcome variable.

standard errors at the ecoregion level (Appendix Table B.6). Last, I lag the main independent variables for 3 and 5 years, since PAs take time to establish and the pressure for or against conservation may take time to manifest in the policymaking process (Appendix Table B.7). Results are robust to these changes.

2.6.1 Endogeneity

Despite inclusion of the EPI emissions trend variable, concerns may still remain over IEAs representing the influence of the environmental regime, rather than potentially representing a broader commitment by the state to good PA policy. Perhaps a state signs up to more IEAs for the same reason that it creates more PAs across a variety of ecoregions: it simply has pro-environment preferences. While country fixed effects should account for some of a country's "environmental zeitgeist," I perform three other checks. First, I employ an instrumental variable approach. I instrument for a country's IEAs by an inverse-distance weighted average of the lagged IEA memberships of all other countries. This measure uses a similar logic to the instruments in Acemoglu et al. (2019) and Lang and Mendes Tavares (2018) for democracy and globalization, respectively.

Results using the instrumental variable are substantively similar to the non-instrumented models above (Appendix Table B.8). Additionally, while there are theoretical concerns that the non-instrumented IEA measure may be endogenous, the Wu-Hausman test is insignificant. Second, I use the emissions trend variable as the dependent variable in a slightly simplified version of the main model.[22] If IEAs are representative of a more broad pro-environmental sentiment, they should be associated with emissions reductions, since this would possibly be associated with the same sentiment. However, this tentative hypothesis does not find support in the regression test. Emissions trending downward are not associated with signing more IEAs (Appendix Table B.9).

[22]Because EPI trends only vary at the country rather than ecoregion level, I had to remove ecoregion-level variables in order for the model to not be rank-deficient. I added total percent of a country's area protected as a control instead.

Third, I leverage the World Values Survey (WVS) to test if there is a correlation between the number of IEAs to which a state is party and the percentage of survey respondents who answer that they are or have been a member of an environmental organization. If there is a relationship, that would be evidence for IEAs representing an endogenous, underlying environmental preference in a country. I averaged the number of IEAs for each country during the period of each WVS wave 2-7, resulting in 276 country-wave observations (Inglehart et al. 2022). A simple test does not provide evidence that IEAs and environmental organization membership are correlated, either positively or negatively (correlation: -0.0195; *p*-value: 0.76; see Appendix Figure B.1).

Fourth, I take advantage of the subnational nature of PAs and pressure on land by testing if increasing the value of land decreases the influence of IEAs. If IEAs and protection are endogenous, we may only expect PAs in cheaper places, which would mean that IEAs are not shifting preferences toward more costly protection but just representing pre-existing interests. However, when I interact the IEAs and potential crop value variables, the interaction term is insignificant while IEAs are still positive and significant (Appendix Table B.10). This means that even when land value is high, IEAs are still associated with more protection. Combining these tests, I have some confidence that IEAs are not endogenous to some underlying country characteristic, and that they exert an independent influence through the channels proposed above.

2.7 Conclusion

Cooperation with international goals can vary within countries as well as across them. In this paper, I focused on protected areas as a policy that demonstrates cooperation with a wide range of international goals and agreements. I showed that while deeper integration into the international environmental regime is associated with more PAs, local, anti-cooperation politics still matter. The influence of agricultural interests, which desire land for economic purposes, diminishes the likelihood of protection. International cooperation and local politics can conflict,

even if there is a net positive influence of the regime on cooperation.

In pointing out this dynamic, I contribute to work that analyzes the influence (or lack thereof) of nonbinding international cooperation. IEAs are a diverse set of agreements in terms of stringency and formality. Despite these limitations, this paper shows that they are associated with more environmentally friendly outcomes. Debates continue as to whether or not international cooperation can shift domestic outcomes or if it is cheap talk that represents inherent preferences. I provide some evidence that even the kind of cooperation and interaction discussed in this paper can matter.

The paper also contributes to literature comparing international and domestic influences on political outcomes. I demonstrate that international political influences are as associated with PA outcomes as domestic ones in this policy space, which would be consequential. This finding demonstrates the importance of including international forces in distributive conflict models of environmental politics, which are the focus of a promising new strand of literature.

Lastly, this paper shines a light on understudied spatial dynamics in environmental politics, and political science more broadly. Looking at national or local indicators is the most common approach in the field, but even fine-grain non-spatial data can miss important dynamics such as underlying geographic and land characteristics that shape distributive conflict. PAs already cover land totaling to the size of South America — understanding why they are located where they are and what politics undergird those decisions will be important for future, sustainable land use planning.

I highlight four main ways that future work can build on this paper. First, while this paper explores subnational policy change, it is agnostic about at which level of government the policy is actually being implemented. This is a reasonable starting point for this broader analysis since the national government is involved in most PA policymaking, but future work could unpack government decisionmaking to a greater degree (Betsill and Bulkeley 2006). Second, future work could examine the particular activities of international actors, testing whether they have a substantive effect at a more micro level. Third, this paper does not discuss the role

that the broader public may have in PA placement. It does not consider the impacts of PAs on local communities theoretically, and does not measure their preferences empirically. This omission is not intended to erase their experiences or discount their importance, but is rather an acknowledgement of the heterogeneity within this group and difficulty of measuring their preferences and power systematically. While some individuals may want protection near them because of ecological value or ecotourism opportunities, others may experience NIMBYism and not want PAs near them, precisely because they prohibit legal exploitation of resources. Communities whose livelihood is based on land that would be protected are especially likely to feel this way. While this paper's geographic and temporal scope made empirically measuring the role of local communities difficult, future work could examine the conditions under which publics prefer protection or do not, which can help flesh out the political economy argument laid out here.

Chapter 2, in part, has been submitted for publication of the material. The dissertation author was the primary investigator and author of this material.

Chapter 3

Information Technologies and the Quality of Democracy

Abstract
The rapid spread of information communication technologies across and within borders has been an important feature of the contemporary era. The internet is at its core. Until recently, the widespread belief was that the internet would be beneficial for the spread and health of democracy. This common wisdom has become increasingly contested, as political actors in democracies and autocracies alike have learned to use the internet to maneuver information to enhance government popularity and suppress or delegitimate the opposition. We argue that the spread of the internet has contributed to recent trends in democratic backsliding, especially through its effect on political polarization. We test the empirical implications of our theory with a mixed-methods approach that combines a large-n quantitative comparative analysis of democratic backsliding in 97 democracies after the Cold War with a typical case study of democratic backsliding in India to trace the underlying causal mechanisms of the theory. Together, the findings indicate that with growing access to the internet has come the increased likelihood of democratic backsliding.

3.1 Introduction

The last three decades have witnessed the rapid globalization of information communication technologies (ICTs). The advent and proliferation of the internet, alongside the now-pervasive use of mobile phones, digital technologies, and social media, was widely thought to be a beacon for the spread and consolidation of democracy, and an inevitable threat against illiberal

governments that sought control over information to suppress dissent against the regime. The internet offered the promise of giving access to free flows of information, stimulating political participation and greater awareness of global issues like human rights, and increased norms of transparency. By doing so, the internet would contribute to the spread of liberal norms and ideas and give people greater power to hold their governments democratically accountable.

Defying these expectations, illiberal regimes that once feared that the rise of access to the internet would undermine their control soon learned that the internet could be used as a tool to consolidate their regimes and even interfere with democratic regimes abroad (Bush and Prather 2022; Cooley 2015; L. J. Diamond, Plattner, and Walker 2016; Farrell and Newman 2019; Hoffman 2022). Even though the internet has had positive effects on the ability of individuals to mobilize and promote democratic norms and values (L. Diamond 2010; Howard 2010), it has also helped consolidate authoritarian regimes and facilitate repression (Deibert et al. 2010; Feldstein 2019; Gunitsky 2015; Guriev and Treisman 2019; Jerit and Zhao 2020; Keremoğlu and Nils B. Weidmann 2020; King, Pan, and M. E. Roberts 2017; Kurlantzick 2022; Lazer et al. 2018; Munger et al. 2019; M. E. Roberts 2018; M. E. Roberts 2020; Rød and Nils B Weidmann 2015; Spaiser et al. 2017; J. A. Tucker et al. 2017). Political actors in democracies, too, have harnessed the use of information technologies to spread disinformation and attack democratic norms, especially during elections (Adler-Nissen and Zarakol 2021; Benkler, Farris, and H. Roberts 2018; Farrell and Newman 2019; Groshek and Koc-Michalska 2017; Hansen and Lim 2019; Jerit and Zhao 2020). These dynamics can also interact, where illiberal states use the "liberal international information order" against itself and democratic regimes (Farrell and Newman 2021). Yet, whether the spread of the internet has had negative consequences for the quality of democracy *within* democratic countries remains debated and underexplored.

While there are many channels through which the internet may harm democracy, in this paper we focus on the relationship between the internet and polarization. We argue that the spread of the internet has deleterious effects for the quality of democracy because of its influence

on political polarization, a known driver of democratic backsliding.[1] The diffusion of the internet leads to a fracturing of media environments, making credible and fact-based information more difficult to locate and distinguish from other forms of information, disinformation, and propaganda. In addition, the content prioritized by many social media algorithms is biased toward outrage and scandal in the type of content an average internet user is likely to consume, even and perhaps especially in democracies. These developments contribute to the entrenchment of political differences, oftentimes intentionally driven by political actors seeking or wanting to keep political office. For those actors, the internet serves as a powerful platform to legitimize themselves while delegitimizing the opposition.[2] To the extent that citizens decreasingly see other parties as a viable option (or even as dangerous adversaries or threats to democracy) and are increasingly captured in their own echo chambers of (dis-)information, they become more willing to support their preferred political parties' anti-democratic measures either to get into power or to remain in power. To "defend" democracy, they are more likely to support unfair elections, the use of violence and derogatory rhetoric against their opponents, and policies that restrict civil liberties against opponents of their political party. Through limiting democratic accountability, polarization allows leaders to enact democracy-eroding reforms. A demoralized opposition combined with dedicated supporters makes it easier for leaders to pass or enact antidemocratic measures, which exacerbate the incremental erosion of democracy.

Our large-n analysis of democratic backsliding in 97 liberal and electoral democracies from 1992 to 2021 finds evidence that the spread and use of internet communication technologies and content are associated with democratic backsliding. Mediation analysis further demonstrates that this relationship works in part through the internet's effect on polarization. The spread of internet access affects democracy institutionally and behaviorally, providing leaders with opportunities to enable executive aggrandizement and publics with a path to support the roll back

[1]The degree to which access to the internet and social media contributes to political polarization is debated among scholars. In the next section, we argue for an average effect and that the most polarizing effects are especially likely to occur in weakly institutionalized or developing countries, where access to the internet is a newer phenomenon.

[2]In doing so, political actors can borrow directly from the autocrats' toolbox (Keremoğlu and Nils B. Weidmann 2020).

or simply turn a blind eye.

Our findings are robust to alternative operationalizations of democratic backsliding and access to internet communication technologies, placebo tests, and alternative model specifications including an instrumental variable approach and a spatio-temporal autoregressive distributed lag model. We also present a case study that traces the effects of the internet on democracy in India to explore the underlying mechanisms of our argument. This case illustrates the processes leading to democratic backsliding in the world's largest democracy with growing levels of access to information coupled with substantial political polarization, mobilizing support for elected politicians to take actions that undermine key aspects of democracy.

The findings contribute to the burgeoning comparative literature on democratic backsliding (Bermeo 2016; Haggard and Kaufman 2021a; Levitsky and Ziblatt 2018; Meyerrose 2020; Meyerrose 2024; Rovny 2023; Waldner and Lust 2018). We highlight the importance of the internet in propagating the problem, not only in autocratic nations, but among even well-established democracies. Access to information communication technologies theoretically can, in many ways, promote democratization and bolster the health of democracies. For many pro-democracy activists, the spread of the internet provides a means to raise awareness, recruit followers, mobilize voters and even organize protests (Steinert-Threlkeld et al. 2015), ultimately making governments more accountable to their citizens. As a consequence, many scholars have highlighted the potential benefits of internet access for democracy (Castells 2015; L. Diamond 2010; Howard 2010; Kiggins 2015; Sanovich, Stukal, and J. A. Tucker 2018; Shirky 2008). Yet, critics point out that social media and the internet writ large may create political divides and exacerbate polarization (Haidt 2022).[3] Our research contributes to these broader theoretical debates by developing and testing an argument about how the spread of ICTs contributes to the worsening of democracy.

[3]Supporting this more cautionary tale, research shows that internet expansion has been harnessed to further marginalize excluded groups (Nils B. Weidmann et al. 2016), and has facilitated the diffusion of ethnic violence (Bailard 2015; Nils B Weidmann 2015). Other work shows that the divisive (and violent) effect of one-to-many communications is different from centralized mass communication like radio, further highlighting the novelty of this technology (Warren 2015).

In developing this argument, we build on the research about the behavioral effects of the internet in democracies (Bail et al. 2018; Boutyline and Willer 2017; Cho et al. 2020; Conover et al. 2011; ForumID 2020; Leeper 2014; Ribeiro et al. 2020; Santos, Lelkes, and Levin 2021) as well as the existing work that relates political polarization to democratic backsliding (Graham and Svolik 2020; Haggard and Kaufman 2021b; Orhan 2022; Somer, J. L. McCoy, and Luke 2021; Somer and J. McCoy 2018; Svolik 2019; Svolik 2020). Finally, our findings suggest that participation is a necessary but not sufficient condition for a healthy democracy. Whether or not political participation is good for democracy depends on the nature of the involvement.[4] Both leaders and publics can utilize open access to pursue or support incremental strategies of executive aggrandizement with debilitating effects for democracy.

3.2 ICTs, Polarization, and Democratic Backsliding

In this section, we develop an argument about how the internet can diminish the health of democracies. In a nutshell, we argue that the spread of the internet helps create a political environment in which institutional erosion and democratic backsliding are more possible. While there are many mechanisms through which the internet may harm democracy, we focus on its effect on political polarization.[5] The spread of the internet has enabled political actors to entrench political differences, as well as created conditions under which ideological sorting is easier and more likely. The resulting increase in polarization allows political actors, both elected and unelected, to influence public and elite opinion to support anti-democratic policies such as voter suppression or pro-regime electoral reforms like gerrymandering, as well as behaviors such as de-legitimation, harassment, or censorship of the opposition.

[4] See Bajpai and Kureshi (2022) for an example of how increased political participation can facilitate democratic erosion.

[5] Political polarization is defined as "a process whereby the normal multiplicity of differences in a society increasingly align along a single dimension, cross-cutting differences become instead reinforcing, and people increasingly perceive and describe politics and society in terms of 'Us' versus 'Them'" (J. McCoy, Rahman, and Somer 2018, p. 18).

3.2.1 The Polarizing Effect of Information Communication Technologies

Access to information communication technologies has fundamentally changed the information environment. The spread of the internet has coincided with collapse in trust in traditional media and the closing of local news outlets throughout the world (Ceron 2015; Tsfati and Ariely 2014). High-quality information is more difficult to find and to distinguish in a sea of exaggeration, misinformation, disinformation, and propaganda (ForumID 2020; Ribeiro et al. 2020; Santos, Lelkes, and Levin 2021). An average user can reject information that challenges their established point of view and seek out alternative sources of information that reinforce their preexisting beliefs. The anonymity of the internet can also allow sources to appear equivalent even when one is a professional journalist and another a Russian troll.

This fracturing of the media landscape is a key driver of political polarization because it allows citizens to become more entrenched with their preferred political parties; they can more easily dismiss negative news about their own political party as fake news (Boutyline and Willer 2017; Conover et al. 2011). For example, access to various information sources allows supporters of a party to brush off scandals by pointing to "alternative" sources that reduce their preferred party's culpability. After the Brazilian Senate launched an inquiry into President Jair Bolsonaro's handling of the COVID-19 pandemic, allies of the president flooded social media with disinformation, attacks on the inquiry, and pro-regime messaging (Soares et al. 2021). These efforts do not only help to entrench existing supporters, also they can potentially sway undecided citizens in an environment of mixed messaging.[6]

The new information environment also offers opportunities to dismiss and "otherize" political opponents. It is not only easier to dismiss positive news about the political opposition as fake news; the nature of the technology creates the potential for certain types of messages to break through. Simple messages that arouse strong emotions like anger and fear are more likely to go viral on online communications both via algorithms and intentional sharing (Hagey and

[6]Echo chamber sorting, both voluntary and algorithmic, can lead to polarization (Cho et al. 2020), but exposure to opposing points of view can also do so (Bail et al. 2018).

Horwitz 2021; Ribeiro et al. 2020; Santos, Lelkes, and Levin 2021). This can entrench political differences, exacerbating political polarization. For example, during Myanmar's recent unstable democratic period, Facebook was flooded with hate speech and sensationalized stories about the Rohingya Muslim minority. Amnesty International found that "Meta's algorithms proactively amplified and promoted" this content, which directly increased the chances of mass violence (International 2022, p. 7). Although an extreme example, this serves as an illustration of how the internet and social media can strengthen "otherization" and polarization of all kinds.

Beyond the effects of the new information environment on individual attitudes and behaviors broadly, the nature of the internet and social media also can also be weaponized by political actors. These actors strategically use the internet to target audiences for messaging and create an appearance of popularity. For example, affiliates of Viktor Orban's Fidesz party in Hungary own around 500 newspapers and radio and television stations, allowing the regime a high degree of control over media narratives (Ozsvath 2021). However, many young Hungarians disapprove of Fidesz's rule and do not consume traditional forms of media. Because of this, organizations with close ties to Fidesz began social media influencing campaigns specifically targeting younger voters. These "Fidesz-Fluencers," as they are sometimes called, promote far-right values while criticizing left-leaning policies. At the same time, Fidesz has spent millions on social media ads (Rutai 2022). Even more directly, governments and other groups can employ "troll armies" to amplify pro-regime messaging and discredit the opposition. In the Philippines and elsewhere, ruling parties hire workforces to flood comment sections in support of the government and to smear opposition (Bengali and Halper 2019). This campaigning can give politicians an appearance of—or sometimes actual—immense popularity, and it can deepen divisions within societies. While all political actors have incentives to take part in these activities, the inherent biases mentioned above in what is likely to go viral mean that divisive and reactionary politics are more successful in these efforts.

It is true that there is an ongoing debate in the political communications and behavioral literature about the relationship between internet use and polarization. In our reading, the

evidence is mixed, but generally points to a positive relationship between the two. That is, while it is true that some research does not find a relationship between the internet and polarization (Boxell, Gentzkow, and Shapiro 2017; Ceron 2015; Gentzkow and Shapiro 2011; Hargittai, Gallo, and Kane 2008), there is a significant body that does point in that direction (Allcott et al. 2020; Bail et al. 2018; Conover et al. 2011; Guriev, Melnikov, and Zhuravskaya 2021; Melnikov 2021; Ribeiro et al. 2020; Santos, Lelkes, and Levin 2021). Meanwhile, there are very few, if any, works that claim that the internet leads to a decrease in polarization. In addition, several dynamics that have been proposed to lead to polarization have only accelerated in recent years, with platforms such as Facebook and X/Twitter deprioritizing or abandoning attempts to moderate content, and Tiktok emerging as an important, almost entirely-algorithmically based platform. Lastly, many of the studies that do not find a relationship between the internet and polarization are conducted in developed, relatively media-literate societies with longer histories of internet availability (e.g. Barberá 2015; Boxell, Gentzkow, and Shapiro 2017. While we argue for an overall positive effect of the internet on polarization and backsliding, we argue that the influence of the internet on political polarization is likely to be especially pernicious in countries that are institutionally weaker, less developed, or have less experience with the internet overall. In other words, the relationship between the internet and polarization in the U.S. may be fairly weak, but it is much more likely to exist in states like Myanmar or (as the case discusses) India.

3.2.2 From Polarization to Democratic Backsliding

If the internet is associated with increased polarization (on average), the path from the internet to democratic erosion is clear. This is because the relationship between polarization and democratic backsliding has been well-established in the literature. In other words, once a society has become polarized, the role of the internet in directly leading to democratic erosion is less important than the fact that it helped facilitate polarization in the first place. A country, once polarized, tends toward democratic erosion through established channels that the internet may or may not exacerbate.

How does polarization lead to democratic erosion? To the extent that citizens decreasingly see other parties as a viable option, or even as dangerous adversaries or threats to democracy, and are increasingly captured in their own echo chambers of (dis-)information, they become less able and willing to hold their preferred political parties accountable for their policies even if those are not democratic. In these situations, citizens may become more willing to support their preferred political parties' anti-democratic measures either to get into power or to remain in power. To "defend" democracy, they are more likely to support unfair elections, the use of violence and derogatory rhetoric against their opponents, and policies that restrict civil liberties against opponents of their political party (Svolik 2020). This can discourage the opposition, leading them to think that the process is fundamentally corrupted (Haggard and Kaufman 2021a). A demoralized and disengaged opposition combined with dedicated supporters makes it easier for leaders to pass or enact antidemocratic measures, which lead to the incremental erosion of democratic institutions and to anti-democratic behavior (Svolik 2019).[7] In general, scholars have focused on how polarization decreases the chances that incumbents will be punished by their supporters for anti-democratic actions (Graham and Svolik 2020; Orhan 2022; Svolik 2020), reduces likelihood of joint collective action across ideological lines (J. McCoy, Rahman, and Somer 2018), makes "mutual toleration" of opposing opinions less likely (Levitsky and Ziblatt 2018), and generally decreases trust in institutions (Haggard and Kaufman 2021a). All of these mechanisms increase the likelihood of democratic erosion.

Taking this into account, we propose the following hypothesis:

Hypothesis 1 *Increase in access to information communication technologies increases the likelihood of democratic backsliding, in particular through increasing political polarization, all else equal.*

[7] For our purposes, we use the terms democratic erosion and democratic backsliding synonymously.

3.3 Research Design

To examine the empirical implications of our theoretical argument, we analyze data on democratic backsliding events using V-Dem's Episodes of Regime Transformation (ERT) dataset (Lührmann and Lindberg 2019). The data set includes information on autocratization events in a large sample of democratic and autocratic regimes. Since we are interested in exploring how the rise and penetration of information technologies has affected the quality of democracy, we limit the sample to 97 liberal and electoral democracies in the post-Cold War era.[8]

3.3.1 Dependent Variable

We measure *Democratic Backsliding* as a period of substantial and sustained decreases on V-Dem's Electoral Democracy Index (EDI). This index includes a broad swath of measures for polyarchy, including freedom of expression and alternative sources of information, freedom of association, share of the population with suffrage, cleanness of elections, and a host of information about the quality of the elected official process. Following Lührmann and Lindberg (2019), Democratic Backsliding is coded as 1 if the country experiences an initial 0.01 decrease on the EDI and a total decrease of at least -0.10 throughout the entire backsliding episode. A backsliding episode ends the final year of a negative change less than or equal to the initial decrease, prior to experiencing an annual increase, cumulative increase, or stasis period.

Figure 3.1 graphs the number of countries that experienced a substantial and sustained increase in the quality of democratic institutions (democratization, dashed line), the overall number of democracies in the world (dotted line), and the number of countries that experienced

[8]Although we follow the common practice in the literature and focus on established democracies, we show that our results are robust to including hybrid regimes (regimes that have both democratic and autocratic features) in Appendix Table C.5 (Model 4). Hybrid regimes capture many of the regimes that subscribed to the Liberal International Order and liberalized after the Cold War. In fact, many of the regimes that fall into the "electoral autocracy", or hybrid, category were officially regarded as full democracies by the West and the variation in their trajectory toward liberal democracies or autocracy has been a focal point in the comparative scholarship (Levitsky and L. A. Way 2010; Merkel 2010). In addition, we show that the results are robust to only including liberal democracies (Appendix Table C.5, Model 5).

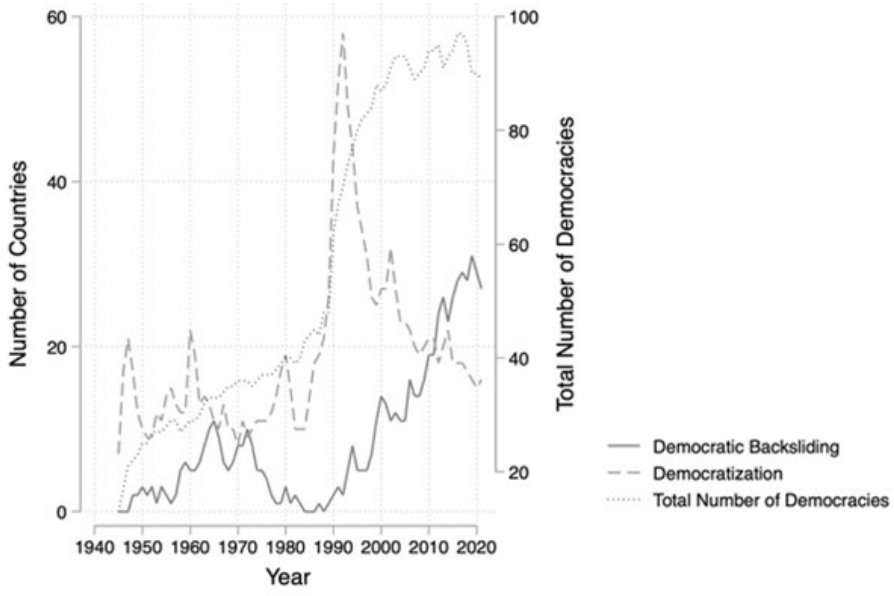


Figure 3.1. Democratic backsliding, 1945-2021. Source: Lührmann and Lindberg (2019)

a backsliding event (democratic backsliding, solid line).[9] The end of the Cold War witnessed a significant increase in the number of countries with improvements in democratic quality as well as the overall number of democracies. But although the overall number of democracies has remained relatively stable since the 2000s, democratic and hybrid regimes became more likely to experience a period of substantial and sustained decline in the quality of democratic institutions. Figure 3.2 shows which countries have experienced any episodes of democratic backsliding since the end of the Cold War. The construct has been validated in different ways and captures many of the well-known cases of democratic backsliding (Hungary, Poland, Mexico) as well as some less well-known cases (Nicaragua, South Korea, Ukraine). Overall, approximately eight percent of observations have experienced a democratic backsliding episode.

Scholars debate how significant the reduction in democratic quality has to be in order to signify democratic backsliding (Haggard and Kaufman 2021a; Haggard and Kaufman 2021b;

[9]Countries are measured as backsliding or democratizing if they experience a significant shift on the V-Dem polyarchy index (0.1 on a scale from 0 to 1) using a sample of democracies and hybrid regimes using data from Lührmann and Lindberg (2019). We will discuss the measurement in greater detail below. Trends in democratic backsliding are similar if we only consider full democracies and if we account for the number of countries in each category (figures available by request).

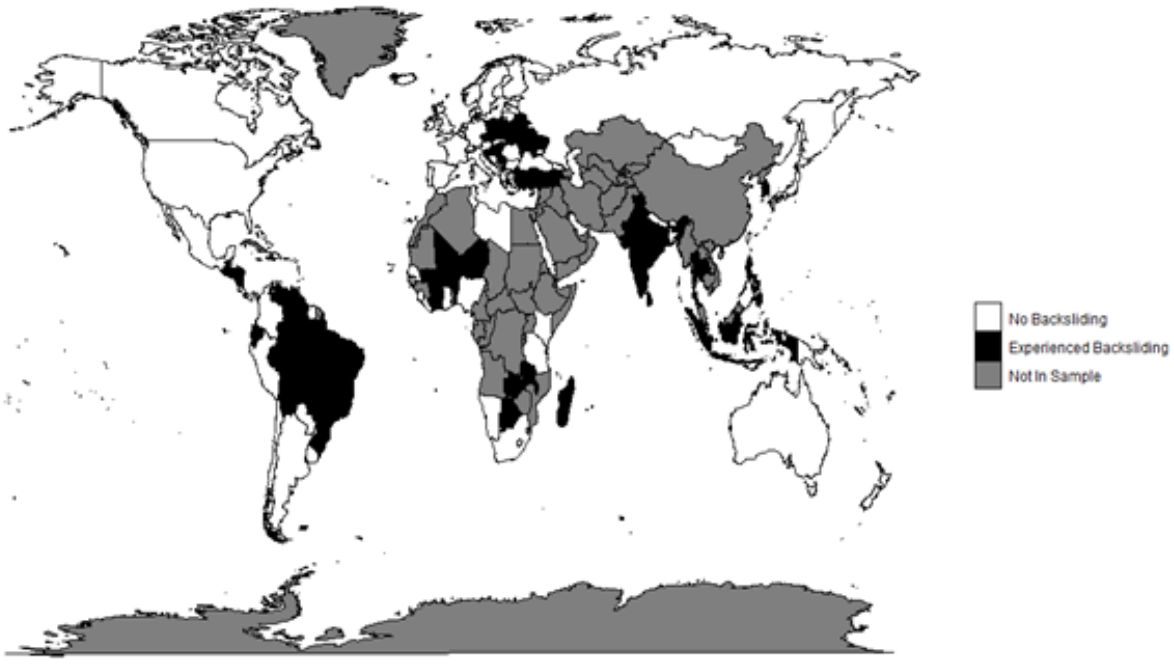


Figure 3.2. Map of countries that have experienced democratic backsliding, 1945-2021. Source: Lührmann and Lindberg (2019)

Jee, Lueders, and Myrick 2022; Rovny 2023; Waldner and Lust 2018)(Haggard and Kaufman 2021a, 2021b; Jee, Lueders, and Myrick 2022; Rovny 2023; Waldner and Lust 2018). Whereas some consider any negative change in democratic quality as democratic backsliding, others argue that democratic backsliding requires a categorical change in regime type such as from liberal democracy to electoral democracy, or from electoral democracy to electoral autocracy. Our measure accounts for significant changes in democratic quality without requiring categorical change in regime type. This strategy is appropriate to capture the incremental decline in democratic quality that has occurred in many democratic regimes since the end of the Cold War. However, we show in Appendix Table C.5 that our main results are robust to more conservative operationalizations that focus on regime change and democratic breakdown (Models 1 and 3) and to continuous measure of backsliding (measured as the continuous change in the democracy score, Model 2).[10]

[10]We also conduct a placebo check and analyze whether integration influences the likelihood of democratization.

Some recent work has pointed to a potential bias induced in subjective measures of democracy that can lead to an artificial overestimation about the extent of global trends in democratic decline (Little and Meng 2023). This work has led to a stimulating debate, most recently published in a special issue of Political Science & Politics (2024), which highlights that (i) the proportion of democracies in the world is still at an (almost) all-time high, (ii) many democracies experience an incremental erosion of democratic institutions and behaviors (without necessarily reverting to autocracy), and (iii) many of the objective indicators that perform well in capturing the democracy-autocracy nexus, are less well suited to measure incremental democratic erosion within democracies (Gorokhovskaia 2024; Knutsen et al. 2024; Levitsky and L. Way 2024; Little and Meng 2024; Miller 2024; Treisman 2024).

At this point, it is important to reiterate that we do not claim that the spread of ICTs generally leads to democratic breakdown or reduces the likelihood of democratic transitions. Rather, our paper focuses on potentially problematic trends of backsliding within democracies, with a focus on how the spread of the internet can be harmful for the health of democracy particularly by increasing political polarization. Although it is not possible to use more objective measures to understand incremental deterioration in democracy, we can use more objective measures to analyze whether the processes discussed in this paper may lead to more serious democratic decline as a consequence of sustained incremental backsliding. In our robustness analysis, we employ a more objective binary democracy-autocracy indicator (Cheibub, Gandhi, and Vreeland 2010), and show that our findings are robust (Appendix Table C.5, Model 3).

3.3.2 Main Explanatory Variables

We expect that access to open information flows and technologies increase the likelihood of democratic backsliding. Following existing work on the spread of ICTs, we measure *Internet (%)* as the share of the population with access to the internet in each year. Data are from the

As expected, we find that *Internet (%)* is not significantly likely to support democratization. In fact, the results indicate that the spread of ICTs has significantly reduced the likelihood of democratization events within democracies. Results are presented in Model 6 of Appendix Table C.5.

World Development Indicators. Figure 3.3 graphs our ICT variable across liberal and electoral democracies over time. There is a clear positive trend in most countries, indicating that an increasing proportion of households have access to the internet. But we also see significant variation. Our sample includes countries that have varied widely in their access to open information, and we find variation both across countries and over time. In 2021, an average of 76% of the population have access to the internet, but access was as low as 22% and as high as 99%, depending on the country.

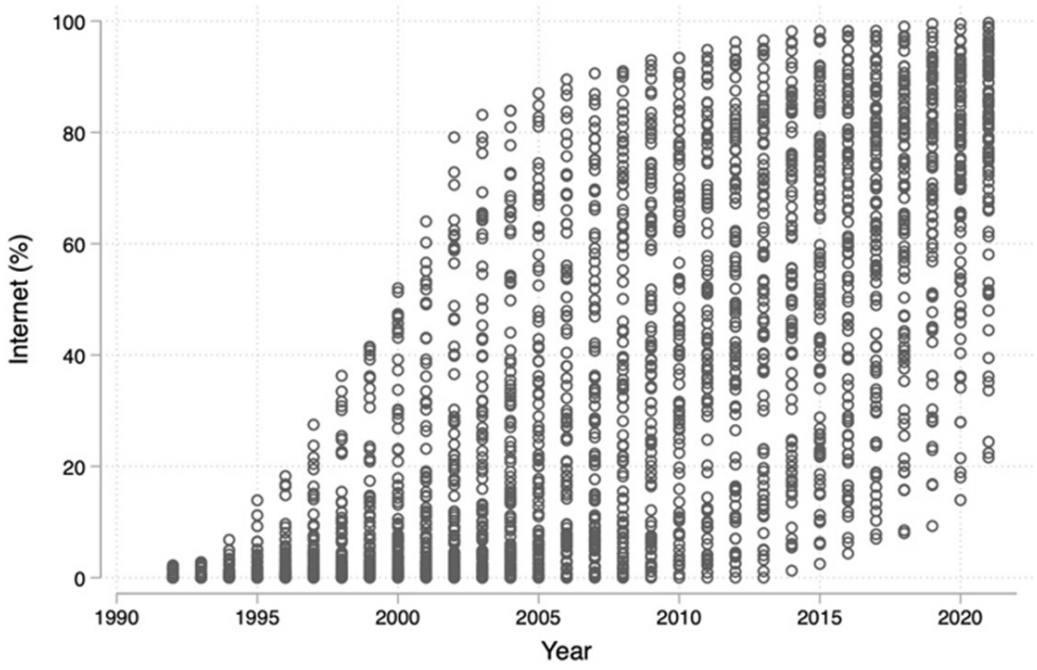


Figure 3.3. The Spread of Information Communication Technologies, 1990-2021, Source: WDI.

In Appendix Table C.4, we show that the results are robust to using alternative operationalizations such as the proportion of households with access to the internet from the International Telecommunications Union, a measure of the number of individuals using the internet, a composite measure of open information flows provided by KOF, and the number of mobile subscriptions.

Aside from the main effect, we also explore whether there is support for the underlying

causal mechanisms we discuss in the theory. We expect *Internet (%)* to be associated with reductions in democratic resilience through its amplifying effects on political polarization. We measure political polarization as the extent to which society is polarized into antagonistic, political camps. Data are from Coppedge et al. (2022). Figure 3.4 illustrates the variation of polarization across countries and over time. The figure shows significant variation in polarization across countries, with a less pronounced but slight upward trend over time.

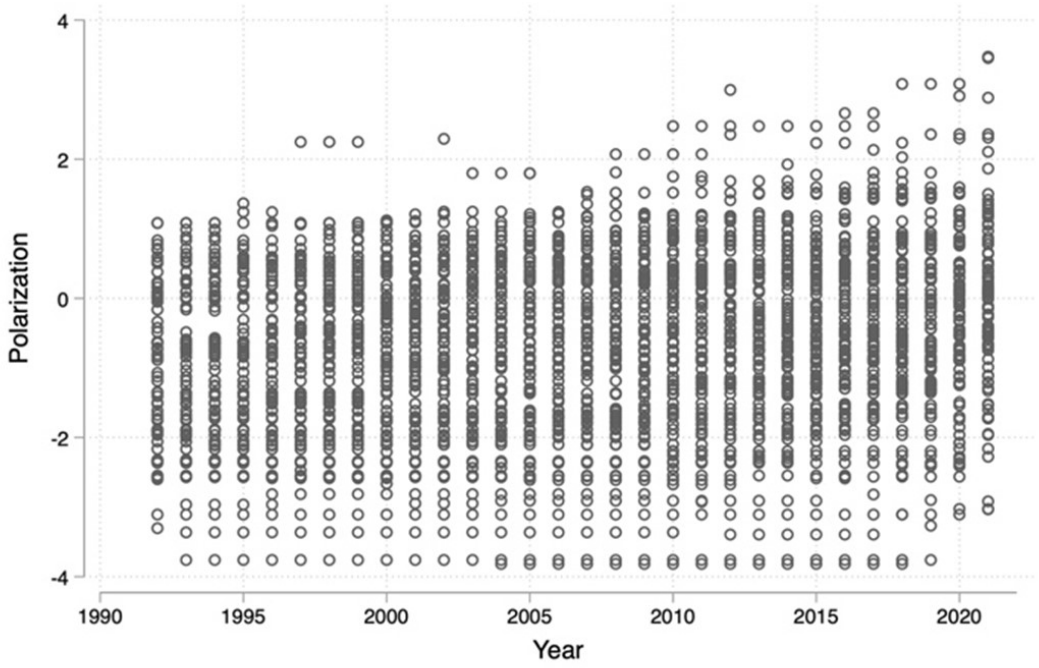


Figure 3.4. Political Polarization in Democracies, 1990-2021, Source: Coppedge et al. (2022).

We also include a battery of control variables into the model, following standard models on democratic backsliding. We describe the operationalization of the variables and present descriptive statistics in Appendix Tables C.1, C.2, and C.3.

3.3.3 Model Specification

Democratic Backsliding is a binary variable, and we estimate generalized linear models with a logit link function and robust standard errors. Since the data is time-series cross-sectional, we follow Beck, Katz, and Tucker (1998) and correct for serial dependence by including

three cubic splines. In Appendix Table C.6, we further probe the robustness of our results to including a five year moving average of the main independent variable (Model 1), a lagged independent variable (Model 2) region fixed effects (Model 3), country fixed effects (Model 4), and to estimating a more parsimonious ordinary least square model (Model 5). We also use an instrumental variable approach to deal with the potential endogenous nature of *Internet (%)* (Model 6). Finally, we use causal mediation analysis to assess whether the effect of **Internet (%)** also occurs indirectly, through the rise of polarization. We describe those alternative models in greater detail in the robustness section.

3.4 Comparative Analysis

The exponentiated coefficients from the model depicted in Figure 3.5 summarize the effects of a range of explanatory variables that have been examined in previous studies of democratic backsliding. For ease of interpretation, we standardized all explanatory variables to a mean of 0 and standard deviation of 1. The details of this model with numerical estimates are reported in Appendix Table C.4 (Model 1).

Internet (%) has a strong positive and significant association with the likelihood of democratic backsliding. A one standard deviation increases in *Internet (%)* almost doubles the odds of democratic backsliding. The effect size is comparable to the effect of *Polarization*, which also has a positive and significant association with democratic backsliding. Figure 3.6 graphs marginal effects and shows that the probability of a democratic backsliding event is almost zero in countries where citizens have very limited access to the internet to 0.2 in countries where all households have access to the internet.

The results of the control variables further lend support to the previous literature on the topic. Whereas polarization and populism of government leaders are positively associated with democratic backsliding, the likelihood of backsliding declines when countries have strong economies and growth. There is no indication that stronger democracies or presidential systems

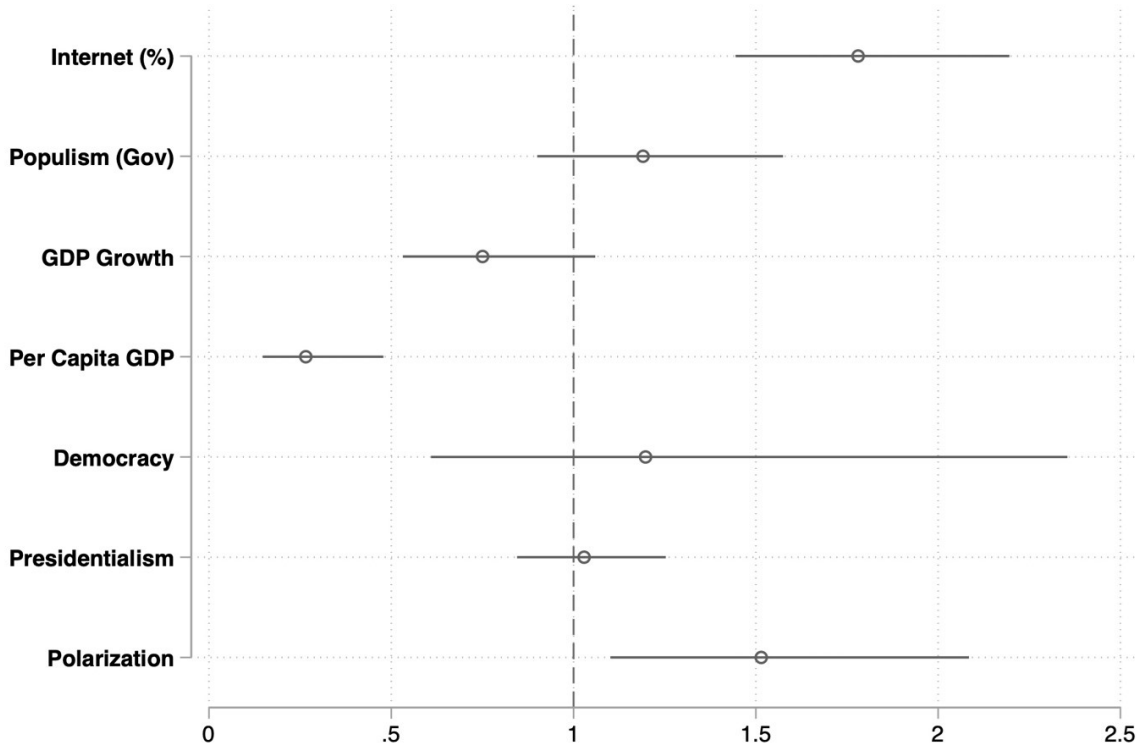


Figure 3.5. The Effect of Internet Access on Democratic Backsliding. Notes: Graph presents odds ratios with 95% confidence intervals. All explanatory variables are standardized. Splines omitted.

are more or less likely to backslide.

According to our theory, we expect *Internet (%)* to have a positive and significant effect on democratic backsliding, and this effects mainly works through an increase in political polarization in democracies.[11] To assess the underlying mechanisms of our argument, we use causal mediation analysis (Imai, L. Keele, and Tingley 2010). We estimate a mediation model in which we analyze whether the effects of *Internet (%)* on democratic backsliding occur directly and/or indirectly through an increase in polarization. We expect that *Internet (%)* would have an indirect effect through polarization.

Figure 3.7 presents the results, which support our argument. The effect of *Internet (%)*

[11] Importantly, given our theoretical argument, we do not expect a conditional effect. Indeed, if we estimate an interaction model, we find no significant interaction effect but Internet (%) and Polarization remain statistically significant.

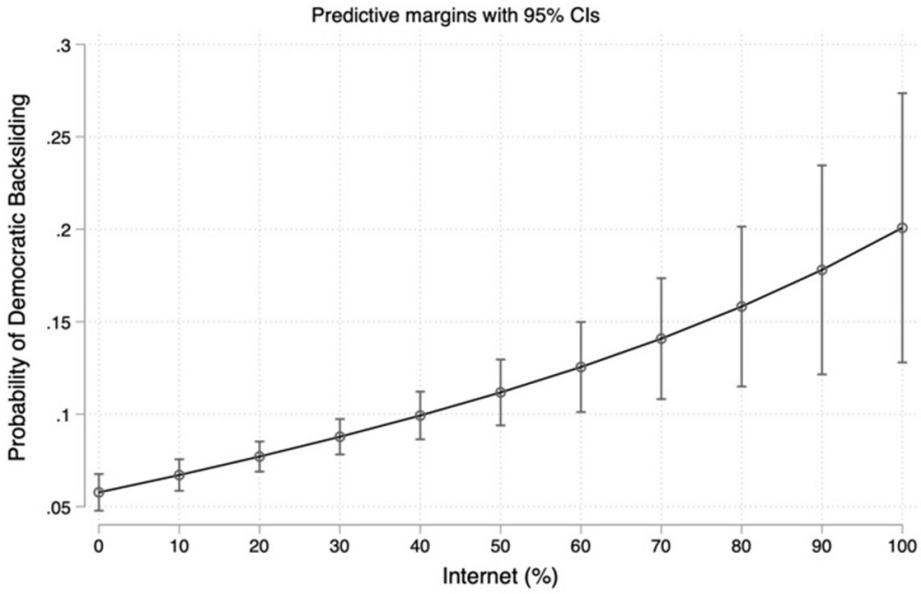


Figure 3.6. Marginal Effects of Internet Access on Democratic Backsliding.

on democratic backsliding works both directly and indirectly. Indirectly, we find evidence for one of our main mechanisms, polarization. The positive and significant coefficient supports the argument that *Internet (%)* increases the likelihood of backsliding through increases in political polarization. At the same time, we also find support for a direct effect. This implies that *Internet (%)* is positively associated with democratic backsliding through other means as well.

3.4.1 Robustness Checks and Empirical Extensions

We have taken substantial measures to validate the robustness of our findings, which we report in the Appendix. In Appendix Table C.4, we report analyses that replace *Internet (%)* with measures for (i) internet access from ITU, (ii) the percentage of internet users, (iii) the logged number of mobile subscriptions, and (iv) an index for open information flows from KOF. We find that using alternative operationalizations of our main explanatory variable yields similar results, though with differing samples and fewer observations.

In Appendix Table C.5, we analyze whether a more conservative threshold for democratic backsliding changes our results by measuring democratic backsliding as occurring only when

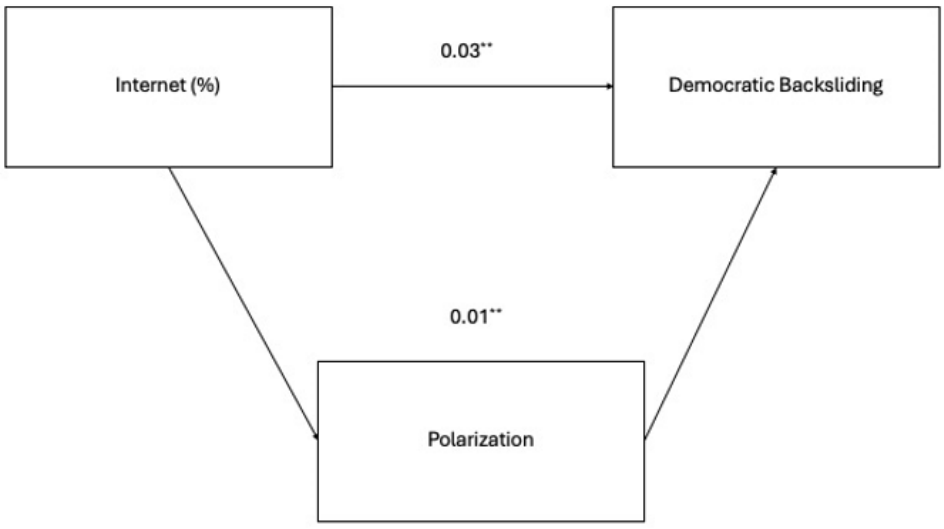


Figure 3.7. Mediation Analysis

a categorical change in regime type takes place, either from liberal democracy to electoral democracy or from electoral democracy to electoral autocracy (Model 1). In addition, we estimate models on the continuous democracy indicator (Model 2) as well as a more objective binary measure of democracy from Cheibub et al (2010) (Model 3). We further analyze whether the results hold if we include hybrid electoral autocracies (Model 4) or only liberal democracies (Model 5), with no changes to the overall effects. Finally, we conduct a placebo check and analyze whether access to internet technologies influence the likelihood of democratization as opposed to backsliding (Model 6). *Internet (%)* significantly decreases the likelihood of democratization.

Appendix Table C.6 reports findings from models that use a five-year moving average (Model 1) and a one-year lag of *Internet (%)* (Model 2). We also present models with region (Model 3) and country fixed effects (Model 4), an OLS version of the model (Model 5) and an instrumental variable approach to deal with the potential endogenous nature of *Internet (%)* (Model 6). The findings are robust to these specification changes.

Finally, a possible alternative explanation is that countries that are of greater geopolitical importance to the United States are more likely to have access to the internet and are more likely

to experience democratic backsliding. In Appendix Table C.7 we include variables that capture geopolitical interests of the United States, China, and Russia, as well as countries that are more dependent on natural resources, to account for potential resource curse dynamics (Ross 2015).

3.5 Internet Access, Polarization, and Democratic Backsliding in India

The findings of our comparative analysis offer support for the argument that increased internet access increases political polarization and provides opportunities for policy changes that lead to the incremental erosion of democratic institutions. In this section, we study a typical case to examine if our proposed mechanisms play out in practice. We analyze how increasing internet access and social media use has contributed to democratic backsliding in India. India under the BJP is a typical case according to the classification in Seawright (2016). The country has experienced both significant democratic backsliding and rapid increases in internet access and social media use. Often touted as the world's largest democracy by population, India has mostly been classified as a consolidated democracy by indices such as Freedom House and Polity since achieving independence from Britain in 1947. Despite the relative health of Indian democracy, Figure 3.8 shows a clear decline in the quality of democratic institutions, starting in the late 2010s. At the same time, Figure 3.8 also illustrates that access to information and political polarization in India have increased, with polarization peaking near the upper bound of the distribution in Figure 3.4.

While this evidence does not prove that our empirical findings are causal, it demonstrates that the underlying mechanisms of our theory are at play. Using a combination of primary and secondary sources, we find evidence that increasing access to information technologies has contributed to the polarization of society, which in turn created a permission structure that allowed Modi and his government to enact democracy-eroding policies.

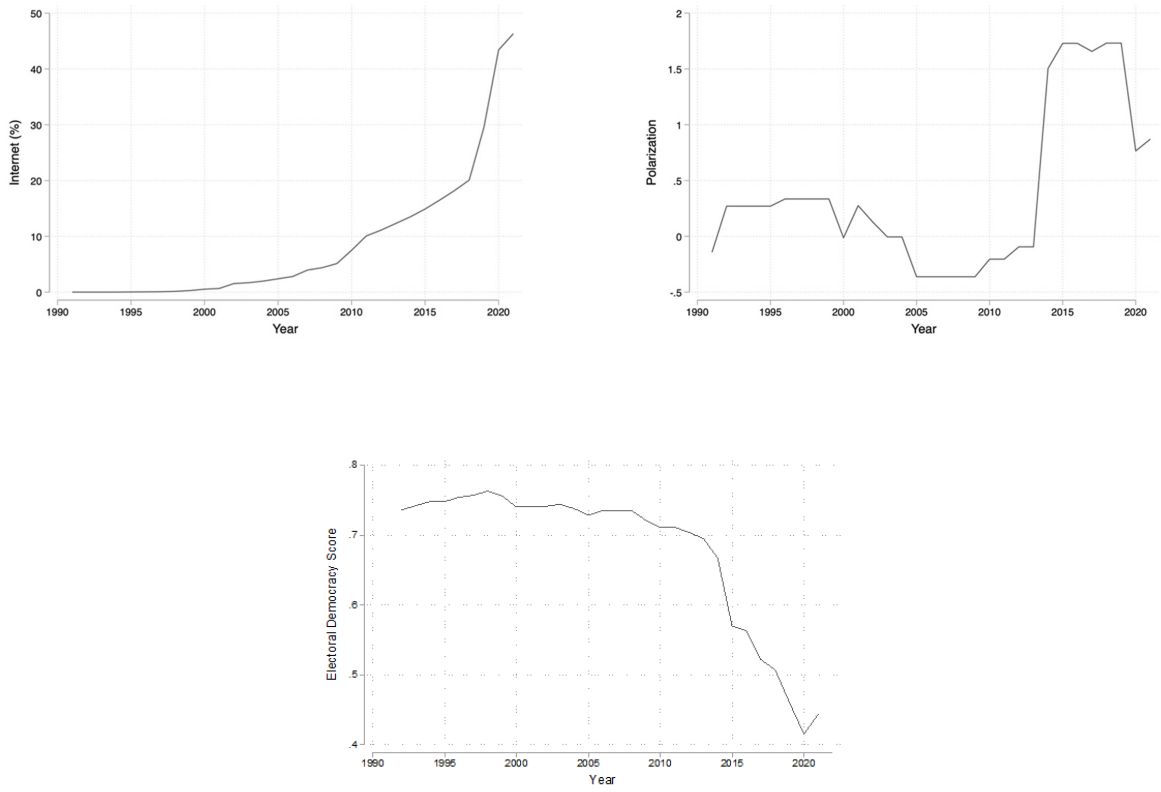


Figure 3.8. Internet Access, Polarization, and Democratic Backsliding in India, 1990-2021.

3.5.1 Information Communication Technologies and the Polarization of India's Society

In 2007, only 4% of the population in India had access to the internet. By 2022, this number had grown to almost 49%, representing well over 600 million people (International Telecommunication Union 2018). Social media has seen an even more rapid rise in use, going from 7% of the population in 2015 to almost 33% today. WhatsApp, Instagram, and Facebook are the most popular social media, with the former commonly used now as the primary means through which people get news and connect with friends and family (Ghaffary and Heath 2023). Almost all Indians use their mobile phone to access the internet: mobile internet was responsible for 97% of internet traffic in 2021 (International Telecommunication Union 2018). Phones often come with social media pre-installed, increasing the chances that new users' first experience of

the internet is through social media.

With the rising internet access of citizens, political parties across the political spectrum in India quickly learned how to use social media to spread misinformation for their own political benefit. A study of over 1000 Hindu-speaking Facebook users residing in India on the effectiveness of misinformation found that respondents were more likely to have heard of (and believe!) inaccurate claims than of accurate ones (Chauchard, Flynn, and Gautam 2019). While all political parties have used the internet for political purposes, oftentimes by spreading mis- and dis-information, the BJP has been particularly prolific at harnessing the internet for its political purposes. The party by far outspent other political parties on social media (Campbell-Smith and Bradshaw 2019). In addition, its ability to engage millions of "social media volunteers", oftentimes with Hindu extreme right-wing nationalist background, has given BJP a decisive advantage over the oppositional Congress party on social media (Sardesai 2020, pp. 226–227). All political actors in India had incentives to harness the rapid in increase in internet and social media use, but the BJP proved to be especially adept at harnessing these new tools for their own ends. This section provides several examples of how political actors have intentionally used the internet to deepen political polarization. However, while there is intentional agency present in India, the examples presented could take place without as organized a political apparatus as Modi and the BJP deploy.

Narendra Modi, BJP's leader, himself has a prolific and carefully curated social media presence. Even before coming to power, he was able to develop a cult following among many young, middle-class Indians with unusually broad engagement with social media, including on Pinterest, Linkedn, YouTube, Twitter, Facebook, and many others. Beyond Modi's own social media presence, the BJP indirectly employs a "troll army" of supporters, generally referred to as "BJP IT cell" (Chaturvedi 2016).[12] Their posts paint the BJP, and especially Modi, in a very favorable political light. For example, in 2022 a story went viral on Indian social media claiming

[12]The party is especially adept at controlling large WhatsApp groups, which are one of the most common forms of online communication in India.

that Modi had convinced Russian President Vladimir Putin to halt the war in Ukraine to allow for a group of Indian students to exit the country safely. Even though fact-checkers quickly debunked those claims, the tweets went viral and the facts of the episode are still believed by many in the public sphere (Ayyub 2023).

Social media posts, whether real or fake information, also have allowed supporters of Modi to deflect attention away or reshape the interpretation of critical issues raised by the political opposition including rising unemployment, falling growth rates, or rising communal tensions (Pal 2019). For example, during early 2021, India experienced a second wave of the COVID-19 pandemic that was one of the deadliest anywhere on earth. International media and remaining free news organizations in India put much of the blame on national-level policies established by the BJP, including allowing for broad domestic travel during an important Hindu festival in order to not upset its Hindu-nationalist support base. Within India, blame of the national government was difficult to find. The BJP downplayed the severity of the situation through official government accounts, attempted to shift blame to state governments, and misreported infection and death counts (Rao 2021). Before the Modi government declared a national shutdown, the BJP IT cell pushed a narrative that the pandemic was a foreign conspiracy (Yadav 2020). Despite the devastating effects of the crisis on many Indians, in part due to the poor government response, Indians remained satisfied with Modi's performance as a leader (Kumar 2023). In a public opinion survey, over 68% of respondents said that the government's Covid policies were the right decision (Times 2021).

India has also seen a stark rise in the use of social media to delegitimize and harass political opponents (Chaturvedi 2018), with significant effects on political polarization within the country. For example, following a suicide bombing against Indian security forces in Kashmir in 2019, a WhatsApp message that went viral across WhatsApp groups claimed that a leader of the Congress Party had promised a large sum of money to the attacker's family and to free other "terrorists" and "stone pelters" from prison if it received support in the upcoming parliamentary election (Xiao 2019). Before his arrest under questionable charges, Modi's main rival, Rahul

Gandhi from the Congress Party, was infantilized by BJP supporters and turned into an object of memes, jokes and cleverly edited videos (Pal 2019). Similarly, the right wing in India used social media paint Muslims as a threat. A prominent example is the baseless "Love Jihad" conspiracy theory, commonly spread via viral WhatsApp messages and videos, which holds that Muslim men are wooing Hindu women to force them convert to Islam (Frayer 2021). Coupled with (also baseless) claims that the oppositional Congress party favored Muslims, episodes like these deepened polarization by providing an enemy to demagogue, bolstering support among lower-information voters, and discouraging opposition for fear of retribution or harassment (Board 2023).

Social media is also used by the public to discredit the opposition in more conventional ways. In 2018, a report by The Guardian revealed that Cambridge Analytica had been involved in harvesting personal data of millions of Facebook users without their consent (Cadwalladr and Graham-Harrison 2018). It was later revealed that the firm had also worked for the Indian National Congress during the 2014 Lok Sabha election. The BJP was quick to capitalize on this revelation to attack the Congress and its leader Rahul Gandhi, using social media and online propaganda to paint the Congress as unethical and corrupt despite no established links between the two projects (Timesofindia.com 2018). WhatsApp groups were flooded with content about the scandal. While many factors go into election outcomes, the general election after this scandal resulted in the BJP receiving 37.36% of the vote, the highest vote share by a single party since 1989, and analysis attributes the success at least in part to the scandal (Dale and Jeavans 2019).

The combined result of these trends is a biased information environment, despite theoretically "open" information access in terms of availability of technology and the existence of independent news organizations, leading to the finding that "the proportion of polarizing political news and information in circulation over social media in India [in the 2019 election was] worse than all of the other country case studies we have analyzed, except the US presidential election in 2016" (Allsop 2019). In India, political, ethnic, and religious tensions have long been present. The rapid growth of access to information and many-to-many communication did not cause these

issues. But the nature of these systems can exacerbate pre-existing tensions through the systems that undergird them. More sensational, outrageous, and polarizing content is what gets shared by the most people, and the one-to-many potential and ease of sharing in modern communication technology like WhatsApp makes this trend more problematic. When applied to places with historical communal tension, these systems amplify and deepen polarization in society in ways that are as or even more dangerous than have been seen in places like the United States—in line with the findings from the quantitative analysis.

3.5.2 From Polarization to Backsliding

The discussion shows how the supporters of the BJP (and the BJP itself) have used the internet both to legitimize the political party and to delegitimize political opponents and critics. Even though these strategies have not always been successful, there is significant evidence that they have led to an increase in polarization and ethnic tensions within the country. These outcomes have paved the way for the slow deterioration of India's democracy by giving Modi and his government a *carte blanche* to pass policies and take actions that bolster the executive's power and the BJP's rule. In particular, increasing hostility and fear of the political opposition created a permissible political environment in which the BJP could enact anti-democratic policies without much fear of political repercussions.

For example, the Indian government voted to revoke the special status of Jammu and Kashmir, a divisive move given the violent and complicated history of managing the area (Shah and Dalton 2019). The BJP and its supporters pushed the message that the move was necessary for national security and to generally stir up Indian nationalism during the immediate aftermath. This helped to distract from the human rights abuses that were taking place in the region, including, relatedly, internet shutdowns. Dissenters against the move were harassed by the troll army, creating a biased online information environment where the only easily accessible news about the action was overwhelmingly positive (Rezwan 2019). By taking advantage of the viral nature of social media, a fractured media ecosystem, and especially heightened polarization,

the BJP was able to shift public opinion and allow for an opening to enact democracy-eroding reforms. In an ABP-C survey, a majority of respondents said the decision had led to a more permanent solution. Over 47% even thought that the abrogation of Article 370 was Modi's biggest achievement in this term (Times 2021). When asked in 2019, a majority of respondents of a Pew survey even believed that the government should use more military force when dealing with Jammu and Kashmir (Stokes, Manevich, and Chwe 2017). Through a message focused on spreading anti-Muslim Hindu nationalist sentiments, supporters of the move successfully polarized society enough to garner support for these moves while minimizing backlash (Sahoo 2020), in line with theoretical expectations linking polarization and backsliding (Haggard and Kaufman 2021b; Svolik 2020).

We also find evidence that the BJP felt emboldened by polarization to increase its efforts to silence opposition leaders and journalists. India is now the country with the most internet shutdowns and take down request to social media companies globally (Pearson 2021). The legal framework prior to the BJP's taking power in 2014 was already very permissive of government surveillance and censorship. The 2000 Information Technology Act was passed under a BJP coalition government, and it was left in place by the Congress party when it ruled from 2004-2014. This act allows broad discretion by the government to remove or request removal of content it considers dangerous or harmful, and the courts are generally pliant when requests are challenged. A Central Monitoring System was established in 2013 that allows the government to intercept digital communications. This practice was established prior to the current BJP government, ostensibly for security reasons, but has been weaponized against political opponents under the current government (Yilmaz and Saleem 2022). The rise of the internet increases polarization when then, ironically, may increase the chance that use of the internet becomes restricted.

Once in power, the BJP under Modi has used this legal framework to require social media companies to take down content on many occasions. One of the most famous came after the BBC published a documentary examining the Gujarat anti-Muslim violence that occurred under

Modi's leadership.[13] It provided evidence that Modi knowingly refused to take action to quell the violence, resulting in more deaths than would have occurred with a more decisive response. The government ordered Twitter and other platforms to remove the documentary.[14] Under suspect justifications such as "national security" concerns, certain posts can only be viewed outside of India, anti-government posts were removed, and internet suspended in Muslim-majority Kashmir (Boyes 2023). Instances of lower-profile censorship have been rampant: the government asked for almost 10,000 tweets to be removed in 2020, up from 1,200 the prior year and only 248 in 2017 (Soni 2021). Former Twitter CEO Jack Dorsey even claims that the Indian government threatened to shut down Twitter and raid its employees' homes and offices (Mateen 2023). Still, most platforms have been willing to comply with these requests and threats, likely for fear of losing access to the huge Indian market (Bond 2021).

Polarization has also increased tolerance toward the BJP's strategies of censorship like arresting journalists and raiding the offices of news agencies, using financial crimes as a cover to discourage negative reporting. Prominent investigative journalist Rana Ayyub and the BBC itself are examples of the targets of this kind of attack (Gunasekar 2022; Wright 2023). As a consequence of this delegitimization of journalists, India fell several places in prominent press freedom rankings (Reporters Without Borders 2023), and experienced a notable uptick in the number of journalists killed (Committee to Protect Journalists 2023). Declining safety for journalists and reduction in press freedom is a clear manifestation of behavioral democratic backsliding, aided by institutional tools like the broad laws discussed above and the strategic delegitimization of traditional media through online propaganda and speech.

The examples of the Citizenship Amendment Act, the status revocation of Kashmir, and the passing of discriminatory laws at the state level demonstrate the degree to which this backsliding has been facilitated by polarization. On the individual level, Modi has been able to increase his popularity despite him presiding over a poor and deteriorating economy. His 2014

[13] India: The Modi Question. 2023. BBC Two. https://www.bbc.co.uk/programmes/p0dk9z6x (May 23, 2023).

[14] It is notable that in this particular case, the removal actually backfired. It led to the video being seen much more than it otherwise would have because the government highlighted it.

campaign promises centered around economic programs, which in large part failed and led to an increase in unemployment and a reduction of over 1% of India's GDP (Xiao 2019). Incomes in rural areas have stagnated and farm incomes reached their lowest point in 18 years. Despite these economic failures, which would be the political death of many democratic leaders, Modi was able to secure a historic political victory in the 2019 elections, and he is set to do so again in 2024. In 2017, nearly 88% of Indians held a favorable view of Modi; 72% approved of the way he handled unemployment (the top concern for Indians over the past few years), and 83% believed that the current state of the economy was good. And despite the significant erosion of the quality of democratic institutions in India, over 79% of Indians were satisfied with the way democracy was working in their country (Stokes, Manevich, and Chwe 2017). Recent allegations of corruption by his opposition notwithstanding, he appears set up for a likely landslide in the 2024 national election (Rajesh and Das 2023).

These statistics again clearly demonstrate the mechanisms linking polarization and backsliding: supporters are willing to tolerate anti-democratic moves and poor outcomes because they can still support "their side," or view the alternative as even worse. According to analysts, few people talk about bad economic numbers or the spread of fake news and misinformation on social media (Vij 2019). When discussing politics and the election, voters tend to talk about a weak opposition, a co-opted media, low inflation, or his welfare schemes. This is due in part to the social media strategies, which were geared toward making Indians believe that it is patriotic to support Modi. But at the same time, polarization and hawkish religious and nationalist notions, fueled by the BJP via social media, led to an increase in support for Modi and greater tolerance for anti-democratic measures or disinformation campaigns. For many, Modi is the only viable leader while opposition leaders are either incompetent, corrupt, or opportunistic.

In sum, India's backsliding under the BJP has been facilitated by the spread of the internet. We see evidence of the theoretical mechanisms we propose by which access to information and technology creates a political environment where backsliding is more likely. Modi and his supporters have used social media and other online platforms to project popularity, obfuscate

scandals, and further divide Indian society. At the same time, they have taken advantage of the profit motives of these platforms to silence dissidents and crack down on opposition speech. All of this has created a more permissive public that is willing to accommodate democratic backsliding, in no small measure by exacerbating polarization in a society already highly polarized.

3.6 Conclusion

This paper explores the influence of access to information communication technologies—and specifically, internet access—on recent trends in democratic backsliding. We argue that internet access can contribute to democratic backsliding. This is especially acute in the context of political polarization, which the internet facilitates and can be used to exacerbate. We test the empirical implications of our theory with a mixed-methods approach that combines a large-n quantitative comparative analysis of democratic backsliding in 97 democracies after the Cold War with a typical case study to trace the underlying causal mechanisms of the theory. The findings robustly indicate that access to ICTs has increased the likelihood of democratic backsliding, especially through its polarizing impact. Our research contributes to the emerging comparative literature on democratic backsliding. These studies generally look toward domestic political explanations including the role of social and political polarization (Cinar and Nalepa 2022; Haggard and Kaufman 2021b; Haggard and Kaufman 2021a; Svolik 2020), political institutions (Helmke, Kroeger, and Paine 2022), ethnic fragmentation (Rovny 2023), democratic values (Grillo and Prato 2023), and the political agency of domestic actors (Grumbach 2022; Mainwaring and Pérez-Liñán 2014; Vachudova 2020). Building on those approaches, our findings highlight the centrality of information technologies. Much of the work that analyzes the negative effects of these technologies focuses on the behavior of highly repressive and autocratic regimes that use these platforms to consolidate already authoritarian countries. Scholars who have focused on the role of technologies in democracies mainly discussed foreign meddling by entrenched autocratic regimes like China and Russia and how the internet can lead to echo cham-

bers and polarization. We provide evidence about how the spread of information technologies can contribute to a reduction in the quality of democracy.

While our argument has not analyzed the role of foreign meddling, this will be an important avenue for future research. Our findings suggest that open access to information technologies could make foreign meddling more effective because there are fewer institutional guardrails on the use of these platforms and often willing audiences. All political leaders have similar access to these tools, but as the preceding examples made clear, they are especially dangerous when politics and public discourse are characterized by polarization and some may actually welcome foreign influence. The internet can create conditions in which foreign meddling is "pushing on an open door."

More broadly, our findings highlight that policymakers and technology leaders should pay careful attention to the influence that the internet as it is currently structured has on political discourse and outcomes. Social media companies like Facebook have made conscious decisions to change their algorithms to reduce inflammatory content in the past (Ward-Bailey 2016)—albeit with mixed results—but deeper consideration about the nature of online interaction and the algorithms that undergird it may also be necessary. These more structural changes seem unlikely given the current ownership structures of the most prominent internet media companies (especially the rapid rise of Chinese-owned TikTok), but future scholarship could analyze the political viability and specifics of these types of proposals.

Chapter 3 is co-authored with Hafner-Burton, Emilie M. and Schneider, Christina J. It is, in part, currently being prepared for submission for publication of the material. The dissertation author was the primary investigator and author of this material.

Appendix A Appendix to Chapter 1

Table A.1. Alternative Grid Cell Sizes

Dependent Variables:	Predicted Difference in Protection	
Model:	(400 square kilometer grid)	(900 square kilometer grid)
Variables		
Resource Dep. Diff.	8.19×10^{-5}	-0.0003
	(0.0007)	(0.0008)
Polyarchy Diff.	0.0020**	0.0057***
	(0.0008)	(0.0011)
GDPPC Diff.	-0.0023***	-0.0071***
	(0.0009)	(0.0015)
Pop. Density Diff.	0.0479***	0.0411***
	(0.0065)	(0.0102)
Rural Pop. Diff.	0.0037	-0.0030
	(0.0023)	(0.0037)
Res. Dep. Diff. $\times$ Poly. Diff.	0.0029***	0.0017**
	(0.0007)	(0.0008)
Fixed-effects		
Country Dyad	Yes	Yes
Year	Yes	Yes
Fit statistics		
Observations	7,621	7,388
R^2	0.88379	0.82143
Within R^2	0.01210	0.00919

Heteroskedasticity-robust standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table A.2. Clustering Standard Errors

Dependent Variable:	Predicted Difference in Protection	
Model:	(Dyad Cluster)	(Random Country Cluster)
Variables		
Resource Dep. Diff.	-0.0011	-0.0011
	(0.0032)	(0.0028)
Polyarchy Diff.	0.0073	0.0073**
	(0.0049)	(0.0032)
GDPPC Diff.	-0.0013	-0.0013
	(0.0058)	(0.0043)
Pop. Density Diff.	0.0617	0.0617
	(0.0484)	(0.0377)
Rural Pop. Diff.	-0.0014	-0.0014
	(0.0188)	(0.0172)
Res. Dep. x Poly	0.0058	0.0058*
	(0.0040)	(0.0033)
Fixed-effects		
Country Dyad	Yes	Yes
Year	Yes	Yes
Fit statistics		
Observations	7,593	7,593
R^2	0.86861	0.86861
Within R^2	0.00823	0.00823

*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table A.3. Alternative Bandwidth Specifications

Dependent Variable:	Predicted Difference in Protection	
Model:	(10km)	(30km)
Variables		
Resource Dep. Diff.	-0.0008	0.0004
	(0.0013)	(0.0013)
Polyarchy Diff.	0.0036**	0.0021
	(0.0017)	(0.0019)
GDPPC Diff.	-0.0025	-0.0009
	(0.0021)	(0.0021)
Pop. Density Diff.	0.0104	0.0055
	(0.0122)	(0.0104)
Rural Pop. Diff.	0.0016	0.0165***
	(0.0049)	(0.0049)
Res. Dep. x Poly	0.0062***	0.0050***
	(0.0014)	(0.0015)
Fixed-effects		
Country Dyad	Yes	Yes
Year	Yes	Yes
Fit statistics		
Observations	7,267	6,484
R^2	0.86457	0.87916
Within R^2	0.00505	0.00592

Heteroskedasticity-robust standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table A.4. Euclidean Distance as Forcing Variable, Quadratic

Dependent Variable:	Predicted Difference in Protection			
Model:	(25km)	(50km)	(75km)	(100km)
Variables				
Resource Dep. Diff.	0.0006	0.0006	-0.0019	-0.0016
	(0.0014)	(0.0014)	(0.0015)	(0.0015)
Polyarchy Diff.	0.0010	0.0010	0.0059***	0.0078***
	(0.0020)	(0.0020)	(0.0019)	(0.0020)
GDPPC Diff.	0.0004	0.0004	-0.0026	-0.0014
	(0.0022)	(0.0022)	(0.0022)	(0.0024)
Pop. Density Diff.	0.0183**	0.0183**	0.0457***	0.0604***
	(0.0077)	(0.0077)	(0.0097)	(0.0112)
Rural Pop. Diff.	0.0078	0.0078	-0.0105*	-0.0100
	(0.0065)	(0.0065)	(0.0059)	(0.0061)
Year	0.0001	0.0001	-0.0001	3.33×10^{-5}
	(0.0002)	(0.0002)	(0.0001)	(0.0001)
Res. Dep. Diff. $\times$ Polyarchy Diff.	0.0058***	0.0058***	0.0068***	0.0070***
	(0.0014)	(0.0014)	(0.0015)	(0.0016)
Fixed-effects				
Country Dyad	Yes	Yes	Yes	Yes
Fit statistics				
Observations	7,952	7,952	7,952	7,952
R^2	0.63267	0.63267	0.85787	0.85685
Within R^2	0.00119	0.00119	0.00803	0.00936

Heteroskedasticity-robust standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table A.5. Euclidean Distance as Forcing Variable, Linear

Dependent Variable:	Predicted Difference in Protection				
Model:	(I-K)	(25km)	(50km)	(75km)	(100km)
Variables					
Resource Dep. Diff.	0.0012	-0.0018	-0.0017	-0.0012	-0.0010
	(0.0017)	(0.0014)	(0.0015)	(0.0015)	(0.0016)
Polyarchy Diff.	0.0033	0.0036**	0.0069***	0.0074***	0.0064***
	(0.0021)	(0.0018)	(0.0020)	(0.0020)	(0.0020)
GDPPC Diff.	-0.0014	-0.0003	-0.0018	-0.0008	-0.0006
	(0.0023)	(0.0018)	(0.0022)	(0.0022)	(0.0021)
Pop. Density Diff.	-0.0035	0.0436***	0.0474***	0.0468***	0.0307***
	(0.0128)	(0.0086)	(0.0098)	(0.0098)	(0.0085)
Rural Pop. Diff.	0.0254***	-0.0120**	-0.0053	0.0004	0.0095
	(0.0060)	(0.0054)	(0.0060)	(0.0061)	(0.0060)
Year	0.0004***	-0.0002**	1.23×10^{-6}	0.0002*	0.0003**
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Res. Dep. × Poly. Diff.	0.0057***	0.0057***	0.0071***	0.0073***	0.0076***
	(0.0016)	(0.0015)	(0.0016)	(0.0017)	(0.0017)
Fixed-effects					
Country Dyad	Yes	Yes	Yes	Yes	Yes
Fit statistics					
Observations	7,141	7,952	7,952	7,952	7,952
R^2	0.87640	0.85908	0.85977	0.86289	0.86413
Within R^2	0.00849	0.00718	0.00822	0.00858	0.00849

Heteroskedasticity-robust standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table A.6. Average Covariate Differences Across All Borders

Covariate	**150 km**	**25 km**	**50 km**	**75 km**	**100 km**
Jan Rain (cm)	1.29	0.56	0.81	1.00	1.14
July Rain (cm)	2.58	.89	1.40	1.78	2.01
Jan Temp (°C)	1.45	0.6	0.88	1.1	1.28
July Temp (°C)	1.42	0.64	0.92	1.12	1.28
Elevation Median (m)	232.78	103.45	148.83	183.04	211.07
Elevation Std. Dev. (m)	33.16	18.85	24.29	28.59	30.96
Ag. Oppo. Cost. (2000 USD/hectare)	112.3	68.1	83.64	94.39	101.57
Biodiversity (0—100 scale in country)	10.37	6.86	7.99	8.89	9.46

Table A.7. Borders Inverse Weighted By Squiggliness

Dependent Variable:	Predicted Difference in Protection
Model:	(1)
Variables	
Resource Dep. Diff.	-0.0037**
	(0.0018)
Polyarchy Diff.	0.0080***
	(0.0021)
GDPPC Diff.	-0.0078***
	(0.0025)
Pop. Density Diff.	0.1964***
	(0.0198)
Rural Pop. Diff.	0.0065
	(0.0058)
Res. Dep. x Poly	0.0069***
	(0.0015)
Fixed-effects	
Country Dyad	Yes
Year	Yes
Fit statistics	
Observations	7,049
R^2	0.89388
Within R^2	0.03305

Heteroskedasticity-robust standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table A.8. Sample Restricted to Straight and Mostly Straight Borders

Dependent Variable:	Predicted Difference in Protection
Model:	(1)
Variables	
Resource Dep. Diff.	-0.0117***
	(0.0031)
Polyarchy Diff.	0.0101**
	(0.0046)
GDPPC Diff.	0.0010
	(0.0036)
Pop. Density Diff.	0.3757***
	(0.0436)
Rural Pop. Diff.	-0.0336***
	(0.0127)
Res. Dep. x Poly	0.0088**
	(0.0039)
Fixed-effects	
Country Dyad	Yes
Year	Yes
Fit statistics	
Observations	1,693
R^2	0.82581
Within R^2	0.09982

Heteroskedasticity-robust standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

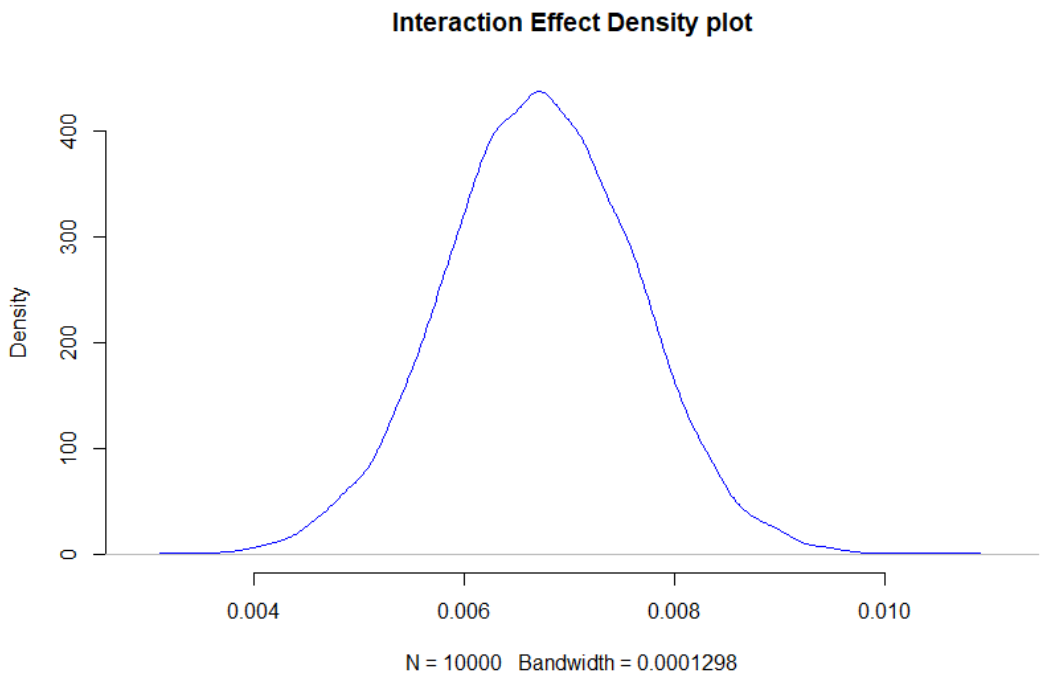


Figure A.1. Main result from bootstrapping new samples of the main dependent variable

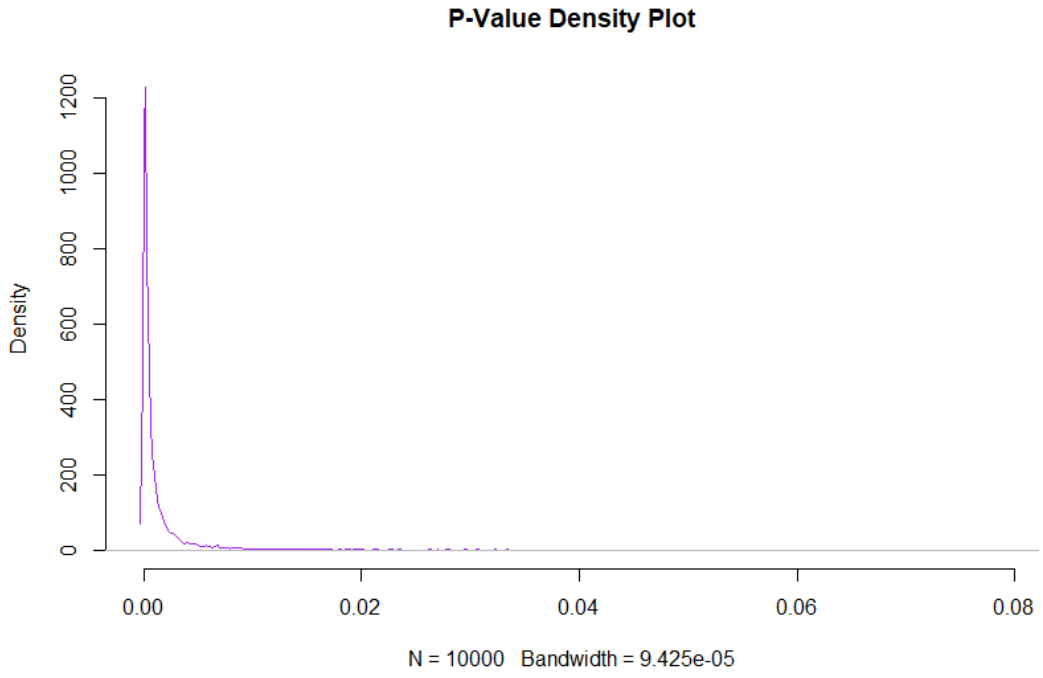


Figure A.2. *p*-values from bootstrapping new samples of the main dependent variable

Table A.9. Inverse Weighting By Total Neighbors in Dyad

Dependent Variable:	Predicted Difference in Protection
Model:	(1)
Variables	
Resource Dep. Diff.	-0.0009
	(0.0014)
Polyarchy Diff.	0.0084***
	(0.0018)
GDPPC Diff.	-0.0029*
	(0.0018)
Pop. Density Diff.	0.0653***
	(0.0126)
Rural Pop. Diff.	-0.0147**
	(0.0060)
Res. Dep. x Poly	0.0040***
	(0.0013)
Fixed-effects	
Country Dyad	Yes
Year	Yes
Fit statistics	
Observations	7,593
R^2	0.86764
Within R^2	0.00960

Heteroskedasticity-robust standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table A.10. Alternative Measures for Independent Variables

Dependent Variable:	Predicted Difference in Protection			
Model:	(1)	(2)	(3)	(4)
Variables				
Nat. Res. Rents Diff.	-0.0005			
	(0.0015)			
Polyarchy Diff.	0.0079***	0.0081***		
	(0.0019)	(0.0019)		
GDPPC Diff.	-0.0032*	-0.0011	-0.0012	-0.0009
	(0.0019)	(0.0020)	(0.0019)	(0.0019)
Pop. Density Diff.	0.0552***	0.0565***	0.0627***	0.0637***
	(0.0139)	(0.0136)	(0.0126)	(0.0127)
Rural Pop. Diff.	-0.0033	-0.0031	-0.0013	-0.0022
	(0.0053)	(0.0058)	(0.0050)	(0.0050)
Nat. Res. Rents Diff. × Poly. Diff.	0.0049***			
	(0.0013)			
Ag, Forest, Fish Diff.		-0.0038**		
		(0.0019)		
Ag, Forest, Fish Diff. × Poly. Diff.		0.0066***		
		(0.0014)		
Res. Dep. Diff.			-0.0010	-0.0012
			(0.0013)	(0.0013)
Lib. Democracy Diff.			0.0388***	
			(0.0083)	
Res. Dep. Diff. × lib_diff			0.0275***	
			(0.0066)	
Particip. Democracy Diff.				0.0099***
				(0.0021)
Res. Dep. Diff. × Partip. Dem. Diff.				0.0104***
				(0.0020)
Fixed-effects				
Country Dyad	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Fit statistics				
Observations	7,237	7,116	7,593	7,591
R^2	0.86935	0.86977	0.86881	0.86900
Within R^2	0.00657	0.00951	0.00974	0.01119

Heteroskedasticity-robust standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table A.11. Lags of Main Independent Variables

Dependent Variable:	Predicted Difference in Protection		
Model:	(1)	(2)	(3)
Variables			
Resource Dep. Diff. lag1	-0.0018		
	(0.0013)		
Polyarchy Diff. lag1	0.0068***		
	(0.0019)		
GDPPC Diff.	-0.0008	-0.0006	-0.0003
	(0.0019)	(0.0019)	(0.0020)
Pop. Density Diff.	0.0677***	0.0730***	0.0790***
	(0.0129)	(0.0134)	(0.0139)
Rural Pop. Diff.	-0.0011	-0.0016	-0.0030
	(0.0053)	(0.0056)	(0.0059)
Resource Dep. Diff. lag1 × Polyarchy Diff. lag1	0.0053***		
	(0.0014)		
Resource Dep. Diff. lag2		-0.0027**	
		(0.0014)	
Polyarchy Diff. lag2		0.0069***	
		(0.0020)	
Resource Dep. Diff.lag2 × Polyarchy Diff. lag2		0.0049***	
		(0.0014)	
Resource Dep. Diff. lag3			-0.0035**
			(0.0014)
Polyarchy Diff. lag3			0.0069***
			(0.0021)
Resource Dep. Diff. lag3 × Polyarchy Diff. lag3			0.0052***
			(0.0014)
Fixed-effects			
Country Dyad	Yes	Yes	Yes
Year	Yes	Yes	Yes
Fit statistics			
Observations	7,360	7,095	6,829
R^2	0.87233	0.87641	0.88129
Within R^2	0.00815	0.00860	0.00989

Heteroskedasticity-robust standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table A.12. Lags of Main Independent Variables, Continued

Dependent Variable:	Predicted Difference in Protection	
Model:	(1)	(2)
Variables		
Resource Dep. Diff. lag4	-0.0044***	
	(0.0014)	
Polyarchy Diff. lag4	0.0061***	
	(0.0022)	
GDPPC Diff.	-5.19×10^{-5}	-2.18×10^{-5}
	(0.0020)	(0.0021)
Pop. Density Diff.	0.0852***	0.0935***
	(0.0146)	(0.0152)
Rural Pop. Diff.	-0.0050	-0.0077
	(0.0062)	(0.0065)
Resource Dep. Diff. lag4 × Polyarchy Diff. lag4	0.0052***	
	(0.0015)	
Resource Dep. Diff. lag5		-0.0049***
		(0.0015)
Polyarchy Diff. lag5		0.0058**
		(0.0023)
Resource Dep. Diff. lag5 × Polyarchy Diff. lag5		0.0045***
		(0.0015)
Fixed-effects		
Country Dyad	Yes	Yes
Year	Yes	Yes
Fit statistics		
Observations	6,553	6,277
R^2	0.88681	0.89240
Within R^2	0.01073	0.01134

Heteroskedasticity-robust standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table A.13. Top and Bottom Half of GDP Per Capita Distribution

Dependent Variable:	Predicted Difference in Protection	
Model:	(Top Half)	(Bottom Half)
Variables		
Resource Dep. Diff.	-0.0023	-0.0014
	(0.0040)	(0.0024)
Polyarchy Diff.	0.0046	0.0099***
	(0.0032)	(0.0028)
GDPPC Diff.	0.0025	-0.0710***
	(0.0021)	(0.0216)
Pop. Density Diff.	0.0930***	0.0746***
	(0.0356)	(0.0230)
Rural Pop. Diff.	-0.0239***	-0.0499***
	(0.0090)	(0.0159)
Res. Dep. x Poly	0.0186***	0.0094***
	(0.0037)	(0.0024)
Fixed-effects		
Country Dyad	Yes	Yes
Year	Yes	Yes
Fit statistics		
Observations	3,285	2,039
R^2	0.87598	0.92931
Within R^2	0.01712	0.04102

Heteroskedasticity-robust standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Appendix B Appendix to Chapter 2

Table B.1. Alternative Samples Based on Regime Type

Dependent Variable:	Proportion Ecoregion Covered	
Model:	(Closed and Electoral Autocracies)	(Electoral Regimes)
Variables		
IEAs	0.0303*	0.0503***
	(0.0182)	(0.0142)
Ecoregion Econ. Potential	-0.0026	-0.0281*
	(0.0027)	(0.0144)
Ecoregion Biodiversity	0.0143	0.0150
	(0.0091)	(0.0105)
Nat. Resource Dependence	0.0016	0.0059
	(0.0029)	(0.0048)
GDP Per Capita	0.0372	0.0450
	(0.0350)	(0.0325)
V-Dem Polyarchy	0.0034	0.0028
	(0.0090)	(0.0100)
Ecoregion Size	-0.2552***	-0.2574***
	(0.0479)	(0.0481)
Fixed-effects		
Country	Yes	Yes
Year	Yes	Yes
Fit statistics		
Observations	19,210	27,579
R^2	0.35306	0.33429
Within R^2	0.04136	0.04232

Clustered (Country) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Supplementary Information: Geospatial Data Process

To create the dependent variable at the country-ecoregion-year, I undertook the following geospatial data processing steps to the World Database on Protected Areas (WDPA) and Ecoregions 2017 datasets. All spatial processing was performing in QGIS.

WDPA

First, because I am analyzing terrestrial ecoregions, I filtered out all strictly marine PAs. Next, I filtered out PAs with a "0" under the "Status Year" column, because this indicates that it is not known when a PA was established, and knowing the timing of creation is important to the research question. I then subdivided the data into PAs created in 1970 and earlier, then 1971 and earlier, and so on until 2020, using batch processing and the "Extract By Attribute" tool. This gave me the full PA network in each year from 1970-2020, although analysis was limited 1992 and onward for this paper because of data availability on the independent variables.

I next simplified the geospatial polygons using the Area Simplification method with a tolerance of 0.01 degrees. I did this to improve performance in later data processing steps by dramatically decreasing the size of the files. The size of each geopackage went from 1.67GB-4.62GB to 147MB-364MB. The simplification method used aims to preserve the area and shape of the polygons while reducing minute changes at the edges (i.e. squiggles). This simplification admittedly reduces the specificity of the measure, but areas calculated in the final steps are essentially unchanged from those calculated using the non-simplified data in limited spot checks. I then ran the Fix Geometries tool to clean misdrawn polygons.

Next, in order to not double-count overlapping PAs, such as a national park located within a national forest, I dissolved each year into a single multipolygon object, rather than having unique objects for each PA. I then fixed geometry again, before finally reprojecting each year into an equal area projection (EPSG 8857).

Ecoregions 2017 and Combining

I intersected the Ecoregions data with GADM admin 0 (country borders) to create country-ecoregion level observations, using QGIS's Intersect tool. Next, I intersected each dissolved, annual WDPA multipolygon, from above, with the country-ecoregions to get a new observation at each PA network-country-ecoregion-year level. I then calculated the area of each PA network-country-ecoregion-year using the Field Calculator, and divided that by the total area of the ecoregion (also calculated with the Field Calculator). This final step left me with observations at the unit of analysis containing the value of interest: the proportion of each country-ecoregion-year covered by a PA, for each country-ecoregion-year that had any protection at all. I then imputed zeros for any observation that did not appear with protection, in order to include the full sample of country-ecoregion-years.

Table B.2. Alternative Land Value Measures

Dependent Variable:	Proportion Ecoregion Covered	
Model:	(1)	(2)
Variables		
IEAs	0.0825***	0.0867***
	(0.0189)	(0.0198)
Land Suitability (Ecoregion Median)	-0.0497***	
	(0.0155)	
Ecoregion Biodiversity	0.0038	0.0028
	(0.0141)	(0.0117)
Nat. Resource Dependence	0.0161	0.0189
	(0.0158)	(0.0149)
GDP Per Capita	-0.0171	-0.0176
	(0.0119)	(0.0118)
V-Dem Polyarchy	-0.0044	-0.0023
	(0.0266)	(0.0264)
Ecoregion Size	-0.3032***	-0.2765***
	(0.0453)	(0.0447)
Ag. Opp. Cost (Ecoregion Median)		-0.0356**
		(0.0171)
Fixed-effects		
Country	Yes	Yes
Year	Yes	Yes
Fit statistics		
Observations	22,142	23,429
R^2	0.31259	0.28740
Within R^2	0.07392	0.05342

Clustered (Country) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table B.3. Linear and Quadratic Time Trend

Dependent Variable:	Proportion Ecoregion Covered	
Model:	(1)	(2)
Variables		
IEAs	0.0877***	0.0858***
	(0.0184)	(0.0195)
Ecoregion Econ. Potential	-0.0336***	-0.0337***
	(0.0071)	(0.0071)
Ecoregion Biodiversity	0.0022	0.0022
	(0.0127)	(0.0127)
Nat. Resource Dependence	0.0223	0.0211
	(0.0147)	(0.0145)
GDP Per Capita	-0.0163	-0.0164
	(0.0109)	(0.0109)
V-Dem Polyarchy	0.0069	0.0044
	(0.0233)	(0.0241)
Ecoregion Size	-0.2570***	-0.2570***
	(0.0442)	(0.0442)
Year	-0.0010	0.1367
	(0.0017)	(0.1907)
Year square		-3.43×10^{-5}
		(4.72×10^{-5})
Fixed-effects		
Country	Yes	Yes
Fit statistics		
Observations	23,719	23,719
R^2	0.27585	0.27591
Within R^2	0.07530	0.07536

Clustered (Country) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table B.4. Results Using Fractional Logistic Regression

	Dependent variable:
	Proportion Ecoregion Covered
IEAs	0.382^{***}
	(0.113)
Ecoregion Econ. Potential	-0.787^{***}
	(0.163)
Ecoregion Biodiversity	0.006
	(0.081)
Nat. Resource Dependence	0.009
	(0.076)
GPD Per Capita	-0.110
	(0.075)
V-Dem Polyarchy	-0.040
	(0.123)
Ecoregion Size	-1.488^{***}
	(0.315)
Constant	-1.389^{***}
	(0.172)
Observations	23,719
Log Likelihood	$-8{,}167.780$
Akaike Inf. Crit.	16,635.560
Note:	*p<0.1; **p<0.05; ***p<0.01

Table B.5. Alternative Variables

Dependent Variable:	Proportion Ecoregion Covered					
Model:	(1)	(2)	(3)	(4)	(5)	(6)
Variables						
IEAs	0.0821***	0.0816***	0.0817***	0.0825***	0.0864***	0.0896***
	(0.0192)	(0.0202)	(0.0189)	(0.0200)	(0.0198)	(0.0186)
Ecoregion Econ.	-0.0338***	-0.0335***	-0.0330***	-0.0339***	-0.0338***	-0.0338***
	(0.0072)	(0.0072)	(0.0077)	(0.0072)	(0.0074)	(0.0073)
Ecoregion Bio.	0.0021	0.0020	0.0038	0.0021	0.0036	0.0039
	(0.0127)	(0.0127)	(0.0131)	(0.0127)	(0.0129)	(0.0129)
Nat. Res. Dep.	0.0188				0.0174	0.0157
	(0.0144)				(0.0173)	(0.0147)
GDP Per Capita	0.0046	-0.0152	-0.0142	-0.0163	-0.0126	-0.0157
	(0.0161)	(0.0112)	(0.0095)	(0.0114)	(0.0105)	(0.0106)
GDP Per Capita^2	-0.0040					
	(0.0025)					
V-Dem Polyarchy	-0.0014	0.0001	-0.0004	-0.0021	-0.0064	-0.0040
	(0.0252)	(0.0271)	(0.0254)	(0.0265)	(0.0225)	(0.0222)
Ecoregion Size	-0.2568***	-0.2553***	-0.2627***	-0.2567***	-0.2621***	-0.2659***
	(0.0442)	(0.0442)	(0.0450)	(0.0442)	(0.0463)	(0.0451)
Oil Rents		0.0273				
		(0.0174)				
Ag, etc. Rent			0.0271			
			(0.0196)			
Nat. Res. Rents				0.0007		
				(0.0071)		
Tourism (% GDP)					0.0065	
					(0.0105)	
Emissions Trend						0.0078*
						(0.0047)
Fixed-effects						
Country	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
Fit statistics						
Observations	23,719	22,910	22,803	23,708	21,433	21,613
R^2	0.27638	0.27580	0.28137	0.27593	0.26531	0.27612
Within R^2	0.04863	0.04765	0.04794	0.04813	0.04895	0.05020

Clustered (Country) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table B.6. HAC Standard Errors and Ecoregion-Clustered SEs

Dependent Variable:	Proportion Ecoregion Covered	
Model:	(1)	(2)
Variables		
IEAs	0.0838***	0.0635***
	(0.0085)	(0.0127)
Ecoregion Econ. Potential	-0.0339***	-0.0143
	(0.0017)	(0.0092)
Ecoregion Biodiversity	0.0021	0.0080
	(0.0027)	(0.0088)
Nat. Resource Dependence	0.0191**	0.0045
	(0.0083)	(0.0035)
GDP Per Capita	-0.0181***	-0.0055
	(0.0037)	(0.0106)
V-Dem Polyarchy	-0.0006	0.0053
	(0.0121)	(0.0079)
Ecoregion Size	-0.2568***	-0.2649***
	(0.0088)	(0.0353)
Fixed-effects		
Country	Yes	Yes
Year	Yes	Yes
Fit statistics		
Observations	23,719	42,929
R^2	0.27617	0.31248
Within R^2	0.04836	0.04062

HAC; Clustered (Country) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table B.7. Explanatory Variables Lagged 3 and 5 Years

Dependent Variable:	Proportion Ecoregion Covered	
Model:	(1)	(2)
Variables		
IEAs lagged 3	0.0749***	
	(0.0186)	
Ecoregion Econ. Potential lagged 3	-0.0348***	
	(0.0073)	
Ecoregion Biodiversity	0.0020	0.0018
	(0.0131)	(0.0133)
Nat. Resource Dependence	0.0068	0.0009
	(0.0179)	(0.0144)
GDP Per Capita	-0.0173	-0.0144
	(0.0108)	(0.0098)
V-Dem Polyarchy	-0.0088	-0.0070
	(0.0260)	(0.0238)
Ecoregion Size	-0.2631***	-0.2696***
	(0.0454)	(0.0470)
IEAs lagged 5		0.0747***
		(0.0177)
Ecoregion Econ. Potential lagged 5		-0.0355***
		(0.0076)
Fixed-effects		
Country	Yes	Yes
Year	Yes	Yes
Fit statistics		
Observations	21,342	19,296
R^2	0.27086	0.26956
Within R^2	0.04913	0.04983

Clustered (Country) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table B.8. OLS with Instrumental Variable

Dependent Variable:	Proportion Ecoregion Covered
Model:	(1)
IEAs (Instrumented)	0.101^{**}
	(0.030)
Ecoregion Econ. Potential	-0.034^{***}
	(0.007)
Ecoregion Biodiversity	0.001
	(0.013)
Nat. Resource Dependence	0.021
	(0.016)
GDP Per Capita	-0.018
	(0.011)
V-Dem Polyarchy	-0.002
	(0.027)
Ecoregion Size	-0.255^{***}
	(0.044)
R^2	0.275
Adj. R^2	0.271
Num. obs.	23,496
RMSE	0.216
N Clusters	112

Clustered (Country) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Table B.9. Emissions Trend as Dependent Variable

Dependent Variable:	EPI Emissions Trend
Model:	(1)
Variables	
V-Dem Polyarchy	0.1107
	(0.3494)
IEAs	-0.5721
	(0.4007)
Nat. Resource Dependence	0.2268
	(0.1524)
GDP Per Capita	0.2956***
	(0.1119)
Total Country Area Covered	0.2741**
	(0.1280)
Fixed-effects	
Country	Yes
Year	Yes
Fit statistics	
Observations	23,140
R^2	0.64299
Within R^2	0.08113

Clustered (Country) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

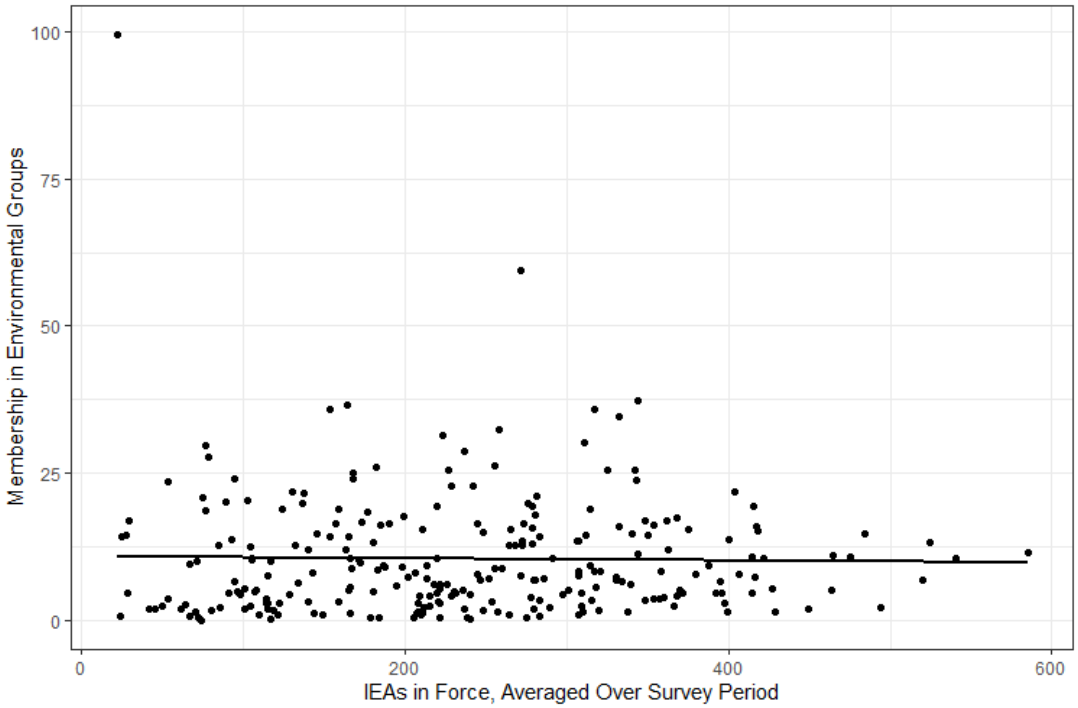


Figure B.1. Membership in Environmental Groups and IEAs in Force

Table B.10. IEAs Interacted with Land Value

Dependent Variable:	Proportion Ecoregion Covered
Model:	(1)
Variables	
IEAs	0.0818***
	(0.0201)
Ecoregion Econ. Potential	-0.0269**
	(0.0133)
Ecoregion Biodiversity	0.0020
	(0.0127)
Nat. Resource Dependence	0.0002
	(0.0072)
GDP Per Capita	-0.0160
	(0.0113)
V-Dem Polyarchy	-0.0035
	(0.0253)
Ecoregion Size	-0.2579***
	(0.0443)
IEAs × Ecoregion Econ. Potential	-0.0053
	(0.0062)
Fixed-effects	
Country	Yes
Year	Yes
Fit statistics	
Observations	23,708
R^2	0.27608
Within R^2	0.04833

Clustered (Country) standard-errors in parentheses
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

Appendix C Appendix to Chapter 3

Table C.1. List of Variables

Variable Name	Description	Data Source
Democratic Backsliding	Democratic Backsliding is coded as 1 if the country experiences an initial 0.01 decrease on the EDI and a total decrease of at least -0.10 throughout the entire backsliding episode, and 0 otherwise.	Edgell et al. 2021
Internet (%)	Estimated proportion of households with internet access	World Development Indicators
Polarization	Extent to which society is polarized into antagonistic, political camps using V-Dem "v2cacamps" indicator.	Coppedge et al. 2022
Populism	Average V-Party populism score (v2xpa_populism) of all political parties that are either a member of the government or officially supporting the government (v2pagovsup)	Lindberg et al. 2022
Democracy	V-Dem Polyarchy Index	Coppedge et al. 2022
Per Capita GDP	Annual per capita GDP (in constant 2005 US$)	World Development Indicators, World Economics and Politics Dataverse
GDP Growth	Annual GDP Growth (in %)	World Development Indicators, World Economics and Politics Dataverse
Presidentialism	Binary variable that takes the value 1 if the chief executive is unitary (V-Dem v2exhoshog=1) and directly elected by the population (V-Dem v2expathhs=7)	Coppedge et al. 2022

Table C.2. List of Variables, Continued

Variable Name	Description	Data Source
Mobile Subscriptions	Number of dedicated mobile subscriptions per 100 inhabitants	International Telecommunication Union
Internet Users	Internet users in percent of populations	International Telecommunication Union
Open Information Access	KOF Information Globalization Index: annual weighted aggregation of information on de facto and de jure forms, including internet bandwidth and access, television access, international patents, high technology exports and press freedom.	Dreher 2006
Democratization	Democratization is coded as 1 if the country experiences an initial 0.01 increase on the EDI and a total increase of at least -0.10 throughout the entire democratization episode, and 0 otherwise.	Edgell et al. 2021
Internet (%)	Estimated proportion of households with internet access	International Telecommunication Union

Table C.3. Descriptive Statistics

	mean	sd	min	max
Open Information Access	50.1511	23.21778	2.746702	95.62386
Populism (Gov)	.3490415	.2072189	.017	.986
Per Capita GDP	10765.9	15321.54	164.1919	91565.73
GDP Growth	3.815832	5.817221	-64.04711	149.973
Presidentialism	.2538164	.4352338	0	1
Polarization	-.2038361	1.346993	-3.817	4.085
N	5437			

Table C.4. Main Results and Alternative Measures for Internet

Variable	(1) Main	(2) ITU Internet (%)	(3) Internet Users (%)	(4) Mobile Subscriptions	(5) KOF
Internet (%)	0.577***	0.031***	0.507***	0.348***	0.842***
	(0.107)	(0.008)	(0.089)	(0.065)	(0.201)
Populism (Gov)	0.174	-0.033	0.180	0.200	0.220
	(0.143)	(0.170)	(0.144)	(0.151)	(0.141)
GDP Growth	-0.287	-0.046	-0.295	-0.324	-0.331
	(0.176)	(0.271)	(0.177)	(0.184)	(0.195)
Per Capita GDP	-1.326***	-1.658***	-1.341***	-1.234***	-0.868***
	(0.300)	(0.367)	(0.310)	(0.326)	(0.231)
Democracy	0.180	0.789	0.213	0.407	-0.116
	(0.345)	(0.430)	(0.347)	(0.395)	(0.354)
Presidentialism	0.029	0.072	0.028	0.030	0.029
	(0.100)	(0.117)	(0.101)	(0.108)	(0.096)
Polarization	0.415**	0.431**	0.409**	0.593***	0.443***
	(0.163)	(0.181)	(0.163)	(0.191)	(0.167)
Spline 1	-0.344***	-0.356***	-0.338***	-0.359***	-0.345***
	(0.042)	(0.051)	(0.041)	(0.046)	(0.043)
Spline 2	2.110***	2.171***	2.061***	2.208***	2.094***
	(0.325)	(0.397)	(0.321)	(0.353)	(0.337)
Spline 3	-3.720***	-3.816***	-3.627***	-3.894***	-3.683***
	(0.594)	(0.722)	(0.586)	(0.644)	(0.617)
Constant	0.028	-0.829	-0.119	-0.005	0.571
	(0.502)	(0.575)	(0.514)	(0.581)	(0.474)
Wald Test	328.489***	280.558***	321.370***	280.447***	362.569***
N	2028	1268	2017	1918	1986

Standard errors in parentheses; ** p <0.05, *** p <0.01

Table C.5. Alternative Standards for Backsliding

Variable	(1) Regime Change	(2) Continuous	(3) Breakdown	(4) Hybrid	(5) Liberal Democracies	(6) Democratization
Internet (%)	1.062***	0.003***	0.858***	0.309***	1.620***	-0.489***
	(0.230)	(0.000)	(0.307)	(0.073)	(0.290)	(0.100)
Populism (Gov)	0.811***	-0.000	0.212*	0.247**	0.497	-0.108
	(0.261)	(0.001)	(0.122)	(0.098)	(0.656)	(0.087)
GDP Growth	-0.282	0.001	0.067	-0.062	-0.957*	-0.045
	(0.340)	(0.002)	(0.105)	(0.094)	(0.492)	(0.123)
Per Capita GDP	-3.414***	-0.000	1.167***	-1.038***	-3.171***	-0.829***
	(0.960)	(0.001)	(0.241)	(0.184)	(1.166)	(0.150)
Democracy	2.754*	0.004*	0.846**	0.561***	-4.224*	-1.003***
	(1.545)	(0.002)	(0.330)	(0.128)	(2.458)	(0.230)
Presidentialism	-0.322	0.001	0.211**	0.042	-1.148***	0.082
	(0.324)	(0.001)	(0.094)	(0.061)	(0.405)	(0.094)
Polarization	1.005	-0.000	-0.394***	0.199**	-0.339	0.253***
	(0.789)	(0.001)	(0.134)	(0.099)	(0.642)	(0.091)
Spline 1	2.883**	-0.000	-0.056*	-0.407***	-0.463**	0.004
	(1.243)	(0.000)	(0.029)	(0.037)	(0.201)	(0.017)
Spline 2	-13.999**	0.002	0.748***	2.646***	3.037*	-0.098
	(5.943)	(0.002)	(0.216)	(0.291)	(1.638)	(0.135)
Spline 3	23.376**	-0.000	-1.500***	-4.699***	-5.464*	0.220
	(9.900)	(0.004)	(0.401)	(0.537)	(3.017)	(0.251)
Constant	-68.920**	-0.018***	1.448***	0.079	7.129	-0.296
	(23.795)	(0.006)	(0.498)	(0.202)	(4.881)	(0.339)
Wald Test	138.221***	300.669***	611.374***	100.434***	269.313***	
N	2028	2028	1243	3321	879	2028

Standard errors in parentheses; * p <0.05, ** p <0.01, *** $p < 0.001$

Table C.6. Alternative Model Specifications

Variable	(1) 5-Yr MA	(2) Lag	(3) Region FE	(4) Country FE	(5) OLS	(6) IV
Internet (%)	0.035***	0.639***	0.399***	1.068*	0.018***	0.284***
	(0.006)	(0.115)	(0.114)	(0.551)	(0.003)	(0.069)
Populism (Gov)	0.165	0.172	0.177	0.542	0.009	0.123*
	(0.143)	(0.143)	(0.165)	(0.412)	(0.006)	(0.073)
GDP Growth	-0.284	-0.282	-0.286*	-0.441*	-0.006	-0.146
	(0.173)	(0.174)	(0.158)	(0.263)	(0.007)	(0.103)
Per Capita GDP	-1.499***	-1.429***	-0.113	-1.450	-0.015***	-0.533***
	(0.330)	(0.319)	(0.455)	(3.085)	(0.004)	(0.194)
Democracy	0.174	0.173	-0.238	-1.111	0.009	-0.056
	(0.348)	(0.347)	(0.378)	(1.402)	(0.014)	(0.207)
Presidentialism	0.030	0.029	-0.112	-0.054	0.008*	0.033
	(0.101)	(0.101)	(0.170)	(0.375)	(0.004)	(0.049)
Polarization	0.421***	0.415**	0.467**	2.143**	0.017***	0.229***
	(0.162)	(0.163)	(0.195)	(1.027)	(0.006)	(0.084)
Spline 1	-0.341***	-0.343***	-0.346***	-0.356***	-0.040***	-0.167***
	(0.042)	(0.042)	(0.041)	(0.050)	(0.002)	(0.015)
Spline 2	2.094***	2.100***	2.128***	2.784***	0.227***	0.994***
	(0.325)	(0.324)	(0.316)	(0.461)	(0.012)	(0.123)
Spline 3	-3.692***	-3.701***	-3.747***	-5.105***	-0.393***	-1.745***
	(0.594)	(0.593)	(0.580)	(0.883)	(0.021)	(0.229)
Constant	-0.217	0.022	1.109*	-2.818	0.632***	0.204
	(0.521)	(0.507)	(0.667)	(3.211)	(0.035)	(0.308)
Wald Test	313.908***	320.820***	245.862***	177.081***		369.118***
N	2030	2030	1310	558	2028	1978

Standard errors in parentheses; * p <0.05, ** p <0.01, *** p < 0.001

Table C.7. Geopolitical Interests

Variable	(1) US	(2) Autocrats	(3) NRR
Internet (%)	0.587***	0.547***	0.555***
	(0.110)	(0.108)	(0.110)
Populism (Gov)	0.164	0.171	0.196
	(0.146)	(0.144)	(0.152)
GDP Growth	-0.304*	-0.298*	-0.304*
	(0.175)	(0.170)	(0.183)
Per Capita GDP	-1.356***	-1.432***	-1.307***
	(0.316)	(0.315)	(0.298)
Democracy	0.204	0.215	0.279
	(0.347)	(0.343)	(0.348)
Presidentialism	0.028	0.163	0.056
	(0.103)	(0.135)	(0.106)
Polarization	0.397**	0.441***	0.412**
	(0.164)	(0.163)	(0.164)
Spline 1	-0.347***	-0.347***	-0.344***
	(0.042)	(0.042)	(0.042)
Spline 2	2.153***	2.158***	2.086***
	(0.329)	(0.328)	(0.321)
Spline 3	-3.805***	-3.811***	-3.668***
	(0.603)	(0.599)	(0.587)
POTUS Visits	0.215		
	(0.363)		
Distance (USA)	0.000		
	(0.000)		
Distance (China)		-0.000	
		(0.000)	
Distance (Russia)		-0.000	
		(0.000)	
Natural Resource Rents			-0.212
			(0.244)
Constant	-0.325	0.468	-0.098
	(0.685)	(0.572)	(0.497)
Wald Test	343.146***	326.660***	331.621***
N	2028	2028	1990

Standard errors in parentheses; * p <0.05, ** p <0.01, *** p < 0.001

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