Extractive “Protectionism”? Natural Resource Dependence and Protected Area Designation

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Abstract

Biodiversity decline and ecosystem loss are among the gravest transnational crises facing the planet, with deep 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 instead argue that resource dependence can lead to mobilization in favor of protection. Citizens experience the negative consequences of environmental degradation and ecosystem loss firsthand, and domestic and international green groups take notice. Although mobilization occurs across regimes, in democracies these groups can more effectively advocate for protection once mobilized. The adverse effects of resource dependence, therefore, mainly apply to less democratic countries, where extractive interests are most able to steer policymaking and mobilization is less likely to succeed. To test this argument, I employ a mixed-methods research design. I employ a novel panel regression discontinuity design at country borders for all terrestrial country-border pairs from 1992 to 2020, using new geospatial data on protected area (PA) designation over time. I find that the effect of natural resource dependence is conditional: when democratic institutions are weaker, natural resource dependence leads to less biodiversity protection. When democracy is stronger, natural resource dependence increases the likelihood that protected areas are established. I complement these results with a qualitative case study of the history of conservation in Costa Rica as a typical case for my mechanisms. These findings highlight the mitigating role that democratic institutions can play between natural resource dependence and biodiversity protection, and have important implications for our understanding of environmental politics and the role of mobilization among various actors in shifting policy.

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Introduction

The world has experienced tremendous environmental degradation in the last several decades, including unprecedented loss of species and ecosystems (Ceballos, Ehrlich, and Raven 2020). The global extinction rate is currently around one hundred to one thousand times what would be expected under normal ecological conditions (Ceballos 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, medicines, and other resources (Sala 2020). Along with climate change, biodiversity loss is one of the greatest transnational threats the international community faces. There are also ethical reasons to wish to slow the loss of intact natural ecosystems. For these reasons, governments across the world have created protected areas (PAs), which are locations set aside for the long-term conservation of nature. The total area of of land-based PAs has grown steadily over the last several decades, now sitting at almost 17% of earth's land. While this growth is impressive, different countries have established PAs at widely differing rates, with some having made great strides toward biodiversity protection while others have not invested resources to preserve natural ecosystems and species. For example, as of 2022 Argentina had only protected 8.7% of its terrestrial area, while its neighbor Chile stood at 20%.

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 level. Because of the centrality of PAs for biodiversity protection, research has focused on understanding the factors that incentivize governments to establish protected areas. Past work has established two key findings. First, while the relationship between democracy and green policies may be complicated,[1] democracies do tend to established more PAs (Kashwan 2017; Midlarsky 1998; Neumayer 2002). Second, for both green policies generally and PAs specifically, scholars have argued that the influence of "brown", or natural resource-reliant,[2] interests is usually detrimental for environmental outcomes (Aklin and Mildenberger 2020; Alger 2023; Beacham 2023; Boyce 1994; Mangonnet, Kopas, and Urpelainen 2022; Mildenberger 2020; Sanford 2021).

[1] See Bättig and Bernauer (2009); Buitenzorgy and P. J. Mol (2011); Kashwan (2017); Mangonnet, Kopas, and Urpelainen (2022); Midlarsky (1998); Neumayer (2002); Povitkina (2018); Povitkina and Jagers (2022); and Sanford (2021) for work that examines the mixed relationship between environmental policies and democracy.
[2] By resource-reliant I mean interests that are either resource extractive or intensive.

My work builds on these findings by providing a causal test of the relationship between resource dependence and protection, and considering how the relationship interacts with institutions. Previous findings would lead us to the conclusion that natural resource dependence decreases the amount of PAs that a country establishes, because the government and interest groups wish to leave as much area as possible open for exploitation. I instead argue that resource dependence can in fact create conditions which cause domestic and international mobilization in favor of protection. Citizens experience the negative consequences of environmental degradation and ecosystem loss firsthand, and concerned domestic advocacy groups and international actors take notice of ecosystem loss. These "green" interests mobilize and push for protection in response to environmental threats. Although mobilization occurs across different political contexts, in democracies the broader public can effectively advocate for protection once mobilized alongside domestic and international green groups. While extractive groups have the capacity to lobby and exert influence in democracies, they are more likely to be countered by environmental interests. The adverse effects of resource dependence on protection, then, 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 et al. 2014, 2018). This means that testing my argument in a standard cross-national regression would introduce serious confounders, because countries vary widely by geographic characteristics that explain much of the variation in PA extent. My research design accounts for geography by comparing like PA extent across national borders. In the first step, I employ geographic regression discontinuities at each terrestrial country border in each year from 1992 to 2020. I leverage geospatial data on over 280,000 PAs to measure PA coverage of more than 2.2 million 100km^2 global grid cells. This design allows me to test for the causal impact of being on one side of the border versus the other, in each year and for each country-border-pair, 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 coefficients from the regression discontinuities as the dependent variable in a dyadic panel regression model, explaining differences in PA designation across neighboring countries using variation in political-economic dynamics. This design provide a plausibly causal test of the theory.

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, including validating the identification assumptions of the geographic regression discontinuities. I also provide evidence of the mechanism of degradation leading to mobilization at the local, national, and international levels. Lastly, I provide a case study of PA development in Costa Rica, as a typical case for my mechanisms to manifest. Costa Rica experienced massive deforestation, which led to mobilization at multiple levels as green interests demanded protection of its remaining natural ecosystems. Its strong democracy helped this mobilization translate into policy change, and it is now one of the most protected countries in the world.

The findings provide new insight to the politics of PAs, a critical part of environmental policy and a phenomenon that has been understudied in the political science discipline (especially considering that PAs cover a total land area larger than South America).[3] They show that the relationship between natural resource extraction and environmental protection is not as simple as we might expect. Most work that examines PAs has focused on distributive dynamics within countries, rather than explaining differences across them (Alger 2023; Beacham 2023; Mangonnet, Kopas, and Urpelainen 2022). Extractive interests may be able to prevent PA designation in places they have the most interest, as previous works suggest. But my findings demonstrate that their activities may actually lead to more PAs overall, even if they may not be optimally located for biodiversity conservation (Jung et al. 2021).

Second, I 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 2002; Povitkina 2018; Povitkina and Jagers 2022; Sanford 2021). 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

[3] They are some exceptions that due explore the politics of PAs and biodiversity (Alger 2023; Beacham 2023; Gibson 1999; Hawkins and Goodliffe 2023; Kashwan 2017; Mangonnet, Kopas, and Urpelainen 2022; Ulloa 2023)

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. My work finds that resource-dependent democracies protect more, but that the overall effect of democracy for protection disappears under conditions of low resource dependence. Distributional bargaining within democracies can shift in favor of green groups, but the threat of significant environmental degradation is often pivotal for this change to occur.

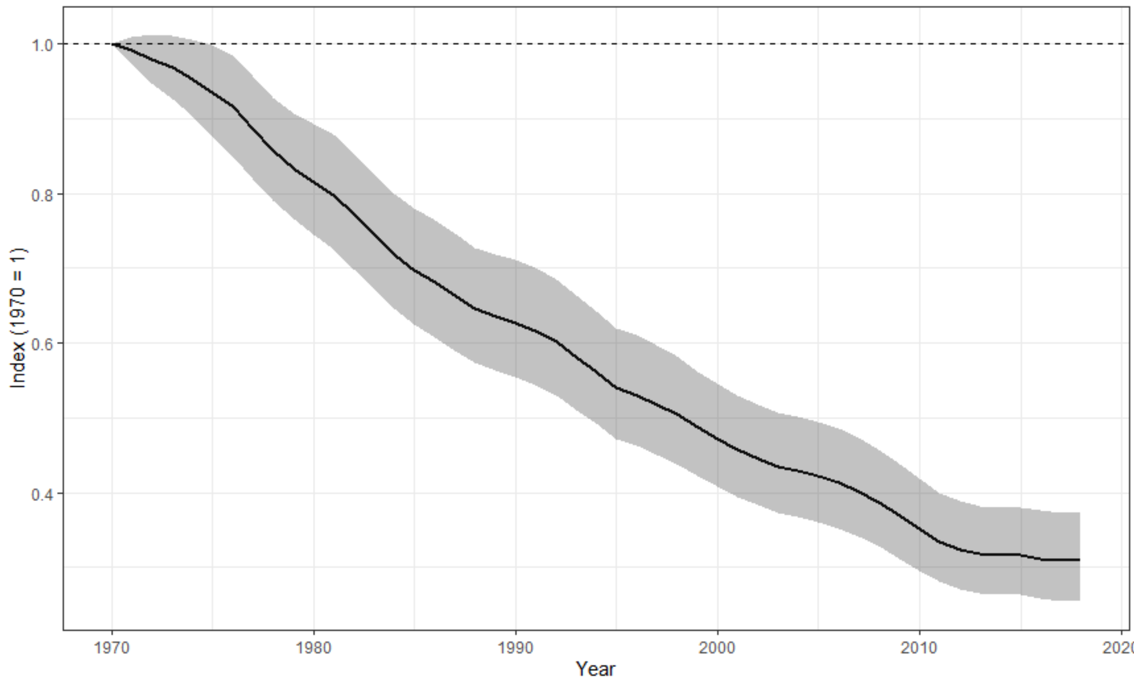
Third, this paper is one of the first to employ rich global data on PAs to understand political determinants of PA designation patterns. I leverage the geographic nature of PAs in a novel research design which allows me to test for the causal impact of national political-economic dynamics — something that is typically difficult to identify.[4] This design could be used in other settings where localized variation near borders is impacted by broader factors, similar to work that analyzes child health outcomes across borders (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.

Biodiversity Decline, Resource Extraction, and Protected Areas

Biological diversity, or biodiversity, refers to diversity of life across three levels: genes, species, and ecosystems (Farnham 2007, 6). For much of human 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).[5] According to the Living Planet Index, global populations of non-human or human-domesticated species have declined by approximately 70% since 1970 (see Figure 1). Many scientists believe we now live in a "10% world," in that only 10% of species and populations now exist which existed before humans (MacKinnon 2013).

[4] To the best of my knowledge, only one other scholarly paper has employed a similar two-step RD design, and the model was not geographic (Bernhardt and Wunnava 2020).
[5] The degree of decline obviously varies across cultures and forms of development. However, evidence suggests that even the most nature-conscious cultures have reduced surrounding biodiversity in the long run (MacKinnon 2013).

Figure 1. Living Planet Index Showing Biodiversity Loss 1970-2018[6]



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 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 (Ehrlich and Ehrlich 2013).

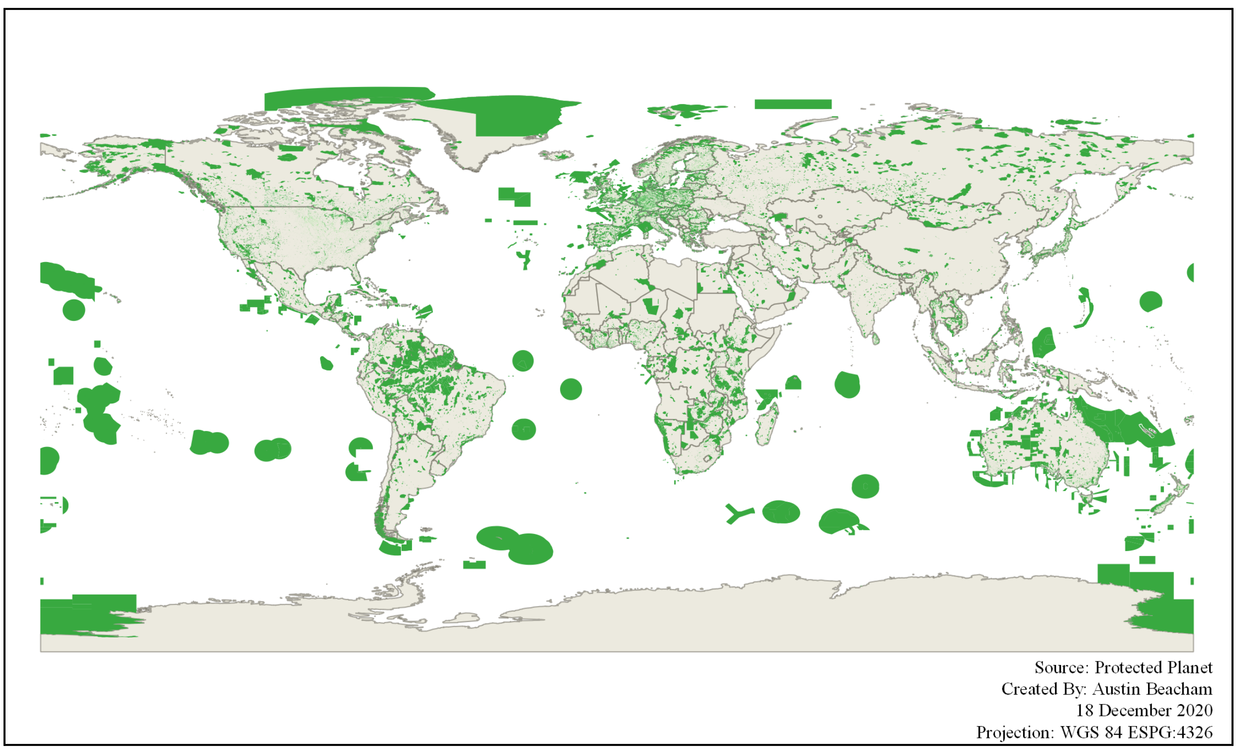
While no single policy can solve the crisis of biodiversity loss, PAs are one of the best solutions we have (IUCN 2010). The National Parks system in the United States is perhaps the best known example of PAs, but their scale varies. The largest terrestrial PA in the world is the Northeast Greenland National Park, which can be seen in Figure 2 below along with the rest of the global PA network. The level of protection can vary depending 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. Limiting economic exploitation is one of the main ways that PAs can help preserve biodiversity, since plant life is not replaced by an

[6] The Living Planet Index is "a measure of the state of the world's biological diversity based on population trends of vertebrate species from terrestrial, freshwater and marine habitats" (WWF 2022).

agricultural monoculture, mine, timber plantation, or other resource extractive site. Similarly, the habitats of animals are also preserved against those direct threats and the pollution that can often result. PAs also protect biodiversity from poaching and wildlife trafficking, in comparison to non-protected land. In sum, they have been shown to benefit biodiversity by reducing human pressures (Geldmann et al. 2019; Gray et al. 2016; Nepstad et al. 2006).

190 countries recently reached a new agreement increasing global commitments to protect 30% of the world by 2030 and establishing procedures for creating marine PAs in international waters (Einhorn 2022). Many international donors, including states, are looking to PAs to slow global environmental degradation, especially deforestation in heavily publicized places like the Amazon, as a way to limit carbon emissions. While investing resources in a PA can create tradeoffs with other environmental priorities like climate change, research has shown that PAs already play a role in climate change mitigation (Duncanson et al. 2023). The expansion of PAs can have overlapping benefits if biodiversity, carbon sequestration, and water quality are jointly prioritized (Jung et al. 2021).

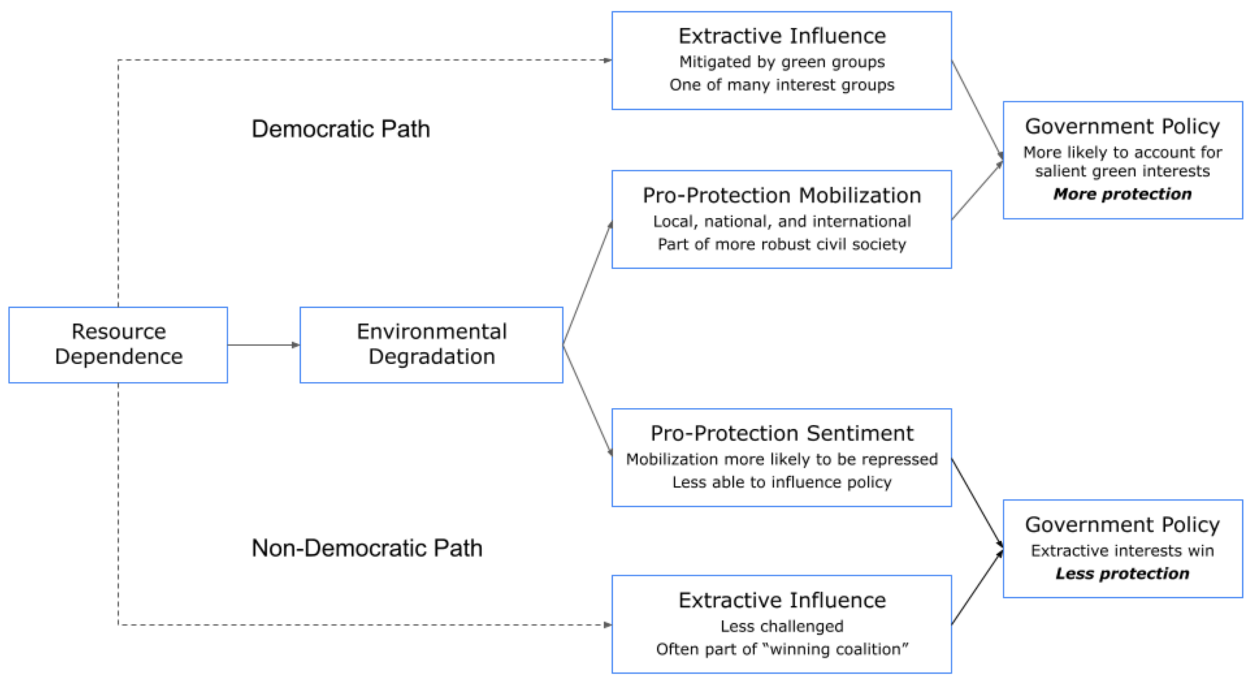
Figure 2. Global Protected Area Network as of December 2020



Theory

In this section, I examine the relationship between democracy, natural resource dependence (NRD)[7] and biodiversity conservation through PAs. To summarize, in resource dependent countries, brown interests are more likely to actively pursue extractive policies. Extraction activates green interests that advocate for protection at the local, national, and international levels. 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. This sort of 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. Natural resource dependence leads to more mobilization in more democratic countries, and that mobilization is more likely to be effective in more democratic countries. Figure 3 summarizes the theory.

Figure 3. Relationship between resource dependence, institutions, and PA policy.



There are two key mechanisms that must be present for my argument to hold. First, higher dependence on natural resources must lead to more mobilization and advocation for

[7] I 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 still entails extraction of minerals and use of other resources in a way that can deplete the land. It also almost always entails the destruction of other, more biodiverse ecosystems in order to establish farms.

protection. Second, these pressures must be more effective in democracies. PA policy is determined, in part, by the gross power of green interests, rather than net power between green and brown interests. Because of the mobilization mechanism, resource extraction generates more gross green power. I examine the two mechanisms in turn.

Mechanism 1: NRD leads to mobilization

NRD tends to lead to 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 groups are more likely to be concerned in the places that are most actively degrading: "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, 2).

Some people benefit from economic opportunities provided by extraction and production, but the average person is also likely to experience 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). In Kentucky, strip mining resulted in soil erosion and flooding that destroyed hundreds of homes and killed at least 37 people (Bruggers 2022). 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 (von der 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 result in significant air pollution, which result in almost 18,000 deaths per year in the US alone (Domingo et al. 2021). Communities living near "factory farms," where animals are kept in extremely dense confines, often complain about horrible odors that can be smelled for miles (Wing et al. 2008), and suffer from water pollution (Driver 2023). The occurrence of these negative consequences increases as country-level NRD increases.

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 largest and tallest trees in the world. The US Forest Service permitted excessive logging, resulting in massive and accelerating deforestation of old-growth forest. A protest movement resulted, with protesters blocking logging roads and even 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.[8] Extraction led to mobilization. As another example, the deforestation of northern India by the timber industry led to devastating floods, and eventually to the Chikpo movement by rural villagers demanding sustainable, local control over resources (Haynes 1999). Both of these movements resulted in restrictions of extractive activity and the establishment of PAs.

Mobilization tends to concentrate in areas near environmental degradation, because it is most salient there.[9] After all, "awareness of the existence of [environmental] problems is a condition for local political mobilization" (Gould 1993, 176). This aggregates to more mobilization at the national level. The more resource dependent a country is, 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.

Country-wide dependence also makes actors from across the country more likely to be concerned with localized 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 due to the U.S.'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 city 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).

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 (IOs) and transnational

[8] While there was also a backlash from local logging communities and timber companies, the key point is that the protest movement was started because of the logging. For a history of this conflict, see (Dietrich 2010). For a fictionalized account, see (Powers 2019).
[9] For an example of local mobilization in a different policy context, see (Nuamah and Ogorzalek 2021).

nongovernmental organizations (TNGOs) 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 citizen 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) and directly lobby the government (Goes and Chapman 2023), in addition to coordinating with domestic green groups (Abbott et al. 2015; Green and Hadden 2021). They have also directly funded the creation of PAs (Adams 2004).

Since the modern environmental movement became globally relevant, people have been able to "link changes close to home with worldwide pressures" (Warde et al. 2018, 1). It is precisely in NRD countries where changes close to home are most prominent. This causes mobilization at the local, national, and international levels. Green interests are most active and influential in NRD countries with ongoing degradation. Biodiversity issues are more pressing in these countries, so mobilization is more common. The broader public is more likely to be receptive to the arguments of green groups, and more likely to sign up as members, thus strengthening their advocacy. Degradation (and resulting mobilization) can also shift public opinion. I do not argue that these shifts will happen to everyone, since pro-extraction interests and citizens still exist, but I do expect enough of a change to affect outcomes.

Mechanism 2: Mobilization is more effective in democracies

I further argue that the mobilization caused by degradation is more effective in more democratic countries. First, more democratic countries allow more mobilization in general. They are more permissive of the types of protests and advocacy that pro-protection groups employ. For example, while recent logging protests in Canada have resulted in hundreds of arrests (Winter 2021), the fact that they were able to mobilize at all is a feature of Canada's democratic system. More democratic countries have more robust civil societies across most issues, including environmental protection (Nur and Andersson 2016; V-Dem Institute 2023).[10] Recent research shows that interest group mobilization in autocratic regimes favors brown interests, because

[10] Many measures and conceptions of democracy include active civil society as part of the definition (Howard 2010), so this claim should be uncontroversial. But see Machin and Ruser (2023) for how civil society may harm green policy in some cases.

popular mobilization demanding environmental protection is more difficult in closed systems (Carlitz and Povitkina 2021).

There is demand for environmental mobilization in less democratic settings, to be clear. Environmental degradation leads people to *want* to demand protection across regime types, and sometimes they do. For example, in authoritarian Vietnam, there have been "protests against Chinese-funded bauxite mining in the highlands, the Hanoi Trees Movement in 2015, the Formosa Ha Tinh Steel's illegal wastewater spills in 2017, and the 2018–2019 anti-Chinese protests in connection with the granting of 99-year land leases in new economic zones" (Bruun 2020, 176). However, mobilization is less likely overall because of the repressive tendencies of less democratic countries. In the extreme, governments can be threatened by environmental movements, causing further restrictions. In Vietnam, "an opposing trend to environmental organizing may be attributed to authoritarian self-intensification in the face of combined socioenvironmental emergencies. This trend finds expression in a rapid succession of new restrictions on public debate and regime criticism as well as in the effective marginalization of formal civil society organizations" (Bruun 2020, 177). Poulos and Haddad (2016) find that less democratic countries are more likely to repress environmental protests violently. This has a dampening effect on mobilization. Citizens may have the same pro-protection desires across regimes, but they calculate that mobilization is not worth the risks in less democratic settings.[11] 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, 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 less likely 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" (Carlitz and Povitkina 2021, 2). While economically powerful brown interests could be 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

[11] Interestingly, most deaths of environmental activists have recently occurred in places that are experiencing serious challenges to democratic institutions, like Brazil, Honduras, and the Philippines. When considered in the framework I propose, this makes sense. Activists are protesting as if they are in a democratic system, but being met with violence as if they are not. A backsliding state would have these conditions, while a fully authoritarian state might have fewer activists to meet with violence.

included in more democratic countries. The government is more likely to listen to their concerns when deciding PA and extraction policy, whereas “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, 2).

This dynamic is also potentially why pro-extraction mobilization, such as the loggers mentioned in the Timber Wars example, is not as important. 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. The extractive interests may lobby harder, but their interests are mostly part of the status quo under extractive conditions. This means their increased lobbying has a much smaller marginal effect than increases on the green side would. The fact the country is resource dependent and experiencing degradation as a result means that their preferences were being met in the status quo.

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 US. There, even those not directly or indirectly employed by the coal industry tend to strongly identify with it. 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. I argue this potential countermobilization does not present a major problem for my theory, for three reasons. First, the multilevel mobilization that I describe above helps pro-protection mobilization mitigate countermobilization. If international actors and concerned citizens across the country are demanding protection in response to degradation, it increases the chance the national government will take action even if it may create local costs (Mangonnet, Kopas, and Urpelainen 2022). The case study of Costa Rica below provides several examples of this.

Second, PAs can actually provide significant economic benefits to local communities through ecotourism, services, and more sustainable use of natural resources. If these possibilities are made clear to local communities, they may countermobilize less, and may even mobilize for PAs. Third, mobilization that originates from demands for protection in one place may lead to protection elsewhere. Governments can respond by protecting a different, currently un-degraded area, allowing them to show they are taking action while still allowing extraction in the original source of protest. For example, the Biden administration both allowed oil drilling projects in Alaska's Western Arctic and protected 2.9 million acres of the nearby Beaufort Sea around the same time (Center for Biological Diversity 2023). My claim is not that jobs are unimportant, only that other concerns mitigate the extractive employment effect. This is what results in the aggregate pattern I posit.

The third reason more democratic institutions lead to more effective mobilization is that PAs can be seen as a public good. They provide diffuse, long-term, non-excludable benefits to many people. The alternative, extraction, is at narrowest a private good for the extractive industries and at most broad a short-term public good until the resource is exhausted. The literature has argued that democratic governments are better at providing public goods (Lake and Baum 2001), because contested political markets decrease monopoly rents available to the state. Following this logic, more democratic governments are more likely to be swayed by mobilization for PAs, as they are less able to accrue monopolistic benefits from extraction.[12]

Fourth, more democratic countries are more likely to be susceptible to international 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,[13] they also have more opportunities to be persuaded and socialized in favor of PAs. In sum, it is clear 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.

[12] Sanford's (2021) argument would seem to contradict this point, but note that his argument is based on incentives of local politicians. In line with Mangonnet et al. (2022), I argue instead that national policymaking determines PA outcomes, so the local political incentives to allow extraction are less important.
[13] See Mattes and Rodríguez (2014) for an overview of this literature.

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

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 for each year from 1992-2020, measuring the causal effect of land being on one side of the border versus the other for PA establishment. In a second step, I use the estimated differences in protection from the first step as the dependent variable, explaining differences in protection with differences in political-economic structures across countries.

I use country borders as a discontinuity for several reasons. First, the design leverages the geographic nature of PAs to allow for inference on political-economic dynamics in the second step. If the RD assumptions hold, the design allows me to measure the causal effect of differences in political-economic structures in countries, 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 25km, which is the smallest bandwidth used in the RDD) is still similar — much of it is in the mountains.[14] Thinking of the border as an abrupt, fine line rather than the mountains themselves helps reduce concerns about differences across borders. I also take empirical steps to ensure these cases do not threaten inference. My robustness checks include covariate balancing, varying RD bandwidth, weighting borders by straightness, and dropping border pairs that are not plausibly exogenous.

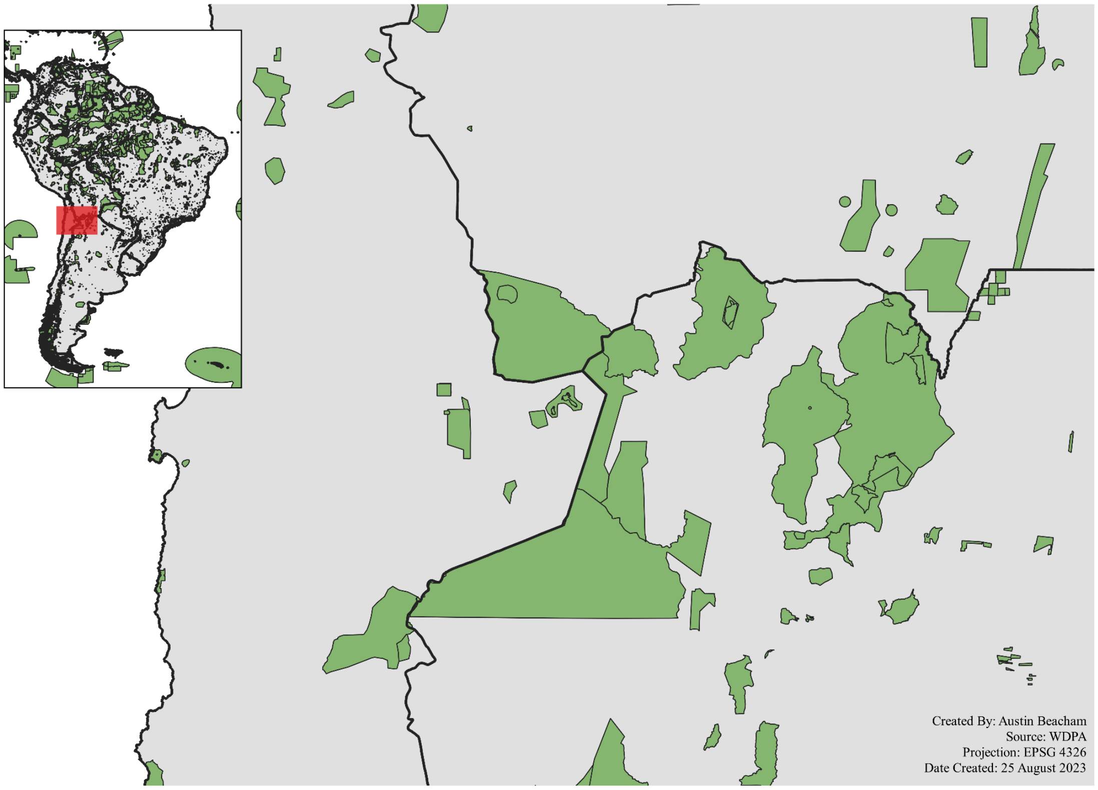
[14] In fact, China and Nepal illustrate the theory well. Nepal is resource dependent but relatively democratic compared to China, and it protects much more of the land near its border.

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 created where there are few accessible, valuable resources, where they will benefit ecotourism, or to protect high-profile biodiversity hotspots or natural monuments (Adams 2004; Joppa and Pfaff 2009; Venter 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 ranges of neighboring countries, meaning that any underlying geographic characteristics that make the land more or less likely to be protected, 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 4 below 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 equivalent ecosystems. To reiterate, while borders may be intentionally located along mountain ranges or rivers, the basic ecosystem immediately on either side of the border line is, in most cases, quite similar.[15]

The third advantage of the design is that using border discontinuities helps deal with monotonicity in PA expansion over time. PAs are rarely degazetted, or undesignated, so the trend over time in almost all countries has been toward greater protection. This may bias my findings in a standard cross-national study. Since I am measuring differences across countries, though, any difference detected is a deviation from global monotonicity in expansion. Detected differences in protection are not just from a general pattern of growth, since differences necessitate a deviation from monotonicity. In sum, the border-discontinuity design allows me to estimate causal effects, account for cross-national geographic heterogeneity, and minimize issues with monotonicity — benefits that a traditional cross-national design would lack. The design takes advantage of PAs' strengths as a subject of study while minimizing their weaknesses.

[15] See Magonnet et al. (2022) for another example of an RD using political borders. While that study focuses on states within a single country, similar arguments could be made for intentional designation of borders along natural geographic "boundaries." My results are relatively robust to the main bandwidth specification from this previous study of 25km.

Figure 4. Argentina, Bolivia, Chile Border Area with 2020 Protected Areas.



It also is a relatively hard test of the theory, for two reasons. First, there is some evidence that PA growth tends to spill over into neighboring countries (Hawkins and Goodliffe 2023). This is especially true near borders: if a country established a PA near its border to protect an important biodiversity hotspot, this would create a focal point for domestic and international pressure to do the same in the neighboring country. Therefore, countries tend to move together when establishing PAs near their borders. Additionally, there is a relatively large network of transboundary PAs (Busch 2008), where a single PA that crosses national boundaries is co-managed by both countries. Both factors would tend to bias the results on the regression discontinuities toward finding small differences across the countries, even if the rest of the PA networks in these countries are quite different. Second, similar spatial clustering occurs in both strength of democratic institutions and resource dependence, given the global distribution of natural resources and patterns of economic development. This also makes empirical tests explaining outcomes through differences in these factors more difficult, since the differences in neighbors tend to be smaller than differences globally. For these reasons, finding significant results would provide strong evidence for the hypotheses derived from the theory. In sum, my research design is a good test of the theory in this paper for several reasons, and allows for causal identification. The following sections explain the two steps in the design.

First Step Sample and Dependent Variable

The first step data is comprised of a global grid of 100 square kilometer 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.[16] Each year's global PA network was then overlaid with the global grid and each grid cell's coverage was calculated. Figure 5 gives an example of what the grid cells and PAs look like in Indonesia and Papua New Guinea.

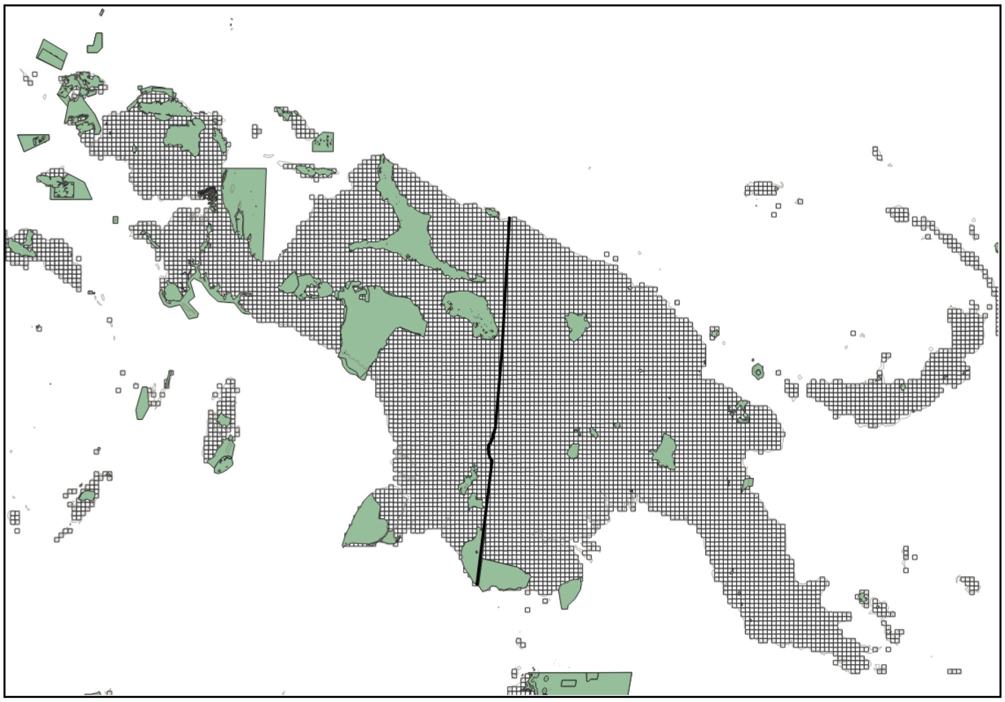
First Step Forcing and Treatment Variables

The forcing variable for the RDD is the is the distance to the nearest point on the country border. I calculate the euclidean distance from each grid cell in a country to each unique border pair that country has. For example, one grid cell in Belize may appear in the full dataset multiple times with distance to Mexico and Guatemala. However, each RD takes place across a single country border-pair, so the grid cell would only appear once in each RD.

The "treatment" in the first step analysis is simply a binary variable indicating if a grid cell is on one side of the border or another. For each country dyad, the two countries are randomly assigned to be Country A or B. In Country A, distances are positive, and in Country B they are negative. The cutpoint is 0, and represents the border.

[16] 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 rare and there is no alternative dataset that does not have this limitation.

Figure 5. Indonesia and Papua New Guinea with 100 sq km grid cells and 2012 PA networks. Indonesia has more PAs both overall and near the border. International border in dark black.



First Step Estimation

At each border pair and for each year, I estimate the following model:

$$Y = \beta Distance + \beta Distance^2 + \gamma D + \varepsilon$$

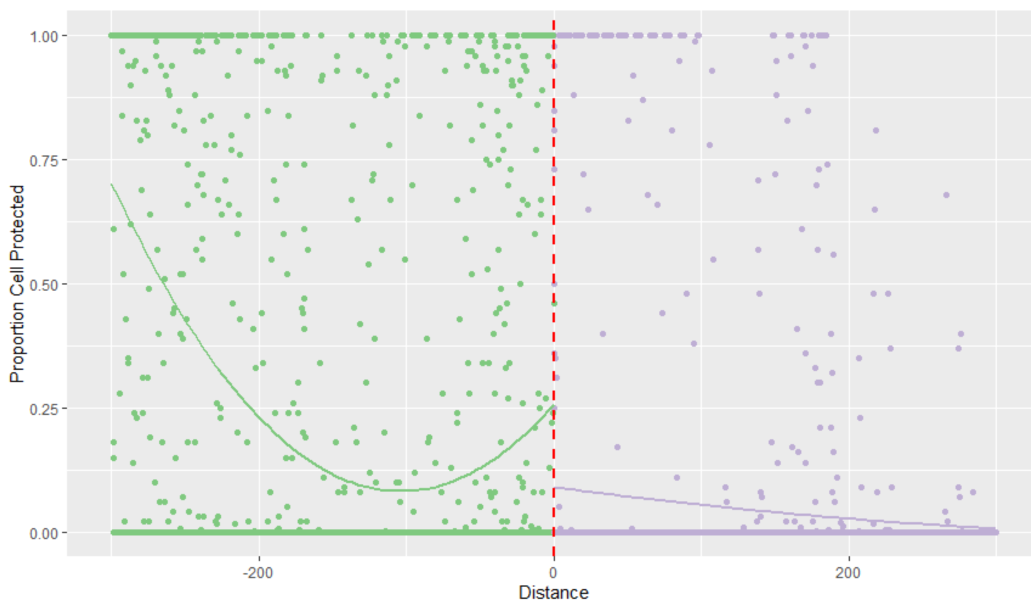
where β is the coefficient for distance from the border (with positive values on one side and negative on the other) and γ is the coefficient on the treatment variable of moving from one country to the other. In other words, it estimates causal effect of a grid cell being close to the border in Country A versus close to the border in Country B. Because positive distances are assigned to Country A and negative distances to Country B, a positive coefficient on γ means that there is more predicted protection in A than in B. It can be thought of as "being in A rather than B results in more protection." These "differences in protection" are local average treatment effects within the bandwidth from the border. In the main model, I allow for the functional form of the regression line to be a quadratic, in order to not overweight observations very close to the border.[17] I use the Imbens-Kalyanaraman optimal bandwidth to measure how far from the border grid cells should be included, with an upper limit at 300km (Imbens and Kalyanaraman 2012).[18]

[17] Results are robust to linear specifications.
[18] Results are robust to more stringent distance bandwidths, and few I-K bandwidths reach near 300km in the main analysis.

Repeating the RD exercise on each of the 314 terrestrial border pairs and for each year 1992-2020 results in 8792 separate regression coefficients.

To help make the design clearer, I present an example of the results from a single RD below in Figure 6, which displays the regression discontinuity results at the border of Indonesia and Papua New Guinea in 2012. Each dot in Figure 5 represents a single grid cell within the calculated bandwidth of the border, and we can see the two fitted quadratic functions. The distance between the two functions at distance = 0 represents the coefficient γ for this RD, or the effect of the treatment (being in Country A). The gap between the green and purple functions make it clear that in 2012, Indonesia was more likely to protect grid cells near the Indonesia-Papua New Guinea border than Papua New Guinea was. The coefficient is positive, because being in A rather than B results in more protection. This matches what we see in Figure 5 above.

Figure 6. RD Example of Indonesia and Papua New Guinea in 2012



Second Step Sample and Dependent Variable

In the second step, 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. I limit the analysis to post-Cold War for three reasons. First, it minimizes changes in country borders, improving the validity of the first step analysis. Second, the vast majority of the global growth in PAs has occurred since then (IUCN 2010). Third, biodiversity conservation was only firmly established on the global policy agenda beginning in the late 1980s and early 1990s, resulting in the Convention on Biological Diversity (CBD) in 1992. Starting in 1992, it is more likely that PAs were established for similar reasons across countries, rather than for heterogeneous reasons such as game preserves, national monuments, and recreation areas that were more common before (Adams 2004).

The dependent variable in the dyadic panel regression is the coefficient γ on the treatment variable for each country pair from the first step. Moving forward, I will refer to these coefficients as the **difference in protection**. While these differences are 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 DV's error term.

Second Step 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:

$$XDiff_i = X_{i,c} - X_{i,c}$$

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 described 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 resource dependence being co-determinate with democracy, as I discuss below. Results are robust to each specification. To measure democracy, I use the **polyarchy index** from V-Dem. This measure varies between 0 and 1, with higher values indicating stronger democratic institutions. Figures 7 and 8 below shows 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 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 difficult establishing PAs because of local resistance. These variables come from the World Bank Development Indicators. I also include year as a control, although results are robust to alternative specifications with year fixed effects.

Figure 7. Distribution of Polyarchy in 2016 and Percent of Land Protected by Country

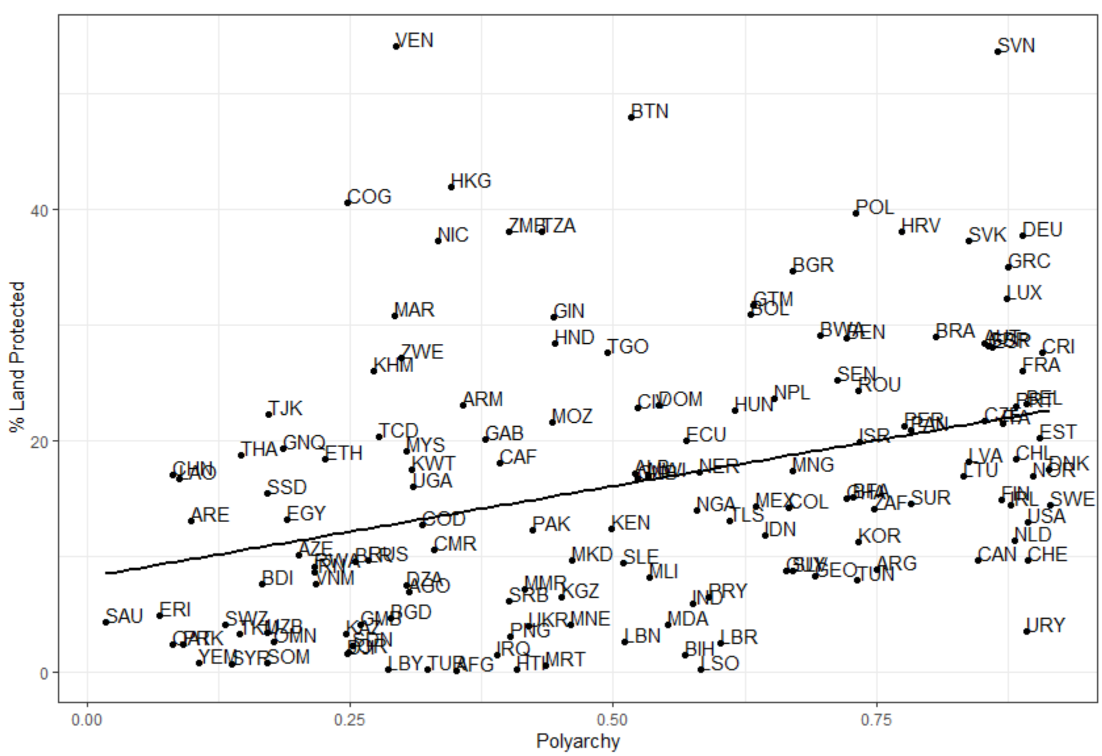
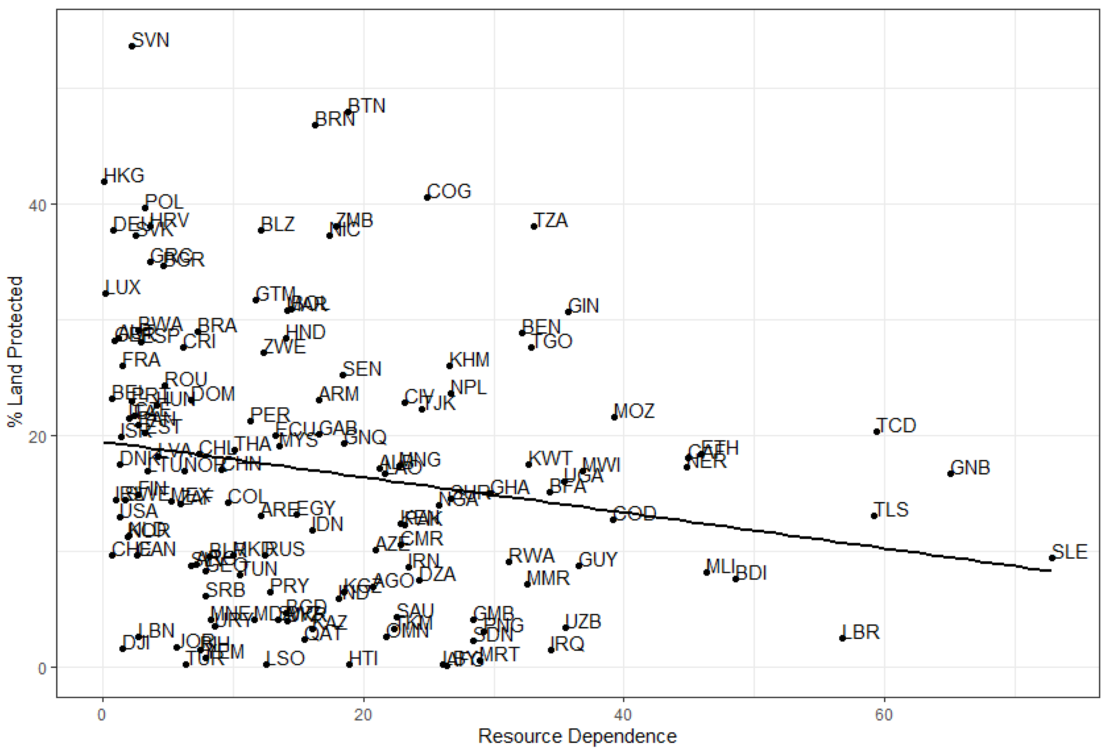


Figure 8. Distribution of Resource Dependence in 2016 and Percent of Land Protected by Country



Second Step Estimation

The model for the second step can be expressed as follows:

$$Y_{d,y} = \beta_0 + \beta_1 ResDepDiff_{d,y} + \beta_2 DemDiff_{d,y} + \beta_3 ResDepDiff_{d,y} * DemDiff_{d,y} + X_{d,y}$$

Where *d* indexes country dyads, *y* indexes years, *Y* is the predicted difference in protection, *ResDepDiff* is the difference in natural resource rents 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 fixed effects and a linear time trend, although results are also robust to country-year fixed effects. I include heteroskedasticity-robust standard errors. 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).[19]

[19] Results remain weakly significant in some specifications when using clustered standard errors at the dyad or region level. This, the fact that this is a hard test, and the likely overly-conservative nature of clustering in this context according to recent research make this a strong empirical design and not a concern about inference..

Results

Table 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 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.[20] The effect is small but substantively significant: a one standard deviation increase in democracy difference results in 0.78% 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%, an almost 1% increase is a meaningful change that makes 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 9 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 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 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: significant differences in democracy predict 1% more or less protection.

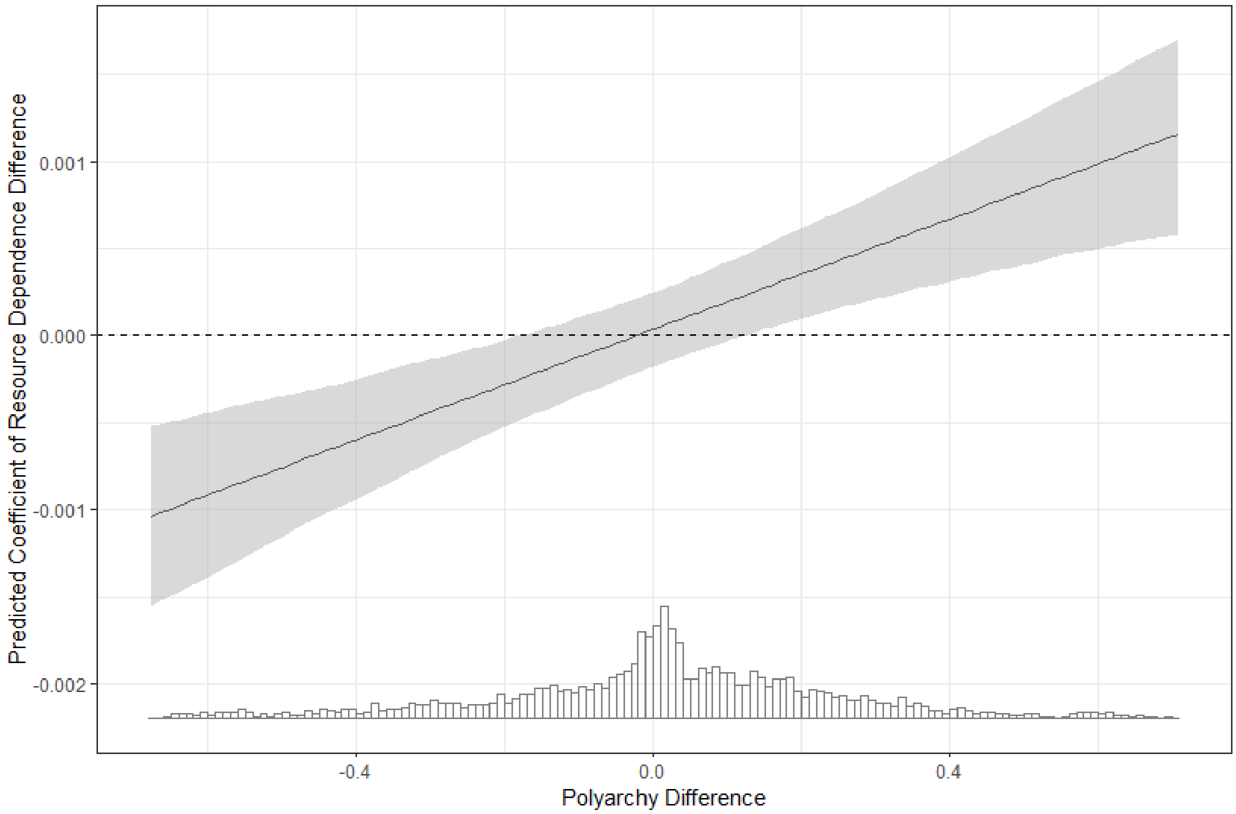
[20] To make this clear, remember that the negative coefficient means being treated by being in country B rather than A results in less predicted protection. Therefore, country A has more protection.

Table 1: Main Results

Dependent Variable:	Predicted Difference in Protection			
Model:	(1)	(2)	(3)	(4)
Variables				
Resource Dependence Diff.	0.0001	0.0006	0.0002	0.0008
	(0.0016)	(0.0016)	(0.0016)	(0.0016)
Polyarchy Diff.	0.0076***	0.0076***	0.0082***	0.0082***
	(0.0021)	(0.0021)	(0.0021)	(0.0021)
Resource Dep. Diff. x Polyarchy Diff.		0.0065***		0.0067***
		(0.0016)		(0.0016)
GDPPC Diff.			-0.0007	-0.0006
			(0.0030)	(0.0030)
Pop. Density Diff.			0.0298***	0.0318***
			(0.0090)	(0.0090)
Rural Pop. % Diff.			0.0040	0.0031
			(0.0057)	(0.0057)
Year			7.96×10^{-5}	2.24×10^{-5}
			(0.0001)	(0.0001)
Fixed-effects				
Country Dyad	Yes	Yes	Yes	Yes
Fit statistics				
Observations	7,261	7,261	7,183	7,183
R^2	0.86833	0.86867	0.86912	0.86947
Within R^2	0.00197	0.00450	0.00333	0.00604

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

Figure 9. Interaction between Polyarchy Difference and Natural Resource Difference from Model 4. Histogram shows the distribution of the Polyarchy Difference variable.



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.[21] In the first step, I specify the bandwidth of distance away from the border explicitly, rather than using the I-K method. I use bandwidths of 25, 50, 75, and 100km. I do this to increase confidence that the landscape under analysis is truly balanced on covariates on either side of the border. The smaller the distance, the more likely it is that covariates are in fact balanced (see next check). The RDD design is what allows me to make causal claims, so ensuring that it is valid is key. Hypotheses 1 and 2 on the conditional relationship between NRD and democracy are both supported throughout these alternative bandwidth specifications. Next, I perform the same analyses using linear rather than quadratic functional forms in the regression discontinuity. Again, the hypotheses are supported.

[21] Robustness check results available in the Appendix.

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 sq km grid cell level. I display the average differences across the borders in each bandwidth below in Table 2. 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 equate to ecological or geographic significance in the real world.

In the second step, I perform two further tests to build confidence in the RD model. First, I inverse weight dyads by the average "squiggliness" of their borders. 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 which are less likely be based on natural features. My results are robust to this change. I also drop all country dyads except those whose borders are mostly or entirely straight lines, presumably established either by treaty or as part of colonial state drawing. 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,[22] I still find support for my hypotheses at the 10% level.

[22] Sample size is reduced to 84 dyads.

Table 2. Average Covariate Differences Across Models, By Bandwidth

Covariate	I-K	25km	50km	75km	100km
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/ha)	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

Beyond adding robustness to the RDD, I probe the sensitivity of the dyadic panel regression in three ways. First, I apply inverse weighting to country pairs based on how many neighboring countries the pair has in total. This is to ensure that my results are not biased by overweighting countries with many neighbors like Russia or Brazil. My results are robust to this change. Second, I use alternative measures of natural resource dependence and democracy, as mentioned in the preceding section. This is 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 things are generally not considered to be part of the resource curse (Ross 2015). Results are robust to this and other alternative measures. 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. My hypotheses are still supported across these alternative specifications, although lags 3-5 reduce the significance of the interaction to the 10% level.

Evidence For Mobilization Mechanism

My primary empirical tests are of the relationship between resource dependence and protection, conditioned by democratic institutions. However, since the degradation → mobilization mechanism is central to that relationship, I also probe its plausibility. My theory relies on mobilization at three levels: local, around the sites of degradation/extraction; national, where more NRD countries experiences more mobilization, and international, where concerned environmental actors put resources into more dependent countries. I briefly provide evidence at each of these levels. 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 10 and 11 show the geographic distribution of environmental social conflicts across the regions.[23] In Africa (Figure 1), 46% 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%), with climate change making up a much smaller portion (n = 3, 5%). In Central America and the Caribbean (Figure 2), the picture is even more stark: 72% 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) find that “bottom-up mobilizations in response to adverse environmental and social impacts of economic activities and development projects occur worldwide across all income groups” (10), with approximately 75% 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.

[23] Because the conflict is about different kinds of environmental degradation (e.g. deforestation, pollution, soil erosion), it is difficult to also map degradation on top of these points and accurately represent the range of degradation. The maps are intended simply to show the range and prevalence of local social conflict based on my coding.

Figure 10. Distribution of Environmental Social Conflict in Africa (n = 67).

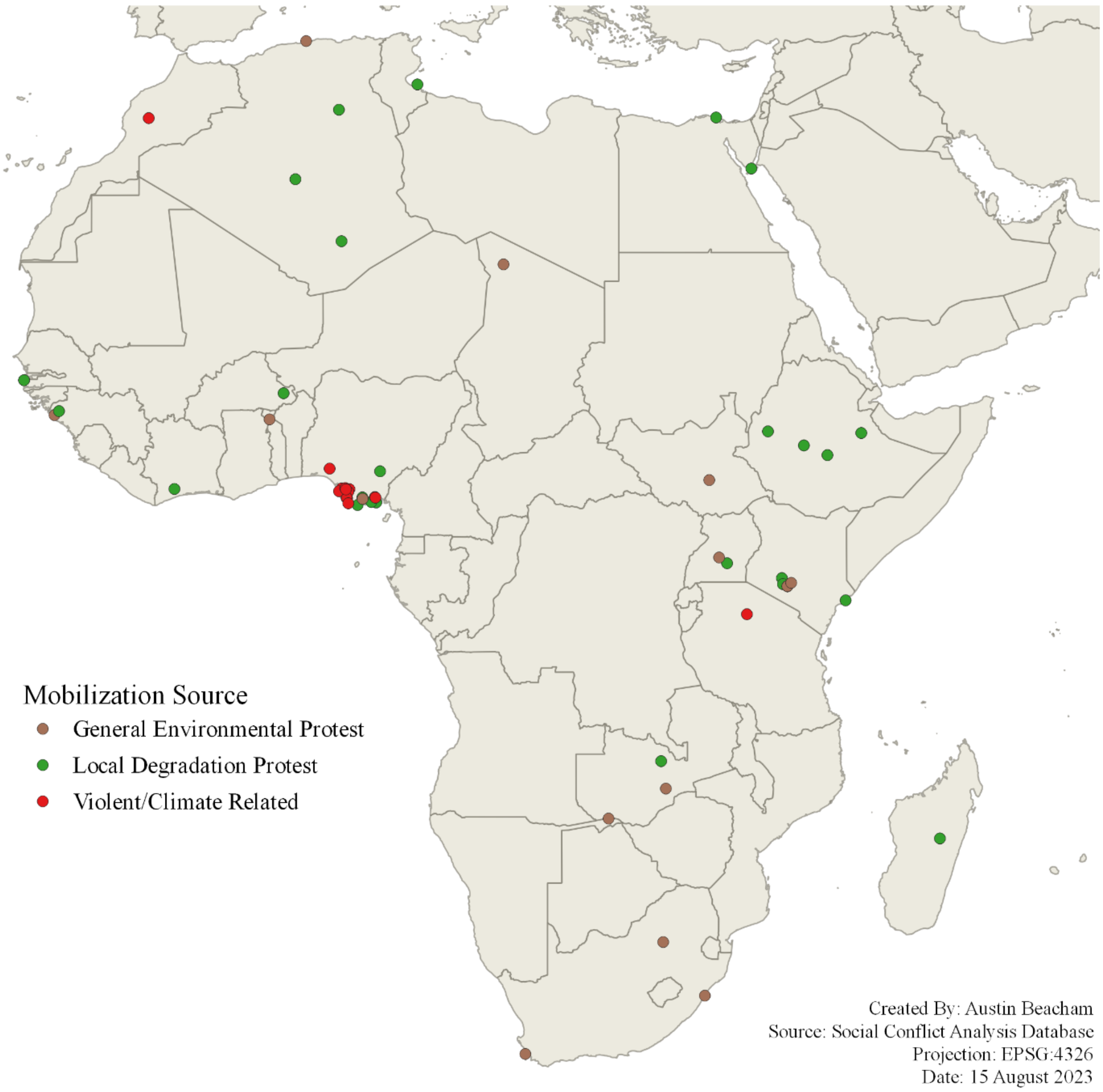


Figure 11. Distribution of Environmental Social Conflict in Central America and the Caribbean.

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 12 below shows the percentage of survey respondents who are active or inactive members of environmental groups plotted against natural resource dependence by country, for survey waves 5 (2005-2009), 6 (2010-2014), and 7 (2017-2022).[24] A simple regression shows a positive and statistically significant relationship between the variables ($p < .05$). This is strong 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.

[24] NRD is constructed as natural resource rents and agriculture, forestry, and fishing value added as percents of GDP, added together. See research design section for discussion.

Figure 12. Environmental Org. Membership Plotted Against Resource Dependence.

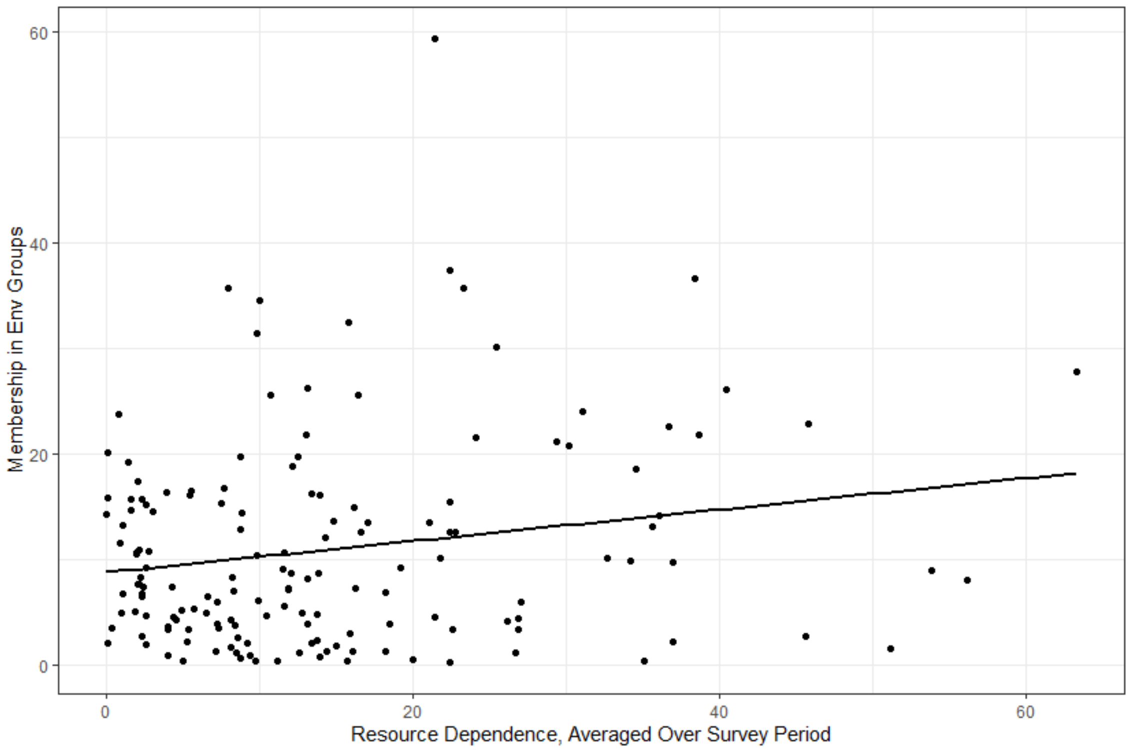
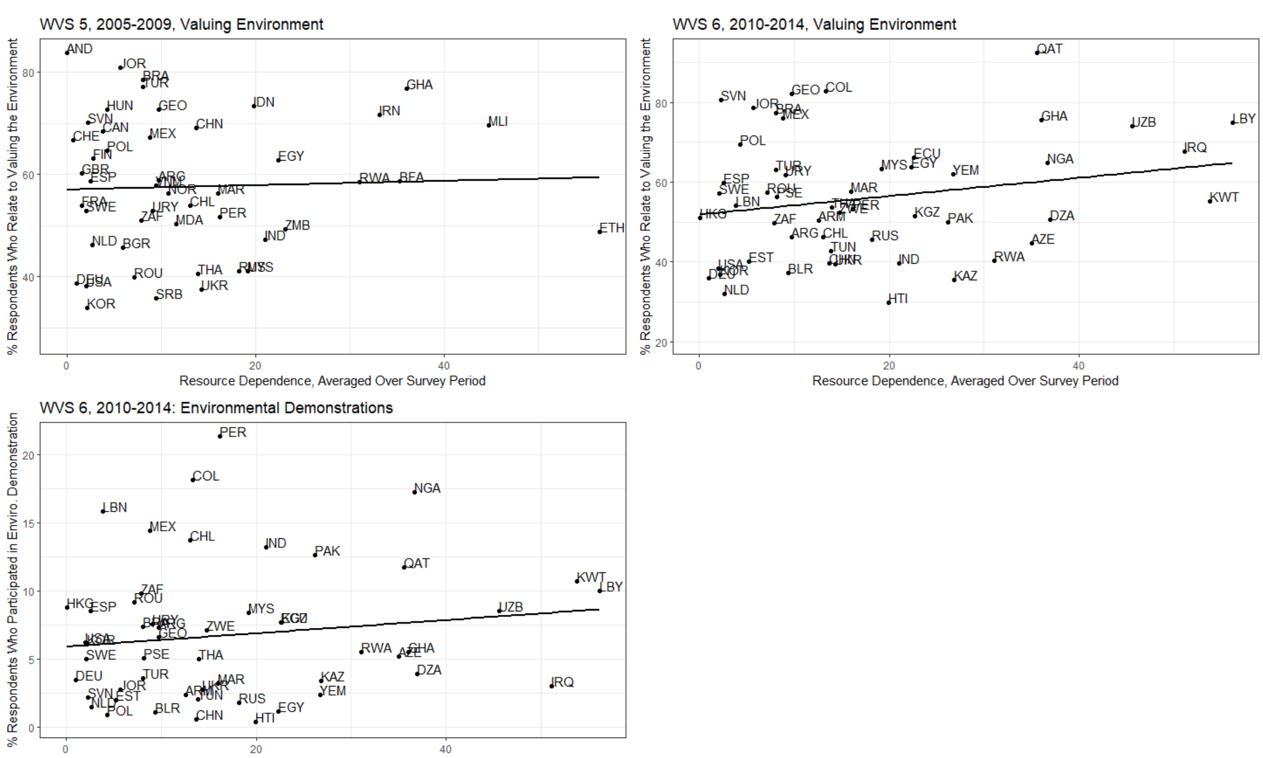


Figure 13. Other WVS Results

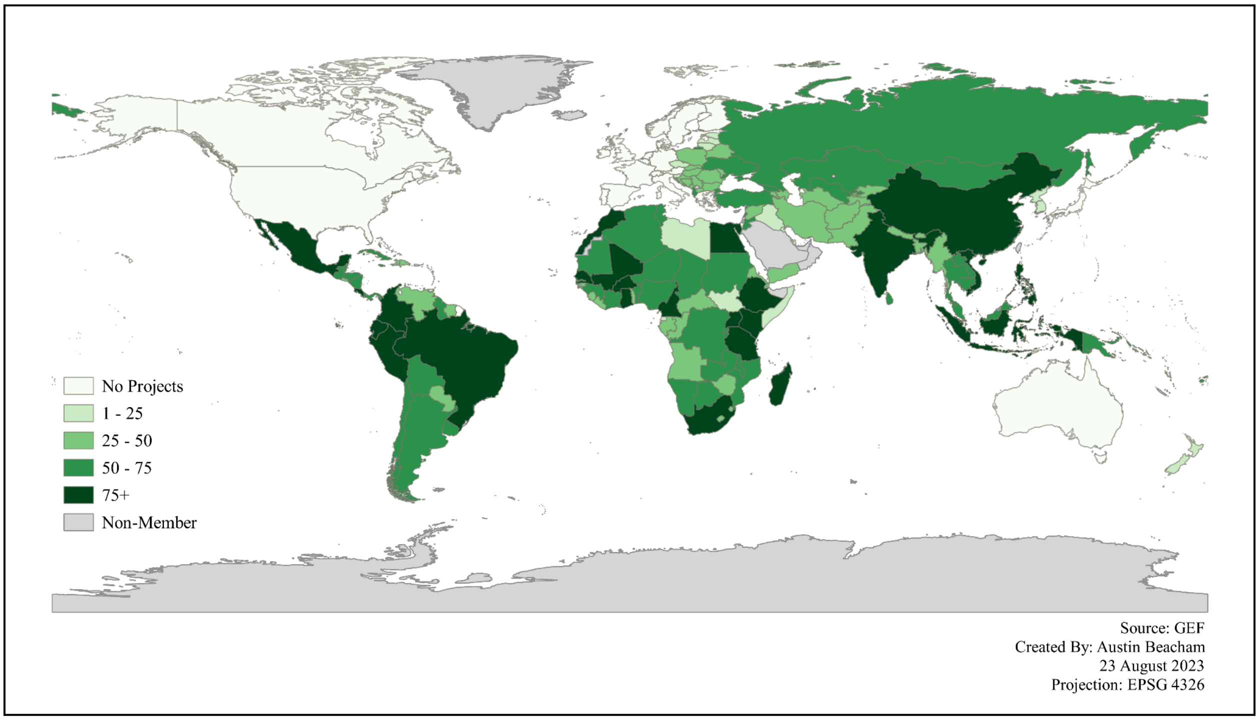


Similar relationships exist between NRD and responses to questions about the respondent feeling similar to a person for whom protecting the environment is important, as well participating in environmental demonstrations: there is no negative relationship, as one might expect if NRD led to solely to valuing the economic benefits derived from extraction, and in some survey waves there is a positive relationship. Figure 13, above, 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) projects. The GEF is a multilateral environmental partnership of 18 agencies, including international NGOs and UN agencies, that works with over 180 countries to fund environmental programs across the world (United 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 → mobilization mechanism. To do this, I collect data on project target countries,[25] 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,[26] and create a count variable for how many projects were approved in each country and each year. Figure 14 shows the total number of projects 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 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.

[25] Available at https://www.thegef.org/projects-operations/database (accessed 23 August 2023).
[26] List of members available at https://www.thegef.org/projects-operations/participant-countries (accessed 23 August 2023).

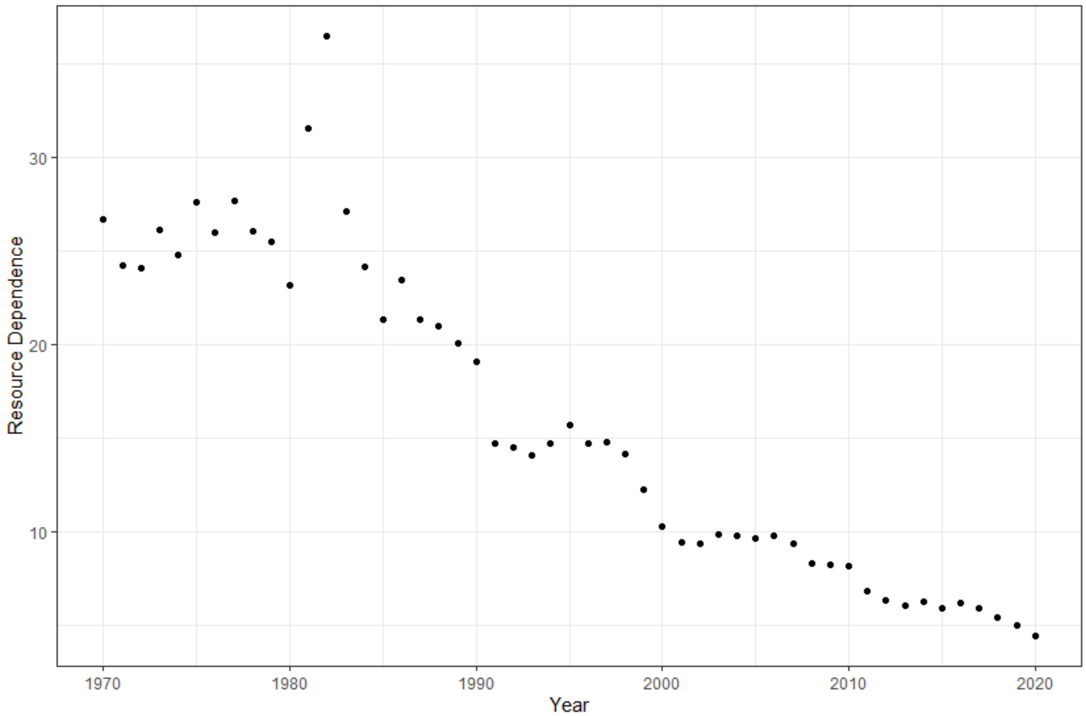
Figure 14. Count of GEF Projects Approved 1991-2022, By Country



Illustrative Case Study: Costa Rica

I complement the quantitative analysis with a qualitative analysis of the mechanisms that underlie the relationship between resource dependence and protection. To trace the underlying mechanisms, I focus on the history of PAs in Costa Rica as a typical case, which allows me to confirm that the proposed causal mechanism is working in a particular observation in the manner I propose (Goertz 2017). This is a typical case because it typical of the relationship between resource dependence, democracy, and protection (Gerring 2008; Seawright and Gerring 2008), not because its values for any of the three are "typical" as in close to the mean. 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. To trace the mechanisms, I rely on a range of primary materials (such as interviews with people directly involved and legislative text) and secondary sources (including academic articles, books, newspaper reports, and web pages). I find evidence that environmental degradation lead to pro-protection mobilization at multiple levels, and that this mobilization had an effect on policy through Costa Rica's democratic institutions.

Figure 15. Resource Dependence in Costa Rica over time.

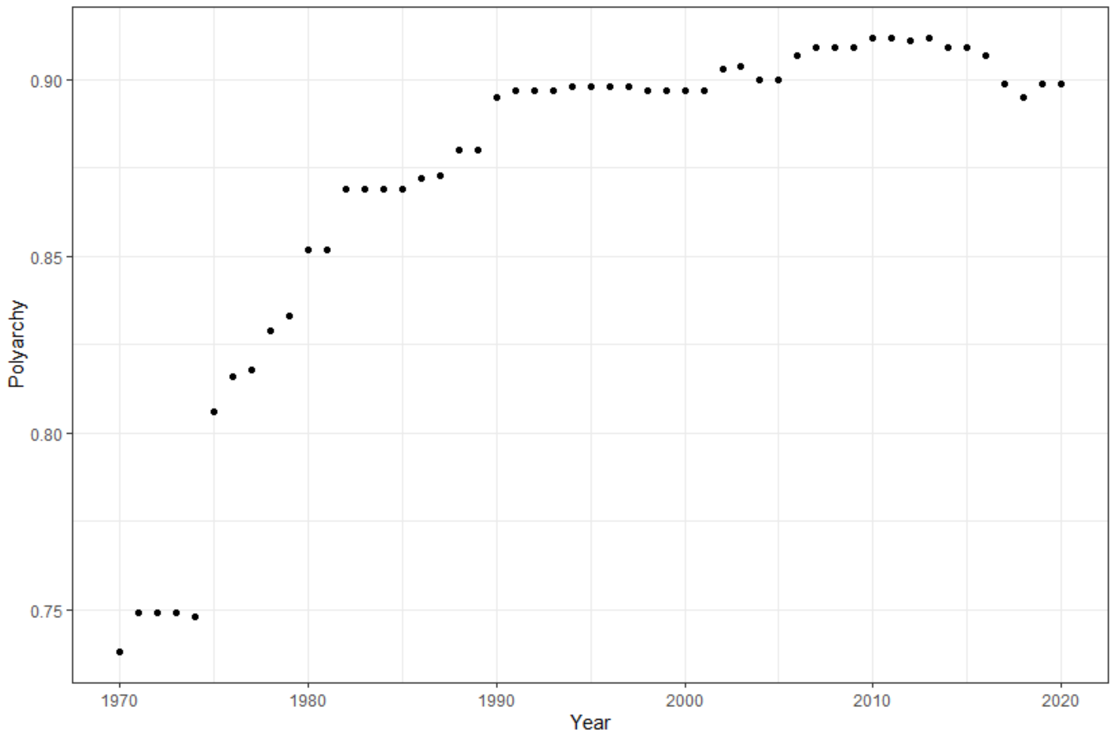


Costa Rica is one of the most biodiverse countries in the world, containing 5% of the world's biodiversity on only 0.03% of the world's landmass (Jordan 2022). Until recently, it was also highly reliant on natural resources for its economy: in 1992, the beginning of data coverage for my quantitative analysis, almost 15% of its GDP originated from natural resources (World Development Indicators). In previous years it had been even higher (see Figure 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 below. 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% of its territory by 1999 (Evans 1999),[27] 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% today (World Development Indicators). 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

[27] I am indebted to Evans' excellent and well-sourced history for many of the examples in this section.

1979). There was, importantly for theory, a significant jump in the strength of democratic institutions in the late 1970s (see Figure 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 and the case.

Figure 16. V-Dem Polyarchy Index for Costa Rica over time.



The above serves to show that Costa Rica fits the criteria of a typical case: 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). If my theory is true, I expect to see environmental degradation leading to mobilization at multiple levels, mobilization to be facilitated and permitted through Costa Rica's democratic institutions, and mobilization to eventually result in more protection. The theory does not preclude local resistance to PAs in some places, but does argue that pro-protection mobilization will also occur.

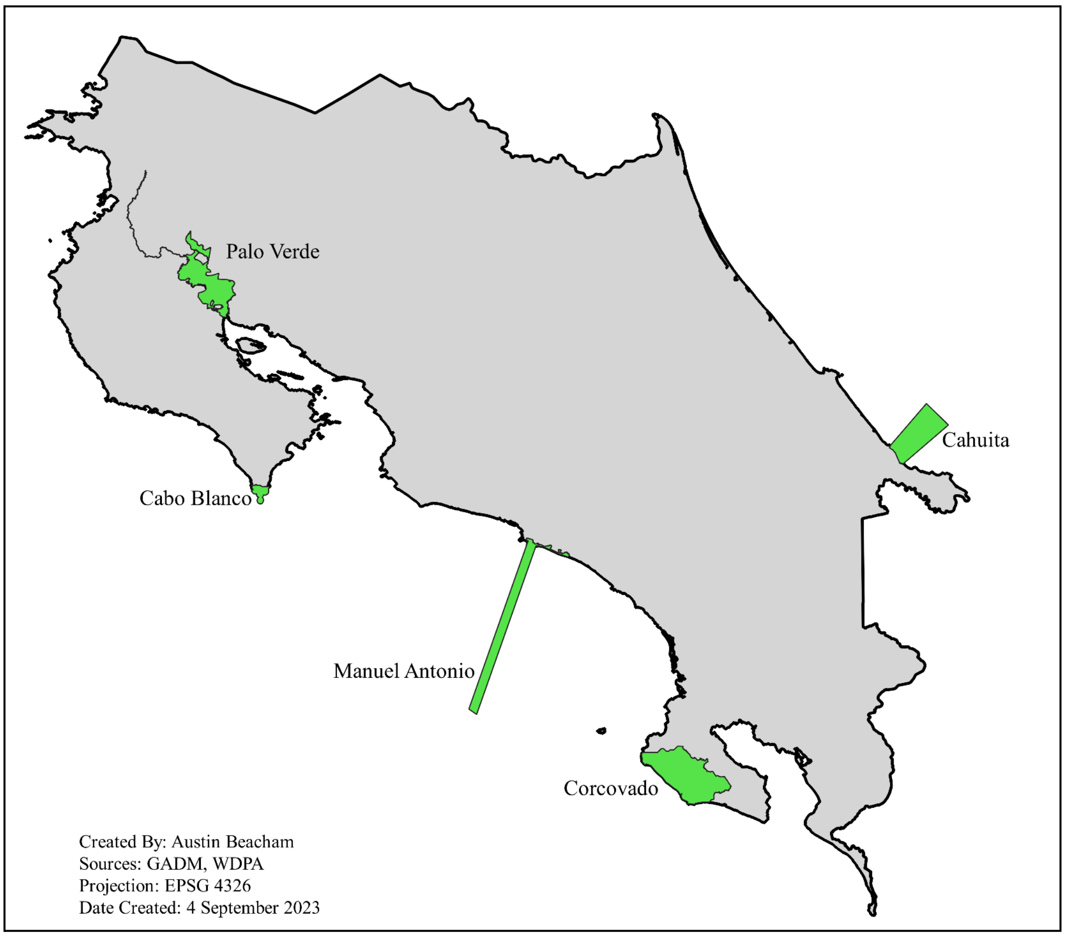
Export Agriculture and Deforestation

In 1940, 75% of Costa Rica was covered by forest. By 1990, that number had been reduced to 29% (Nygren 1995). The primary reason for this loss was export-oriented agriculture based around coffee, bananas, and livestock. 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, 14). While this economic model led to a boom in Costa Rica until a financial crisis in 1978, it also caused massive and noticeable environmental problems. Beyond the problem of deforestation itself, these 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, 7). It took the threat of losing its forests, and the negative environmental consequences that resulted, for Costa Ricans to begin to take action.

Deforestation was the primary point of contention, and "became a significant rallying call in the conservationist community, urging the government of Costa Rica to legislate against forest abuse" (Evans 1999, 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 is an important point, because it shows 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 work on 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 asking for more funding (quoted in Evans 1999, 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 outside of them. By 1981, over 8% of the countries land was under some form of PA, which was well above the global average at the time and only continued to grow (again, sitting at over 25% by 1999).

Figure 17. Costa Rica with Protected Areas Discussed in Case Highlighted



Local and International Mobilization: Cabo Blanco

In addition to this broad pattern, several examples (shown in Figure 17 below) highlight the role of mobilization at multiple levels in establishing Costa Rica’s PA network. These “cases within the case” are also typical of the relationship my theory proposes, although each comes with its own idiosyncrasies. 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). They primarily vary in terms of at what level mobilization first occurs, so I organize them based on that characteristic.

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 n.d.), 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, 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, 62), and the government would have likely been more suspicious of receiving international funds for that purpose.

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 can be seen in Figure 14. Its creation was the result of loca mobilization, particularly by citizens of the town of Quepos. They wanted to protect the land because they were concerned about foreign capital turning the site into a resort, which would entail significant deforestation and development (SINAC n.d.). 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, especially when they continued after the land changed hands again. 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 grouped 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, and convinced him to visit the area. Upon his return to the capital of San Jose, he drafted a bill declaring Manual 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, 90). It was signed into law by then-President Figueres, and is now Costa Rica's smallest, but one of the most visited, national park — drawing over 465,000 visitors in 2017 (Manuelantoniopark.com 2018).

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 (Cahn and 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, 104-105). They subsequently voted in near-unanimous fashion to support the creation of the park (Cahn and 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. For Cahuita, national and international mobilization started the process of creating a PA, rather than local concerns.

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, 98). Olof Wessberg, the Swedish emigrant responsible for the creation of Cabo Blanco, 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 an international spotlight — including, eventually, a movie about Olaf and Karen (Et hjørne af paradis 1997; Tjäder 2014). 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, 42-43).

Within two months, the area was declared a national park. Its cost ran over budget, but the president responded to the overrun by saying "it may cost ten million colones now, but how much more would it cost fifty years from now? We will do it." (quoted in Evans 1999, 99). He 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 14, 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 Mario 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, 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 (Evans 1999).

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, 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, 51). Costa Ricans mobilized to conserve nature close to their communities and around the country. Throughout the entire 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 US, 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).

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 ecosystem 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.

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 new research, especially as new international goals will lead to accelerated PA network growth. The relationship between 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 geospatial techniques to provide a plausibly causal test of the theory. 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. If democratic institutions are important for the creation of PAs both through the resource dependence channel and independently, as other work has argued, the current global trend toward democratic backsliding is worrying from a conservation perspective in addition to its other troubling implications.

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 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 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 focus 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.

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Appendix A: Varying Bandwidths

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)
Resource 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*

Appendix B: Linear Specifications

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)
Resource Dep. Diff. × Polyarchy 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*

Appendix C: Borders Inverse Weighted By Squiggliness

Dependent Variable:	Predicted Difference in Protection
Model:	(1)
Variables	
Resource Dep. Diff.	-0.0011
	(0.0020)
Polyarchy Diff.	0.0106^{***}
	(0.0024)
GDPPC Diff.	0.0028
	(0.0043)
Pop. Density Diff.	0.2128^{***}
	(0.0291)
Rural Pop. Diff.	0.0151^{**}
	(0.0059)
Year	-3.03×10^{-5}
	(0.0001)
Resource Dep. Diff. × Polyarchy Diff.	0.0090^{***}
	(0.0018)
Fixed-effects	
Country Dyad	Yes
Fit statistics	
Observations	6,690
R^2	0.88931
Within R^2	0.02733

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

Appendix D: Sample Restricted to Straight and Mostly Straight Borders

Dependent Variable:	Predicted Difference in Protection
Model:	(1)
Variables	
Resource Dep. Diff.	-0.0062
	(0.0038)
Polyarchy Diff.	0.0231***
	(0.0055)
GDPPC Diff.	0.0298***
	(0.0070)
Pop. Density Diff.	0.3214***
	(0.0530)
Rural Pop. Diff.	-0.0303**
	(0.0137)
Year	0.0023***
	(0.0003)
Resource Dep. Diff. × Polyarchy Diff.	0.0089**
	(0.0043)
Fixed-effects	
Country Dyad	Yes
Fit statistics	
Observations	1,381
R^2	0.86610
Within R^2	0.14023

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

Appendix E: Inverse Weighting By Total Neighbors in Dyad

Dependent Variable:	Predicted Difference in Protection
Model:	(1)
Variables	
Resource Dep. Diff.	0.0001
	(0.0018)
Polyarchy Diff.	0.0117***
	(0.0022)
GDPPC Diff.	-0.0071*
	(0.0037)
Pop. Density Diff.	0.0635***
	(0.0127)
Rural Pop. Diff.	-0.0125*
	(0.0070)
Year	0.0002*
	(0.0001)
Resource Dep. Diff. × Polyarchy Diff.	0.0040**
	(0.0016)
Fixed-effects	
Country Dyad	Yes
Fit statistics	
Observations	7,183
R^2	0.86669
Within R^2	0.01023

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

Appendix F: Alternative Measures for Resource Dependence and Democracy

Dependent Variable:	Predicted Difference in Protection			
Model:	(1)	(2)	(3)	(4)
Variables				
Nat. Res. Rents Diff.	-0.0002			
	(0.0018)			
Polyarchy Diff.	0.0075***	0.0080***		
	(0.0022)	(0.0022)		
GDPPC Diff.	-0.0010	-0.0052*	-0.0006	-0.0005
	(0.0032)	(0.0027)	(0.0030)	(0.0030)
Pop. Density Diff.	0.0289***	0.0428***	0.0322***	0.0320***
	(0.0093)	(0.0121)	(0.0090)	(0.0090)
Rural Pop. Diff.	0.0016	-0.0042	0.0031	0.0023
	(0.0060)	(0.0062)	(0.0057)	(0.0057)
Year	-1.59×10^{-5}	8.17×10^{-6}	4.08×10^{-5}	1.67×10^{-5}
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Nat. Res. Rents Diff. × Polyarchy Diff.	0.0071***			
	(0.0017)			
Ag, Forest, Fish Diff.		-0.0026		
		(0.0023)		
Ag, Forest, Fish Diff. × Polyarchy Diff.		0.0062***		
		(0.0016)		
Resource Dep. Diff.			0.0008	0.0008
			(0.0017)	(0.0016)
Lib. Dem. Diff.			0.0397***	
			(0.0097)	
Resource Dep. Diff. × Lib. Dem. Diff.			0.0282***	
			(0.0074)	
Partip. Dem. Diff.				0.0091***
				(0.0021)
Resource Dep. Diff. × Partip. Dem. Diff.				0.0086***
				(0.0020)
Fixed-effects				
Country Dyad	Yes	Yes	Yes	Yes
Fit statistics				
Observations	6,873	6,772	7,183	7,181
R^2	0.87012	0.87473	0.86949	0.86960
Within R^2	0.00522	0.00616	0.00616	0.00703

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

Appendix G: Lags of Main Independent Variables

Dependent Variable:	Predicted Difference in Protection		
Model:	(1)	(2)	(3)
Variables			
Resource Dep. Diff. lag1	-0.0004		
	(0.0016)		
Polyarchy Diff. lag1	0.0072***		
	(0.0022)		
GDPPC Diff.	-0.0006	-0.0007	-0.0007
	(0.0030)	(0.0030)	(0.0031)
Pop. Density Diff.	0.0332***	0.0347***	0.0366***
	(0.0097)	(0.0103)	(0.0110)
Rural Pop. Diff.	0.0041	0.0033	0.0017
	(0.0059)	(0.0062)	(0.0065)
Year	8.54×10^{-5}	0.0001	0.0002
	(0.0001)	(0.0001)	(0.0001)
Resource Dep. Diff. lag1 × Polyarchy Diff. lag1	0.0054***		
	(0.0016)		
Resource Dep. Diff. lag2		-0.0009	
		(0.0016)	
Polyarchy Diff. lag2		0.0068***	
		(0.0023)	
Resource Dep. Diff. lag2 × Polyarchy Diff. lag2		0.0041**	
		(0.0017)	
Resource Dep. Diff. lag3			-0.0012
			(0.0016)
Polyarchy Diff. lag3			0.0062***
			(0.0024)
Resource Dep. Diff. lag3 × Polyarchy Diff. lag3			0.0029*
			(0.0016)
Fixed-effects			
Country Dyad	Yes	Yes	Yes
Fit statistics			
Observations	6,977	6,740	6,500
R^2	0.87249	0.87623	0.88043
Within R^2	0.00485	0.00390	0.00328

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

Appendix G Continued: Lags of Main Independent Variables

Dependent Variable:	Predicted Difference in Protection	
Model:	(1)	(2)
Variables		
Resource Dep. Diff. lag4	-0.0021	
	(0.0017)	
Polyarchy Diff. lag4	0.0044*	
	(0.0024)	
GDPPC Diff.	-0.0011	-0.0013
	(0.0031)	(0.0031)
Pop. Density Diff.	0.0414***	0.0454***
	(0.0119)	(0.0127)
Rural Pop. Diff.	-0.0008	-0.0043
	(0.0069)	(0.0072)
Year	0.0002	0.0002
	(0.0001)	(0.0002)
Resource Dep. Diff. lag4 × Polyarchy Diff. lag4	0.0033*	
	(0.0017)	
Resource Dep. Diff. lag5		-0.0032*
		(0.0017)
Polyarchy Diff. lag5		0.0034
		(0.0025)
Resource Dep. Diff. lag5 × Polyarchy Diff. lag5		0.0029*
		(0.0017)
Fixed-effects		
Country Dyad	Yes	Yes
Fit statistics		
Observations	6,252	6,001
R^2	0.88537	0.89008
Within R^2	0.00326	0.00348

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