Long Institutions: Forest Conservation as a Problem of Governance Time Horizons

Sam Houskeeper

Columbia University

Abstract:
This article develops a novel institutional theory of long-term environmental good provision, particularly forest conservation. Long goods, or those for which payoffs are delayed over time, are more likely to be provided by states with long institutions, or those with low discount rates and strong inter-temporal commitment mechanisms. Specifically, I demonstrate that long executive tenures, which lower institutional discount rates, and robust rule of law, which allows effective inter-temporal commitment, can facilitate the resolution of long-term problems such as forest conservation and many other forms of environmental protection. I leverage a cross-sectional time-series of forest coverage by country to test these predictions. The theory of institutional time horizons outlined in this article carries significant promise for explaining the variation in environmental protection which is not currently explained by prevailing theories centered around state capacity, collective action, and distributive politics. It also has implications for theorizing the institutional determinants of climate change policy, which I address in the conclusion.

1   Introduction

Forests provide carbon sinks for the mitigation of climate change, habitats for a large share of the world's biodiversity, resources for much of the global economy, and sources of recreation and aesthetic value. Although forests currently cover about one third of the Earth's land surface (FAO, 2020), they are receding by roughly 0.1% per year (FAO, 2020). In general, slow reforestation in the developed world is outpaced by rapid deforestation in the developing world, but this simplification obscures vital heterogeneity that does not fit traditional theories of environmental politics, which focus on democracy and state capacity. While India, a democracy, and China, a strongly

centralized autocracy, each make slow progress in reforestation of close to 0.4% and 0.9% per year respectively (FAO, 2020), neighboring Bhutan, a monarchy beset by Maoist insurgents until 2008, nearly doubled its forest coverage between 1992 and 2016 through effective community-forestry policy (Fox et al., 2019).

Time horizons are a critical but under-studied determinant of forest conservation and of other types of environmental protection that are also imperfectly predicted by conventional theories. Deforestation, for example, can yield large benefits in the present from timber and newly opened farmland despite denying the future a valuable and difficult to replace asset. This inter-temporal distributive problem makes conservation more difficult. But political systems vary in their ability to manage such a tradeoff. Despite broad scholarly recognition of inter-temporal tradeoffs in environmental politics, little theory exists on the definition of so-called "long problems," and on the nature of what I call "long institutions," or institutions most suited to resolving such problems.

I survey the shortcomings of existing theories of environmental protection and define the concept of long problems in Section 2. I conceptualize long problems as difficulties in providing long goods, or goods whose benefits are experienced after their costs. I then argue that there are two distinct types of long problem: long payoff problems, which suffer from temporal discounting, and long action problems, which suffer both from discounting and from time inconsistency. Institutions may ameliorate discounting problems with features such as long executive terms, which allow decision-makers to enjoy delayed rewards for long goods provision. Institutions may ameliorate the time inconsistency problem with robust rule of law, which facilitates intertemporal commitments.

In Section 3, I test my theoretical predictions along with prevailing theories of environmental protection with a cross-national analysis of yearly change in forest coverage measured with classifications of satellite image data from 1983 to 2024. I find moderate support for my theory and numerous opportunities for future research.

This first-cut attempt to explain environmental protection with institutional time horizons helps to broaden the environmental politics research program and connect it with growing literatures in comparative politics disaggregating traditional regime type

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distinctions. It also carries significant implications for the growing literature on the politics of climate change, with which I conclude in Section 4.

2 Explaining Forest Conservation as a Long Problem

Conventional explanations for national variation in domestic environmental protection focus on state capacity, collective action, and distributive politics. These explanations are limited; each theory applies only to a particular type of environmental problem. They are also empirically insufficient; their broad predictions that high capacity democracies will protect the environment often fail to fit reality, especially in the case of forest conservation. I propose a new theoretical framework that explains forest conservation as, in Hale's (2024) terms, a long problem. Forest conservation should be easier for governments with long time horizons, i.e. with long institutions, as I refer to them below. This framework should generalize to help explain variation in some other types of environmental protection because many other (but not all) environmental problems are also long problems.

Scholars have long recognized the challenges posed by inter-temporal tradeoffs in environmental politics, especially in regards to climate change (Hovi, Sprinz and Underdal, 2009; Finnegan, 2022; Hale, 2024). But little systematic theory exists to identify which environmental problems are long problems and what kind of governments have long institutions. Before proposing some simple schemas for each question in Sections 2.2 and 2.3, I briefly emphasize the need for grappling with time for the explanation of environmental protection, especially forest conservation, in Section 2.1.

2.1 Explaining Environmental Protection

Prevailing explanations of national variation in domestic environmental protection center around three concepts: state capacity, collective action, and distributive politics. Each approach is useful under the right conditions, and none are mutually exclusive.

According to state capacity theories of environmental protection, all states wish

to provide some level of environmental protection, but ability to do so varies. Poverty, corruption, weak authority, or ineffective bureaucracies may all subtract from this ability. Thus, this approach makes the simple prediction that higher capacity states will engage in more environmental protection. This argument is theoretically robust and empirically supported (Povitkina, 2018), but cannot explain observed variation among states with similar capabilities or between environmental issues that should be equally difficult to manage.

According to collective action or distributive politics theories, on the other hand, states vary in their willingness to engage in environmental protection. In both approaches, environmental protection abates externalities from publicly polluting but privately rewarding activity. Collective action theories focus on cases in which the externalities are broadly felt and the abatement is non-excludable (i.e., a public or common pool good). For example, factory smog may may affect an entire population and all may benefit from smog reduction. In these cases, environmental protection is achieved through broad cooperation against a diffuse free-rider problem. Distributive politics theories focus on cases in which externalities are more narrowly felt and/or abatement is excludable (i.e., a private or club good). For example, factory smog may only affect a particular vulnerable neighborhood, and wealthy families that are affected may have the ability to install in-home air purifiers to deal with the problem without public smog reductions. In these cases, environmental protection is achieved through effective bargaining through upstream polluters and downstream victims or between victims who can and cannot self-provide abatement. Despite this distinction, collective action and distributive politics approaches have much in common.

Theoretically, both tend to define a protected environment as broadly beneficial and accessible. While the distributive politics literature identifies variation in vulnerabilities and capabilities, downstream environmental effects tend to be treated as broader than the private benefits of upstream polluters. Thus, the bargaining solution to the problems posed by much of the distributive politics literature is collective action of the many victims against the few polluters. This theoretical alignment drives empirical alignment.

Empirically, both theories predict that broadly inclusive democracies will protect the domestic environment more effectively than governments more responsive to concentrated interests (Stokes, 2020; Mildenberger, 2020). Democracies are more likely to provide goods whose benefits are symmetric and non-excludable, as democratic governments are relatively more dependent on broad-based support (Deacon, 2009).

Like state capacity theories, collective action and distributive politics approaches provide compelling explanations for some variation in environmental protection but are both theoretically and empirically limited. Not all forms of environmental protection provide broad benefits to the public. Forest conservation is one example. Benefits from forests are not equally distributed throughout society, as forests may be private property, may be geographically concentrated, or may be more important to particular industries. Moreover, contrary to the excludability assumption of collective action, some forests can be protected while others are not. Thus, forest conservation is not always a collective good, and will not necessarily be predicted by democracy. Indeed, research has found a null or even negative relationship between democracy and forest conservation (Marquart-Pyatt, 2004; Ehrhardt-Martinez, Crenshaw and Jenkins, 2002), especially during competitive election years (Sanford, 2023).

One way to address these shortcomings in the literature is for scholars to develop new theories connecting other common features of environmental protection to institutional variation. One such feature is the tendency of many (though not all) environmental problems to be long problems. By explaining what types of states are more likely to resolve long problems, scholars can predict variation in environmental protection that is not well predicted by state capacity, collective action, or distributive politics, or that does not neatly fit the theoretical assumptions of those models. In this vein, I develop a theory of long institutions that make states will be more likely to resolve long problems. One example of a long problem is forest conservation. If allowed to remain healthy, forests pay dividends over the long run through self-sustainment and self-replenishment. But overzealous exploitation of forests in the short term forestalls these future benefits in favor of immediate benefits. Thus, forest conservation politics can be partially described

as a distributional conflict between the present and the future; while forest conservation is not perfectly predicted by state capacity and does not always follow a clear logic from collective action or distributive politics theories, it will always reflect the dilemmas posed by goods with upfront costs and delayed benefits.

Table 1: Theories of Environmental Protection

Theory	What explains state environmental protection?	What kind of environmental problems?
State Capacity	high capacity/low corruption	all
Collective Action	democracy	non-excludable, diffuse
Distributive Politics	democracy	diffuse
Time Horizons	long institutions	long problems

2.2 Long Problems

What are long problems, and which environmental problems can be described this way? I define long problems as political challenges in the provision of goods for which the benefits accrue after the costs.[1] This could mean that the goods benefits are temporally concentrated but delayed, or that the benefits are spread across future time periods. This payoff structure is omnipresent in political life, defining investment problems like savings and pension funds, infrastructure, or preparing for low-probability risks like natural disasters. Long problems are particularly common in the realm of environmental protection and management because of feedback effects and non-linearities in environmental systems. Human interaction with the environment's growth and decay processes does not always result in linear and additive effects, but rather can lead to complex and even unpredictable system effects (Jervis, 1997). Outcomes of human degradation of the environment can be delayed, such as when toxicity from accumulated chemicals builds up before crossing some threshold of safety, or can be multiplicative, such as when one season's catch leaves a fish population flourishing but several season's catches cause cascading fishery collapse. In short, environmental degradation can be costless in the

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[1] Hale (2024) defines long problems as those with effects stretched beyond one human generation, but most of his arguments and many of his examples cover problems with significantly shorter duration.

short-term but costly in the long-term. Categories of environmental issues that are commonly long-term are those dealing with maintaining a particular ecosystem balance, such as managing toxicity, conserving self-replenishing natural resources, or species protection.

But not all environmental goods are long goods. Some forms of environmental protection are immediately beneficial, while others may even be paid for by a delayed cost (such as the cost of forgoing a long-term but environmentally damaging infrastructure project). While the climatic benefits of reduced GHG emissions are delayed, the local health effects of smog concentrations are felt almost immediately. Heavy particulate smog common near unregulated industrial plants or automobiles dissipates soon after it is released, meaning that the benefits of measures to curb smog are experienced almost immediately. This distinction suggests one reason why the success of smog eradication in developed economies (see the Clean Air Act of 1970 for the US case) has not been emulated with GHG emission reductions.

Long goods may be excludable or non-excludable and may be symmetric or asymmetric. Thus, private goods, club goods, public goods, and common-pool goods could all be either long or short. Long problems therefore are distinct from collective action problems or distributive politics problems, but could interact with these dilemmas in interesting and complex ways.

Much of the literature on long politics defines long problems by the political dilemmas that they pose. Finnegan (2022) and Hale (2024) define long goods as those whose provision suffers from inter-temporal discounting, Hovi, Sprinz and Underdal (2009) define long goods as those whose provision suffers from uncertainty and time inconsistency, while Jacobs (2016) argues that a good that suffers from the former will necessarily suffer from the latter. But by defining long goods by the difficulties that they cause, these approaches fail to clarify the determinants of long goods or differences between them.

I argue instead that the political dilemmas arising from long problems will depend on both the structure of the long problem and the bundle of assumptions used in its analysis. Long problems can be divided into two sub-types: long payoff problems and long action problems. In a long payoff problem, the necessary action to provide a good can be taken

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immediately, but at least part of the good's payoff is delayed after provision. In a long action problem, on the other hand, not only are payoffs delayed but these future payoffs also require additional future action. In other words, in a long payoff problem, today's action is not worthwhile without considering tomorrow's payoffs, while in a long action problem, today's action is not worthwhile without additional action tomorrow. Any long action problem also suffers from long payoff problems–payoffs must reside in the future or else securing them would not depend on future action–but long payoff problems are not necessarily also long action problems–sometimes all necessary action can be taken immediately even if the payoffs are delayed.

Meanwhile, either of these types of problems can be analyzed under more or fewer simplifying assumptions. A parsimonious analysis of long problems could assume rational unitary actors. If so, then the problem faced by actors trying to provide long payoff goods is discounting. According to most theories of individual and institutional choice, costs and benefits in the present have higher relative valuations than those in the future. Similarly, future valuations are higher the closer they are to the present. Assumed discount functions and rates may vary by scholar or by topic, but inter-temporal preferences are always negative in the first derivative. Long environmental goods are paid for in the present but yield benefits in the future, either through a delayed benefit or through a steady stream of projected benefits. Forests, for example, offer small but consistent existence benefits (such as wildlife protection and hunting, tourism, air filtration, timber availability, flood and erosion protection, etc.) but must be maintained by refraining from enjoying the high short-term benefits of over-exploitation (such as uncontrolled logging, slash and burn farming, etc.). Even if the summed future value of a forest's existence far outweighs the market value of its timber, the timber can be harvested and enjoyed today.

Under this same rational actor assumption, an actor trying to provide a long action good suffers not only from discounting but also from time inconsistency. Also known as dynamic inconsistency, this dilemma occurs when preferences may change over time in such a way as to undermine commitment to future action. For example, actor A in period t may prefer that A (itself) in $t+1$ would take action q, but knows that it

will prefer to take action $q\neg$ when period $t + 1$ actually occurs. Consider, for example, conservation of the Amazon rainforest. A particular Brazilian political party may value the numerous ecological benefits of conservation, which will continually pay off for Brazil forever unless the forest is logged and farmed past some irrecoverable level. But this party may figure that, through the natural rotation of power, another party will likely come to office feeling differently and will destroy the forest for the short-term benefits of excessive extraction. Even without the rotation of actors, this party may know that its own prioritization between economic and ecological gain may change if the global economy slides into recession. Knowing that the forest is doomed sooner or later and thus that restraint today has lower future payoffs than would be preferred, even this party with green preferences may decide to cash in on resource extraction in the present.

Table 2: Why are long problems difficult?

Problem structure:

		Long Payoff	Long Action
Assume rational unitary actors?	Yes	discounting	time inconsistency discounting
	No	uncertainty discounting	planning time inconsistency uncertainty discounting

Next, consider loosening the rational actor assumption. If scholars consider non-rational and non-unitary states, then the provision of long payoff goods will face not only discounting dilemmas but also problems of uncertainty. Long goods are more prone to uncertainty than goods with immediate feedback because of the delayed realization of results, hindering experimentation and ongoing reactions. The implications of uncertainty have been well studied in environmental politics (Barrett and Dannenberg, 2012, 2014), but significantly more work is needed on the connection between uncertainty and time.

Under the same loosened assumptions, the provision of long action goods will face not only discounting, uncertainty, and time inconsistency dilemmas but also planning dilemmas. In addition to the appreciation of delayed payoffs, the planning of delayed ac-

tion presents complications in organizational and bureaucratic politics that are mitigated for short-term actions.

In the analysis below I will maintain the relatively strict assumption of rational and unitary actors in order to limit the breadth of my analysis to discounting and time inconsistency. But future research would benefit from the incorporation of the broader set of dilemmas resulting from long payoff and long action problems.

2.3   Long Institutions

Many solutions proposed by the literature on long problems take some form of democracy reduction, although the authors generally do not frame their solutions in that way. Jacobs (2016) and Finnegan (2022) each propose electoral reforms that reduce the responsiveness of the government to popular will (i.e., reducing seat-vote elasticity) and reduce the clarity of government accountability. Aside from the obvious normative dilemmas posed by these prescriptions, they also suffer from theoretical and empirical problems. Theoretically, these suggestions rely on the very strong assumptions that legislators are intrinsically motivated to maximize public welfare and are correct in their views on how to do so. Legislators balance intrinsic goals against the short-term necessity of winning re-election; if they are less vulnerable to electoral backlash from short-term costs of their actions, then they are more likely to pursue long-term welfare maximization. In much of the comparative politics literature, scholars rely on significantly weaker assumptions about legislator preferences. Legislators may be assumed only to care about re-election, or to balance a preference for re-election with some intrinsic preferences that are orthogonal to public welfare. Moreover, legislators are typically not assumed to be necessarily wiser or more competent than the public. Elections and other methods of legislator accountability are thus both preference and competence discovery processes. Empirically, these proposals also suffer from the lack of a clear relationship between democracy and suboptimal long good provision. If these arguments were correct, then democracies would be worst at providing long goods. Jacobs (2016) may be acknowledging these theoretical and empirical problems when he writes that long good provision will be increased by

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decreasing the vote-seat elasticity only up to a point, although he gives no indication of where this point is.

The democratic deficit in long problem theorizing is especially problemmatic because these authors have tended to focus on long goods that are also collective goods (Hovi, Sprinz and Underdal, 2009; Finnegan, 2022; Hale, 2024), which democratic legislators should be more inclined to provide. As I pointed out above, long goods need not necessarily be collective goods. Thus, I explore determinants of long institutions that are at least partially independent of the determinants of collective institutions, i.e., partially independent of the democracy-autocracy distinction.

Political institutions will be more likely to provide long environmental goods if their designs ameliorate the four problems outlined in Table 2. Under the simplifying rational actor assumption used to maintain a manageable scope for this article, long institutions will mitigate two dilemmas: discounting and time inconsistency.

2.3.1 Discounting

First, discounting the future undercuts payoffs from long-term investments; state institutions that create lower discount rates will mean greater long-term environmental goods provision. One reason that policymakers may discount the future less is if they will be in office longer and therefore be able to be rewarded from the long-term benefits of their policies.

Institutionalized parties may be another vehicle through which a government's time horizons are extended from the lifespan or careerspan of a particular leader to the longer arc of an party's interests. A robust literature on the comparative politics of authoritarian regimes has found that those led by institutionalized parties are more stable (Magaloni, 2006). Similarly, institutionalized parties are seen as crucial to the consolidation of democracies and thus the stability of those political systems (Randall and Svåsand, 2002). Regime stability will likely increase the policy time horizons of leaders. But strong parties will also extend time horizons if decisions are at least partially be driven by the interests of the potentially permanent party rather than solely those of the

mortal individual leader. Personalist political movements or weak political parties will be unlikely to value long-term policy goals over shorter-term ones. Thus, in democratic and authoritarian states alike, party institutionalization should increase forest conservation by lowering the discount rate inherent in policy decision-making.

2.3.2 Time Inconsistency

Second, time inconsistency threatens the credibility of long-term payoff realization; state institutions that create inter-temporal commitment mechanisms will mean more long environmental goods provision. Political institutions with stronger inter-temporal commitment mechanisms will be better able to invest in goods with payoffs across time. This argument is similar to the recognition that intra-temporal commitment mechanisms that restrain political power are essential in fostering investment in many types of short-term goods (North and Weingast, 1989; Wright, 2008). Inter-temporal commitment is made possible by the rule of law, or a system in which laws are equally and judiciously enforced. These mechanisms bind policymakers to legal statutes and constitutional authority, and thus to prior legal commitments, rather than allowing them free reign to easily change policy in favor of short-term incentives. The rule of law is correlated with democracy, but many democracies–such as Mexico–lack a robust rule of law, while some autocracies–such as Singapore–enjoy a notably strong rule of law. In both democratic and authoritarian states, the constraints provided by the rule of law should increase forest conservation by allowing the inter-temporal commitment necessary for long goods investment.

2.4 Hypotheses

I test the following hypotheses derived from prior theories of environmental protection and from this articles theoretical intervention describing long institutions.

Hypothesis 1: Corruption will decrease forest conservation.

Hypothesis 2: Democracy will increase forest conservation.

Hypothesis 3: Longer executive terms will increase forest conservation.

Hypothesis 4: Party institutionalization will increase forest conservation.

Hypothesis 5: Constraints on executive power will increase forest conservation.

3 Predicting Forest Conservation with Long Institutions

In this section, I demonstrate that forest conservation is not well predicted by prevailing theories but is predicted by long institutions. I first outline my data structure and sources, then discuss my strategy to model forest growth and decline.

3.1 Data

I take values for forest coverage by country-year from Vegetation Continuous Field (VCF) classifications of two separate sources of NASA satellite imagery: Landsat (available from 1983 to 2016) (Song et al., 2018) and MODIS (available from 2000 to 2024) (DiMiceli et al., 2017). These estimates of national forest coverage provide large samples with nearly continuous coverage (small temporal gaps are interpolated using averages of surrounding values). I combine these two timeseries by simply averaging their values for years in which they overlap, or taking the non-NA value for years in which they do not overlap.

For independent variables, I take population and economic data from the World Bank Development Indicators (World Bank, 2024) and institutional ratings from the Varieties of Democracy (V-Dem) institute at the University of Gothenburg, Sweden (Coppedge et al., 2024; Pemstein et al., 2022).

3.2 Modeling Deforestation and Reforestation

One problem with using institutions to predict forest coverage is the existence of other major drivers of deforestation and reforestation. If not adjusted for, other causes of forest change will lead to, at best, lack of statistical power due to noise in the dependent variable and, at worst, omitted variable bias if these drivers are also related to the explanatory variables. I adjust for exogenous forest variation with two strategies. First, I adjust for state and year fixed effects, capturing unobserved variation across states and across time.

Second, I take control variables from the predictions of Forest Transition Theory, an empirically robust explanation for variation in forest coverage within and between countries (Mather, 1992; Kauppi et al., 2006; Hosonuma et al., 2012). This theory argues that states tend to pass through sequential phases of a transition from high and stable forest coverage, to rapid deforestation, to slowing deforestation, to gradual reforestation at a lower level of forest coverage (Mather, 1992; Hosonuma et al., 2012). At low levels of economic development, when economies are based on natural resource extraction and populations are largely rural, economic and population growth will each lead to rapid deforestation. Alternatively, at high levels of economic development, when economies have transitioned to industrial and post-industrial models and populations have largely urbanized, neither economic nor population growth will impact forest coverage to the same extent, and forests will be able to regrow (Mather and Needle, 1998; Barbier, Burgess and Grainger, 2010; Walker, 1993). At the same time, higher levels of societal wealth will lead to greater preference for environmental protection as a luxury good, while lower levels of national forest coverage due to previous deforestation will lead to increased motivation for conservation (Rudel et al., 2005). Thus, forest coverage plunges as societies develop and rebounds as they continue to develop. I adjust my analysis for logged GDP per Capita to reflect each state's stage of economic development and therefore of forest transitions. I also adjust for urbanization in order to account for the end of widespread subsistence farming that is a key variable in Forest Transition arguments.

Another problem with estimating forest coverage with institutional variables is the

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signal to noise ratio. Forest coverage regularly fluctuates while institutions are slow to change and slow to confer their effects. I account for the disjuncture between slow-moving explanatory variables and a fast-moving dependent variable in two ways. First, I use robust regression rather than ordinary least squares in order to make the model more resistant to outliers in the dependent variable. Second, I use a rolling average (from t to $t+5$) of forest coverage as my dependent variable in order to smooth forest changes and to capture delayed effects of institutional changes. Coefficients in the model therefore indicate how the variable in year t corresponds to average levels of forest coverage in years t through $t+5$.

I estimate the following equation:

$$Forest_{\overline{t:t+5}} = \beta_0 + \beta_1 X_{i,t} + \tau_t + \gamma_i + \epsilon_{i,t}$$

in which $X_{i,t}$ is a matrix of values of the key explanatory variables specified in the hypotheses above (corruption, democracy, executive term lengths, party institutionalization, and rule of law). τ_t and γ_i are fixed effects for year and state respectively. I cluster standard errors by state. I also test for serial correlation by plotting residuals from my fitted models in the appendix of this paper.

3.3   Results

Table 3 displays the main results, first with only the explanatory variables from prevailing theories and then with variables describing long institutions. The explanatory variables of interest are standardized according to the methods of V-Dem, meaning that a one unit change in each explanatory variable indicates a commensurate difference in each quantity of interest.

Forest Transition Theory is broadly validated by a robust upward effect of GDP per Capita on forest coverage, indicating that continued development fosters reforestation. Nevertheless, the negative result for urbanization contradicts this theoretical literature

Table 3: Main Results

|	National Forest Coverage	
	Dependent variable:	
	(1)	(2)
ln GDP per Capita	0.76***	0.53**
	(0.25)	(0.27)
Urban Population Share	−0.08***	−0.08***
	(0.02)	(0.02)
Corruption	2.53***	2.15***
	(0.75)	(0.77)
Electoral Democracy	0.67	1.05
	(0.70)	(0.71)
Executive Term Length		3.34***
		(1.16)
Party Institutionalization		−2.57**
		(1.05)
Rule of Law		0.81**
		(0.37)
Constant	18.43***	21.76***
	(2.26)	(2.52)
Observations	2,792	2,792
Residual Std. Error	1.44 (df = 2615)	1.47 (df = 2612)
Note:	*p<0.1; **p<0.05; ***p<0.01	

and warrants further scrutiny.

Democracy and corruption, the predictors derived from state capacity, collective action, and distributive politics theories of environmental protection do not correspond to the theoretical predictions outlined in H1 and H2. Corruption has a significant effect in the opposite direction theorized, indicating that more corrupt states are better at conserving forest. This puzzling result also warrants further examination. Democracy, meanwhile, is not significantly related to forest conservation.

In regard to institutional factors for lowering discount rates, the results are mixed. Executive term length significantly corresponds to greater forest protection, validating H3 and indicating that longer-serving executives may protect long-term resources. But party institutionalization significantly corresponds to lower forest protection, contrary to H4. This result may indicate that even entrenched parties do not increase long-term thinking but, like other puzzling results in this model, it warrants further attention in follow-up research.

Finally, rule of law is significantly associated with greater forest coverage, indicating that the ability to solve intertemporal commitment problems is vital for protecting forests. This finding validates H5 and strongly supports the categorization of forest conservation as a long action problem.

Figure 1: Main Results

Marginal Effects of Institutional Features
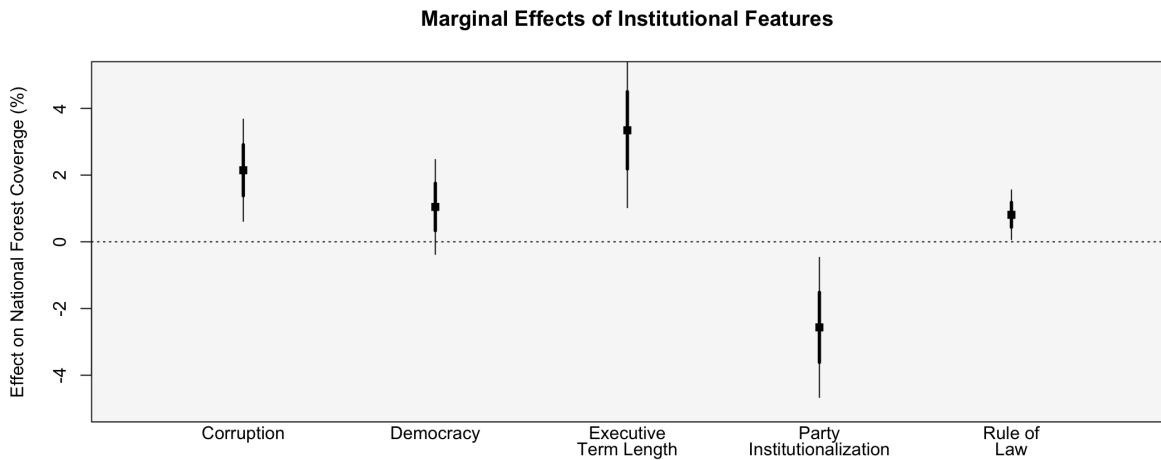
In sum, these results demonstrate the insufficiency of extant theories of environmen-

tal protection as well as the promise of time horizon theories to the provision of long goods. Longer executive terms, which lower institutional discount rates, and robust rule of law, which facilitates inter-temporal commitment, are powerful predictors of forest conservation.

4   Discussion

This study has several limitations that suggest promising paths for future work. Technically, inference of cross-national patterns of forest change could be improved with a longer time series, better landcover classifications for more stable outcome data, and improved statistical models. Theoretically, given the partial failure of the Forest Transition model above, a refined theory on deforestation and reforestation patterns would be useful in isolating the independent effects of political institutions.

Further theoretical work on institutional time horizons will allow additional hypothesis testing of other institutional features that may correspond to lower discount rates or stronger inter-temporal commitment mechanisms. This research should leverage the robust comparative politics literature on variation within autocratic and democratic institutions.

Despite these limitations, this paper has contributed in two major ways to explaining national variation in environmental protection. First, the theoretical discussion and empirical results above both amply demonstrate the insufficiency of prevailing theories that emphasize state capacity, collective action, and distributive politics to explain issues like forest conservation.

Second, this paper argues for the importance of institutional time horizons for explaining the provision of long goods. Environmental goods vary by their temporal payoff structures; some are short-term goods while others produce benefits gradually or after long delays. State institutions, meanwhile, vary in their ability to manage the inter-temporal distribution problem posed by long goods. Institutions vary by their discount rate and by the strength of their inter-temporal commitment devices. My effort to theo-

rize this institutional variation has been partially validated with the finding that executive constraints are strongly predictive of forest conservation.

4.0.1 Implications for the Comparative Study of Institutions

The theory presented above explores institutional variation that is independent of traditional theoretical distinctions between autocracy and democracy. It therefore corresponds to a growing literature in comparative politics and international relations that disaggregates regime type (Mansfield and Snyder, 2002, 2005; Weeks, 2012, 2014). Moreover, while much of the new literature on institutional time horizons focuses exclusively on democracies (Jacobs, 2016; Finnegan, 2022), my theory indicates long institution features that may have predictive power across regime types as well as within regime type. The long institutional features explored in this article tend to correspond to distinctions in the comparative politics literature between institutionalized and non-institutionalized autocracies, in which the former enjoys more stable leadership, developed parties, and some checks and balances, and between consolidated and un-consolidated democracies, in which the former enjoys mature parties and a robust rule of law. Table 4 diagrams the intersection of these concepts with my theory by comparing the democracy-autocracy and the short-long institutional binaries.

Table 4: Institutions for Domestic Environmental Good Provision

| | | Democracy | |
		Low	High
Time Horizons	Long	institutionalized autocracy	consolidated democracy
	Short	non-institutionalized autocracy	unconsolidated democracy

4.1 Implications for Climate Change

This article used forest conservation as an example of a long environmental problem, but climate change provides another salient example. On one hand, greenhouse gas (GHG) emissions can be understood as an externality problem in the present. Abatement of this externality through emissions reduction is globally non-excludable. Scholars that consider the need for abatement to be mostly symmetric expect democracies to lead on climate change mitigation (Bättig and Bernauer, 2009), while those that see asymmetric effects predict bargaining between the geographically vulnerable and invulnerable (Schelling, 1992). But GHG emissions can also be understood as a time horizons problem in which externalities are asymmetric across time. The costs of GHG emissions are delayed by the non-linearity of the climate effect, in which only a large buildup of GHGs in the atmosphere will affect global temperatures enough to start disrupting climate systems. Emissions today ruin the climate tomorrow, but these costs are not realized directly or immediately. Moreover, the costs of cutting emissions are felt today.

The differential ability of domestic institutions to manage the inter-temporal trade-offs of climate change has only received recent attention (Finnegan, 2022; Hale, 2024). My theory would predict that states with institutionalized parties and constraints on the executive would be more proactive in addressing climate change, especially through mitigation.

But climate change mitigation is also an international problem; absent radical improvements in carbon capture technology, no state can unilaterally maintain a low GHG concentration in the globally shared atmosphere. To apply intertemporal analysis to climate change, it is therefore critical to consider the time horizons of international as well as domestic institutions.[2] How could the hypotheses above apply to international institutions? Although parties do not exist in international politics, could institutionalized subgroups of states, such as regional organizations, serve the same role? Do constraints on hegemonic power promised by the liberal international order (Ikenberry, 2001) ap-

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[2]It is also worth noting, in reference to state capacity, collective action, and distributive politics theories, that international institutions could generally be described as extremely low capacity and undemocratic.

proximate domestic executive constraints in such a way as to facilitate inter-temporal commitment?

Applying this article's theory to climate change also prompts the question of whether climate change is a long payoff or long action problem. I would argue that this is not yet clear and depends on certain assumptions about the technological, social, and economic structure of decarbonization. Some scholars believe that climate change mitigation is a problem defined by upfront costs that will disappear after enough green investment. This may be because green investments are catalytic due to technological breakthroughs or economies of scale (Hale, 2020), because the primary barrier to decarbonization is carbon lock-in in the economy rather than a fundamental advantage to carbon-intensive activity (Unruh, 2000; Seto et al., 2016), or because the main costs are political and the interest groups representing anti-green industries will disappear in a green economy (Colgan, Green and Hale, 2021). According to these theories, climate change is merely a long payoff problem, worsened by discounting but by commitment problems. Other scholars argue that climate change mitigation will be a problem of ongoing costs. If fossil fuels remain an economically viable alternative to green energy, then maintaining a low GHG concentration in the atmosphere will require states to continually refrain from the profitable exploitation of their carbon resources. According to this theory, climate change is a long action problem in which states will struggle not only to refrain from emitting GHGs in the present, but will struggle to commit to keep refraining into the future.

Further research on institutional time horizons is vital to understanding climate change, deforestation, and other crucial environmental problems. This article attempts to lay the groundwork for further development of this question.

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