The Ethnic Politics of Nature Protection in Africa

Stephen Dawson* Felix Haass† Carl Müller-Crepon‡
Aksel Sundström*

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Abstract

Nature protected areas are hailed as an institutional solution to the global biodiversity crisis. However, conservation entails local economic costs for some communities and benefits for others. We propose that the establishment of protected areas in Africa follows an ethno-political logic which implies that governments distribute protected areas such that their ethnic constituencies are shielded from their costs but enjoy their benefits. We test this argument using continent-wide data on ethnic groups' power status and protected area establishment since independence. Difference-in-differences models show that political inclusion decreases nature protection in groups' settlement areas. However, this effect is reversed for protected areas that plausibly generate tourism income. We also find that ethno-political inclusion is linked to legal degradation of protected areas. Our findings on the ethno-political underpinnings of nature protection support long-voiced concerns by activists that politically marginalized groups carry disproportional costs of conservation.

Keywords: Environmental protection, protected areas, ethnic politics, political economy, Africa, GIS

*Department of Political Science, University of Gothenburg
†Department of Social Sciences, Humboldt University
‡Department of Government, London School of Economics and Political Science

It's a decree from the Cameroonian prime minister that says a national park is created at such and such a place, from point A to point B, without the people who live there ever having been involved.

- Spokesperson of the Baka, a minority group evicted from the Lobéké Park (Kouagheu 2022).

Introduction

Protected areas (PAs) are the most established policy instrument for nature conservation in the face of the global loss of biodiversity and the climate crisis. Covering already a tenth of the African continent, their extent will only rise with the ambition to protect 30 % of global land by 2030 as agreed upon by 196 countries through the 2022 Kunming-Montreal agreement (UNEP 2022). While PAs benefit nature, they come with costs to local populations, often borne by minorities excluded from political power. Indeed, activists across the globe campaign against PAs. NGOs, for example, accuse UNESCO World Heritage parks of forced evictions (Survival International 2024). Ethnic groups without political clout reported to have faced evictions from PAs include, e.g., the Basarwa in Botswana, the Masaai in Tanzania, and the Twa in DR Congo. Such concerns are echoed by a UN Special Rapporteur, noting: "conservation areas have resulted in serious and systemic violations of indigenous peoples' rights through expropriation of their lands" (UN 2016). We follow up on these accounts and ask whether access to political power shields ethnic groups from bearing the costs of PA establishments.

Research on PAs suggests that they are not optimally located: establishment patterns reflect that authorities prioritize areas where protection is less expensive rather than those most threatened by biodiversity loss (Joppa and Pfaff 2009). This finding implies political and economic biases in allocation decisions. PA creation in Africa is typically guided by legislation that gives governments the ability to designate areas for protection based on their importance for conservation. This assessment is generally made by government agencies in consultation with local stakeholders (Borrini-Feyerabend et al. 2013). Ultimately, however, governments can direct this process at the initiation and legislation phases, and this is when considerations besides nature conservation may enter.

Recent work has started to theorize about the political economy of PA placement, pointing to the role of industry interests (Alger 2023) and the bargaining power of local political actors (Beacham 2023). Focusing on Brazil, Mangonnet, Kopas, and

Urpelainen (2022) show empirically that incumbents designate PAs predominantly in opposition areas, so that their competitors incur the costs of land use limitations. In contrast, we shift the focus to an Africa-wide examination of how ethnic politics affect the political economy of PA allocation.

We argue that the establishment of protected areas significantly restricts land-use and livelihoods. PAs thus come at socio-economic costs for local populations but have, in many but not all cases, few local benefits. We develop the consequent logic of PA allocation from the literature on ethnic favoritism (Franck and Rainer 2012; Kramon and Posner 2016). Governments have incentives to designate PAs such that their ethnic constituencies are shielded from their costs. This leads them to establish PAs in settlement areas of ethnic groups that are not represented in the national executive. This cost-based logic should be offset or even reversed for parks with substantive local economic benefits, arising particularly where parks' charismatic megafauna attract tourists. Governments lastly have incentives to degrade previously established PAs in areas mostly settled by their ethnic constituents, thus reducing the conservation costs they bear.

Our empirical approach uses spatio-temporal data on the power status and settlement areas of ethnic groups, in tandem with the location of PAs from the World Database on Protected Areas in African states since independence to 2019 (Hanson 2022). We create a evenly distributed sample of points across the African continent with a density of 1 point per 2,000km^2. For each point, we code whether, in a given year since states' independence, it is located in a PA. We furthermore overlay points with geographic information from the Ethnic Power Relations dataset (Vogt et al. 2015), to identify whether a point is located in the settlement area of an ethnic group that is politically included in the national executive in a given year. We use our point-level panel data in a generalized difference-in-differences setting to estimate the effect of ethnic inclusion on a point's chance of being designated as a PA.

We document that ethnic groups' political inclusion lowers the probability of observing a PA in their homelands. The negative effect of 1 percentage point amounts to 15 percent of the overall sample mean or, in overall absolute terms, an area equivalent to about 9 Kruger National Parks. This effect is consistent when applying recent counterfactual DiD estimators that account for potential biases from heterogeneous treatment effects. Event studies suggest that estimated treatment effects are not due to differential pretrends. Consistent with our argument, the effect of ethnic groups' political inclusion is muted by the presence of large mammals, which make the establishment of PAs more attractive due to revenues from tourism. A complementary analysis of PA degradation lastly documents that PAs in areas of politically included groups are more likely to be institutionally degraded than when the group inhabiting their surroundings is politically excluded or politically irrelevant. Overall, our findings illuminate ethno-political dimensions of nature conservation.

Our study of the ethno-political determinants of the geography of PAs contributes to recent work on the political economy of environmental protection and degradation. Research finds effects of lobbying (Harding et al. 2023), representation (Gulzar, Lal, and Pasquale 2023), and political institutions (Sanford 2023) on nature protection and degradation. We address four knowledge gaps. First, we expand the argument to incorporate political competition along ethnic rather than party-lines in PA allocation. In this way, we complement existing research on ethnic favoritism into the domain of nature protection. Second, we add theoretical nuance by assessing variation in the costs and benefits PAs entail for local populations. Third, we go beyond PA establishment and assess their potential degradation over their subsequent lifetime. Lastly, we improve upon previous studies' external validity by assessing our arguments with data from the African continent since countries' independence, helping to generalize beyond existing studies from single-case contexts.

Theory

While area-based conservation serves the global common good of combating biodiversity loss, there is debate on the *local* impact of PAs on humans. A critical strand of this literature points to the toll such reserves have on the ground. Coad et al. (2008) identify three types of local burdens from PAs: (a) displacement (the forced removal of communities), (b) changes in land tenure (shifts from customary to state control over land use and rights, which is especially harmful for indigenous communities) and (c) restrictions in access to resources (e.g., limitations to farming, logging or herding).

Political conflict around the establishment of some PAs in Uganda illustrate these costs for local populations. In Uganda, a biodiverse environment in need of protection meets a history of political struggles between ethnic groups. Smaller, politically excluded groups such as the Batwa – part of the Banyarwanda people living near the Rwandan border in the south-west of the country – and the Benet, of eastern Uganda, have been forcibly evicted from their homelands to make way for the demarcation of the Bwindi Impenetrable National Park and the Mount Elgon National Park, respectively. The plight of the Benet people and their resettlement was politicised by the opposition party Forum for Democratic Change (FDC) in their manifesto ahead of the 2021 election.[1] The incumbent NRM party also approached the Benet community before elections with promises of de-gazetting this land in return for their groups' political support (Dirkse 2017). A local resident (quoted in Dirkse 2017) suggests that "during elections, we are allowed to take our cows to the forest, but after that...we are not allowed anymore."

The context of Uganda also illustrates the politicisation of such local costs. The Acholi, a larger ethnic group excluded from executive politics in distinct periods of time, have used their limited number of representatives in parliament to attempt to shield the region from the consequences of conservation. When the East Madi Wildlife Reserve was gazetted in 2002, it resulted in a dispute over the boundaries between two districts and made a group of Acholi inhabitants effectively landless (Reuters 2019). Since then, the Acholi have opposed further PA demarcation in their territory. Gilbert Olanya, then leader of the Acholi Parliamentary Group, demonstrated his opposition by stating in parliament that "as long as [I am] a Member of Parliament, no activity will take place to demarcate the land" (quoted in Olanya 2016). Together, these examples demonstrate the contested nature of PA establishment in localities due to the costs incurred by locals in terms of displacement, land tenure, and land use.

Other evidence, however, points to the possible economic benefits from conservation. PAs can improve ecosystem conditions and thereby provide long-term income opportunities, particularly when they come with infrastructure investments (Andam et al. 2010; Naidoo et al. 2019). PAs can also generate second order economic benefits through local employment in conservation management (e.g. local guides or rangers; Watson et al. 2014). Tourism is arguably the largest local revenue stream generated by PAs. Protected areas help to preserve nature, thereby attracting national and international visitors willing to pay to see protected wildlife. It is estimated that 80% of

[1] Party manifesto of FDC. See https://fdc.ug/wp-content/uploads/2020/12/FDC-Manifesto.pdf.

tourism trips in Africa are nature-based (Waugh and Thoumi 2020). Yet, not all parks attract tourists. McKinnon et al. (2016) stress that increased material well-being from PAs is particularly linked to "commercial enterprises (e.g., eco-tourism or trophy hunting) that rely on the presence of charismatic species," (p.2) especially the so-called Big Five animals (Elephant, Rhinoceros, African buffalo, Lion, and Leopard) which attract many safaris. We therefore expect that PAs come mostly with costs but may bring offsetting benefits depending on their capacity to attract tourists.

The ethnic politics of allocating costs and benefits from PAs

Leaders have political reasons to avoid allocating public bads towards areas where their constituents reside (e.g. Monogan, Konisky, and Woods 2017). Harjunen, Saarimaa, and Tukiainen (2023) observe that for leaders, an essential task is "the question of where to locate local public goods (or bads)" (p. 863). The term 'public bads' generally refers to unwanted activities, such as school closures or air pollution, where the possible benefits of the activity are reaped elsewhere, and the local area is exposed to its costs. Whether PAs can be considered a local public bad or good depends on the economic implications for locals in terms of obstructing or facilitating revenues. Focusing on the context of the African continent, we propose that who bears the costs from PA establishments and who reaps the benefits depends on the ethnic power structure of executive politics.

One of our assumptions borrows insights from work on land tenure in Africa. While tenure regimes on the continent vary – smallholders have more power over their lands in some settings compared to others – land rights are often weak and affected by politics (Honig 2022). Weak tenure should give politicians the leeway to steer land use in a biased manner. Boone (2011) illustrates how discretionary allocation of land rights in settlement schemes is biased to favor groups belonging to leaders' core constituencies. We expect a similar process in the allocation of PAs – demanded by goals in international agreements and subsequently allocated through centrally-based domestic decisions. A second assumption of our argument relies on the description of politics in Africa where citizens tend to identify with an ethnic group, defined as a social group with a shared culture and/or language (Kimenyi 2006). Moreover, we build on the premise that while localities across Africa are frequently multi-ethnic, ethnic groups tend to have geographically-concentrated settlement areas, widely known as politically relevant "homelands" in which a large plurality of the population identifies with the group (Müller-Crepon 2024).

Insights on the political economy of patronage in Africa generally hold that leader ethnicity matters for which groups receive public goods (Kramon and Posner 2016). Societies with substantial ethnic heterogeneity could produce a situation of an "ethnicisation" of public services (Rabushka and Shepsle 1972), where leaders supply goods to those of their own group to a larger extent. This favoritism "refers to a situation where coethnics benefit from patronage and public policy decisions, and thus receive a disproportionate share of public resources, when members of their ethnic group control the government" (Burgess et al. 2015, p. 1817). Similar processes should be at work when it comes to the allocation of the local goods and bads of nature conservation. Given ethnic groups' geographical distribution, we suggest that leaders selectively allocate PAs with high local costs towards settlement areas of non-coethnics and PAs with greater local benefits towards the settlement areas of their coethnics.

Our argument is informed by two models on why one could expect leaders to benefit their own group. The first reasoning assumes that elites of a certain ethnic group will favor coethnics through policies in a setting of high heterogeneity and polarization, because of inter-group solidarity (Franck and Rainer 2012). A contrasting model builds on the interest-group theory of government and posits that leaders are self-interested when navigating ethnic politics (Kimenyi 2006). This entails that they favor their coethnics over others but also that they use their group's welfare instrumentally to balance political support. Both models assume that a leader values the welfare of coethnics above that of non-coethnics, and result in similar expectations for distribution.

Consequently, a change in political representation in the national government will have ramifications on the spatial allocation of PAs. Miquel's Miquel (2007) theory of patronage predicts that "a change in the group controlling power should be followed by a change in taxation, spending, and allocation of public resources" (p. 1270). A similar process of change should take place when it comes to the allocation of local costs or benefits. We therefore propose that PA allocation patterns are affected by a change in a group's access to executive power at the national level. Given that revenue-generating tourism in most cases is likely an ancillary consideration of protection we expect PAs – on average – to be more of a local public bad than good, by obstructing local inhabitants from utilizing resources from the land. As such, political leaders will seek to prevent coethnics from incurring the costs of PAs. Inclusion in national executive politics of a group will likely help to 'insulate' its settlement area from receiving protected status.

Hypothesis 1 *Settlement areas of politically included ethnic groups are less likely to be transformed into protected areas.*

Nevertheless, PAs can in some cases generate revenues that offset or even outweigh their local economic costs. These benefits can accrue to the ethnic groups in whose territories the PA is located. Given potential benefits from tourism in some cases, we expect that ethnic groups are more likely to establish PAs in their homelands where the expected revenue from tourism is particularly high. One major appeal of tourism in Africa is the presence of rare, large terrestrial mammals. These include the "Big Five" animals, but also Giraffes and Apes, such as Gorillas or Chimpanzees. Making access to these species available through PAs lends itself to profitable tourist operations, such as safaris and lodges, and allows the government to issue hunting licences.

Hypothesis 2 *The negative effect of political inclusion on the presence of protected areas should decrease (or even reverse) in areas with the potential for tourism.*

Our reasoning suggests that leaders will strive to reduce the costs of existing PAs in their groups' settlement areas. This can in particular take the form of actions to degrade protected areas' legal status. PAs are not permanent institutions and protection rules are sometimes relaxed or eliminated to permit land use. With an ethno-political dimension to this decision as well, governments could create economic opportunities for coethnics by revoking protection laws in included groups' homelands. PAs that were established (and seen as a cost) in a (previously) excluded group's territory will become an obstruction when there is a shift in the power status of a group toward political inclusion.

Hypothesis 3 *Protected areas in settlement areas of politically included ethnic groups should be at higher risk of legal degradation than those located elsewhere.*

Data

Our empirical analysis takes points in geographic space as its primary unit of analysis. As the main (in)dependent variables, we measure whether, in any given year between states' independence and 2019, points are located in a protected area as well as inside the main settlement region of a group included in the national executive of a state.

Geo-points

We choose spatial points as units of analysis to directly accommodate the spatial structure of our main outcome and treatment variables: we are interested in whether the political representation of an area's main ethnic groups increases the size of protected areas in it. Treatment and outcome variables are thus defined as spatial areas that are not nested or otherwise aligned. In this setup, spatial points directly solve several problems associated with alternative, *areal* units of analysis. First, due to the modifiable areal unit problem (Fotheringham and Wong 1991), there is no stable 'natural' unit to which outcomes and treatments can be assigned – protected areas often span across administrative units and artificial grid cells as do (at times overlapping) ethnic settlement areas. Even more importantly, areal units such as administrative units or ethnic settlement areas might only be partially covered by parks and many spatial covariates vary within them. This creates the risk of ecological inference. Lastly, the interpretation of effect magnitudes is challenging where units are not of the same size or overlapping as in the case of ethnic settlement areas.

Spatial points mitigate these problems. They avoid issues of ecological inference as each point is unequivocally placed either inside or outside any ethnic settlement area and PA. In addition, the use of points regularly sampled from geographic space yields a clear probabilistic interpretation of estimates of the effect of ethnic inclusion as the percentage point change in the spatial coverage through PAs. In turn, the issue of "double-counting" outcomes and treatments that cover multiple points is an inferential problem dealt with through standard error clustering.[2]

The most important choice when using spatial points as the main units of analysis is the density of the sampling frame. A denser sampling yields more points, allows for greater precision, but increases the extent of spatial clustering in the data. Our baseline analysis is based on a sampling scheme targeting 1 point per 2'000km^2,[3] with points

[2]Areal units are of course also frequently affected by this problem.

[3]This is similar to the resolution of the PRIO grid (Tollefsen, Strand, and Buhaug 2012) where grid

located on a regular hexagonal lattice which produces an even coverage of all areas with and without protected areas (see Figure 3).[4] In practice, the hexagonal grid sampler in R's `sp` package only yields a sample of 0.87 points per 2,000km^2 or 1 point per 2,312km^2. A robustness check shows robust estimates when choosing a target density between 1 point per 500 to 8'000km^2 (see Figure A6 in the appendix).

Protected areas

The primary source of data for our dependent variable, protected areas, is the World Database on Protected Areas (WDPA) (Hanson 2022), which is part of the collaborative Protected Planet project between the UN Environment Programme (UNEP) and the International Union for Conservation of Nature (IUCN). The database is compiled by submissions from a range of governmental and non-governmental organizations. Along with information on an area's date of establishment, reported size, and governance structure, each protected area is represented by either a point or polygon geometry. We focus our analysis on the polygon data, since points have no areal extent and therefore do not overlap with our unit of analysis by definition. The data covers the full temporal extent of our data, from countries' independence to 2019.

The main shortcoming of the WDPA data consists in reporting only the date of creation of existing PAs, thus lacking coverage of PAs that at some point were degazetted. We therefore add additional analyses of secondary data on PA degazettement and downsizing available for a subset of countries. These suggest that PA degradation is a relatively minor issue, only affecting 1.65 percent of all protected areas (Appendix Table A6). In addition, we find that political inclusion of ethnic groups increases the chance of degradation of PAs in their settlement areas. The lack of coverage of degradation processes thus likely leads us to underestimating the effect of political inclusion.

Across the entire sample, protected areas cover 7 percent of points. This number masks the substantial increase in nature protection over time, from 2 to 12 percent between 1960 and 2019. Figure 1 shows that this increase was not synchronous across all states – indeed, some states designated a substantive amount of their area as protected area already in the 1970s while others established large PAs only after 2000.

cells have a size of approximately 2'500km^2 at the equator.

[4] Appendix Figure A1 plots the linear relation between the number of points per PA and their size.

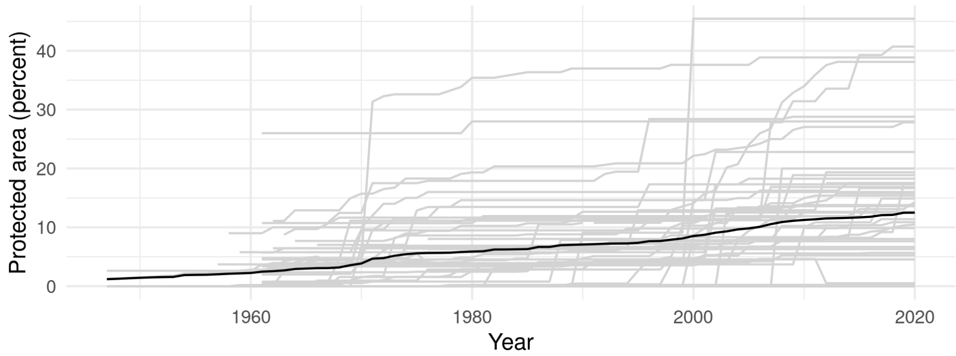

Figure 1: Share of protected land in Africa over time

Note: Area estimated by authors based on the main point data (see section on methods). The black line shows the mean across Africa, grey lines plot individual countries since independence.

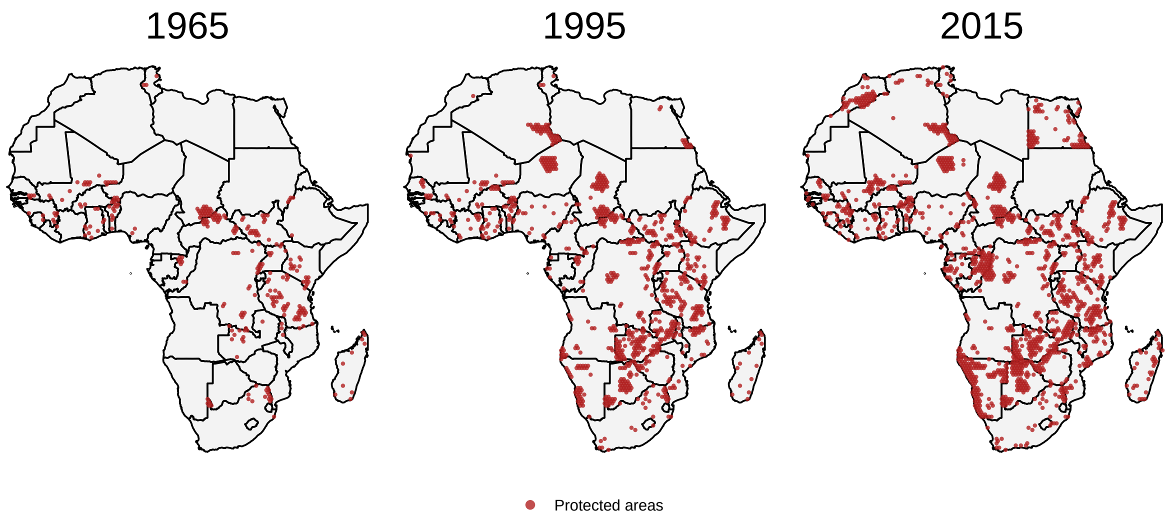

Figure 2: Map of protected areas in 1965, 1995, and 2015

Note: Borders shown for independent countries in 2015. Geo-point resolution is 1 point per 2000 km^2.

Ethnic inclusion and exclusion

Our main independent variable captures whether a point in a given year is located in the settlement area of an ethnic group that is included in the national executive or not. We turn to the Ethnic Power Relations data to derive this measure (Vogt et al. 2015). The EPR provides information on whether politically relevant ethnic groups across Africa were included in the national executive on January 1st of every post-independence year up to 2019. Political inclusion, as defined by the EPR, must go beyond "token" inclusion, thus providing meaningful political representation to a group. In our sample, inclusion varies from groups' elites being "senior partners" in a country's executive to them being junior partners in a power-sharing coalition. The main analysis combines both into a single dummy variable of political inclusion.

In addition to the political inclusion data, the EPR data family includes geographical data on ethnic groups' settlement areas based on country-specific expert compilations of relevant ethnographic maps for EPR's politically relevant groups and their subgroups (Wucherpfennig et al. 2011).[5] This data allows us to determine whether, in a given year, a point lies within the settlement area of any politically included ethnic group or not. Points outside included groups' settlement areas are located either in settlement areas of ethnic groups (implicitly) coded by the EPR as politically irrelevant or in areas of groups that are politically relevant but excluded from executive power.

Additional analyses in Appendix C.6 show that alternative data on executive representation since 1990, state leaders' ethnicity and their birth-region coded by Bomprezzi et al. (2024) yield very similar results to the EPR inclusion measure when correlated with the presence of PAs. Yet, because the PLAD data only starts in 1990 and therefore features much less variation in inclusion within points compared to EPRs longer time-series, effect estimates of changes in representation yield insignificant results, just as they do when limiting the EPR-based analyses to the post-1990 period.

Illustration of data setup

Figure 3 illustrates the resulting spatio-temporal data structure taking the example of the eastern border region of Uganda. The whole country in 2019 is illustrated in Panel A, and the rectangular inset is illustrated in Panel B in the same point in time. Each spatial point (labelling in Panel B) is attributed to two types of polygons: ethnic groups' territorial homeland and protected areas. The blue area in the north-west corner of Panel B is the ethnic homelands of the Langi/Acholi and the Teso groups, who during 2019 were excluded from executive power. The yellow area in the south-west corner is part of the the homeland of the Basoga, who during 2019 were included in executive power. The dark green areas represent active protected areas up to the end of 2019.

Our approach furthermore captures the temporal variation of the data, specifically when PAs are established and when ethnic groups are included in or excluded from political influence. This variation is illustrated in Panel C, where each row corresponds to a specific spatial point in Panel B. To take the example of point 4514 in the centre of Panel B, we can see how this point has fluctuated between political inclusion and

[5]With the exception of changes in country borders or politically relevant ethnic groups, settlement areas are constant over time.

exclusion over the years, and how this point ultimately came under protection in 2006.

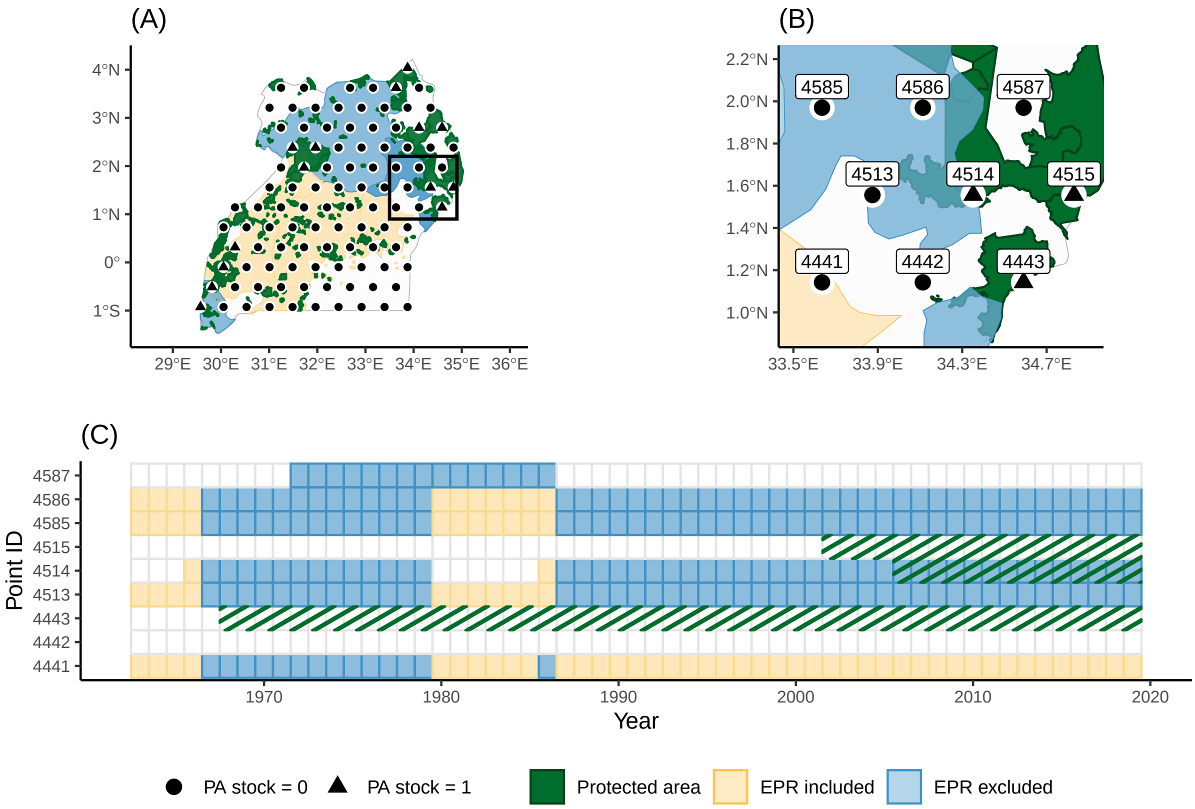

Figure 3: Illustration of data structure using the example of Uganda.

Note: Panel A represents the spatial structure of the data in 2019. Panel B magnifies the square inset of Panel A at the same point in time. Numerical labels in Panel B refer to the ID number of each geo-point. Point shapes represent the value of the dependent variable (circle = unprotected, triangle = protected). Panel C shows the temporal structure of the data (EPR and protected status) for the same points throughout the entire period since Ugandan independence in 1962.

Empirical strategy

We estimate the effect of ethnic inclusion on a geo-point's probability of being designated as a protected area as a linear probability model of the following form:

$$\text{protected area}_{icy} = \beta_1 \text{Ethnic inclusion}_{icy} + \gamma_i + \rho_y + \epsilon_{icy} \tag{1}$$

where protected area_{icy} is a dummy variable taking 1 indicating that geo-point i in country c was covered by a protected area in year y. Ethnic inclusion_{icy} is a dummy variable that takes 1 when an ethnic group whose territory covers geo-point i is included in power, as measured by the EPR dataset. We are interested in $\hat{\beta}_1$, the OLS estimate of the effect a geo-point being included in power on the probability to be designated as a protected area.

To causally identify $\hat{\beta}_1$ we implement a generalized difference-in-differences design with staggered treatment timing: in our baseline specification, we add geo-point (unit) fixed effects γ_i and year (time) fixed effects ρ_y. The geo-point fixed effects control for any time-invariant differences between geo-points, such as their biodiversity, altitude, or resource wealth – in short, the general suitability for protection. Our estimates thus focus on variation *within* points. This is important, since it avoids bias from most prominent geographic drivers of PA allocation identified (Joppa and Pfaff 2009).

The year fixed effects account for shocks and developments common to all geo-points in the sample, such as waves of independence, the end of the Cold War, or the generally growing share of protected territory and politically included groups. In more conservative specifications, we replace the year fixed effects with country-year fixed effects α_{cy}. Country-year fixed effects control for all potential confounders that are constant within a country-year: any country-specific shocks, such as civil war outbreaks or democratization events. Crucially the country-year fixed effects also account for country-specific conservation "shocks", such as the ratification of conservation treaties or the entering into force of such treaties.

Consequently, $\hat{\beta}_1$ only uses variation over time within a geo-point's ethnic power status as compared to other points in the same year (or country-year) to estimate an effect on a point's designation as protected area. We compute two-way clustered standard errors ϵ_{ig} by unit and ethnic group-year (through which the treatment—the power status—is assigned), to address temporal and spatial autocorrelation which arises from the sampling of our spatial points.[6]

Causal identification of $\hat{\beta}_1$ rests on a strict exogeneity assumption (also known as the parallel trends assumption), constant treatment effects, and no carryover effects. The latter two assumptions in particular can be violated in a setup such as ours where treatments are staggered and can be reversed (Liu, Wang, and Xu 2024). To account for these possibilities we assess violations of these assumptions with a counterfactual estimator and provide event study plots that are robust to these potential violations (see Figures A1 and A2 in Appendix C.1).

[6]We employ different levels of standard error clustering, including Conley Standard Errors for different cutoffs of spatial clustering in Appendix C.5 and results are generally robust.

Table 1: The effect of EPR inclusion on PA establishment

	DV: Stock PA (0/1)			
	1	2	3	4
EPR included	-0.008**	-0.011***		
	(0.003)	(0.003)		
EPR senior partner			-0.013***	
			(0.004)	
EPR junior partner			-0.009**	
			(0.004)	
EPR excluded				0.011***
				(0.003)
EPR irrelevant				0.009
				(0.007)
Unit FE	Yes	Yes	Yes	Yes
Year FE	Yes	–	–	–
Country x Year FE	No	Yes	Yes	Yes
Mean Dep. Var.	0.073	0.073	0.073	0.073
Num.Obs.	726177	726177	726177	726177
R2	0.785	0.799	0.799	0.799
R2 Within	0.000	0.000	0.000	0.000

Note: The table reports OLS estimates. Robust standard errors clustered by geo-point and ethnic group-year in parentheses. Unit of observation is the geo-point. Significance levels: + p <0.1, * p <0.05, ** p <0.01, *** p <0.001

Results

Table 1 presents the main results from estimating Equation 1. Model 1 presents the baseline model with unit and year fixed effects, Model 2 replaces the year fixed effects with country-year fixed effects. Across both models we observe a negative and statistically significant coefficient for the EPR inclusion dummy variable. Once an ethnic group is included in power, the geo-points within that group's territory become less likely to be designated as and covered by a protected area.

The coefficient size ranges between -0.008 and -0.011, indicating a reduction of about 0.8-1.1 percentage points in the probability of a point being designated as protected area once its ethnic group is included in power. This is a sizable effect that amounts to 15% of the baseline probability of any geo-point being a protected area (about 7%). Since our geo-points are sampled representatively from the landmass of the African continent (30,370,000km^2), we can translate the effect into an areal extent: our findings imply that the African continent is "missing"[7] about 173 340km^2 of protected areas due to the dynamics of ethnic political inclusion.[8] This is equivalent to approximately nine times the Kruger National Park in South Africa or roughly half the size of Germany (349,390km^2)—a substantively significant effect size.

As the coefficients in Models 1-2 indicate that politically included groups are less likely to receive protected areas, two questions arise. First, are executive senior partners more likely to avoid parks than junior partners? Model 3 shows that this is indeed the case. Points in the ethnic settlement areas of senior partners have a 1.3 percentage points lower probability of being located in a park as compared to excluded groups, with junior partners seeing a reduction of .9 percentage points. Exploratory findings in the Appendix additionally show that the main results are strongest in electoral autocracies and democratic regimes, precisely the contexts in which ethnic coalitions often occur (Appendix C.8). Second, we assess whether the presence of parks is higher in politically mobilized yet excluded groups or politically irrelevant groups. The positive and statistically significant coefficient of the EPR exclusion dummy in Model 4 indicates that parks are most likely in areas settled by groups that are mobilized but excluded from power. The coefficient for politically irrelevant groups is similarly sized but imprecisely estimated. This is at least partially due to low variation in the political relevance of groups over time.

Fixed Effects Counterfactual Estimators

The estimates in Table 1 might be biased either by non-parallel trends between treatment and control groups or by the presence of heterogeneous treatment effects that can bias the TWFE estimator as ethnic inclusion is staggered and can reverse (e.g. Callaway and Sant'Anna 2021). To account for these potential caveats, we turn to counterfactual DiD estimators (Liu, Wang, and Xu 2024), which allow for testing the parallel trends assumption and are robust to heterogeneous treatment effects under staggered treatment adoption and reversal. Using the various available methods to derive unit-level counterfactuals, we estimate models with point and year fixed effects as well as point and country-year fixed effects.

[7]This is assuming that inclusion suppresses the establishment of PAs, rather than shifting them to excluded areas.

[8]Calculated fixing the rate of ethnically included landmass at the 2019 value which is 52%.

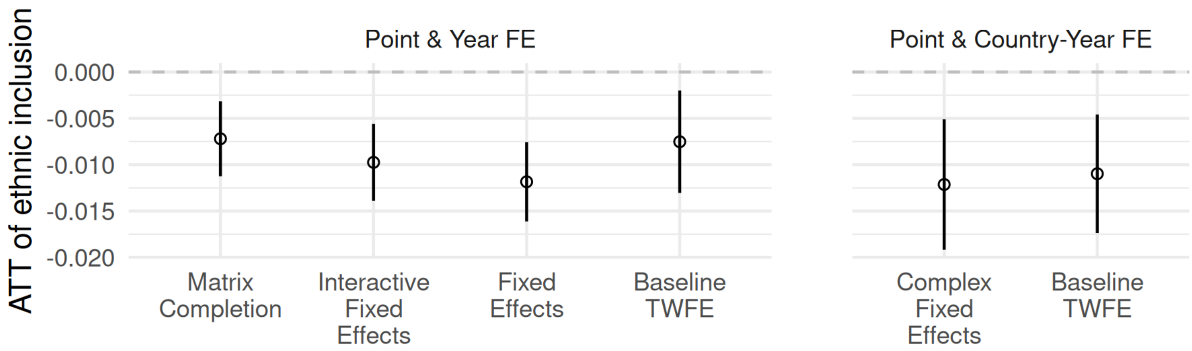

Figure 4: Results from counterfactual DiD estimators

Note: The plot shows the estimated Average Treatment Effect on the Treated (ATT) with 95% confidence intervals from a non-parametric bootstrap. The reference OLS estimate corresponds to Table 1 Models 1 and 2.

In Figure 4 we present the respective results in comparison to the main TWFE results. The left panel displays the estimates from the matrix completion, interactive fixed effects, and fixed effects counterfactual estimators with country and year effects, while the right panel shows results from the complex fixed effects estimator which allows for the more conservative country-specific year effects. Across estimators, the results are similar to the OLS estimates, with the matrix completion method yielding the most conservative treatment effect estimate of 0.72 percentage points.

Analyzing estimated pre-treatment differences between treatment and control groups, we note that the matrix completion method (Athey et al. 2021) yields best balance and thus most robust identification. Figure 5 plots the event study estimates which yield very small pre-treatment coefficients. While they jointly differ from 0 due to high statistical power, they do not exhibit a negative trend[9] and are significantly smaller ($p < .001$) than a commonly defined equivalence range of .36 times the standard deviation of the residualized outcome variable (Liu, Wang, and Xu 2024). Treatment effects increase over time, reaching the average effect of -.7 percentage points after 9 years and up to 2.5 percentage points after 15 years. Presented in the Appendix, event study results for the interactive fixed effects and fixed effects methods show slightly more variation pretreatment but similar trajectories post-treatment. The country-year complex fixed effects specification yields a more sudden effect onset for the first five years of political inclusion and larger standard errors. Overall, Figure 4

[9]Appendix C.1 shows a placebo test that suggests, if anything, a slight positive pre-trend, which would bias effect estimates downward.

implies that the main results are robust to potential biases that could arise from the staggered difference-in-differences design.

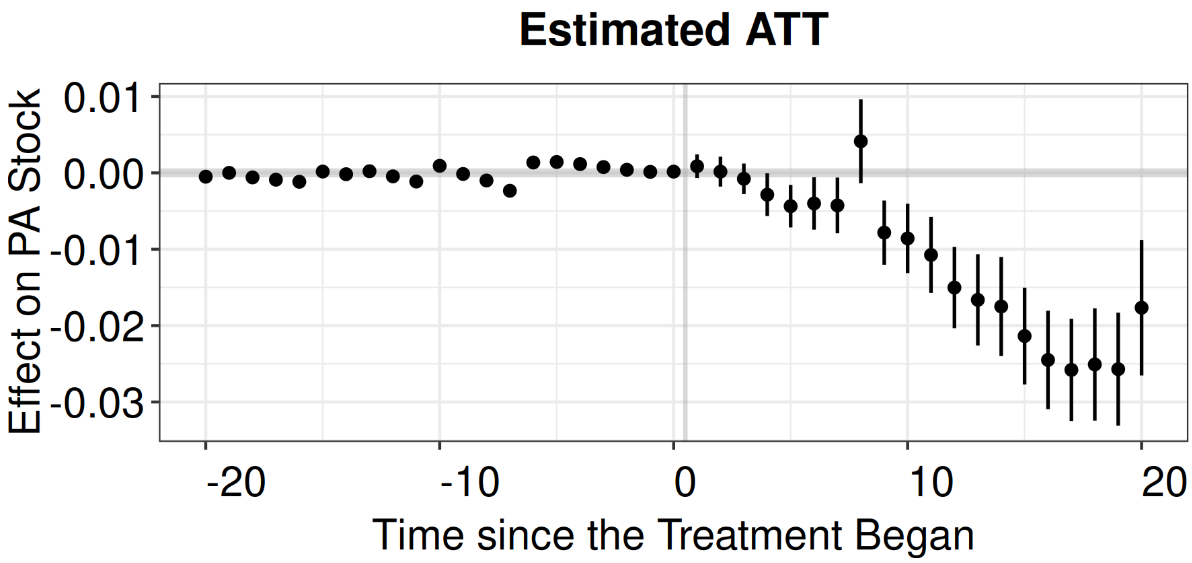

Figure 5: Event study estimates of the effect of EPR inclusion on protected area status, matrix completion method

Robustness tests

We also implement a series of additional robustness tests. First, our results might be driven by the resolution of our geo-points. Consequently we re-run our models at different resolutions of our main data set (see Appendix C.2). Results are robust to these alternative strategies. We also investigate heterogeneity by country. Our results could be driven by one large country that masks heterogeneous effects across other countries. We reestimate our models removing one country at a time and report results in Appendix C.3. While we observe some heterogeneity in effects there is no country that is driving the results themselves, increasing the confidence in the robustness and generalizability of the results. Third, we explore if the results are affected by the sizes of the PAs. We reestimate Model 2 from Table 1, but only considering parks with specific sizes. Results reported in Appendix C.4 suggest that—while the main effect size slightly decreases as we consider only larger parks—the results are largely robust to PA size. Finally, we investigate if results are robust to different levels of clustering of standard errors and spatial correlation in Appendix C.5. We estimate standard errors on different ethnic group and country levels, Driscoll-Kraay standard errors as well as Conley standard errors with varying cutoffs from 50 to 1,000km^2. Results are robust to these alternative specifications.

Observable implications

Having found overall support for our main expectation, the next sections focus on our tests of H2, on park profitability, and H3, on PA degradation.

Park profitability

So far we have investigated the consequences of economic costs generated by PAs and the resulting negative effects on PA designation in politically included ethnic territories. But under certain conditions parks can also generate economic benefits for locals in the region. As theorized, one of the most important revenue sources generated by protected areas is tourism. Our expectation is that the negative effect of being included in power on PA establishment is attenuated in places where expected revenue from tourism is particularly high, i.e., in areas where large, terrestrial animals are present.

To test this expectation we use habitat shapefiles of the IUCN Red List of Threatened Species to measure the presence of the following large nine terrestrial mammals for each geo point: Elephants, Rhinoceros, Buffalos, all big cats (Lions, Leopards, Cheetahs), Giraffes, Gorillas and Chimpanzees. If indeed local tourism profitability shapes effect heterogeneity, we should observe PA designation in included groups' territory particularly in areas with a presence of large terrestrial mammals (the median number of large mammals across points is 0).[10] We therefore expect the coefficient of an interaction term between the dummy for EPR inclusion and a dummy indicating the presence of large mammals to be positive and statistically significant.

We present results of this estimation in the first column of Table 2. The interaction between EPR inclusion and the presence of large, tourist-attracting mammals is indeed positive and statistically significant. The results indicate that geo-points in ethnic homelands that become politically included without large mammal presence are 2.5 percentage points less likely to receive a park. This effect is almost completely negated in the habitats of one or more large mammals.

Investigating this interaction in closer detail, we find that the effect of EPR inclusion even turns positive in locations where a high number of big mammals are present. Instead of using a dummy for the presence of any large mammal, we calculate the

[10]To plausibilize this expectation we correlate estimates on presence of large mammals in parks with tourism estimates for each park, documenting a positive relationship between large mammal presence and park visitors, see Appendix C.7.2.

Table 2: Ethnic inclusion, park profitability and PA establishment

	DV: Stock PA (0/1)		
	Main results	Robustness	
	1	2	3
EPR included	-0.025***	-0.024***	-0.035***
	(0.005)	(0.006)	(0.008)
EPR included x Large mammals (contemp.)	0.026***	0.019**	
	(0.006)	(0.007)	
EPR included x Large mammals (historical)			0.025***
			(0.007)
Sample	Full	High. biodiv.	Full
Unit FE	Yes	Yes	Yes
Country x Year FE	Yes	Yes	Yes
Num.Obs.	726177	363273	726177
R2	0.799	0.830	0.799
R2 Within	0.001	0.000	0.000

Note: The table reports OLS estimates. Robust standard errors clustered by geo-point and ethnic group-year in parentheses. Unit of observation is the geo-point. Significance levels: + p <0.1, * p <0.05, ** p <0.01, *** p <0.001

marginal effects of EPR inclusion at different numbers of large mammals having their habitat at any given geo-point. We model both a linear/continuous interaction of EPR inclusion with the count of mammals and a fully categorical interaction where each number of mammals present receives an individual dummy (with no mammal habitat as reference category) to account for potential non-linearities in the data distribution (Hainmueller, Mummolo, and Xu 2019). Results are presented in Figure 6 and show that the marginal effect of EPR inclusion becomes positive at high numbers of mammals present. The effect of individual dummy variables is not very precisely estimated at high numbers of mammals present given the scarcity of locations with many species simultaneously present. Nevertheless, we consider this as suggestive evidence for the interpretation that the profits generated by tourism can counteract the localized costs of PA establishment, making PAs a local public good that is more likely to be allocated among politically included ethnic groups.

We probe the plausibility and robustness of this result with three additional pieces of evidence. First, the interaction effect might be a result of a high correlation between general biodiversity and presence of big mammals. To ensure this finding is

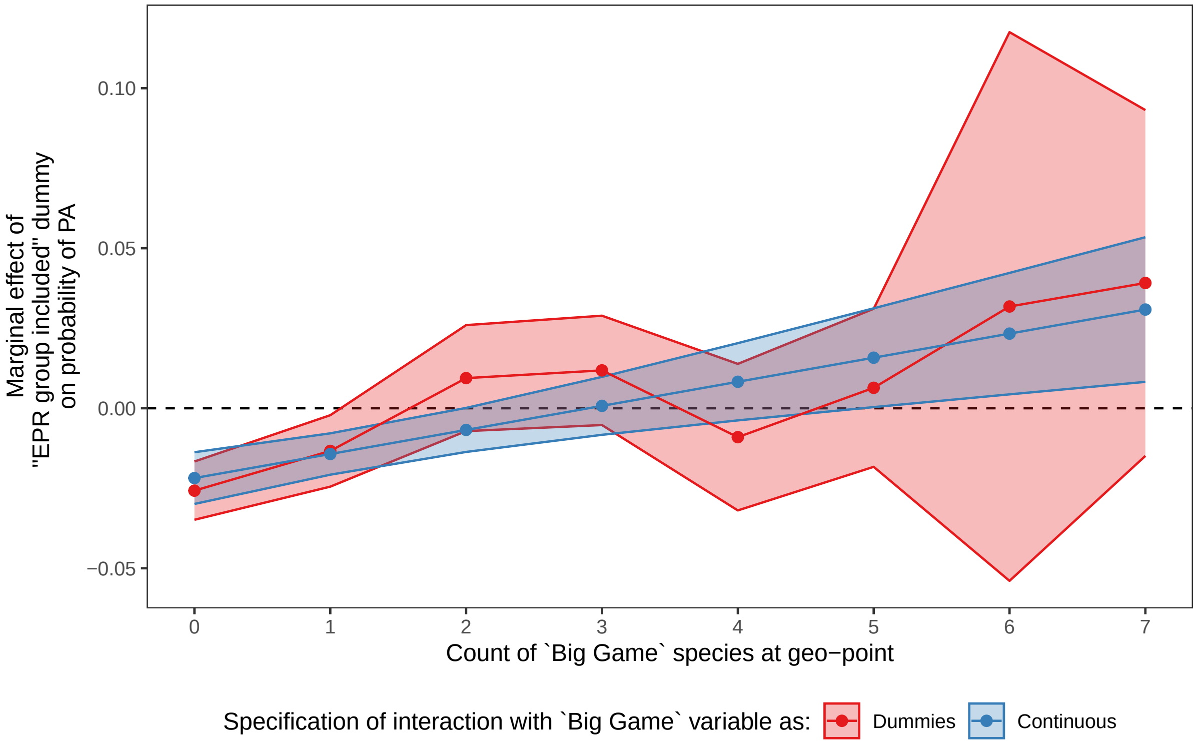

Figure 6: Marginal effects for EPR inclusion at different levels of large mammal presence

Note: Numerical results for marginal effects estimates available in Appendix A3

not driven by high-biodiversity areas we limit our results to geo-points that have an above-median number of species. The interaction effect, reported in Model 2 in Table 2, remains positive and statistically significant, but is slightly smaller in substantive size.

Second, we probe whether the results from the interaction model are driven by post-treatment bias. The IUCN shapefiles for species distribution are generated from the most recent species counts and were mostly taken between 2016 and 2020. This could generate post-treatment bias if the species ranges are themselves a consequence of PAs. To mitigate this problem we generate a different measure of mammal ranges using the PHYLACINE database (Faurby et al. 2018). The PHYLACINE data provides a counterfactual estimate of where historical species ranges would be located in the absence of a human footprint, based on fine-grained ecological models. We provide more detail on data construction and provide maps of the mammal distribution in Appendix A10. The results of the interaction model using the median of the estimated number of historical large mammals (4) to construct the dummy variable are provided in column 3 of Table 2. The results are very similar to the main interaction model, increasing our confidence that the patterns are not entirely driven by post-treatment bias.

Finally, the results could simply reflect other location characteristics that underlie mammal presence. In Appendix C.7.3 we document that this is not the case, demonstrating that the results are robust to including interactions with population size, cash crop suitability, and distance to mineral deposits.

PA degradation

We also investigate an additional implication that results from a cost-incurring logic of PAs: governments should seek to degrade existing PAs in the settlement areas of their co-ethnics more than PAs in other areas. To investigate, we first draw upon a qualitative account of the Mau Forest complex in Kenya and substantiate it with a cross-country quantitative analysis of protected area degradation events.

PA degradation in the homelands: qualitative illustrations from Kenya

The Mau Forest complex, a uniquely large mountain forest that covers south-western Kenya, has had its status as protected land change as a result from ethno-political struggles. In this area, "land became inextricably linked with ethnicity and political patronage" (Vayda 2021) and, similarly, **?** note that "the Mau Forest became one of the clearest demonstrations of how power and patronage dynamics caused massive deforestation" (p.129). In short, the fate of these Kenyan protected forests is a vivid example of how PAs may be degraded through formal declassification by a ruler seeking to maintain support from an ethnic group.

The forests are located in Kenya's Rift Valley. The region, home to violent eviction schemes by the British colonial government, faced an influx of ethnic Kikuyu during the first decades of rule under Jomo Kenyatta, a Kikuyu himself. When power shifted from Kenyatta to Daniel arap Moi, the dynamic in the region was tilted by his politics to uphold his support among the Kalenjin. As such, the 1980s witnessed the removal of Kenyatta-era Kikuyu settlers from the Mau forest (Boone 2012). Forested lands faced an extensive resettlement scheme in the 1990s, used to shift the ethnic composition in the region to strengthen support for Moi (Klopp 2012). In the words of Alberatazzi, Bini, and Trivellini (2023) (p. 26): "thousands of Kalenjin people [the same ethnic group as President Moi] looking for land came from the neighboring Rift Valley districts ... the forest land redistribution to Kalenjin families would have worked to strengthen the political power of the KANU government in the district."

As documented by Kweyu (2022), the Moi government used the Mau Forest to reward loyal politicians and secure the Kalenjin vote in the 1992 and 1997 elections. Moreover, "the Kalenjin were allowed to occupy the forestland left by the displaced communities ... and the gazetted forest reserve faced massive 'illegal' encroachments and settlements mainly by the Kalenjin" (p. 252). This signal of lax rule enforcement (a *de facto* declassification of protection) was complemented by *de jure* declassifications. Accounts suggest how 2001, the last year of Moi's presidency, resulted in massive forest degazettement (Kweyu et al. 2020). In the run-up to the 2002 elections alone, about a third of the South-Western Mau Forest Reserve and half of the area of the Eastern Mau Forest Reserve was degazetted (Boone 2012). This declassification of protected land, allowing some to live in those areas previously assigned as PAs, created rifts between ethnic groups that are still visible. In recent decades, there have been evictions and intense political negotiation, as some of those given land in the Mau forest during the 1980s and 1990s were politicians with substantial influence. More evictions from lands that were formerly protected are thus likely, which will present ethno-political concerns. Alberatazzi, Bini, and Trivellini (2023) note that these evictions "in the name of conservation ... are linked to shifting allegiances in central government" (p. 91).

Large-N illustration of inclusion and PA degradation

To identify the degradation of protected areas we rely on the Protected Area Downgrading, Downsizing and Degazettement (PADDD) Tracker.[9] PADDD traces the downgrading (decrease in legal restrictions regarding human activities), downsizing (legal boundary changes to reduce the area) and degazettement (removal of all legal protection) of protected areas. We combine PADDD events that are geo-coded to at least to the PA-centroid level[10] with EPR geo-spatial data to determine whether each event occurred in a PA that is inside a politically included area or otherwise.

The (geo-referenced) PADDD data is mainly clustered in a few countries in our sample, with Kenya and South Africa accounting for 73.3% of PADDD events. Overall, however, the number of African countries recorded as having at least one geo-referenced PADDD event and variation in the political inclusion/exclusion of ethnic

[9]See https://www.conservation.org/projects/paddd-protected-area-downgrading-downsizing-and-degazettement

[10]In the case of missing geographical precision for the PA in question, events are sometimes given points at the national capital. These observations are omitted from the analysis

Table 3: PADDD events

	PADDD countries			Kenya		
	Prot. land	PADDD	Diff.	Prot. land	PADDD	Diff.
Included (%)	53.3	57.7 (205)	+4.4	47.8	63.8 (88)	+16
Not included (%)	46.7	42.3 (150)	-4.4	52.2	36.2 (50)	-16

Note: The table reports the percentage and number of PADDD events in politically included, excluded, and other territories along with the total percentage of protected land covered by the same categories. The Diff. columns indicates the disproportionality in likelihood of each group receiving a PADDD event. Land percentages are calculated by pooling the points for all years across the sample in the main analysis. Countries that have at least one PADDD event and experience EPR variation and are included in the PADDD sample. Results are also shown for Kenya only. Land coverage percentage and the percentage of protected land in the full sample from the main analysis for each group are presented for reference.

groups is 17. Table 3 presents descriptive results for the proportion of PADDD events in politically included, excluded and other areas together with the share of protected land covered by those same categories across different samples. A graphical representation of the temporal nature of the relationship between ethnic power shifts and protected area establishment and degradation is illustrated with the Kenyan case in Figure 7.

There is initial indication that park degradation is primarily concentrated in the territories of politically included groups. Even relative to the proportion of protected land in politically included territory across Africa, PAs are disproportionately degraded in politically included areas. Nowhere is this stronger than in the Kenyan case, where 63.8% of degradation events took place in politically included areas, relative to 47.8% of protected land which is in included areas across all years since independence (1963).[11]

Conclusion

This study breaks new ground by investigating the role of ethnic politics in the context of nature conservation in Africa. We present a theory that outlines how the inclusion or exclusion of ethnic groups from power shapes the designation and degradation of protected areas in space. By overlaying spatio-temporal data on ethnic group homelands and the establishment of PAs, we use a difference-in-differences approach to document

[11] In Table A7 we use a series of linear probability models (LPM) to formally test this relationship and identify a statistically significant effect of political inclusion on the probability of a PA-year receiving a PADDD event in both PADDD country and Kenyan subsamples.

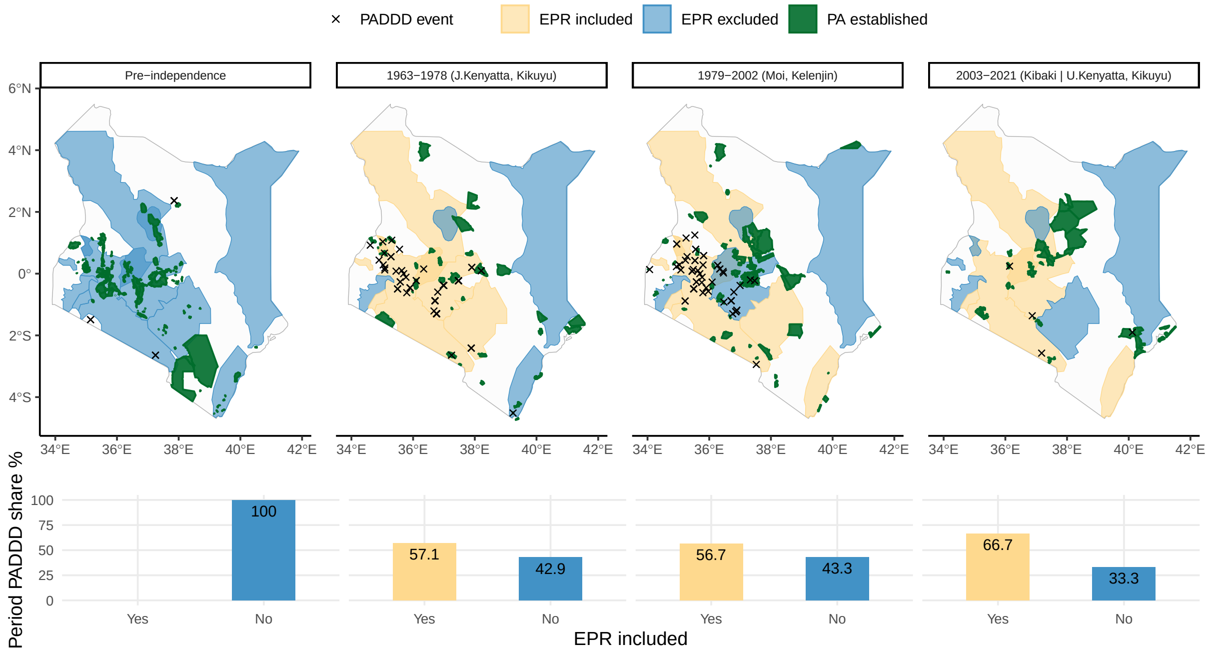

Figure 7: Map of protected area downgrades, downsizes and degazattement (PADDD), and establishment over phases of ethnic power status in Kenya

Note: PADDD events and PA establishments both refer to the time periods denoted at the top of each map. Time periods are determined by following the status of the Kikuyu ethnic group.

a negative effect of political inclusion on PA establishment. We find support for two further implications of our argument: First, included groups are more likely to receive PAs that can generate tourism revenues. Second, ethno-political inclusion is linked to the legal degradation of existing reserves. Taken together, these findings suggest that PAs are used to collect benefits to politically included groups and deflect costs towards excluded groups' territories.

This work complements several lines of research. We contribute by extending one of the few attempts to understand the politics of why some areas receive PAs (Mangonnet, Kopas, and Urpelainen 2022), with an ethno-political perspective and a more extensive empirical scope. Furthermore, our study speaks to recent work on how political inclusion of marginalized groups affects conservation outcomes (Gulzar, Lal, and Pasquale 2023), as we show that nature protection policies may impose costs on those excluded from power. Our insights on elites' calculus to degrade protection regulations ties into scholarship on how politicians (mis)use elections to distort enforcement of environmental rules (Harding et al. 2023; Sanford 2023). We also contribute to research on the impact from conservation on humans (Andam et al. 2010), by providing insights on why some groups might benefit from getting their homelands protected, while others only receive livelihood restrictions from these institutions.

We see several promising avenues for further research. Theoretically, our framework can be developed further by including dynamics of elections in democracies as well as in competitive autocracies, as there is a significant interest in the relationship between election cycles and environmental protection outcomes (Cisneros, Kis-Katos, and Nuryartono 2021). Moreover, future research would benefit from extending our work to other regions of the world. Research could also test the theoretical framework we outline on other types of data, for instance by studying further aspects of how political inclusion is related to the degradation of environmental regulations, e.g. through logging or mining.

We also believe this study has relevance for policymakers. Area-based nature protection is today the most common policy response to remedy the global biodiversity crisis. In the years to come, PAs will likely be significantly expanded across the Global South. Will this be yet another burden on marginalized ethnic groups, or can it be an opportunity to attract funds and development? This study provides one piece to the puzzle of understanding this issue – illustrating that these institutions are indeed infused with the ethnic politics still present on the African continent. As such, we find it likely that enlarging the share of land under protection will give rise to both winners and losers.

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The Ethnic Politics of Nature Protection in Africa

Supplementary Material

Table of Contents

A Descriptives

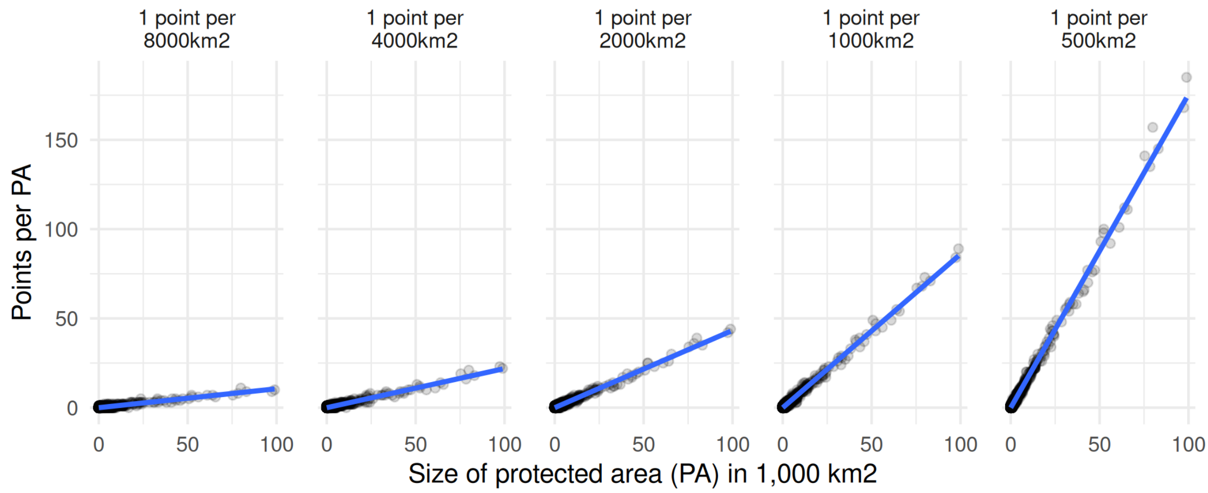


Figure A1: Points per protected area at different target resolutions

Note: Note that we undersample in relation to the target resolution by a factor of ≈ .86 due to the implementation of the hexagonal grid sampler in R.

B Tables

B.1 Summary statistics

Table A1: Summary statistics for geo-points across EPR spatial categories

Category	Point-Years	Unique Points	Protected Points	Mean Protected	SD Protection
All points	726177	12442	52884	0.07	0.26
EPR Included	314307	7464	25454	0.08	0.27
EPR Senior Partner	225581	5455	17072	0.08	0.26
EPR Junior Partner	88726	4300	8382	0.09	0.29
EPR Excluded	194301	4996	11949	0.06	0.24
EPR Irrelevant	217569	4186	15481	0.07	0.26

B.2 Alternative DiD estimators

Table A2: Numerical results from different DiD estimators

Estimator	ATT estimate	Bootstrapped Standard Error	p-Value	Conf. Int. (Low)	Conf. Int. (High)
FE: Country & year (Model 1)					
Reference: OLS	-0.008	0.003	0.0075979	-0.01	-0.002
FEct	-0.012	0.002	0.0000001	-0.02	-0.008
IFE	-0.010	0.002	0.0000634	-0.01	-0.005
MC	-0.007	0.002	0.0026913	-0.01	-0.002
FE: Country x year (Model 2)					
Reference: OLS	-0.011	0.003	0.0007693	-0.02	-0.005
CFE	-0.012	0.004	0.0010841	-0.02	-0.005

B.3 Marginal effects estimates for interaction models

Table A3 presents the numerical results for the estimated marginal effect coefficients visualized in Figure 6.

Table A3: Marginal effect estimates for Figure 6

Count of 'Big Game' species at geo point	Marginal effect estimate	Standard Error	Conf. Int. (Low)	Conf. Int. (High)	p-Value
Continuous specification					
0	-0.022	0.004	-0.030	-0.014	0.000
1	-0.014	0.003	-0.021	-0.008	0.000
2	-0.007	0.004	-0.014	0.000	0.056
3	0.001	0.005	-0.008	0.010	0.857
4	0.008	0.006	-0.004	0.021	0.174
5	0.016	0.008	0.000	0.032	0.044
6	0.024	0.010	0.004	0.043	0.015
7	0.031	0.012	0.008	0.054	0.007
Dummy specification					
0	-0.026	0.005	-0.035	-0.017	0.000
1	-0.013	0.006	-0.024	-0.002	0.020
2	0.008	0.008	-0.009	0.025	0.347
3	0.013	0.009	-0.004	0.031	0.141
4	-0.009	0.012	-0.032	0.014	0.427
5	0.006	0.013	-0.018	0.031	0.607
6	0.032	0.044	-0.054	0.118	0.466
7	0.039	0.028	-0.015	0.093	0.154

C Robustness tests

C.1 Counterfactual DiD estimators

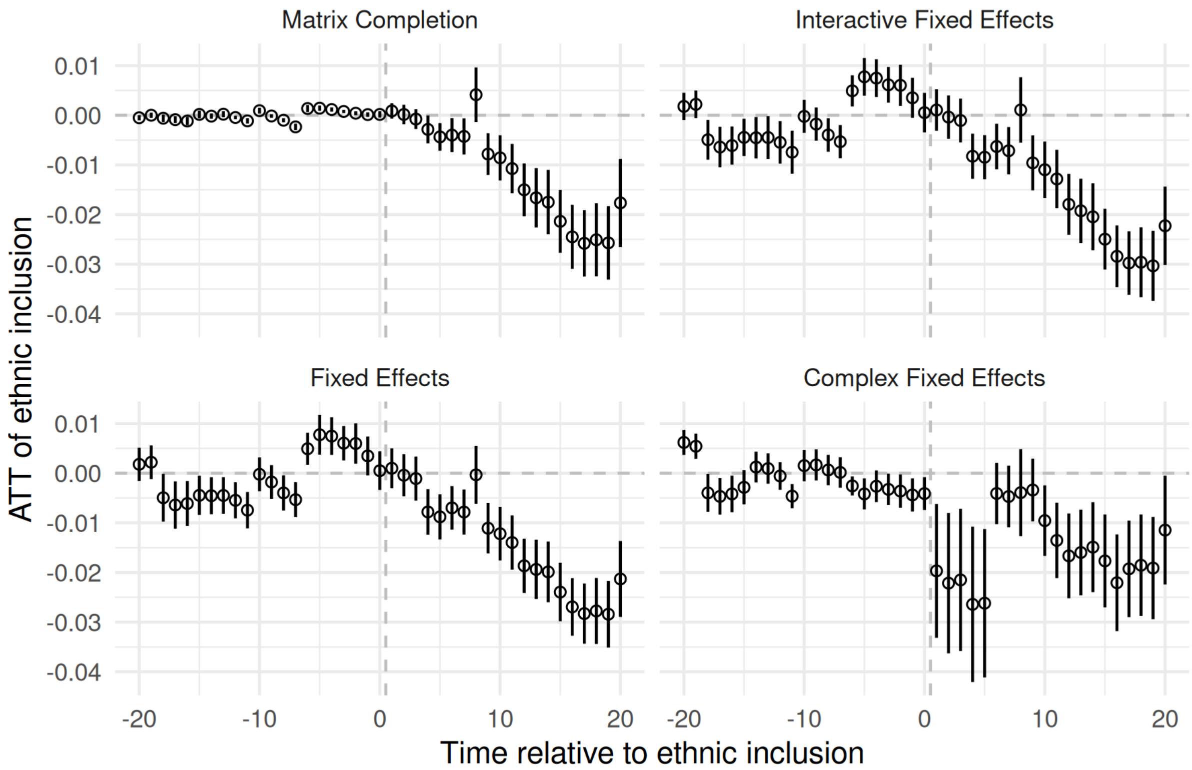


Figure A2: Counterfactual DiD estimators: Event studies

Figure A2 displays the event study results for all results from counterfactual fixed effect estimators in Figure 4. The plot shows coefficients for leads/lags of the EPR inclusion dummy and provides an important check on the validity of the parallel trend assumption: the lead coefficient prior to treatment onset should indicate small and statistically insignificant differences between treated (politically included) and control geo-points. Only after the treatment actually happened should we observe distinct differences between treatment and control groups.

Figure A2 shows evidence that the matrix completion method yields results that are most consistent with this assumption. Before a geo-point is included in the ethnic power coalition (negative time periods), differences in protected area designation are very close to 0, though precisely estimated due to the high statistical power afforded by the data and method. Once the point becomes included through representation in the ethnic power-sharing coalition, the coefficient becomes negative and substantive in size. The results for the other methods are more varied suggesting less balance between trends in the treated and control units. While for the (interactive) fixed effects methods we observe a slight positive pretrend, it is slightly negative for the complex fixed effects method which includes country-year fixed effects. The latter shows, though, a sudden onset of the treatment effect in the first year of inclusion.

The matrix completion method also yields robust results for a series of further tests. First, we observe that the treatment effect does barely spill over once an ethnic group

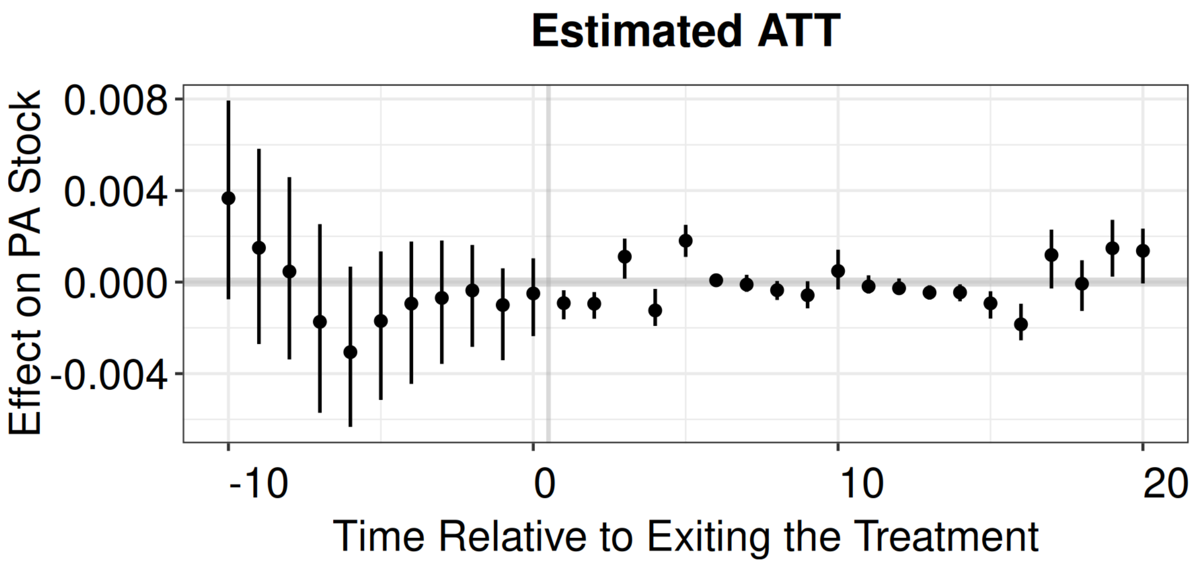


Figure A3: Treatment exit plot, matrix completion method

becomes excluded from political power, probably also because of small or null effects in the last years of groups' political inclusion (Figure A3). A placebo test in Figure A4 for which the onset of the treatment is recoded to five years prior shows if at all (small) positive effects – this suggests that there is if at all a positive pre-trend towards more PAs in the treatment group which would downward bias our results. Similarly, a carryover test for which the end on inclusion is postponed by five years shows slight negative effect in the first two years of the carryover period in which a cell is newly excluded but not thereafter. This would again suggest a slight underestimation of the treatment effect.

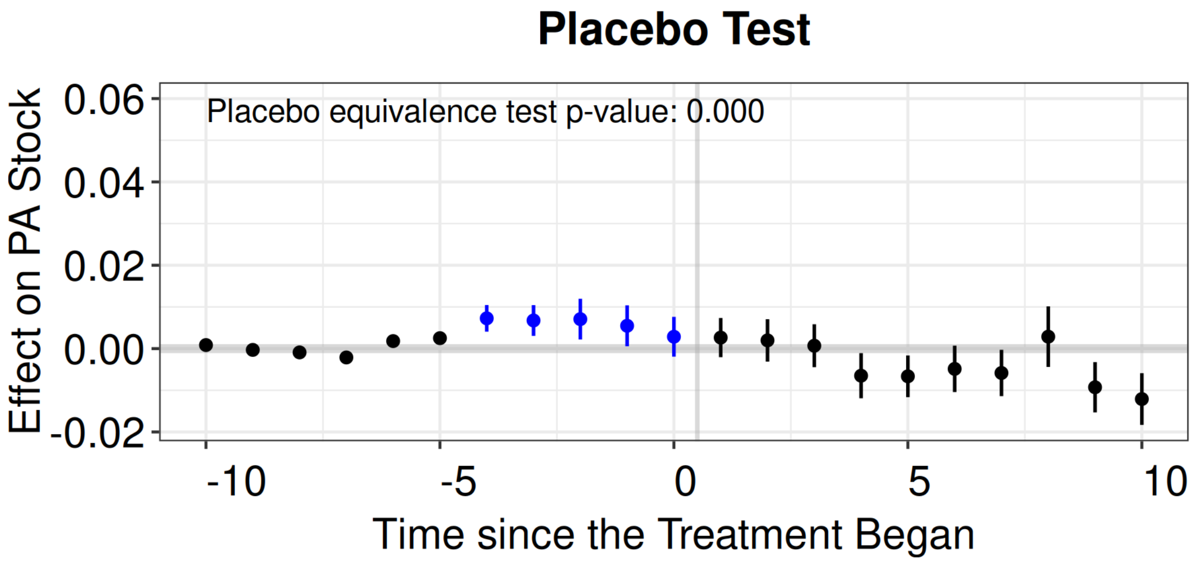


Figure A4: Placebo test, matrix completion method

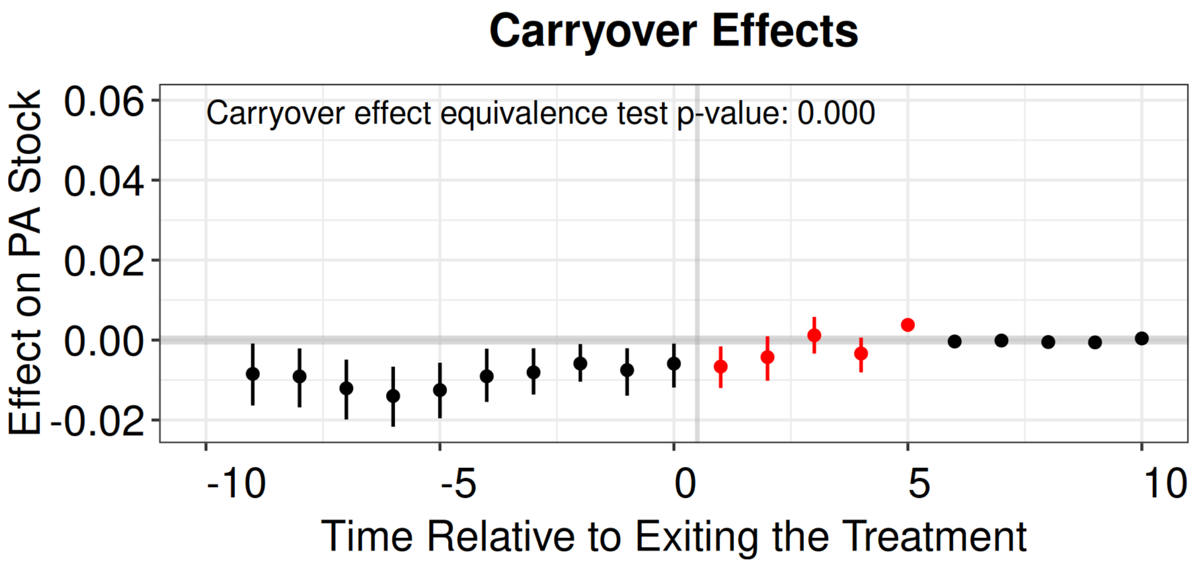


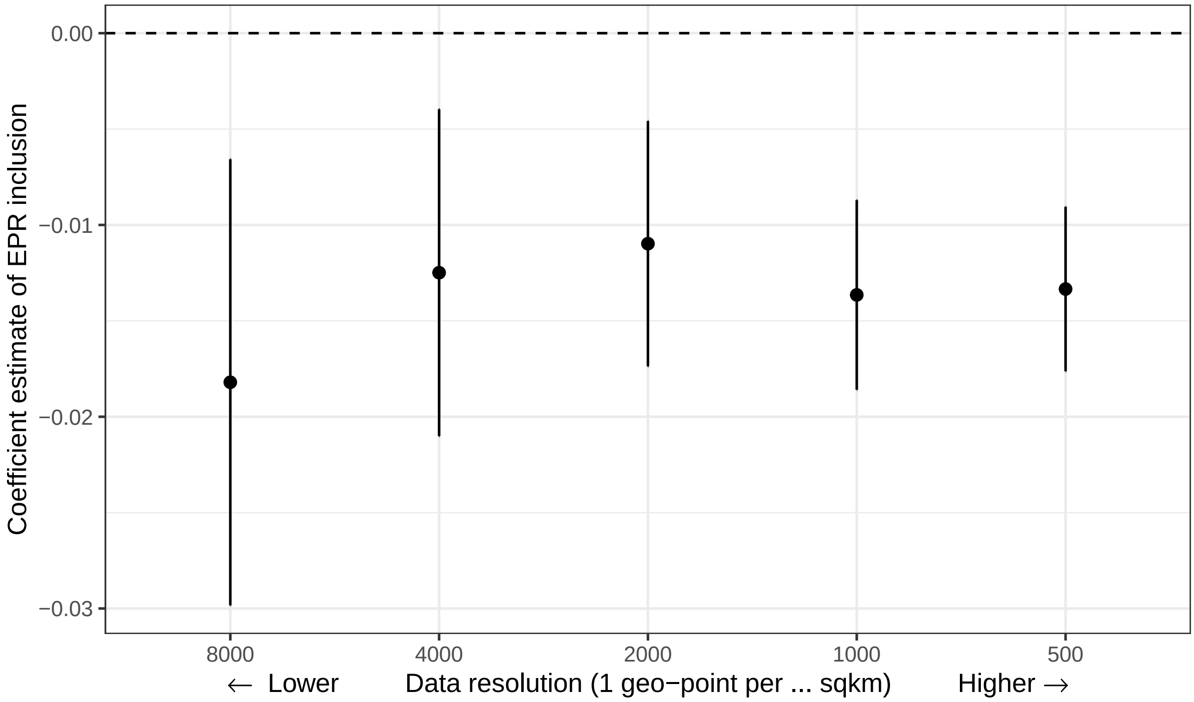
Figure A5: Carryover test, matrix completion method

C.2 Data resolution

To check if results are driven by different resolutions of the geo-points sample, we estimate Model 3 from Table 1 using different spatial resolutions. We vary the resolution from 1 geo-point per 8000 sqkm (roughly corresponding to the centroid of a 90x90km rectangle) to 1 geo-point per 500 square kilometers (roughly corresponding to the centroid of a 22x22km rectangle).

The results are displayed in Figure A6. The plot demonstrates that our baseline estimates of the negative relationship between ethnic inclusion and PA designation are not substantively driven by the resolution of our spatial point sample.

Figure A6: Robustness test: different data resolutions



C.3 Removing one country a time

The single coefficient for EPR inclusion estimated in Table 1 could be disproportionally driven by a single country. To account for this possibility, we estimate Model 2 from Table 1 removing one country at a time. The resulting coefficients are displayed in the right-hand side of Figure A7. While there is some hetereogeneity, overall the negative effect EPR inclusion does not seem to be driven by a single country.

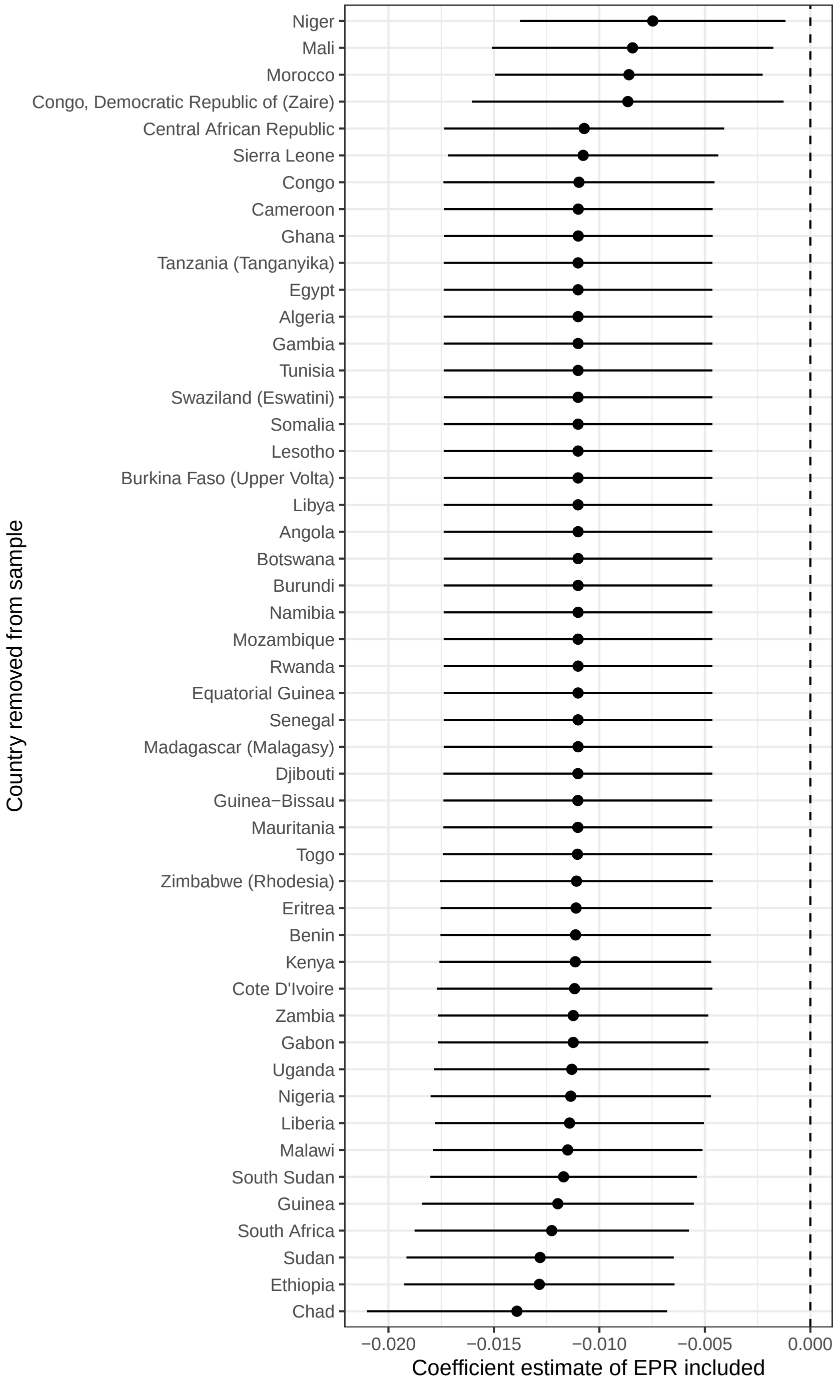


Figure A7: Estimates removing one country at a time

Note: Model specifications include unit and year fixed effects. 95% confidence intervals shown, based on robust standard errors clustered by unit ID and ethnic group-year.

C.4 Differently sized PAs

PA size is an important dimension since protected areas vary enormously in the space they occupy. PA sizes range from parks that are only 4 km^2 in size to almost 100 000 km^2, with more than 50% of parks concentrated at the lower end of the range, at less than approx. 10 000 km^2.

We also have theoretical reasons to expect that the effect of ethnic inclusion could vary with PA size. Smaller parks might be easier to designate since bureaucratic procedures to establish a smaller PA might be more efficient and more easily to control by political entrepreneurs. Larger PAs, on the other hand, might be more difficult to designate according to political-strategic considerations, given their national and international publicity, the number of parties and potential veto players involved, as well as constraints on ecological suitability which is likely to be higher for larger PAs.

We therefore recode our dependent variable, PA designation status of a geo-point, by different percentile cutoffs, depending on park. Specifically, we exclude designations in PAs that are smaller than $\sim$3000 km^2 (25%), $\sim$10 000 km^2 (50%), and $\sim$32 700 km^2 (75%) which means we stepwise increase the size of parks considered.

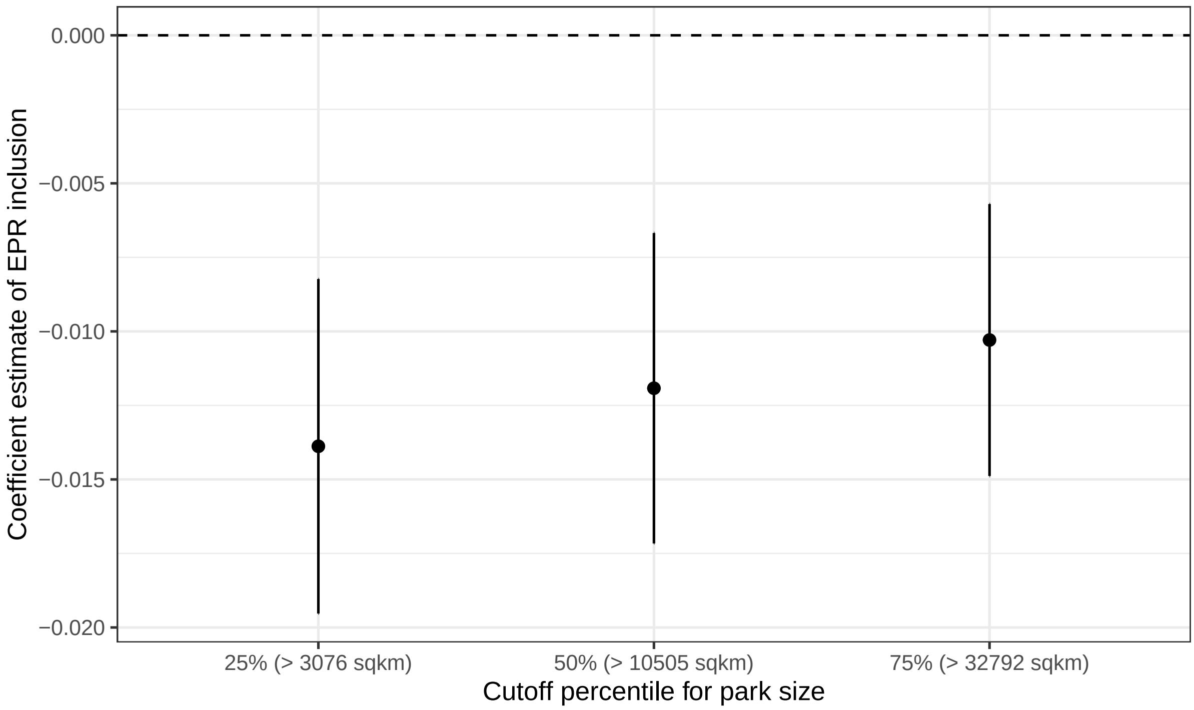


Figure A8: Park size

Figure A8 plots the coefficient of the models using the different cutoffs. The plot shows that the absolute effect size becomes smaller as we consider only larger parks in the sample. The difference between coefficients is substantively small and not very precisely estimated. Nevertheless, the trend at least suggests that ethnic inclusion helps groups to "protect" their home areas from smaller parks rather than larger parks.

C.5 Standard error clustering and spatial correlation

In our main models we compute robust standard errors clustered by unit ID to account for serial correlation as well as by ethnic-group-year to account for spatial correlation of within ethnic group homelands.

One concern with the choice of ethnic-group year as second cluster is that it assumes independent errors between ethnic group areas. To test the extent to which this choice affects our uncertainty estimates we compute the following types of standard errors:

1. Ethnic-group-year (baseline comparison)

2. Country-year

3. Driscoll-Kraay standard errors that account for temporal and between-unit spatial correlation

4. Conley standard errors that account for spatial correlation within a specific cutoff, varying the cutoff from 50 to 1000km

For standard errors types 1-3 we always also cluster by unit ID. The software implementation for Driscoll-Kraay and Conley standard errors does not allow for multi-way clustering. Consequently, the D-K and Conley SEs we show only account for the respective temporal and/or spatial correlation. We compute the different standard errors separately for each spatial resolution of our data, since spatial correlation is plausibly more relevant in the data versions with a high spatial resolution. We use the same specification as in Model 2 in Table 1.

We show results in the form of 90% (thick lines) and 95% (thin lines) confidence intervals around the respective coefficients in Figure A9. Across the different cluster levels and/or error correction procedures, as well as data resolutions, the results generally remain statistically significant at conventional levels of statistical significance.

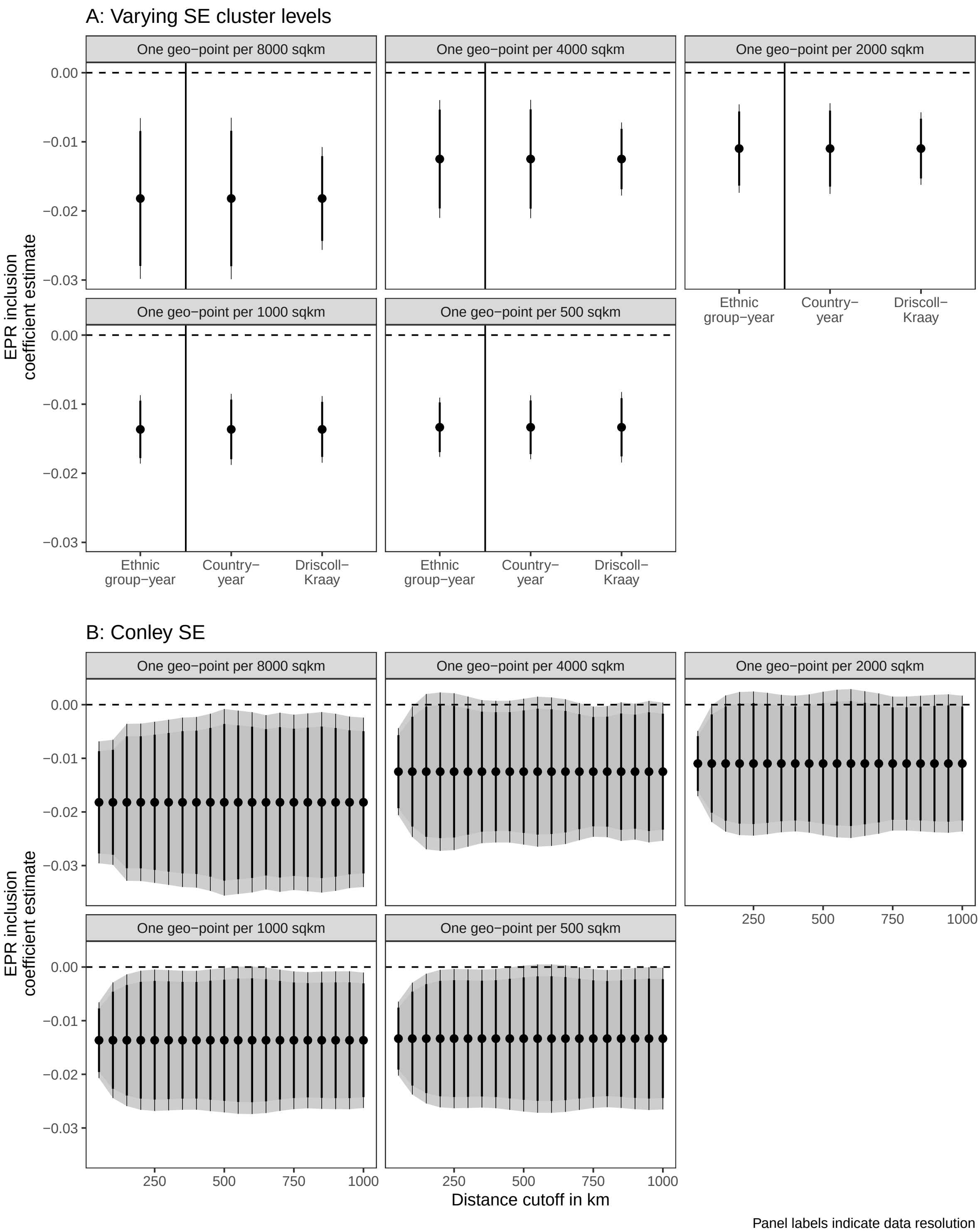


Figure A9: Standard errors

Note: Dark grey areas represent 90% confidence intervals; light grey areas represent 95% confidence intervals.

C.6 Alternative specifications of ethno-political inclusion

We here report results from using alternative data on ethnic and regional representation in countries executives. In particular, we use the new, comprehensive coding of state leaders' ethnic identities and birthplaces from the PLAD data (Bomprezzi et al. 2024), which includes data on all state leaders in power since 1990. In particular, we make use of the data's link of leaders' ethnicity to the GREG database of ethnic settlement areas (Weidmann, Rød, and Cederman 2010) which is based on a digitiztion of the Soviet Atlas Narodov Mira from the 1960s. In addition, we use the boundaries of administrative regions in 1990 from Müller-Crepon (2023) to code whether a point is located in the birth-region of a state leader in a given year.

While the inclusion on birthplaces and leader-specific ethnic identities is an advancement over EPR, the PLAD data comes with two downsides for our purposes. First, it only covers state leaders but not other partners in a country's ruling coalition. As we show in our main analysis in Table 1, points located in settlement areas of executive junior partners also see a reduced presence of parks. Second, and more importantly, PLAD only covers years since 1990, thus restricting all comparisons to a much shorter time-frame. We therefore estimate purely cross-sectional models without point fixed effects as well as the main specification. In addition, we ensure comparability with the main EPR results with an analyses for our main specification for the post-1990 data.

Table A4 reports the results. We see that, for the post-1990 period, the cross-sectional estimate of the effect of EPR inclusion on park presence indicates a negative effect of 4.3 percentage points (Model 1). Yet, in difference to the main results which rely on the full temporal scope of the data, this effect vanishes once we include point fixed effects, thus only exploiting changes in points' level of ethno-political inclusion. We find very similar patterns when using PLAD's coding of leaders' ethnicity and birth-region as the main independent variables. Both show a significant negative association with park presence in the cross-sectional specification (Models 3 and 5). Estimates range between 3.7 and 2.4 percentage points. The smaller coefficient size compared to EPR Model 1 is likely due to the presence of junior partners in the respective control groups which biases the estimate towards 0. Yet, once we include point fixed effects estimates again drop towards zero, just as in the EPR Model 2. In conjunction, these patterns show that the main results depend on including all post-independence years but that estimates are consistent between the EPR and PLAD coding of ethno-regional executive representation.

Table A4: Alternative Ethnic Inclusion Measures and PA establishment: Post-1990

	DV: Stock PA (0/1)					
	(1)	(2)	(3)	(4)	(5)	(6)
EPR included	-0.043***	0.003				
	(0.006)	(0.003)				
PLAD leader ethnic group			-0.037***	-0.003		
			(0.007)	(0.003)		
PLAD leader region					-0.024**	0.003
					(0.008)	(0.003)
Unit FE	Yes	Yes	Yes	Yes	Yes	Yes
Country x Year FE	No	Yes	No	Yes	No	Yes
Mean Dep. Var.	0.073	0.073	0.073	0.073	0.073	0.073
Num.Obs.	367644	367644	367644	367644	367644	367644
R2	0.088	0.896	0.086	0.896	0.085	0.896
R2 Within	0.004	0.000	0.002	0.000	0.000	0.000

Note: The table reports OLS estimates. Robust standard errors clustered by geo-point and ethnic group-year in parentheses. Unit of observation is the geo-point. Significance levels: + p <0.1, * p <0.05, ** p <0.01, *** p <0.001

C.7 Park profitability, tourism suitability, and geographical heterogeneity

C.7.1 Mammal range data

To estimate the conditional effect of EPR inclusion on PA areas, we use spatial data on species ranges from the International Union for Conservation of Nature (IUCN), accessed through the `R` package `rasterSp`. We spatially match the IUCN data to the geopoints in our main dataset to get an estimate for the number of different species present in a given point. For each geopoint we count the number of the following big mammal species present: Elephants, Rhinoceros, Buffalos, all big cats (Lions, Leopards, Cheetahs, Tigers), Giraffes, Gorillas and Chimpanzees. The left panel of Figure A10 maps the spatial distribution of large mammals according to the IUCN.

The IUCN estimates are time invariant and reflect the latest assessment year, which in our data ranges from 2016 to 2023. Consequently, they are measured post-treatment for most of the EPR inclusion events. Furthermore, the large mammal species ranges (and thus their count) could be a direct consequence of protected areas. As an additional robustness check, we therefore also estimate the interaction between *EPR inclusion* and *Large mammal presence* using information about the historical ranges of the same large mammal species from the PHYLACINE 1.2.1 database (Faurby et al. 2018). The PHYLACINE database uses ecological modeling to estimate the presence of species "without anthropogenic pressue" (Faurby et al. 2018, n.p.). We use the spatial

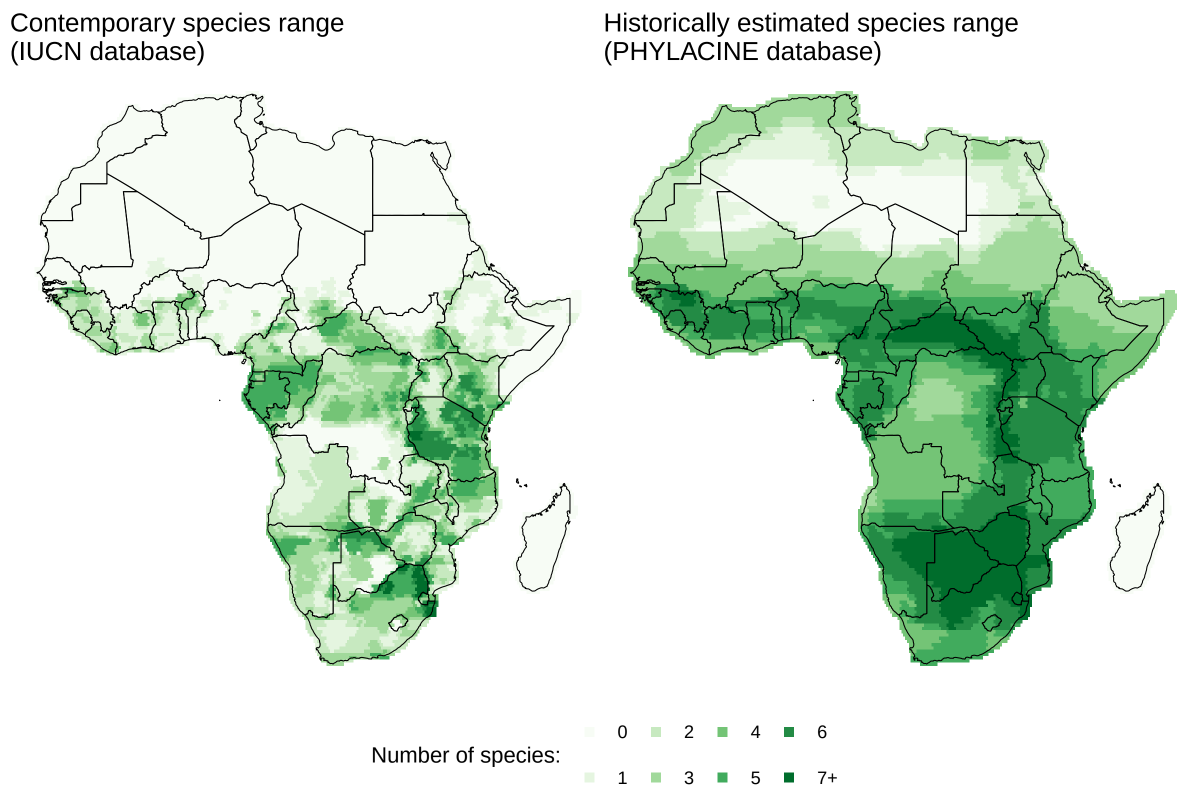


Figure A10: Geographical distribution of large mammal presence.

`.tif` files from the database and match them to the geopoints. The spatial distribution of the historical estimates for large mammals is displayed in the right panel of Figure A10. Given that the explicit purpose of the data is to remove spatial bias from a human footprint, we are confident that this version of the variable does not suffer from post-treatment or collider bias. Both variables are highly correlated, however (see Figure A11). Both measures tap into the same underlying concept, namely the suitability for protected areas to generate profits from tourism.

C.7.2 Presence of large mammals and tourism

To plausibilize that the presence of large mammals helps to generate tourism revenue, we correlate park visitor estimates from Balmford et al. (2015) with a measure of parks' biodiversity, generated by interpolating IUCN habitat shapefiles with park areas. The plot shows that only the local presence of large mammals is positively correlated with higher visitor numbers. None of the other indicators of local biodiversity, both aggregated and divided by species, display a positive correlation with park visitors. These results strengthen our confidence that the presence of large terrestrial mammals helps to generate tourism revenue through designating PAs—and that ethnic politics plays a role in capturing these profits for the ethnic group included in the ruling coalition.

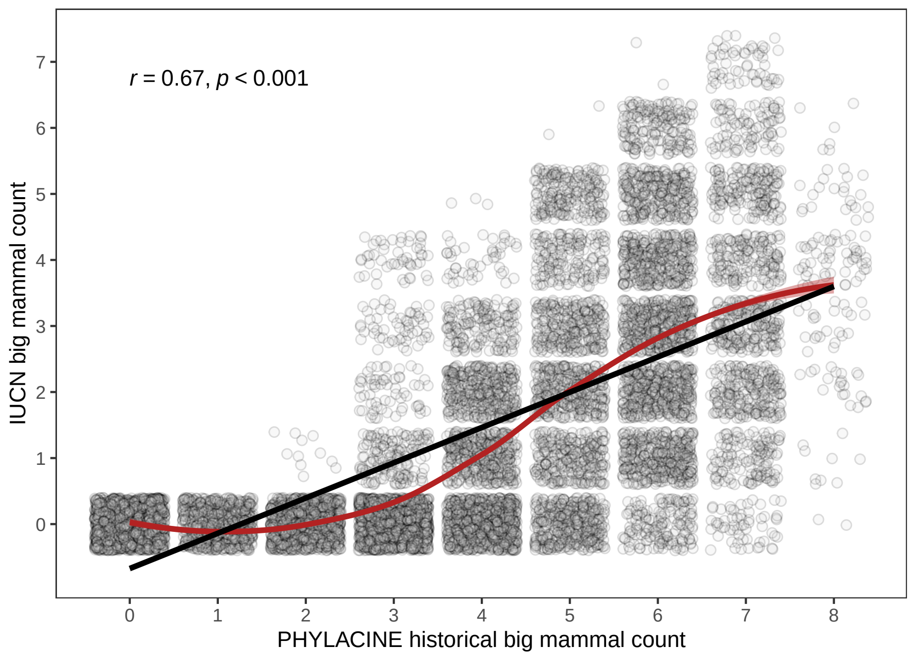


Figure A11: Correlation between IUCN and PHYLACINE large mammal presence.

Note: The figure depicts the count of large mammals according to the IUCN/PHYLACINE database. Each point represents a geopoint in the dataset. Values are jittered for better visibility. Dark red line represents a LOESS smoother; black line represents a linear trend.

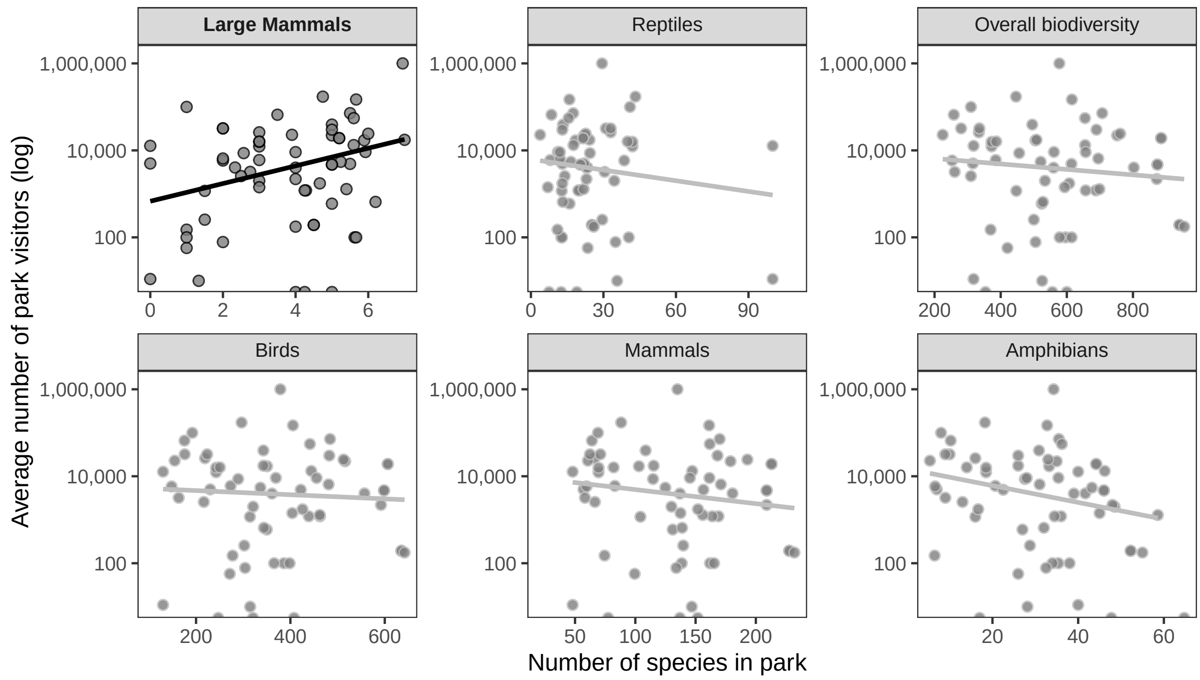


Figure A12: Park biodiversity and visitor numbers

C.7.3 Robustness and geographical heterogeneity

One concern about the interaction effect between EPR inclusion and presence of large mammals is that it simply reflects other geographical characteristics. More generally—and in line with the implications of our theory—there might be other location features that moderate the effect of ethnic inclusion on park designation.

To probe that possibility we investigate effect heterogeneity with respect to three location characteristics, interacting the *EPR included* variable with the following time-invariant variables. First, population size at each geo point. We measure population size in 1940 to avoid post-treatment bias. Population data comes from Goldewijk, Beusen, and Janssen (2010). Second, presence of cash crops. The variable is constructed from the Food and Agricultural Organizations data on the suitability of soils and climate for the production of the eight most important cash crops: Cotton, cocoa, coffee, tea, palm oil, sugar cane, groundnuts, and tobacco. We take the maximum value across these eight suitabilities. Third, distance to mineral deposits as recorded in (Schulz and Briskey 2005).

Table A5: Ethnic inclusion, geographical heterogeneity, and PA designation

	DV: Stock PA (0/1)				
	1	2	3	4	5
EPR included	-0.011**	-0.011*	-0.015**	-0.032***	-0.039***
	(0.003)	(0.005)	(0.005)	(0.008)	(0.009)
EPR included x Population (1940)	0.089			0.098	0.106
	(0.268)			(0.289)	(0.267)
EPR included x Cash crops		0.000		-0.025+	-0.005
		(0.013)		(0.014)	(0.014)
EPR included x Dist. to mineral deposits			0.002	0.004*	0.002
			(0.001)	(0.002)	(0.001)
EPR included x Large mammals (contemp.)				0.037***	
				(0.007)	
EPR included x Large mammals (historical)					0.027***
					(0.008)
Num.Obs.	722540	719753	722540	719495	719495
R2	0.800	0.800	0.800	0.800	0.800
Unit FE	Yes	Yes	Yes	Yes	Yes
Country x Year FE	Yes	Yes	Yes	Yes	Yes
R2 Within	0.000	0.000	0.000	0.001	0.000

Note: The table reports OLS estimates. Robust standard errors clustered by geo-point and ethnic group-year in parentheses. Population size is measured in units of 1mio, distance to minerals is measured in 100km. Unit of observation is the geo-point. Significance levels: + p <0.1, * p <0.05, ** p <0.01, *** p <0.001

Results are presented in the first three colums of Table A5. Across specifications, the main effect of *EPR included* remains negative and statistically significant between $p < 0.1$ and $p < 0.001$. The coefficient for the interaction terms are substantively small and statistically insignificant, indicating no meaningful effect heterogeneity with regard to population size, cash crop presence, or distance to mineral deposits if we look at them individually.

Models 4 and 5 replicate the main interaction models of Table 2 in the main paper, adding the all previous three interaction terms simultaneously. We report three results.

First, the positive interaction effect between mammal presence/tourism suitability and EPR inclusion remains similarly sized, positive, and statistically significant, indicating robustness to the presence of other location characteristics.

Second, we observe a negative and statistically significant ($p < 0.1$) interaction effect between the presence of cash crops and ethnic inclusion on park designation of that location in Model 4. This result suggests that ethnic groups entering into power avoid PA designation of locations that are economically productive by providing food/cash—benefits which might become lost if that area becomes protected land and thus less accessible to farming.

Third, we observe a positive interaction effect between distance to mineral deposits and ethnic inclusion in Model 4. This result suggests that, once we take into account other effect heterogeneities, locations become more likely to be designated parks the further away they are from mineral deposits. This result is also in line with our political economy theory of park designation: regions closer to mineral deposits likely become more difficult for a group to exploit economically once these locations become protected land. Politically included groups therefore seek to protect land that is farther away from potentially profitable mineral deposits to avoid these economic costs.

While the last two findings are broadly in line with our theory, we caution against overinterpretation of these results. The coefficients are only statistically significant in Model 4, but not in Model 5. Moreover, they are not statistically significant in individual models (columns 1-3). Taken together, this suggest some underlying noise in the data that is not fully captured by all models. Nevertheless, given that these additional results are at least roughly in line with our theory and, more importantly, do not undermine or invalidate our main results, we are confident that they strengthen the robustness of our findings.

C.7.4 Robustness to spatial correlation

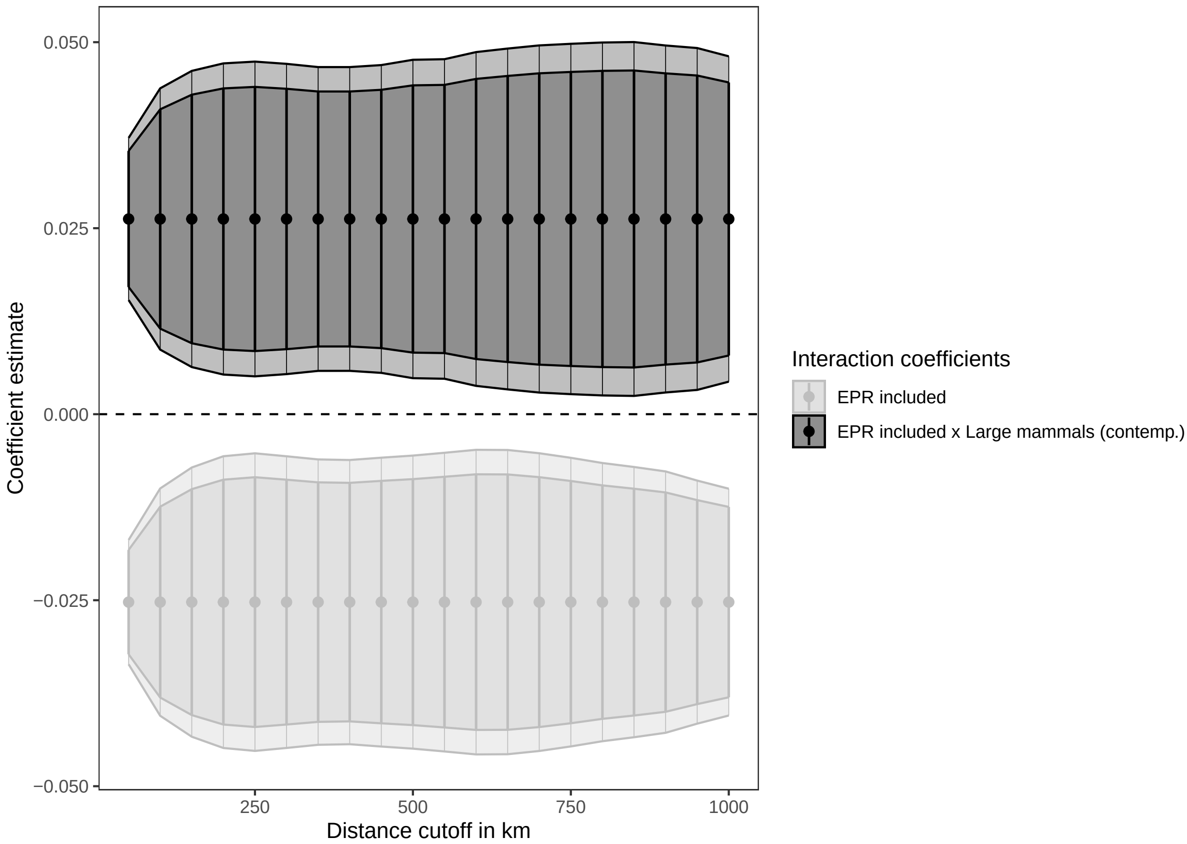


Figure A13: Robustness tests of interaction models on park profitability to spatial correlation, using Conley Standard Errors.

Note: The figure displays coefficients of Model 1, Table 2, but estimating Conley Standard Errors using different spatial cutoffs as designated on the x-axis.

C.8 Cross-country heterogeneity

In which regime types do we observe the strongest effect of ethnic favoritism on PA establishment? In the left panel of Figure A14 we show marginal effects for *EPR inclusion* interacted with a categorical variable for regime type, taken from V-Dem (Lührmann, Tannenberg, and Lindberg 2018). The figure shows that the effect becomes stronger (more negative) in more democratic contexts, and is almost zero (and statistically insignificant) in closed autocracies (even though it is very noisily estimated in liberal democratic contexts, but those are rare in our data).

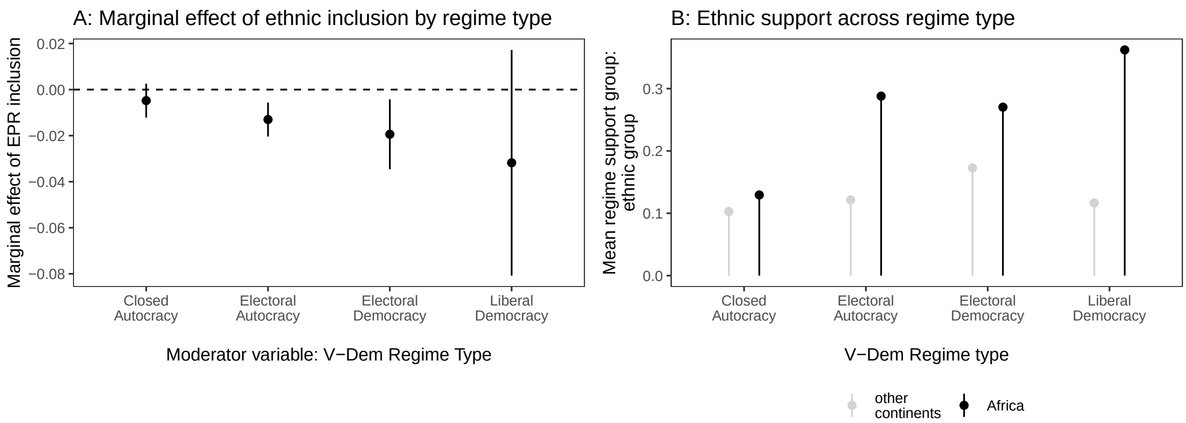


Figure A14: Ethnic inclusion and park designation across regime types

Note: Regime type variable is taken from V-Dem's "Regimes of the World" dataset.

The right panel of Figure A14 provides insights why this pattern might emerge. Using data from V-Dem's Regime Support variables (Knutsen et al. 2025), the plot shows that across electoral autocracies and democracies, as well as liberal democracies (but not so much in closed autocracies), ethnic regime support groups are much more prevalent than in other parts of the world. Consequently, the larger the political role of ethnic groups, the larger the effect of ethnic favoritism in the politics of nature protection.

D Additional Data

D.1 PADDD

Table A6 presents the geographic extent of protected area degradation (specifically degazettement and downsizing) in African countries. Data is presented for all observation for which there is information in the spatial magnitude of alterations, as reported by the PADDD tracker.

Table A6: PADDD extent

Country	Protected (KM^2)	Degazetted (KM^2)	Downsized (KM^2)	Degraded sum (KM^2)	Degradation ratio
Burkina Faso	62796	365	0	365	0.0058
Congo - Brazzaville	178345	0	1560	1560	0.0087
Côte d'Ivoire	48668	0	208.5	208.5	0.0043
Gabon	129733	0	160	160	0.0012
Guinea	71128	0	15.4	15.4	0.0002
Kenya	101282	21	13925.8	13946.7	0.1380
Malawi	18885	0	220.6	220.6	0.0117
Mali	99933	0	2448	2448	0.0245
Mozambique	146564	0	3770	3770	0.0257
Namibia	406920	0	3400	3400	0.0084
Nigeria	45777	0	135	135	0.0029
Rwanda	2774	2710	1600	4310	1.5535
South Africa	371469	1578.9	4129.7	5708.6	0.0154
Tanzania	415392	15	334	349	0.0008
Uganda	40449	2553	1335	3888	0.0961
Zambia	310461	0	24	24	0.0001
Total	2450576	7242.8	33266	40508.8	0.0165

Note: The table reports the spatial extent of degradation events in countries as reported by the PADDD tracker. Where data was available, figures are presented for the cumulative size of PAs degazetted and the extend of PA downsizing, calculated as the area prior to downsizing minus the area following downsizing. The degradation ratio is calculated as the sum of degraded land divided by the sum of (currently) protected land.

In Table A7 we estimate the effect of political inclusion on the probability of receiving a PADDD event using a series of linear probability models (LPM) across samples of all countries in which at least one PADDD event is recorded (Models 1-2) and Kenya only (Models 3-4). We take protected area-years as the unit of analysis to test our expectation that PAs in the homelands of politically included ethnic groups will be more likely legally degraded than PAs in other areas. This approach considers whether a protected area geographically intersects with an included ethnic group's homeland as well as whether that PA experienced legal degradation in a given year. Results are presented with (Models 1 & 3) and without (Models 2 & 4) unit (PA) fixed effects. All cross-national models include country-year fixed effects and Kenya-specific models include year fixed effects. The specification in Models 2 & 4 is our strictest approach and reflects that taken in previous analyses, whereby we effectively control for any time-variant factors between countries as well as time-invariant factors within countries -

Table A7: PA Degradation

	DV: PADDD event (0/1)			
	PADDD countries		Kenya	
	(1)	(2)	(3)	(4)
EPR included	0.001**	0.001+	0.007**	0.010
	(0.000)	(0.001)	(0.003)	(0.007)
Num.Obs.	197960	197960	11457	11457
Unit FE	No	Yes	No	Yes
Country-year FE	Yes	Yes	Yes	Yes
R2	0.006	0.085	0.023	0.098
R2 Within	0.000	0.000	0.001	0.001

Note: The table reports OLS estimates. Robust standard errors clustered by PA in parentheses. Unit of observation is PA-year. Samples are limited to African countries with at least one recorded PADDD event in models 1-2, and Kenya only in models 3-4. Significance levels: $^{***}p < .001$; $^{**}p < .01$; $^{*}p < .05$; $^{+}p < .1$.

between PAs. We relax the second of these restrictions in models 1 and 3, as we consider repeated legal degradations of the same PA (such as periodic downsizing) to be as relevant as isolated degradations of different PAs. Note that the results of the analysis are likely downward biased due to the selection of PAs that can be degraded into the sample, such that we would expect *less* events in politically included areas.

The results of our less restrictive specifications in models 1 and 3 suggest a statistically significant positive effect of an ethnic group's political inclusion on legally degrading PAs in their homeland. The effect size is markedly higher in the Kenyan case, where political inclusion increases the likelihood of PA degradation in a given year by 0.7%. Considering that the likelihood of any PA being degraded in a given year is around 1% (the corresponding likelihood in the cross-country sample is 0.1%), this is a substantial effect size. Statistical significance is reduced in the tougher specification of the cross-national test in Model 2, and the coefficient for political inclusion loses significance in the same specification in the Kenyan sample, possibly due to the spatial clustering of PADDD events visible in Figure 7 in combination with the relatively few PADDD events that remain in the sample after adding this restriction.

E References (Appendix)

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