

## How Natural Resource Decentralization Reshapes Inequality

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### Abstract

Decentralized, community-based approaches to natural resource management are believed to improve natural resource conditions while reducing poverty in the Global South. Despite apparent successes, one of the key challenges facing these approaches is that of inequality. The local distribution of benefits under community-based resource management is often not only highly unequal, but also inequitable because it reflects pre-existing social inequalities by gender, class, ethnicity, and geography. There is, however, a lack of rigorous evidence from large-scale population studies showing how community-based governance approaches affect inequality compared to before such arrangements are implemented. Hypotheses about positive as well as negative effects of community-based approaches have theoretical support. On one hand, institutions that are self-organized locally—without support from external actors such as governments—will tend to reflect the preferences of traditionally advantaged members of the community. The formal, externally imposed rules implemented under a community-based resource management program may therefore reduce inequality by providing some constraints on the powers of traditional elites, and ensuring that more cash and subsistence benefits are channeled toward the marginalized. On the other hand, the formal institutions and bureaucratic structures inherent to community-based resource management may merely empower local elites further, allowing them to collect a greater share of the benefits compared to members of marginalized groups. We use data on over 18,000 local natural resource governance committees across Nepal and household-level data from two nationwide censuses to test the two competing theories. We find evidence to suggest that the program partially alleviates social inequality—conceptualized as differences in poverty between the ethnic elite and the most marginalized ethnic groups—though the magnitude of the effect is modest.

## 1. Introduction

Decentralized, community-based approaches to natural resource management are believed to improve natural resource conditions while reducing poverty<sup>1,2</sup>. Scholars have long emphasized the role of local communities in managing natural resources<sup>3-6</sup>, a role that is particularly important in rural areas where livelihoods depend upon those resources. Decentralization reforms based on this logic have created natural resource user groups—local committees of resource users with management authority and collective property rights—in countries across the Global South. Such governance approaches can benefit rural households by expanding access to subsistence products and creating opportunities for resource-based commercial livelihood activities. Additionally, the funds generated by resource user groups can be invested in local development projects, the delivery of local public services, or paid back to members in the form of grants or microcredit. Through these pathways, natural resource decentralization reforms may help to lift some rural households out of poverty<sup>2</sup>.

Despite apparent successes, one of the key challenges facing community-based resource governance approaches is that of inequality. The local distribution of benefits under community-based resource management is often inequitable because it reflects pre-existing social inequalities by gender, class, ethnicity and, geography<sup>7-10</sup>. In other words, it is often the wealthier households, male-headed households, and households belonging to the ethnic elite who reap the most benefits under decentralization. There is, however, a lack of rigorous evidence showing whether community-based governance approaches make inequality *better or worse* compared to before such arrangements were implemented. Does natural resource decentralization *worsen* inequality, or is the inequality observed under decentralization actually less acute than inequality that we would observe when natural resources are managed under other governance models?

Previous studies of natural resource decentralization reforms have not shed light on this question because they have estimated effects on average poverty rates in the rural population, not in subpopulations. For example, recent research suggests a 4.3% relative decrease in average rural poverty rates as a result of Nepal's forestry sector decentralization program<sup>1</sup>, which transferred authority over nearly one third of the country's forested land to rural communities by 2020<sup>11</sup>. Understanding how this program has impacted social inequality, however, would require (1) theories connecting the institutions of decentralization to changes in local inequality, and (2) an analytical approach that disaggregates the effects on poverty rates according to socially relevant subpopulations, such as ethnicity categories. Through this approach, our study estimates the impacts of this decentralization reform on social inequality, defined as average within-community disparities between members of historically marginalized social groups and members of the historically advantaged elite.

We show that there is theoretical support for two competing expectations (Sections 1.1 - 1.2): Decentralization reforms may reduce these disparities (reducing social inequality), or such reforms may widen the disparities (worsening social inequality). We use the forestry decentralization program in Nepal, which is seen as a model example of decentralization legislation, to test the two competing expectations empirically (Section 2). Our results are consistent with a modest inequality-reducing impact from the program (Section 3), which we attribute largely to provisions in the program that explicitly target benefits to members of historically marginalized groups (Section 4). These results raise important policy implications (Section 4), since they suggest that even if local inequality is widespread under natural decentralization reforms, such reforms may not necessarily worsen inequality, and may even reduce inequality to some degree when they are designed to target provisions toward the marginalized.

### ***1.1 H1: Community-based resource management reduces social inequality***

There are theoretical reasons to expect that inequality may not be as severe under natural resource decentralization compared to the scenarios that it is often implemented to correct in Global South countries—scenarios that are often characterized by informal domination by local elites through self-organized local institutions. Even where central governments have *de jure* property rights over natural resources, they may be unable to monitor and enforce such property rights over large resources in rural areas, leading to *de facto* open access scenarios or governance through rules and norms that are self-organized locally. Institutions that are self-organized locally, without support from external actors such as governments, will tend to reflect the preferences of traditionally advantaged members of the community<sup>9,12</sup>. Elite capture enables the more advantaged community members—such as individuals with political power due to their social, economic, or ethnic characteristics—to receive a larger share of the benefits<sup>10,13</sup>.

The formal, externally imposed rules implemented under a community-based resource management program may therefore reduce inequality by providing some constraints on the powers of traditional elites. Community-based resource management programs may also encourage social inclusion and more equal benefit-sharing through specific provisions targeting benefits toward, or encouraging the participation of, marginalized households<sup>14</sup>. Local elites, who have the power to manipulate the formation of local institutions in accordance with their own preferences<sup>9</sup>, have little incentive to adopt such measures on their own. Taken together, this suggests that more natural resource benefits may accrue to households from historically marginalized groups under decentralization, compared to under the typical pre-decentralization scenarios. To the extent that these benefits have a meaningful impact on a household's economic status, this leads to H1: *The formal adoption of community-based resource management under decentralization programs reduces social inequality*. While inequality and elite capture are not inevitable in the absence of external involvement because marginalized groups can sometimes

circumvent elite capture over time <sup>15</sup>, H1 follows from the assumption that such inequality and elite capture are less likely, on average, when local elites face more constraints and have less discretion over how the benefits from natural resource governance are distributed.

While decentralization tends to be viewed as the granting of autonomy to local actors <sup>16</sup>, the theoretical approach described here emphasizes decentralization as a set of constraints placed on such actors. Previous research suggests that such constraints are the norm, since experiments in decentralization across the world have tended to devolve fairly limited powers to local actors, allowing higher-level governments to maintain a large degree of control over decision-making around natural resources <sup>17,18</sup>. While many have critiqued the constrained local autonomy created by natural resource decentralization reforms, highlighting both inefficiencies and potential injustices associated with reforms that do not grant enough autonomy <sup>16</sup>, the theoretical discussion above suggests that the constraints inherent to decentralization reforms may be a mechanism through which these reforms can alleviate the local inequalities that are more severe where local elites go unchecked.

### ***1.2 H2: Community-based resource management worsens social inequality***

On the other hand, there is reason to believe that the formal institutions and bureaucratic structures inherent to community-based resource management may merely empower local elites further <sup>10</sup>. This is because members of traditionally advantaged social groups tend to be more literate, politically connected, and advantaged when it comes to dealing with bureaucrats, and are therefore better able to navigate the institutions and processes of community-based resource management programs, and to influence local rules <sup>19-21</sup>. Government officials may treat local elites as important “gatekeepers” for the establishment of the local institutions of natural resource decentralization (e.g. the formation or formal recognition of local user groups, and the crafting of user groups’ rules), allowing elites to work directly with officials in the process of institutional formation <sup>19</sup>.

The technical and bureaucratic processes of institutional formation under decentralization programs may themselves favor elites. By framing natural resource management in technical terms and privileging expertise, these processes may serve as a vehicle for more educated, literate local elites to deepen their control over natural resource governance <sup>20,22</sup>. Where local elites can manipulate the processes of institutional formation, they may also eventually receive higher proportions of benefits generated from community-based management efforts <sup>23</sup>. If the distribution of resource-related benefits is *more* unequal under decentralization compared to the distribution in the absence of decentralization, such reforms may enrich members of historically advantaged social groups without delivering the same benefits to the marginalized. This suggests that there is the potential for worsening inequality under decentralized, community-based

resource management programs, leading to H2: *The formal adoption of community-based resource management worsens social inequality.*

## **2 Methodological approach**

We test the two competing expectations using the case of forestry-sector decentralization and social inequality in Nepal, explained in Section 2.1. We use household-level census data from rural Nepal, and a within-ward econometric modeling approach to estimate the impact of the forestry-sector decentralization program on the degree of inequality in average poverty levels between households from ethnic minority groups and households of the traditional ethnic elite living in the same area (see Section 2.2).

### ***2.1 Empirical case: decentralization and ethnic inequality in Nepal***

Nepal's Forest Act of 1993 was a response to the central government's perceived inability to monitor and regulate the use of the country's rural forest resources, which cover more than 3 million hectares, by including local communities in resource management activities<sup>24-26</sup>. The Forest Act ordered the Department of Forests to hand over forested lands to community forest user groups (CFUGs) and provide them with collective rights to manage and use the forests. As of 2020, approximately 22,000 CFUGs had been established, with memberships including more than 2.9 million households, and management authority over nearly 2 million hectares of forest<sup>11</sup>. Forming a CFUG begins when local forest users work in collaboration with government foresters to form a local executive committee, identify and enroll member-households in the village, and prepare a set of written rules detailing forest management strategies, the allowable distribution of benefits from the community forest, and how the group will be governed. Once the plan is approved, the user group is recognized as a legal and autonomous entity, and collective property rights over the forest are formally granted to the CFUG.

Along with the goal of averting rapid deforestation, a central goal of Nepal's forestry program is to alleviate poverty through the provision of subsistence and cash benefits to rural Nepalese. Nearly two-thirds of Nepal's population relied on agriculture and forest-based income for their livelihoods after the initial decades of community forestry implementation (Ojha, Persha, and Chhatre 2009). The most widely gathered subsistence products from community forests are fodder for domesticated animals, and firewood, which is the primary cooking fuel for over half of Nepalese households<sup>27</sup>. Benefits from community forestry include these subsistence products, as well as cash benefits such as grants for emergency medical expenses, scholarships and assistance with educational expenses for member households, or paid employment opportunities<sup>28,29</sup>.

There are distinct socio-economic disparities between the commonly recognized categories of ethnic groups in Nepal. Brahmans, Chhetris, and Newars (BCN) make up the traditionally advantaged ethnic groups in terms of human development outcomes (health outcomes, literacy, and educational attainment), economic status and wealth, and political representation<sup>30</sup>. Dalits (sometimes referred to as the 'untouchable' castes), Janajatis (state-recognized indigenous

groups), and other ethnic minority groups (such as Muslims and the Terai Middle Castes) have consistently scored lower than the BCN groups on average, in terms of human development, political representation and empowerment<sup>30</sup>, chronic and structural poverty<sup>31</sup>, and upward mobility<sup>32</sup>. For these reasons, we operationalize social inequality in this study as the average difference in poverty between these ethnic minority groups and the historical ethnic elite (the BCN groups) in the same area (See Section 2.2).

The community forestry program in Nepal, as implemented under the Forest Act of 1993, the Forestry Sector Regulations of 1995, and the Community Forestry Guidelines (updated in 2000 and 2009), was designed with these longstanding social inequalities (and others) in mind. The concept of community forestry was not new in Nepal when the Forest Act was passed, since local user groups had already governed forests collectively in many villages across the country despite lacking formal collective property rights. Benefits from these forests were mostly used by local elites in two senses, first, to appropriate and accumulate resources, and, second, to initiate and establish their political foundation through locally formed community forestry institutions. Furthermore, local elites controlled large tracts of forest granted to them under the Birta system, an elite-controlled land-tenure system established during the Rana dynasty (1846-1951)<sup>33</sup>. The Forest Act of 1993 and Forestry Sector Regulations of 1995 both followed the reintroduction of multiparty democracy in Nepal in 1990. Along with the Community Forestry Guidelines, the Forest Act and Forestry Sector Regulations included provisions meant to democratize forest governance and channel benefits to marginalized households.

For example, when local forest users form a CFUG, the Community Forestry Guidelines require that Dalits, Janajatis, and other marginalized groups are proportionally represented on the locally elected executive committee. Furthermore, the guidelines mandate that each CFUG allocate 35% of its total income to programs targeted at creating livelihood opportunities and alleviating poverty among Dalits, Janajatis, other marginalized groups, and women. In practice, these programs include targeted activities such as grants, scholarships, funds for healthcare expenses, and employment offered to members of these groups<sup>29</sup>. The guidelines also state that the CFUG should allocate some portion of the community forest for the livelihood activities of these groups, if there is some land within the community forest boundaries that suits these needs. Finally, the guidelines state that it is the CFUG's responsibility to provide forest products to Dalits, Janajatis, other marginalized groups, and women at either a reduced cost or for free. These targeted activities are codified in a written contract between the CFUG leadership and members of the marginalized groups in the village.

Despite these provisions in the community forestry program aimed at promoting equity, a body of existing research suggests that there are ethnic inequalities under community forestry in Nepal. Once CFUGs are established in a village, ethnic minority households often appear less likely to participate in CFUG decision-making<sup>29,34,35</sup>, and to influence group decision-making

when they do participate <sup>20,36</sup>. Some of the subsistence and cash benefits from community forestry may flow disproportionately toward the BCN ethnic majority <sup>37</sup>. However, as we argue in Section 1, evidence of inequality under decentralization does not necessarily constitute evidence that inequality is worse under decentralization compared to in its absence.

## ***2.2 Data and modeling approach***

We measure poverty among 751,538 rural Nepalese households using data from the 2001 and 2011 population census.<sup>1</sup> Following previous research in this context <sup>1</sup>, we calculate a multidimensional poverty index for households in the census sample based on multiple indicators related to three dimensions: health, education, and living standards. Table 1 shows the variables used to calculate the poverty index, their weights, and how they are measured from the census questionnaire. The poverty index is standardized based on the mean and standard deviation in 2001, and is therefore measured in 2001 standard deviation units. Of the households in our sample, 36.9% are classified as belonging to the BCN ethnic majority, 14.9% are classified as Dalit households, 33.8% are classified as Janajati households, and 14.3% belong to other ethnic minority groups (mainly Muslims and the Terai Middle Castes).

These dimensions included in the poverty index are based on established global multidimensional poverty indices <sup>38,39</sup>. It is also reasonable to expect that all three dimensions can be influenced by the implementation of the community forestry program in a household's village. CFUGs provide direct grants to member households for educational expenses and healthcare expenses <sup>29</sup>. Furthermore, the income-generating activities and access to free forest products offered to households under the community forestry program should mean that some households have more funds to devote to consumption across areas like nutrition, healthcare, and education, and toward household amenities like flush toilets and improved cooking stoves.

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<sup>1</sup> 251,893 households in the sample come from the 2001 census, and 485,581 come from the 2011 census. The sample we use is a 11% random subset of the 2001 rural census population and a 12% random subset from the 2011 rural census population. The data from the two census years represent a random probability sample from each census, rather than a panel. Urban areas are excluded from the analytic sample.

<b>Table 1: Components of household-level poverty index.</b> Adapted from <sup>1</sup> . Weights in parentheses.		
Health dimension (33.3%)	Child mortality (16.6%)	1 = a child < 6 years old died in the household during the past twelve months.
	Premature mortality (16.6%)	1 = a person in the household died before the average age of life expectancy during the past twelve months.
Education dimension (33.3%)	School attendance (16.6%)	1 = at least one child aged 6-16 was not currently attending school at the time of the census.
	Years of schooling (16.6%)	1 = at least one person older than 10 years had less than 5 years of schooling by the census date.
Living standards dimension (33.3%)	Cooking fuel (8.3%)	1 = respondent reported that the main source of cooking fuel for the household was wood or dung.
	Electricity access (8.3%)	1 = respondent reported that the main source of lighting for the household was something other than electricity (kerosene, biogas, solar, or other).
	Clean water (8.3%)	1 = respondent reported that the main source of drinking water for the household was something other than piped/tap water (tube well/hand pump, covered well/kuwa, uncovered well/kuwa, spout water, river/stream, other).
	Improved sanitation (8.3%)	1 = respondent reported that the household did not have a flush toilet.

We use records from the Department of Forests to identify when each ward<sup>2</sup> in the country received its first implementation of the community forestry program <sup>40</sup>. The data were collected from the Department of Forests in January 2017 and contain records on all CFUGs reported by local forestry officials to the central government by that date. Of the 18,960 CFUGs in the database, 60.4% were formed before the 2001 census date, 35.6% were formed between the 2001 and 2011 census dates, and 4.0% were formed after the 2011 census date. We use these data to construct a dichotomous indicator for whether or not at least one CFUG was formed under the forestry decentralization program by year  $t$  in the ward in which each household was sampled in year  $t$ . Ward-level geographic data on CFUGs are mostly or completely missing from the database for 15 districts. For four of these districts, we were able to fill in the missing data using

<sup>2</sup> Before the restructuring of administrative boundaries in 2017, the two smallest administrative units in Nepal were the village development committee (VDC) and ward. Rural Nepal was divided into more than 3,000 VDCs which were divided further into roughly 36,000 wards. Because the ward was the smallest geographic administrative area during the study period, we use the ward as our geographic unit of interest for this analysis.



records provided by district-level forest offices. Observations from the remaining 11 districts are excluded from the analysis.<sup>3</sup>

We use a two-way fixed-effects modeling approach that provides within-ward estimates of ethnic inequality, and predicted within-ward differences in those estimates of inequality based on the presence or absence of community forestry, while controlling for unobservable time-invariant confounding variables at the ward level, key characteristics of the household (and household head), and year fixed-effects. The model is expressed by the following equation:

Eq. 1:

$$poverty_h = \alpha + \beta_1 CF_{wt} + \beta_2 Dalit_h + \beta_3 Janajati_h + \beta_4 Other\ minority_h + \beta_5 CF_{wt} * Dalit_h + \beta_6 CF_{wt} * Janajati_h + \beta_7 CF_{wt} * Other\ minority_h + \beta_7 2011_t + X_h \beta + u_w + \varepsilon_h$$

In this model,  $poverty_h$  is the multidimensional poverty score for household  $h$ , and  $CF_{wt}$  is the dichotomous indicator for whether or not ward  $w$  had at least one CFUG that formed under the community forestry program by year  $t$ . The ethnicity of household  $h$  is given by a vector of dummy variables representing whether or not the household head is Dalit, Janajati, or a member of another minority group ( $Other\ minority_h$ ), with BCN as the baseline category. The variable  $2011_t$  is a dichotomous indicator for whether or not the observation comes from the 2011 census, with the 2001 census treated as the baseline category.  $u_w$  is a vector of ward fixed-effects, and  $X_h$  is a vector of additional household-level covariates to improve the precision of the estimates—a dichotomous indicator for whether or not the household head was female in year  $t$ , and the age of the household head in year  $t$ .

The coefficient estimates on the minority ethnicity categories ( $\beta_2, \beta_3, \beta_4$ ) represent the average within-ward gap in the poverty index between members of each ethnicity category and the BCN category, in 2001 standard deviation units, in wards that had not yet received the program. Likewise, the estimates on the interactive terms ( $\beta_5, \beta_6, \beta_7$ ) represent the predicted within-ward differences in each of those poverty gaps in the presence of the program compared to in its absence. We interpret these coefficients on the interaction terms as our best within-ward estimates of the association between program implementation and social inequality.

### **3 Results**

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<sup>3</sup> In our sample, we use data from district-level offices for the districts of Kavrepalanchowk, Lalitpur, Nuwakot, and Okhaldhunga. The districts of Achham, Bajhang, Bajura, Dolakha, Humla, Khotang, Manang, Parsa, Rupandehi, Sunsari, and Syangja are omitted.

### ***3.1 In the absence of the community forestry program, patterns of social inequality are consistent with previous studies***

Table 2 shows the estimates from the two-way fixed-effects model. Coefficient estimates on the ethnicity categories represent average within-ward differences in poverty between households belonging to each of the ethnic minority categories (Dalit, Janajati, or Other minority) and the households belonging to the ethnic majority (the BCN category), in the absence of the community forestry program. These estimates suggest in the absence of the program, Dalit households scored nearly 0.4 standard deviations higher on the poverty index compared to BCN households in the same ward ( $p < 0.001$ ), Janajati households scored roughly 0.3 standard deviations higher compared to BCN households in the same ward ( $p < 0.001$ ), and households from other ethnic minority groups scored about 0.3 standard deviations higher compared to BCN households in the same ward ( $p < 0.001$ ). These estimates are consistent with previous work showing gaps in poverty and human development outcomes between households from minority groups and the BCN majority. The population-wide estimates from these previous studies are not directly comparable to our within-village estimates. However, they are qualitatively similar in that both show higher incidences of poverty and poorer human development outcomes on average for Janajati households, Dalit households, and households belonging to other ethnic minority groups (compared to poverty and human development outcomes for households from the BCN majority), with such disparities appearing strongest for Dalit households<sup>30,31</sup>.

### ***3.2 The community forestry program appears to partially alleviate social inequality***

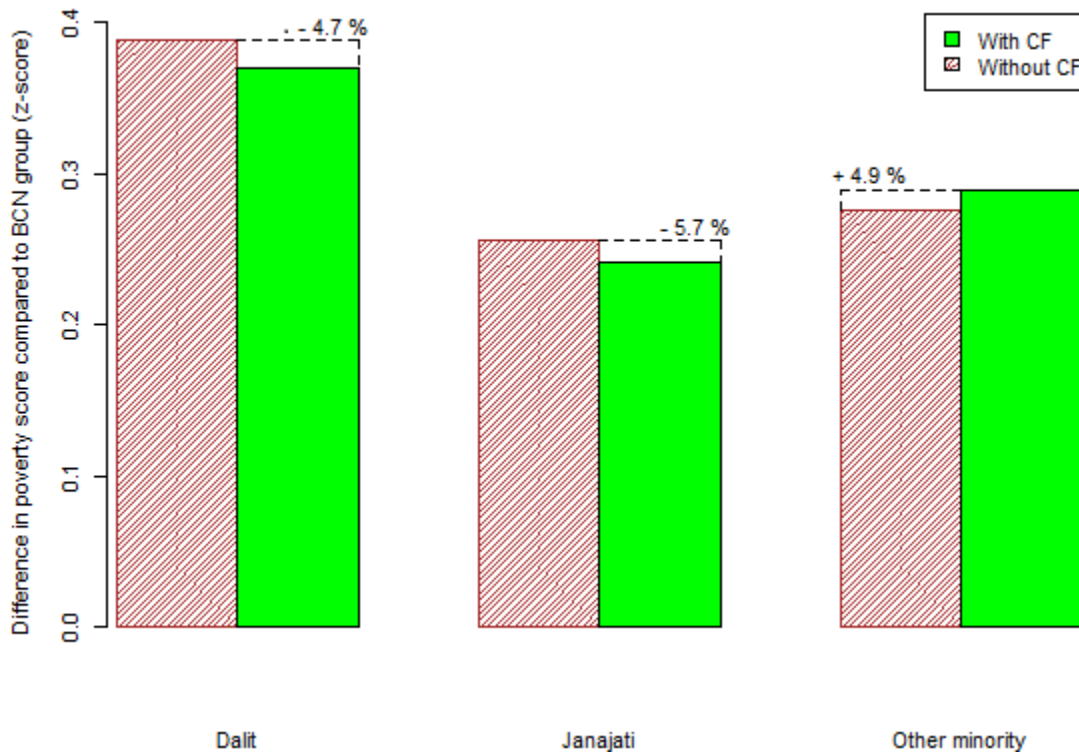
The estimates on the interaction terms for the Dalit and Janajati ethnicity categories in Table 2 are both negative and statistically significant, which is consistent with what we would expect if the community forestry program partially alleviates social inequality with respect to these groups. Based on the results of the two-way fixed-effects model, the presence of the program predicts a decrease in the within-ward poverty gap between Dalit households compared to BCN households in the same ward ( $p < 0.01$ ), and also predicts a decrease in the within-ward poverty gap between Janajati and BCN households ( $p < 0.05$ ).

**Table 2: Within-ward estimates of social inequality in the presence and absence of the community forestry program.** See Section 2 for details on the data and modeling approach. Dependent variable is a multidimensional poverty score, expressed in 2001 standard deviation units (see Table 1 and Section 2). Household-level controls include the age of the household head (in years) and a dichotomous indicator for whether or not the household head was female at the time of the census. \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

CF <sub>wt</sub>	-0.059***
	[-0.078, -0.039]
Dalit <sub>h</sub>	0.388***
	[0.378, 0.399]
Janajati <sub>h</sub>	0.256***
	[0.246, 0.265]
Other minority <sub>h</sub>	0.276***
	[0.264, 0.288]
CF <sub>wt</sub> *Dalit <sub>h</sub>	-0.018**
	[-0.033, -0.003]
CF <sub>wt</sub> *Janajati <sub>h</sub>	-0.017*
	[-0.029, -0.0005]
CF <sub>wt</sub> *Other minority <sub>h</sub>	0.0134
	[-0.013, 0.040]
Constant	0.144***
	[0.133, 0.155]
Household-level controls	X
Ward fixed-effects	X
Year fixed-effects	X
<i>N</i>	751,538

Figure 1 shows the magnitude of these estimates. The estimated within-ward poverty gap between Dalit and BCN households is 4.7% smaller in the presence of the program compared to in its absence (95-percent CI = -8.5%, -0.77%). Similarly, the program predicts a 5.7% decrease in the gap between Janajati and BCN households (95-percent CI = -11.3%, -0.19%). The results suggest the type of pattern that would be expected if the program alleviated poverty among BCN

households, Dalit households, and Janajati households, and narrowed inequality through a stronger impact on poverty among Dalit and Janajati households (compared to among BCN households). According to the model, the poverty index was 0.059 standard deviation units lower for BCN households in the presence of the community forestry program compared to in its absence. For Dalit and Janajati households, the presence of the community forestry program predicts a decrease in the poverty index of 0.077 and 0.076 standard deviation units, respectively.



**Figure 1: Estimates of social inequality in the presence and absence of the community forestry program.** Each bar represents the average difference between households from a given ethnicity category and BCN households in the same ward, based on the results of the two-way fixed effects model (see Section 2 for details on the data and modeling approach).

While the results are consistent with what we would expect if the community forestry program partially alleviates social inequality between BCN households and households from the Dalit and Janajati groups, we do not observe the same pattern for the other ethnic minority groups. The estimate on the interaction between this category and the presence of the community forestry program is positive (Table 2), and corresponds to a within-ward poverty gap between BCN-households and households from the other ethnic minority groups that is roughly 4.9% *larger* in the presence of the community forestry program compared to in its absence (Figure 1). In other words, the implementation of community forestry predicts an *increase* in inequality between the other (non-Dalit and non-Janajati) ethnic minority groups and the BCN groups. However, the

estimate on this interaction term is not statistically significant ( $p = 0.335$ ), suggesting that the gap between BCN households and households from the other ethnic minority groups was not statistically different in the presence of the community forestry program versus in its absence.

#### **4 Discussion and conclusion**

While problems of inequality under natural resource decentralization are well-studied, there is a lack of systematic evidence from large-scale population studies for demonstrating whether inequality is more or less severe in the presence of decentralization compared to in its absence. In addressing this gap, our results are consistent with the theory that the community forestry program in Nepal—which we use as our test case—has helped to narrow disparities between some ethnic minority groups and the ethnic majority. Specifically, gaps in poverty between households from Dalit and Janajati groups—two officially recognized marginalized ethnic minority categories in Nepal—and the comparatively privileged ethnic majority appear slightly less pronounced in the presence of the community forestry program compared to in its absence. This pattern is evident through within-ward comparisons that also control for time effects. On the other hand, we find no evidence that the program had a similar impact for non-Dalit and non-Janajati ethnic minority groups.

Taken together, the results point to a potential mechanism behind the apparent effect of the program, and raise important policy implications. While the design of the program has targeted specific cash and subsistence benefits at women, the poor, and members of marginalized ethnic groups, the policy language targets these benefits to Dalit and Janajati households more explicitly than other ethnic minority groups<sup>29,41</sup>. For example, the Community Forestry Guidelines state that Dalits and Janajatis, specifically, must have access to cash benefits coming from a fund comprising no less than 35% of a CFUG's income, should have land set aside for them within the community forestry boundaries where available, and must have access to forest products from the CFUG for free or at a reduced cost, among other benefits (see Section 2.1). While the guidelines do state that the poorest households, female-headed households and marginalized households in general should also have access to these benefits, households belonging to other ethnic minority groups (such as Muslim households or households belonging to the Terai middle castes) are not explicitly named, while Dalit and Janajati households are. As a result, members of non-Dalit and non-Janajati ethnic minority groups may be less likely to be the targets of these benefits in practice. This explains why the implementation of the reform predicts a reduction in inequality between Dalit or Janajati households and households in the same village belonging to the BCN majority, but predicts no such effect for the other ethnic minority groups. This also suggests that the inequality-reducing potential of natural resource decentralization depends upon how decentralization reforms are designed. More specifically, these impacts may only materialize when such reforms explicitly target tangible benefits to marginalized groups.

By implying that the apparent inequality-reducing impact of the natural resource decentralization program was dependent upon the explicit targeting of benefits toward marginalized groups, the findings are directly actionable for the design of such programs in the future. These findings also highlight two important areas for future research. First, it is unlikely that all decentralization reforms have the same impacts on inequality, since some reforms may not target benefits as explicitly compared to the reform studied here. Second, since the explicit targeting of benefits toward marginalized groups seems crucial, we recommend that future research explore the political processes that lead to the inclusion of such explicit targeting mechanisms in decentralization legislation. For example, were the provisions in Nepal's community forestry policies that target benefits at Dalit and Janajati households the result of broader domestic political movements aimed at combating the marginalization of these groups <sup>30</sup>? Were these provisions advanced by foreign donors, who outspent the government of Nepal by nearly 30:1 supporting the community forestry program in its initial years <sup>29</sup>? By exploring heterogeneity in the impacts of natural resource decentralization across countries, and by understanding the political processes that make these impacts most likely, future research can shed light on the prospects for decentralization as a means to achieve both environmental conservation and social justice goals.

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