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Opening Economics

By
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Community forest management: the story behind a success story in Nepal

Climate change mitigation implies, among others, to drastically reduce deforestation and to restore degraded forests. Among the pathways to protect forests and to sequester more carbon, institutional innovations are a clear part of the policy mix. At the forefront of these innovations, participatory management of forest resources has been put forward as a potential solution, especially in countries with weaker state capacity. When it comes to management by communities, Nepal appears as a success story and receives a lot of international attention, for instance by UNEP (Sukhdev and Nuttall, 2010).

Over the past 25 years, the government of Nepal implemented one of the most ambitious and comprehensive programs of decentralization of forest management in the world. This major institutional change resulted in the transfer of the management of almost 50% of Nepalese forests to no less than 18 000 Community Forest User Groups (CFUG). More than a third of the Nepalese population are directly involved in the management of forests, a key natural resource in their everyday life. Forests provide not only firewood or timber, but also fodder or leaf litter for livestock, fruits, nuts and medicinal plants.

Despite wide international support for participatory development and management of natural resources, scientific evidence on the effectiveness of large programs of decentralized management of forests are rather mixed.

Methodology

To evaluate the impact of the community forestry program in Nepal, we leverage multiple quantitative data sources, heavily relying on a combination of administrative data, survey data and remote sensing. We supplement the analysis by qualitative data collection. Our main variable of interest is the evolution of tree cover in Nepal over the last decades. In terms of remote sensing, measuring canopy cover in Nepal is challenging because of the country topography and of the close imbrication of crops and trees.

We construct our main explanatory variable, the share of a "village development committee"[1] (VDC) area managed by community forest user groups (CFUG), based on the national census of CFUG. In the first part of the analysis, we combine this data with yearly village level information on tree cover (Verger et. al, 2014) and land use (Friedl, 2012) as well as a broad set of controls, most of them derived from

1 "Village Development Committee" roughly corresponds to municipalities and group several villages and hamlets. For clarity, we use the word "village" in the remaining part of the brief.

remote sensing. We follow the 2 252 VDCs of the Hills and the Mountains[1] over 13 years. In the second part of the analysis, we merge data about CFUG with household level information coming from the last two waves of the Nepal Living Standard Survey. The Nepal Central Bureau of Statistics, in collaboration with the World Bank, interviewed 1 474 households in the Hills and Mountains region in 2003-04 and 2 116 in 2010-11 about several aspects or their production and consumption activities. The surveys cover 123 villages in 2003-04 and 178 villages in 2010-11, selected randomly with a probability proportional to their population.

Economics and remote sensing

Measuring forest regeneration requires a creative interdisciplinary approach between economists and remote sensing specialists. Compared to deforestation, forest regeneration is a gradual change. We could pick slow moving changes at the level of the country by leveraging the intra-annual variation in greenness between the tree and the herb layer. Our main variable of interest is the Leaf Area Index, a measure of the number of square meters of leaves per square meter of ground. This value goes up in the density of forest cover. For some parts of the upcoming analysis we are also combining optical remote sensing and radar-based measures.

Figure 1.
Area managed by CFUGs in 1993

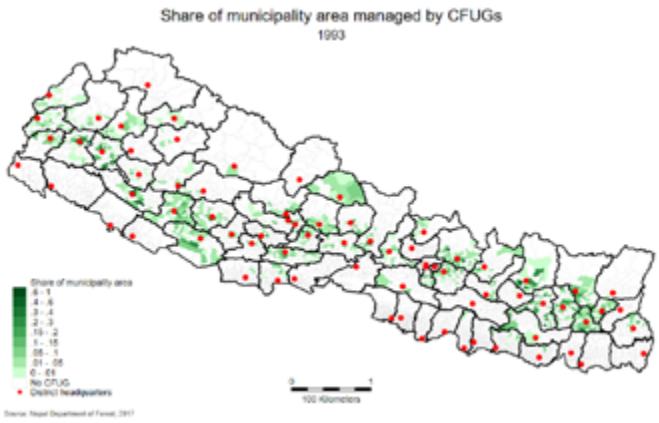
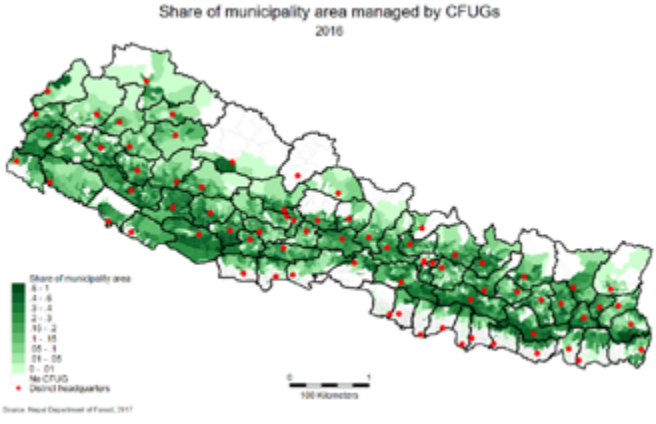


Figure 2.
Area managed by CFUGs in 2016

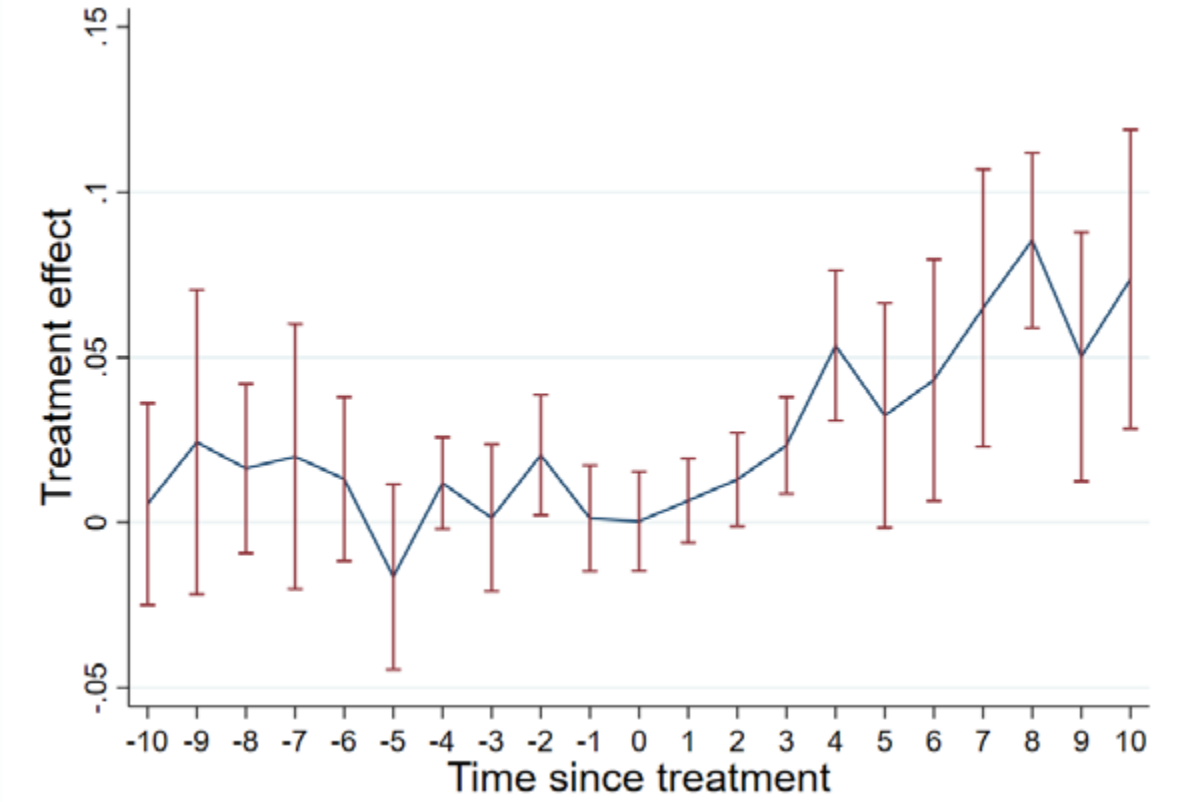


Results

We first show that the CFUG program contributed to substantial increases in tree cover and forest area in the Hills and the Mountains of Nepal. The estimated effect using quasi-experimental methods reveals much larger contribution of community forestry than estimations relying on the pure observation of the change in tree cover in municipalities affected by this institutional change. Indeed, CFUGs have typically been created in more degraded or less valuable forests, in places closer to human settlements and urban centres.

1 We exclude the Terai, the lowlands of Nepal that stretch over the Southern border of the country.

Figure 3.
Short - and long - term effects of CFUG creation on Leaf Area Index



Estimation based on de Chaisemartin and D'Haultfoeuille (2020), VDC share has been re-categorized in 6 categories, 0 for VDC without a CFUG, 1 for >0-20%, 2 for 20-40%, etc. The standard errors computed are based on 500 bootstrap replicates

We then investigate potential mechanisms underlying these positive changes. Based on extensive literature review and field work with human geographers, we list these mechanisms and test the how important they are using quantitative methods, when feasible.

First, we find suggestive evidence of potential replanting efforts – coming on top of natural regeneration –, as needle tree forests and mixed forests increase while broadleaf forest area is not affected by the program, a feature in contrast with the baseline characteristics of forests that are mostly broadleaf (70%).

Second, community forestry imposes restriction on firewood collection, reducing the access to energy for households, especially in the short-run. It impacts the energy mix of households as they still need energy for cooking and heating purposes. We show that the presence of CFUGs induce a shift in household energy demand towards alternative sources of energy, including home produced biogas, LPG or kerosene purchased on markets; It may also include higher reliance of firewood purchased from markets and potentially coming from further away.

Third, our extensive field work with human geographer in 8 of the 75 districts of Nepal strongly suggests that CFUGs regulate the extraction of fodder for livestock and prevent grazing in community forest. This is very important as it allows for natural regeneration, on top of drastically reducing lopping of green branches. Over repeated interviews, it is pointed by villagers and forest managers as an important driver of forest regeneration.

Economics and human geography

Collaborations between economists and human geographers is beneficial to both disciplines. Human geographers have a very deep knowledge of Nepal and especially of some villages where they have been working for decades. They get very quickly at stories about every day life in Nepal, about human interactions and power relations.
Systematic quantitative analysis carried on by economists can check if what happens in a given village is sufficiently general to be detectable in surveys representative of the country and therefore is a relevant characterization of Nepal.
Systematic data collected as part of the project also speed up discussions in qualitative surveys as they bring an additional set of issues on the table.

Discussion and policy implications

Our study yields several policy implications in the broader framework of the decentralization of natural resource management. First, it is crucial to analyse the potential effects of such programs in the short- and in the long-run. The long-term success of CFUGs has been eased up by the short-term availability of alternative energy sources channelled through markets. The availability of substitutes, such as biogas, LPG, kerosene or even firewood coming from further away allows CFUGs to credibly implement short-term restrictions on the forest patch they manage. In the long-run, as forests get denser, sustainable harvest may actually yield more forest products than at CFUG creation and the role of short-term buffers may go unnoticed. More broadly, developing a community forestry program with the goal of restoring forests should go hand in hand with a proper understanding of the main uses of forests. Based on that, well-designed policies should allow for temporary solutions to compensate users who benefit from degraded forests between the onset of local management to the moment where users will again be able to reap direct benefits from the resource, i.e. when the forest will be dense enough to provide more ecosystem services. Not accounting for that may just displace the pressure from forests managed by communities to adjacent forests and have no positive effect at the local -and global - level.

Second, our study calls for analysing forest decentralization programs at the landscape level and not exclusively by looking at those plots of which management has been transferred. Indeed, reducing the pressure on one piece of land may induce an increase of harvesting in nearby areas. By estimating the effect of our treatment as a function of its intensity over a broader geographical area, we focus on the net effects of decentralization forest management on the forests of Nepal and not just in the treated forests. This is important for policy makers, for instance, when their objective is to increase forest cover and store carbon. In the Nepali context, we show that community forestry increases carbon sequestration at the local landscape level. However, our study probably overestimates this contribution as some of the temporary reduction in local firewood collection is compensated by the use of other sources of energy. If alternative energy sources come from biogas, this is all the more beneficial from a climate perspective. If alternative energy sources come from the market, such as firewood collected further away, LPG or kerosene, then the contribution of CFUG to climate change mitigation is lower than the pure local effect on forest restoration.

While this study is able to measure some average benefits of community forestry on forest conditions at the local level, it is not the whole story either. Our field insights do point to a list of issues that sound policies designs should also integrate. For instance, an increase in ecosystem services may also mean that the population of wild animals may increase, extending crop damages in nearby cultivated plots. The distribution of benefits may also change as a consequence of community forests. For instance, a typical claim of women is that men leading CFUGs decide to plant pine trees that can be sold as timber for construction while women would prefer to have more broadleaf trees as they are often in charge of fetching firewood and fodder. It is therefore important to make sure that local communities do benefit from increased carbon sequestration, in the short- and the long-run, keeping in mind that the distribution of benefits and costs may not be homogenous within the group of beneficiaries.

Still, community forestry in Nepal is a game changer at the local level. This institutional innovation empowers local communities, restores degraded forests, and may help remote villages to get out of a poverty-environment vicious circle while contributing to a global public good.

Interdisciplinary approach

The strength of this project lies in the dense interactions between 3 scientific disciplines. It combines the very precise approach of human geographers, the ability to generalize of economists and the "skyview" of remote sensing. Assuming people are ready to work together, it's a perfect combination to analyse interactions between human beings and their environment with a broad scope of findings and relevance for populations at the local level.

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