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Deforestation in the Himalayas: Myths and Reality

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Deforestation in developing and middle income countries is an urgent global problem, affecting climate change, soil erosion, major river basins, and livelihoods of poor households living near the forests. Public discussions of the problem are frequently dominated by widely held beliefs concerning the extent of deforestation (that it is large and growing over time), and its impacts on local livelihoods (that these are adverse and large). Views concerning determinants of deforestation include economic growth, local poverty, and inequality, all of which are generally believed to accelerate the process. Of possible remedies, the most widely discussed one involves property rights over forests: that local communities should be granted ownership and management autonomy in order to arrest deforestation.

There are many good reasons why these propositions could be true, informed both by economic theory and casual empiricism. Human populations use forests for household energy, fodder for livestock, and timber for wood products. Forest areas are often cleared to extend agricultural cultivation, increase mining exploration, create residential construction, or expand land for urban use. Economic growth that increases demand for food, energy, mineral resources, furniture, housing could thus naturally increase deforestation. Among those living near forests, the poorest households rely the most on forests for firewood, fodder and other produce. They rely more on livestock

grazing, are least able to afford commercial fuels or timber, and have numerous family members (especially women and children) with a low opportunity cost of time who can be sent to collect forest products. Hence increased poverty among neighboring populations could increase human pressure on the forests. Heightened deforestation could therefore have a severe impact on local poverty, possibly generating a vicious spiral as this increased poverty may in turn accelerate deforestation. Women and children, the principal collectors, are likely to be the most adversely impacted. Greater socio-economic inequality of local communities could undermine their capacity to engage in collective action to impose and enforce curbs on forest use. Shifting ownership rights over forests to local communities away from the state might therefore enhance the scope and power of such collective action.

These views are commonly expressed in numerous anecdotes, media reports, scholarly treatises, policy documents of national governments and international organizations. To what extent are these upheld by results of empirical ground-level research? Do they apply equally to different countries or continents?

In collaboration with various researchers over the past decade, we have undertaken a study of the mid-Himalayan region spanning Nepal and northern India, using a variety of detailed micro-level data sets. For Nepal we have relied on three successive rounds of the nationally representative household Living Standards Measurement Survey (LSMS) between1995 to 2010. For Indian states of Himachal Pradesh and Uttaranchal which falls in the same geo-climatic zone as Nepal, we carried out detailed household, community and forest surveys between 2001-04. The findings turn out to be similar across Nepal and the two Indian states, as well as with studies in these regions by a number of other researchers.

Forest degradation rather than deforestation poses critical challenges. There is no clear evidence that deforestation in this part of the world is accelerating over the past few decades. For India as a whole, Foster and Rosenzweig (2003) use aerial satellite data on forest biomass and find the opposite phenomenon of reforestation. Our detailed ground-level forest surveys in Himachal and Uttaranchal indicate the key problem is degradation rather than deforestation. Tree branches are heavily lopped, stunting tree growth and limiting foliage. 61% of forest areas sampled exhibited crown cover below the ecologically sustainable threshold of 40%. In contrast, measures of tree biomass were not alarmingly low: mean basal area exceeded the sustainability threshold of 40 sq meters per hectare. While forest areas have receded owing to growing encroachments, this accounts for a relatively small fraction of the increased times taken by households to collect firewood.

Over the past quarter century, firewood collection times have increased 60% on average, but walking time to the forest increased only 10%. The bulk of the increased collection time owed to declining quality of the forest, with households taking longer to find firewood owing to trees being more heavily lopped.

These facts imply that a feasible research strategy for testing various hypotheses concerning determinants of forest degradation, is to study their effects on household firewood and fodder use, and on the quality of neighboring forests. In this regard, the main findings are the following.

Effects of economic growth on forest degradation vary depending on the nature of growth. If it is measured in terms of household consumption levels, the evidence (based on estimated household Engel curves) shows that economic growth aggravates degradation: rising consumption levels (upto the 95th percentile) are associated with increased firewood collection/use.

However, the same is not true when growth is measured in terms of key household productive assets rather than consumption levels. Only growth in livestock assets have a strong positive impact on firewood. The effect of land ownership is negligible, and education and nonfarm assets have a negative effect. Indeed, in Nepal villages, per household collections of firewood *fell* between 1995 and 2010, explained mainly by rising education and nonfarm assets, shrinking livestock and greater outmigration. Hence the nature of growth matters. If growth is accompanied by occupational changes wherein local populations shift from traditional livestock or land-based occupations to modern nonfarm occupations, a reduction in forest degradation can occur. The opposite may happen if growth in living standards is driven by rising income transfers from the government or remittances, or by rising livestock assets.

Far more important than economic growth in explaining trends in forest degradation in the Himalayan region are demographic factors, such as the rise in population and increasing fragmentation of rural households. Shrinking household size, growing population and slow rates of permanent out-migration have translated into fast growth in the number of rural households, raising forest degradation. A 10% growth in productive assets in the two north Indian states was estimated to raise household firewood use by less than .2%, while a 10% growth in population was estimated to raise it by 9.9%.

There is no evidence that poor households collect more firewood than non-poor households. In reality, it is the other way around. Non-poor households have greater energy needs, related both to consumption of cooked foods, size of house and of heat during the winter. This result is robust with respect to estimation methodology and applies to both Nepal and northern India. Declining poverty is therefore unlikely to arrest forest degradation.

Forest degradation does not seem to have a significant effect on poverty in the short run. The data also shows very limited evidence for the reverse link between forest degradation and current living standards of neighboring populations. An increase in firewood collection time by an hour in northern India (comparable to the extent observed over the past quarter century) was estimated to lower household consumption by less than 1% uniformly across poor and non-poor households. The reason is that the opportunity cost of

household time is low, since they accumulate firewood during lean agricultural seasons. It is possible, however, that there will be some adverse effects on local livelihoods in the long run, if current degradation trends continue.

Increased inequality does not seem to affect forest degradation. There is no any evidence that increased inequality of consumption or landownership in neighboring villages is associated with greater pressure on adjoining forests. Informal collective action to regulate forest use in northern India is conspicuous by its absence, except in a few locations. This does not reflect a general inability to engage in collective action, as indicated by functioning informal cooperatives in the context of other local public goods, such as irrigation or temples. Part of the reason could be the fact cited above: a more degraded forest has a negligible impact on current household livelihoods. So local communities do not worry about the condition of neighboring forests and try to regulate use of forest products.

Community management has a positive effect on forests. Both Nepal and India have transferred ownership and responsibility for management of forests to local communities, in the form of forest-user-groups (FUGs) in Nepal and Van Panchayats (VPs) in northern India. These local organizations have created and enforced rules for firewood and fodder use by their members, and engaged in reforestation programs. While estimating the impact of these changes raises a number of methodological problems, **the most careful studies available find a 10-20% reduction in household firewood region associated with formal community forestry.** In northern India these findings are corroborated by reduced lopping of forests transferred to VPs, compared with neighboring state and open access forests.

Subsidies for modern fuels will help reduce degradation. Our studies in northern India show households use of firewood is sensitive to the cost of alternate modern fuels, especially LPG. A Rs 100 (approximately $2, one-third the cost in the early 2000's) subsidy on an LPG cylinder was estimated to reduce household firewood use by between 20-27%.

In summary, many commonly stated views – such as effects of economic growth, poverty reduction, or local inequality on forests, or of the reverse effects of forest degradation on local livelihoods – turn out either to be invalid, or require serious qualification, in the Himalayan context. Our main findings are summarized in Table 1:

Forest degradation is a serious problem, from the standpoint of its larger, non-local ecological and climate change impacts, as well as possible long-run impacts on local livelihoods. It results mainly from firewood and fodder use by households that live near the forests. Informal collective action by neighboring local communities is unlikely to make a serious dent on the problem. Transfer of ownership and management to local communities is, however, likely to help moderate firewood use and encourage forest regeneration. Subsidies and increasing availability of modern energy substitutes will induce households to rely less on the forest. In the long-run, the most effective means of limiting degradation will be policies that control population growth, promote education, growth of non-farm occupations and permanent out-migration.

Table 1: Effect on firewood collections of various in Nepal and Northern India.

Change considered	Resulting change in total firewood collections
Growth in all productive assets (= income growth) by 10%	+0.2%
Population growth by 10%	+9.9%
Increase in collection time by one hour per load	-1%
Increased inequality in the village	No evidence
Transfer of ownership to local communities	Between -10% and -20%
Price subsidy on LPG of 33%	Between -20% and -27%

[1] For the change in forest property rights, the change reported is in the extent of tree lopping in the forest, which directly results from firewood collection.

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