Degradation, sustainability or transformation?

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Paradise Lost

With deforestation remaining unchecked and solutions failing, the biological treasure trove and lifeline of peninsular India is on the brink of ecological catastrophe.

(Title and blurb of cover story in *India Today* magazine's Independence Day issue, 1995.)

FOREST loss and degradation is a hot topic in the Indian and global environmental discourse, and has been so for quite some time. That there is more heat than light in the deforestation/degradation debate is, I believe, the consequence of three intertwined problems: confusion about what degradation means, inadequate ecological work on detecting its presence and identifying the physical processes by which it occurs, and a correspondingly blurred debate about its causes. In this article I present a very personalized account of how I arrived at, or rather stumbled upon, this conclusion. The account is meant to reflect on the sys-

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temic and methodological difficulties, not individual failures, in understanding the complex question of forest degradation.

Let me also say that I do not wish to convey that there is no degradation or deforestation occurring in the Western Ghats or elsewhere in India, but that the problem is a multifaceted one that exemplifies the very socially constructed nature of environmental issues, and that requires the application of a rigorous but also self-aware, transparent and pluralistic science to enable us to come to terms with its complexity and move towards solutions.

My own exposure to the topic of forest loss and degradation began in my trekking and bird watching days during school and college, and my concern was sharpened and understanding considerably deepened by the very influential Citizen's Report on the State of India's Environment, 1982. I even did some calculations on the value of forest loss due to submergence under hydropower projects for my Masters degree work. But I was exposed to the full complexity of the problem only when I decided to take up my doctoral dissertation research in Uttara Kannada district of Karnataka's Western Ghats region, using the Centre for Ecological Sciences' field station at Sirsi as my base.

I went in with the assumptions that forest degradation in particular and degradation of all biomass resources in general not only existed but was in fact rampant, that several years of research that preceded me had already pinpointed the major causes of degradation, and that I as a systems modeller could facilitate the generation of 'integrated' plans for ecologically sound development that individual solutions to individually identified resource problems might not.

These assumptions were based upon a series of highly influential studies on Uttara Kannada that emerged from three very different sources immediately prior to my research. These consisted of a technical document published by the Karnataka Forest Department (Reddy *et al.*, 1986), a set of reports published by the Centre for Ecological Sciences (Mani, 1985; Prasad *et al.*, 1985; Mishra *et al.*, 1985; Gadgil, 1987a; Gadgil, 1987b) and a book by an environmental economist and his colleagues (Nadkarni *et al.*, 1989) from the Institute for Social and Economic Change.

The three studies analysed the problem of forest degradation in Uttara Kannada district at various spatial and temporal scales. Common to all of them, however, was a detailed discussion of the forest degradation in the arecanut cultivating region east of the crestline of the Ghats over the previous three-four decades. This region consists of Sirsi, Siddapur and Yellapur talukas and is commonly known as the northern *Malnaad* region. Interestingly, while they differed significantly in their analysis of causes of degradation at the district scale, the role of historical processes and of state forest policy, and while they used rather different ecological data and methods, the studies were unanimous about one point: that there was forest degradation occurring in the northern Malnaad region at an alarming rate.

The KFD document used a series of calculations on production and extraction of forest biomass (wood and grass) at the district scale to show how there was a severe 'demand supply gap' in both fuel and fodder that naturally translated into rapidly 'eating into the capital', i.e., a decline in the forest resource base. The CES studies used a combination of similar 'demand-supply calculations' for one village and an index of forest quality based upon multiple qualitative criteria applied by a panel of experts for another village. The ISEC study drew partly on this multi-criteria assessment, and supplemented it with grassland and forest 'yield' data from questionnaire surveys of rural households and with visual impressions gathered by the researchers during these surveys. And they all came to the same conclusions about the physical phenomenon: the forests in the Sirsi region were degraded and degrading, primarily because of the manner in which they were being used by the villagers.

In explaining why villagers did what they did, the KFD study used the standard combination of Malthusian and ignorance/primitive technology arguments, and called for more afforestation programmes, controls on grazing, etc. The CES studies mentioned the open access nature of the forests. But they focused primarily on the technological aspects of resource extraction and use by the rural households:[1] agricultural practices that involved the import of vast quantities of organic matter from the forest (in the form of green and dry leaves and fodder for livestock that in turn produced dung) to maintain the productivity of the arecanut-spice orchards and paddy lands, the inefficiency of fuelwood use in traditional stoves, and the highly inefficient livestock system that involved large numbers of poor quality animals grazing in the forest but producing very little milk.

1. In subsequent papers discussing the forest management history of Uttara Kannada as a whole, CES scientists have also highlighted the role played by the British government's usurpation of traditional systems of forest access, their reservation of the majority of the good forests for exclusive state use, and release of poorer quality forest patches for local use, without the creation of any village level mechanism for proper management, a situation that continued after Independence (Gadgil and Chandran, 1988).

Their recommendations thus included giving timber rights to the villagers (as incentives for better forest management), and technological interventions that would increase resource use efficiency, increase biomass productivity, and increase sustainability: improved stoves, switching to biogas and modern animal husbandry, experimenting with new fodder crops and exotic grasses, afforestation, horticulture, rabbit farming, soil conservation measures, and so on.

The ISEC study focused on the 'political economy' of forest management, and pointed out that only part of the forests in these villages were under open access, with the major portion being under a unique forest tenure called *soppinabetta*[2] privileges. This tenure regime, instituted by the British, gave exclusive individual control of forest patches to owners of historical arecanut orchards in the ratio of nine acres of forest for every acre of areca. With areca-spice orchards being by far the most economically valuable agricultural land use and being the major source of employment for the significant peasant and landless class in the villages, the existing inequalities in agricultural landholding were thus magnified by the forest tenure. The rich areca cultivating elite were thus also the heaviest exploiters of the forest. The study therefore called for the reform of forest tenure, arguing for a shift from open and private access regimes to community control.

As I began my dissertation research in collaboration with CES, my first impression about the condition of the forests was no different: the so-called forests in the villages I was studying were a far cry indeed from the lush evergreen, tall and dense forests on the crestline of the Ghats I had trekked through a few years before. They were a mosaic of small dense evergreen groves, patches of medium height, heavily pruned or lopped stands of moist-deciduous species, some looking like 'telephone poles', some with a heavy growth of grass in the understorey and others with dense shrubs, patches with very dense but stunted tree growth dominated by just *Hopea wightiana*, and patches of pure grassland. Intermingled were patches of barren land or land with only shrubs and stumps, and patches of taller denser forest but with wide openings in the understorey.

Visits to the villages with CES staff quickly highlighted the physical processes through which this degradation seemed to be happening: massive stacks of stored firewood peeped from the backyards, big logs burned under pots of boiling arecanut, large herds of cattle grazing in the forest, stacks of leaf and twig loppings sat drying under leafless, twigless trees in the forests, and headloads of fuelwood lined up on the main road entering Sirsi town every evening. Village elders whom we visited admitted that they had degraded the forests, and called for more development programmes and increased rights to forests to provide an incentive to better management.

However, after more than a year of analysing existing CES data, doing additional forest sampling and grass productivity studies, and (after improving my Kannada so that I could talk to a larger cross-section more easily) surveying and resurveying households in villages that had not been included in the earlier CES reports, the picture became much more confusing. Many villagers denied that the forest was degrading ('it's been like this for generations'). They argued that indigenous breeds of livestock were better suited to the climate and terrain and did not trample tree seedlings (as 'their weight is hardly half that of *maidaan* (plains) breeds.' They did not see why tree pruning was necessarily destructive ('don't we all prune trees in our gardens for better growth') and why the 'organic' nature of their traditional leaf manuring practices was not lauded.

The landless were clearly more interested in figuring out how to 'encroach' a patch of forest for cultivation than in conserving an apparently abundant resource that gave them only fuelwood, and even the landed were on the look out for opportunities to expand their cultivated land area into the forest. If deforestation was a concern, it seemed to concern only the forest department, the ecologists, and the village elite, not those villagers worried about issues of livelihood and income.

My confusion gradually coalesced around the three links in the degradation narrative: the definition of degradation, the measurement of its presence, and the explanation of its occurrence. Take the last first. Surely the over exploitation of forests would lead to reduced availability of that resource in the future (possibly near future) to the villagers themselves? And while in open access situations this concern for one's future cannot be expressed, surely the private access soppinabettas did not suffer from the 'tragedy of the commons'?

How would one explain the betta holders neglect of their own future wellbeing? Was it a case of what neoclassical resource economists had identified as the 'discount rate versus resource renewal rate' problem, viz., that the forest resource grew so slowly that the betta holder would be better off over exploiting it for green manure, reaping maximum profits from the

2. In Kannada, *soppu*=leafy matter and *betta*=hill.

thus heavily manured arecanut orchards in the near future and then living off the interest earned on this money than on the 'living interest' from forest or horticultural capital, as was in fact argued in the *American Journal of Agricultural Economics* by two economists modelling betta holder behaviour (Bhat and Huffaker, 1991)?

But although in public betta holders argued that the (very substantial) benefits obtained by them under the soppinabetta privileges were not sufficient incentives for them to comply with the responsibilities attached to the privileges[3], no economic calculations showed the benefits to be less than the costs.

A detailed analysis of the data on vegetation growth and biomass use also refused to converge to simple scenarios of degradation. Productivity of the heavily pruned trees and seasonally grazed grasslands was much higher than earlier estimates (Lélé, 1994; Lélé and Hegde, 1997). Amounts extracted from the soppinabettas were less then total household consumption, as supplies were judiciously supplemented with extraction from state controlled reserve forests or open access areas. Moreover, the large number of species in the forest and the variation in site conditions generated very large uncertainties about any estimate of production, making comparisons with equally uncertain estimates of consumption (averaged over space and time) inconclusive.

The comparison of extraction with production – a strategy very commonly employed in the forest and biomass resource degradation literature – did not always make sense either: how can one 'over extract' (in the sense of annually harvest more than what is annually produced) a grass when all that one can see above ground and cut or graze is at most a years production? How can one over harvest leaf litter from the forest floor? One can only collect what falls. Negative effects of litter removal, if any, would be on soil nutrient content and erosion and hence on the growth of the forest in the (very) long run.

On the other hand, one does not really need very detailed scientific studies to say that the species composition and structure of these heavily used forests is quite different from that of relatively undisturbed 'natural' stands, that in general the use of pruning, grazing and fire promotes the conversion of evergreen forest into moist-deciduous vegetation, and hence if everybody was engaged in such practices, the evergreen habitat in the region would be reduced sharply, and animal, bird or insect species that strongly prefer such habitat would thereby also decline. If therefore, we are trying to save forests primarily to save the diversity of animal, plant and insect life in the region as a whole, then even the most 'sustainable' management of soppinabettas, i.e., management that ensured continuous high levels of production of soppu and other products, would nevertheless be 'degrading'.

Delving into the history of the soppinabetta privileges, the granting of which had generated a furious debate within the British administration in the late 19th century, I found century old echoes of this same confusion. Voelcker, a chemist deputed to look at the state of agriculture in British India, described the forest management practices around cultivation as follows:

I saw cultivators lopping around their own fields... Nor were the trees ruthlessly destroyed, for they were only lopped once in four years. Similarly, some trees are most usefully grown for pollarding... I could not help thinking it was better for the trees thus to yield a triennial supply of shoots for 40 years, than that they should be left alone all the time in order to afford at the close of it one single log of timber... (Voelcker, 1897, para.169).

In contrast, the Conservator of Forests of Kanara felt that:

The kind of *bet* [betta] that meets one at every turn in the garden tracts consists of open forest of mutilated stems from which the branches have been lopped close to the trunk, and on which fresh shoots are allowed to remain for periods varying from one to, at most, three years. The induration, impoverishment, and degradation of the soil are necessary consequences of such treatment, and in time such land must become utterly barren for all practical purposes of garden owners or foresters (MacGregor, 1894, para.10-11).

While MacGregor sought to project his concern in universalist terms ('garden owners or foresters'), Voelcker was very clear about the socially constructed nature of what constitutes 'good forestry':

It is by no means the case that timber growing will always be the purpose to which the forest is best suited naturally, or the most desirable one when all considerations are taken into account...What must come to be understood is ...that what the forester is accustomed to regard as 'accessories', such as small timber, firewood, grass, etc. should, in many cases, be the main consideration...Growing of

3. The privileges consist of exclusive access to twigs, small timber, tree leaves, shrubs, grass, soil, and water from the bettas, including the right to fence/trench around their privileged areas, and the right to get timber from the bettas at a highly concessional rate for domestic use. The responsibilities consist of maintaining at least 100 trees per hectare of more than 30cm girth at breast height and not pruning trees of certain 'reserved' species.

trees that may be pollarded would do much more good than supplying timber (para.169).

Not surprisingly, MacGregor's 'science' led him to a dire prediction: This distressing landscape, ever present to the traveller in the garden tracts of Sirsi, Siddapur, and Yellapur, has forced me to the conclusion that the garden business is being overdone, and that *ruin and desolation* will be the outcome of a continuance of the present state of things.

Yet, one hundred years later, this same 'garden business' continues to flourish in the same Sirsi-Siddapur-Yellapur region. And the same soppinabettas that had roused MacGregor's ire are now the focus of distressed attention of his heirs, the Karnataka Forest Department: Nearly 70% of betta lands are in degraded condition, and have become grass lands instead of being covered by useful trees (Reddy *et al.*, 1986).

But many of these very 'degraded' patches are carefully fenced off every year around August by the betta holders to prevent their own cattle from grazing in them as the local *karada* grass grows luxuriantly and is harvested by hand in late November or early December and stored to meet the fodder requirement in the lean summer months.

Clearly, it is not just imperfect data or methods, but the very ideology that values a particular vegetation form and the corresponding land use over others that is at fault. The ideology pushes the forester or ecologist to look for and find degradation no matter how limited the evidence of continuous decline in (say) production. Degradation occurs *by definition*, not by observation, because the observed land use and the value it serves is at odds with one's own values. Conversely, land use types that we are conditioned to think of in benign terms ('verdant', 'green', 'beautiful') are equally unthinkingly merged with 'natural forests' that harbour much greater levels of biodiversity.

The journalist writing the *India Today* article quoted at the beginning expressed great shock at the 'fact' that forest cover in the Western Ghats has dropped from 'more than ... 60% in the 1950s ... to 38% today.' But he blithely goes on to state that the hill district of Kodagu has more than 80% of its area under 'some of the best [evergreen and moist-deciduous] forests in the world' and in the same breath says that 'coffee and cardamom grow luxuriantly on its slopes as do oranges and pepper', when in fact it is this 'luxuriant growth' of coffee plantations that has doubled in area in about three decades. Today it accounts for nearly half of the tree cover in the district, and is the source of tremendous concern for wildlife and 'natural forest' lovers. It is this expansion of coffee cultivation, and not the smuggling of timber as the journalist claims (which is felled mostly by the same coffee growers) that accounts for most of the loss of 'natural' forest in Kodagu.

My reconstructed narrative of forest degradation in the northern Malnaad[4] combines several of the insights from the earlier CES and ISEC studies with additional spatial and temporal data (including data from CES' long term monitoring) within a more systematic and interlinked framework for defining, measuring and analysing degradation. It starts by pointing out that forest degradation can be defined only with reference to some 'desired' state of the forest, that this desired state varies from one social group to another, even within the village and certainly between 'villagers', 'timber focussed foresters' and (say) 'wildlife lovers'.

It then chooses to focus on a particular definition of this desired state that is preferred by the majority of the rural population of northern Malnaad, viz., a forest that maximised production of fuelwood, fodder, leaf manure and small timber without requiring too much investment in production or regeneration (and hence depends upon natural processes rather than planting), and seeks to understand the extent and causes of departure from this desired state across the landscape that is used by the villagers.[5]

Ecologically, it then appears that this landscape is a patchwork of a *few* rapidly degrading or degraded areas (barren or with only shrubs or stumps) and large areas of systematically harvested dense stands or tree savannas or pure grasslands that are producing the desired twig, leaf and grass biomass at high levels and appear to be sustainable at least in the short run.[6] It also has several areas of unsystematically harvested stands where there is a serious shortage of regenerating tree saplings, and some patches where denser trees stand have clearly been or are being converted purposefully into tree savannas or even pure grasslands by the users.

Socially, this mosaic of degradation, sustainable use and land use transformation is explained by a combination of economic, institutional, locational and other factors. Overall, severe degradation is limited to open access areas that are close to town-

4. Lélé (1993).

5. That the very boundaries of this 'supporting, uncultivated landscape' may be slowly changing as an expanding population of landless or marginal peasant feels the need for bringing land under cultivation is another story, again not of degradation per se, but of conflicting land use interests.

6. The possibility of long run declines in soil fertility could not be ruled out.

ships and accessible from main roads and hence subject to urban fuelwood headloading pressure;[7] in a few cases this pressure even spills into private-access soppinabettas. There are also a few soppinabetta patches that suffer degradation from lack of interest (or disputes) among betta holders in demarcating boundaries of individual control.

That the majority of soppinabettas are not degrading rapidly is in accordance with the high economic value of arecanut plantations and the strong link between arecanut and livestock productivity and leaf manure, mulch and fodder inputs from the forest. And the occasional conversions of dense stands to tree savannas or grasslands are a response to changing fodder-fuel requirements and household endowments, as one finds an inverse relationship between the area of soppinabetta lands that is converted to grassland by a household and its access to other sources of fodder, such as ownership of paddy straw yielding croplands.

Where there is a discernible decline in twig and leaf production of soppinabettas without intentional change in land use, it is caused by either increased fuelwood pressure in households with limited betta holdings, increasing numbers, inadequate resources to switch to biogas and no access to state forests, or by increased lopping frequencies that are driven by the expansion in area under areca orchards, an expansion directly related to the highly remunerative price of arecanut and encouraged by governmental policies towards horticulture 'development'. Finally, the more subtle degradation through removal of tree saplings or young trees occurs in state controlled or open access forests, an indication of the expanding demand for fuelwood and small timber and the lack of any institutional mechanism to meet this demand sustainably.

Similarly, grazing induced declines in grass production are mostly confined to open access areas around towns or settlements, and are not related to burning or grazing practices followed in privately owned or controlled lands. The impact of grazing on tree regeneration is poorly understood. But assuming that there is some negative impact, one finds that all year round free grazing is in any case not the preferred livestok management option of any household. Most prefer a mix of open grazing during the monsoon (where grass growth in the understorey reduces the chances of animals browsing on tree seedlings anyway), and the ability to stall feed the animals depends directly upon the household's control over fodder producing lands (grass or paddy) or availability of cash income for fodder purchase.

To summarize, any analysis of forest degradation must start from an obvious yet often overlooked point, viz., that forests provide a multiplicity of products (fuelwood, fodder, manure, timber), ecosystem services (soil conservation, hydrological regulation, habitat for wildlife, carbon sequestration, aesthetic or spiritual value) that are shared by a multiplicity of beneficiaries residing at varying distances from the forest (constituting local, regional, and global communities), and that these benefits – products and services – cannot be simultaneously maximised, and are sometimes in direct conflict with each other and certainly with other beneficial uses of the land that we choose to term as 'non-forest'.

The terms 'forest degradation' or the supposed 'social loss' due to deforestation are value loaded social constructs,[8] whose scope and very acceptability as a valid description of what is happening on the landscape depend critically upon who is doing the talking. Thus, any enquiry must at least explicitly say in which and hence in *whose* terms it is choosing to assess forest or land cover change; more generally, the assessments should be done using several alternative definitions.

The ecological enquiry into the existence of any form of degradation requires firstly that assessments of vegetative and ecosystemic impacts or outcomes be in terms of variables closest to the values being assessed. For example, production must be measured not in terms of undifferentiated 'tonnes of total biomass'[9] but in terms of each 'useful' or relevant biomass type in the specific socio-ecological context. Second, conclusions of secular declines in the production of socially useful biomass types would have to be drawn carefully, using as much time series data as possible, taking into consideration the great diversity of species and local conditions, and incorporating the effects of complex traditional harvesting and management practices. The latter requires an understanding of 'disturbed' or 'manipulated' forest ecosystems – such as the effects of

7. A CES report (Prasad *et al.*, 1987) and the KFD study had both highlighted this pressure from urban fuelwood consumption. But the Western Ghats Forestry Project of the KFD did not incorporate any concrete action on this front.

8. As is the currently fashionable opposite of degradation, viz., sustainability – see Lélé and Norgaard (1996).

9. This is exemplified by the classic confusion between ecologists' definitions of production, which is net primary production, and foresters' definition of production in terms of net annual increment, which is net primary production minus litterfall (including whole tree mortality). Satoo and Madgwick, 1982.

lopping or grazing in humid forests, a science very much in its infancy, falling betwixt the forest ecologists' traditional obsession with 'natural' or 'climax' communities and the foresters' excessive focus on timber and softwood production for urban/industrial use.

Finally, the social causes of 'degradation' will include situations of simply conflicting land use interests, situations of short term gains but long term losses for the same interest group, and changing interests of a group over time as its relationship with the forest changes. Arriving at adequate explanations will therefore require the removal of the blinkers imposed by conventional social science 'disciplines' that seek only one of economic, institutional, political, technological, cultural, or Malthusian explanations of human interactions with nature. And if these explanations are to be socially acceptable and are to inform the discourse, they will have to be explicit about the value judgements underpinning their analyses.

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