

Arun Agrawal
220 Woodburn, Indiana University
Workshop in Political Theory and
Policy Analysis
Bloomington IN 47408

63
**WORKSHOP IN POLITICAL THEORY
AND POLICY ANALYSIS
513 NORTH PARK
INDIANA UNIVERSITY
BLOOMINGTON, IN 47408-3895 U.S.A.**
63

Geographical Factors and Efficiency of Institutional Forms in Forest
Utilization.

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I. Introduction

In the debate on the causes of deforestation, the role that local populations at the village level play in deforestation, has assumed an increasingly controversial character. The question is fairly simple. Do local populations at the village level act in a manner that leads to deforestation or do they protect existing forest resources around their villages? Another side to the issue relates to whether the local populations have the capacity to protect forest resources in the vicinity of their villages, or if they will necessarily over-exploit such resources in the absence of controls imposed by central governments.

Empirical studies on the actual behavior of villagers do not provide definite answers to the question. A number of papers stress the destructive role that villagers play in forest management. Studies of a general nature that investigate causes of deforestation argue that increasing population levels and the resultant pressure on resources lie "at the heart of our current dilemma (of deforestation)" (Cool, 1984:29). Campbell notes that such pressures lead villagers to engage in a number of ecologically unsound practices - over-collection of fuel and fodder, over-grazing, shifting agriculture, and regeneration of annual grasses through burning (1979:11). Such conclusions can be strengthened by looking at specific case studies of the behavior of villagers regarding their forest resources and especially by looking at the perceptions of government forestry officials. (Need examples here).

Such pessimistic conclusions about the role that villagers play in deforestation, leads analysts to policy prescriptions that are strongly paternalistic in nature. Since villagers do not know their own good, the government must control destructive practices followed by them (Ehren-

feld: 1972, Hardin: 1978). Indeed government policies are often premised on such prescriptions.

Alternate policy prescriptions also stem from economists who usually have aversions to government interventions in markets and to the
5 existence of institutions of collective management. Since private property rights usually do not exist in forests in developing countries, and the management of forests at the local levels is not influenced strongly by markets, their prescriptions imply the creation of private property rights in collectively owned and managed resources.

10 On the other hand, a large number of studies dispute the generality of conclusions that emphasize the destructive aspects of collective management of resources. They stress the positive role that villagers can play in the management of forest resources. These studies argue that villagers have good knowledge about the resources that they have, and
15 have sound practices of resource management which take into account both ecological considerations, and their individual and collective welfare. The arguments are buttressed with reference to actual instances of collective resource management practices by villagers (Acharya: 1984, Messerschmidt: 1987).

20 The problem therefore is to find a theoretical basis for reconciling the conflicting conclusions of different studies. Clearly, it is possible to find more instances of situations where villagers have collectively over-exploited their resources, and of instances where they have carefully husbanded and managed benefits from it in face of individual
25 incentives to over-use it. It is also clear that finding more instances of over-exploitation or of careful use will not settle the question about

the capacity of villagers to manage resources on their own. However, empirical evidence on the subject, as well as its conflicting nature cannot be ignored.

In this paper, I will attempt to provide a theoretical justification for the proposition that collective management of forest resources by villagers in certain ecological environments under certain management objectives will be more efficient than private or government management and control of these resources. After all, at the heart of the debate on whether villagers can collectively protect their forest resources is the question of efficient management of these resources. I will use stylized facts from secondary sources to construct the ecological environment that I am interested in investigating. While this particular imaginary situation may not exist in reality, it will describe significant and relevant characteristics of large areas in the Middle Himalayas. Although existing case studies describe these features, usually in detail, they often fail to appreciate the manner in which these features mesh together.

The theoretical framework that I will use in my analysis is borrowed from transaction cost economics. Using this framework I will attempt to reconcile the divergent claims of different empirical studies by pointing out the crucial variables in forest management on which efficient utilization of forests depends. More specifically, I will establish links between geographical and historical features of forest resources as they exist in my stylized version of the environment, and elements of my theoretical framework. In this context, I will argue that these features make it more efficient for forests to be utilized as common pool

resources at the same time as it is more efficient for cultivated land to be owned and managed through private property rights.

While I will argue that collective management of forests will be more efficient than private or government management, I will not make any claims about whether efficiency properties of collective management will make such arrangements more durable. Nor am I implying that such arrangements come into being because they are more efficient.

II. Ecological Environment

Either under pressures of increasing population, or through incentives from government policies, the general tendency in the Himalayan region has been an increase in the cultivated area at the costs of area under forests. At the same time, the kind of agriculture that has evolved is not similar to that practiced in plains. Livestock and crop farming are very closely interlinked in the Himalayan regions. In the plains where returns to specialization in agricultural production (either livestock farming or crop production) are high, such integration is not so common. There are a number of reasons for observing this close link between forests, livestock farming and crop production in the hills.

One of the most important reasons for the continuation of such integrated farming systems in higher altitudes is the relative isolation of these regions. Since transportation is difficult in higher altitudes, the farming areas are often effectively isolated from factor and product markets. This means that the relative prices of inputs such as chemical fertilizers, improved seeds, pesticides and other inputs are higher in these regions. Owing to the terrain and the physical features of the region, it is more difficult to use mechanized equipment in the hills

than in the plains - especially in societies in which industrialization has not reached a point where specialized equipment for hill regions can be manufactured at reasonable prices. The same also holds for other needs of households such as energy.

5 In light of this, animals assume a highly significant role in the predominantly agricultural hill economies. They can provide both draught power and fertilizers. They are also good sources of protein and food in the form of milk and milk related products, as well as meat.

10 Different areas in the hills may have comparative advantages in specialization of production of either animals or crops. This is especially true in light of the large number of variables that can actually affect production in the hill areas. Altitude, slope, soil characteristics, precipitation, light conditions, or drainage, to name some of these, can change significantly in over very small distances. However, the distance from markets and the resultant higher costs of
15 transporting products to markets mean that the returns from specialization may not be high, and that each area has to produce some minimal level of crops and livestock for subsistence.

20 Given that animals and crops are highly complementary in hill agriculture, sources of food for animals are equally important. One source is of course crop residue. Another very important source of fodder for animals are the forests. Not only are forests sources of fodder for animals they have a large number of other important functions in the hill economy. Fuelwood for energy, leaf litter for compost, and for bedding
25 for animals in the winter, and timber for local construction purposes are the more important uses of forests. Many of these functions are also

fulfilled by forests in plains, but in light of the transportation problems in hills, forests are much more significant there.

The point is that many of these uses may have relatively low returns to inputs. But at the same time, given the nature of agriculture in the hills, they are essential to the hill farmer (Mahat et al., 1987:66-67). At the same time, difficulties in transportation make it relatively less easy to exploit all forests in the hill areas for commercial purposes.

Given this great importance of forests in hill economies, and higher problems in commercial exploitation relative to a gentler topography - at least in the remoter areas - it is not very surprising that even in places where deforestation is occurring at high rates, some forest cover can still be found. In distinction to the plains, where there may be no distinguishable stands of trees and the average no. of trees per hectare may be less than 10, in hills, areas where the average no. of trees is less than hundred may be difficult to find (Gilmour, 1988:348).

Further, most local level case studies of forest use in hill areas suggest that the geographical distribution of areas under agriculture and forest cover follow a distinctive pattern. Forests are usually at the outskirts of villages and are often exploited as common resources that belong to the village community. There may be more than a single stand of forest that belongs to the village, but the number of forests that belong to the village is never anywhere near the number of distinct households that comprise the village. Cultivated land on the other hand is usually owned privately and holdings of arable land are often contiguous. While all arable land would not be clumped together, (indeed, in light of the terrain of the region this may be extremely difficult), in almost all

instances, the holdings of several individuals will be found to lie together.

The reasons for a spatial distribution of arable and forested land where forested land is separated from the cultivated land and not found interspersed with it, are not very important for the moment. It is sufficient that the spatial distribution is generally as I have portrayed it.

III. Criteria for Judging Efficiency

To argue that collective management of forests will be more efficient under the ecological conditions that I have described, it is necessary to identify the sets of costs and benefits that a given arrangement of property rights and institutions will produce. Keeping benefits constant, property rights and transactions costs theorists stress the importance of two sets of costs incurred in institutional operations. These can broadly be categorized as costs incurred in negotiating and creating property rights that will allocate benefits from resources (ex ante costs), and costs incurred in making sure that once the rules for allocation of benefits are created, they are faithfully observed (ex post costs). While these are useful analytical categories they can not be operationalized easily.

A number of theorists have used functional criteria to create cost categories that can be easily operationalized in real situations. Thus Dahlman (1980:116) refers to four sets of costs that are involved in producing and consuming resources - costs of establishing and protecting property rights, of decisionmaking with respect to the use of a scarce resource, of establishing certain organizations to facilitate production

and exchange, and finally, of policing the implementation of decisions about the desired use of productive resources. Ostrom et al. (1989:119) use production costs, coordination costs, information costs, and strategic costs in their analysis. However, they have sub-categories for coordination, information and strategic costs which increases the total number of categories of costs to nine. The problem with creating functional cost categories seems clear. In different situations, one can define a large number of costs which are incompatible with each other. This is theoretically unsatisfying.

Both Dahlman and Ostrom et al. try to specify a set of costs that can cover a range of possible situations where common pool resources are involved. Indeed, their theoretical ambition is to provide a framework that can deal with all possible situations where common pool resources are involved. However, it is entirely possible that in a certain empirical situations not all of the costs that they specify are important. At the same time it is also conceivable that some other costs are very significant and can be treated only through a more fine-grained analysis of one or more of their pre-specified cost categories. Therefore in my analysis I will not use their or any other framework about what the relevant costs are. Instead, I will proceed on the basis of the particulars of the situation that I want to explain, and use existing discussions on costs as guidelines.

As I stated in the first section of this paper, I am primarily interested in showing that given the spatial distribution of forests in village settings, using forests collectively through communal institutions at the village level will be more efficient than dividing them up

through imposition of private rights or instituting government control over them. Therefore, for the moment I will ignore the costs of establishing property rights over forests. In my comparative static analysis, I will simply assume that different forms of rights over forests already exist. From this assumption, I will proceed to consider the costs that different institutional forms must try to minimize and assess the relative capacity of a given institution in lowering that cost.

Since I am assuming that property rights are already in existence, there are four major costs that will affect the utilization of forests under a given institutional arrangement. These are the costs of actually using the resource, of monitoring the use of the resource in accordance with the rules agreed upon by the users, enforcing the rules, and finally, the costs of punishing those users who deviate from rules for using the resource. In the next section, I will argue why these costs will be lower under collective arrangements.

Before I do that, it may be useful to clarify that I will be comparing collective arrangements of decisionmaking about using a resource with only two other forms of ownership and control. These are government control, and private arrangements. This involves a considerable degree of oversimplification in the diversity that institutional arrangements (whether classified under government, communal, or private ownership and control) can exhibit. Therefore it will be useful to explain what I am referring to through these three arrangements. Government ownership and control, refers to those systems where the

* What other costs do you think may be relevant?

government or some agent of the government at the local level defines and enforces rules about the use and management of the resource, and the resource is owned by the government. Under private ownership, such rights are vested in individuals who own the resource. Communal institutions authorize the community to make such decisions, and the resource is collectively owned. Communal arrangements are harder to define because they exhibit greater diversity in form, and the boundaries of the community are harder to locate. I will define the community as some group of users of the resource at the village level that is either formally or informally constituted.

IV. Why are Communal institutions more efficient?

In the discussion on ecological environment, I stressed three features of these environments. In these regions, there is a much closer link between livestock production and crop production, and therefore forests are very important in the production systems followed in mountains. Second, that forests are not interspersed with cultivated fields, but most often found on the outskirts of the village. And finally, that with changes in the relative isolation of the mountainous regions, there will be greater economic advantages from specialization in production of either livestock, or crops or some other commodity.

How do these factors affect the different costs that I mentioned in the previous section under different property regimes? To answer this we must keep in mind that there are many uses of forests. It may be that there are no differences in costs in using forests for fuelwood under different property arrangements, but that there are differences in using forests for fodder.

4.1 Costs of Using forests

As far as costs of using forests are concerned, there will be no differences under the three alternative arrangements that I have outlined, if the technology of utilizing forests remains the same in each case. It may be argued that over time some of the institutional arrangements will favor the use of more efficient technologies over other institutional forms. A satisfactory functional form for technological innovation is yet to be developed, and usually the development of new technologies is itself taken to be a function of how well benefits from using a resource are allocated to an individual in relation to the costs which the individual bears (North and Thomas, Hayami and Ruttan). However, the question of technological change is based on change over time, and does not affect my argument that at any given time, the costs of using a resource will be the same under different property arrangements.

If we treat the organization of use of the resource as part of the technology of use for a resource (Schultz, 1964), then grazing in forests can cost less under communal arrangements of forest utilization than under private or government arrangements. The argument is very simple. If on the average an individual can oversee a larger number of cattle and sheep and goats while they are grazing, than the number of animals owned by an average household in the community, then communal utilization of forests will be more efficient than private arrangements, or government rules regarding forest grazing, if government rules assign grazing rights in the forest on an individual basis. Communal utilization of forests will have lower costs because the costs of supervising the animals under

communal organization of forest use will be lower. Usually, most families in the hills have only a few heads of animals (given that few of them specialize in animal or crop production). Therefore, any individual can supervise more animals than are owned by him. In fact, a single
5 individual can supervise the animals of four or more families. Under communal organization of grazing, therefore, fewer individuals will be required to look after the animals while they are grazing in the forest, than under private organization of grazing where each family will require at least one individual to look after its animals while they are grazing.

10 There are two conditions where this argument will not be valid. If the animals are stall fed then there is no need for supervising animals while they are feeding. However, it should be kept in mind that in most villages, there are at least some seasons in which animals are not stall fed. Also, there are some animals that are seldom stall fed - such as
15 sheep and goats. Second, if individual families can devise arrangements for letting some one individual take care of the animals of a number of families while the animals are grazing, then costs of looking after the animals while they are grazing will be the same under the three different property rights arrangements that we are interested in.

20 4.2 Costs of Monitoring the users

The second cost that I want to discuss is that of monitoring the users while they are using the resource. There are two kinds of costs that are associated with monitoring of a resource. There are costs that result because individuals use more use unit from the resource than they
25 are entitled to. There are also costs that result from the manner in

which individuals use the resource (carefully or carelessly) and which can be controlled if the individual exercises restraint in the manner of using the resource, but cannot be easily detected. For example, let us assume that an individual is allowed to extract a certain amount of timber from the forest to repair his house. He can be careful while cutting wood from the tree, (cut large branches from a big tree and not smaller trees, not cut more than required and then discard the portion not required, procure wood of the species that is appropriate for construction and not of a species that can be used for purposes that are valued more) or simply careless. If rules do not exist about the amount of care he must exercise, or if detection of the amount of care he exercises in satisfying his needs from the resource is difficult, this will impose costs that different property regimes will influence differently.

The costs of monitoring the use of the resource so as to prevent individuals from using more than the share due to them will be higher under private and government control than under communal control. This is because of the particular spatial distribution of the forests in the villages. As I outlined, most forests in mountain villages are grouped together at the outskirts of the village. To utilize them on a private basis, it will be necessary to demarcate the share of each individual in a given patch of forest. Further, each individual must prevent other individuals from using his part of the forest. This would clearly impose very high monitoring costs.

Let us assume that division of forests into individual plots is possible and has been done. Since individuals must cultivate their

fields, which are often at a distance from the area where the forests are located, it implies that either individuals must interrupt their agricultural activities in the field to look after their parcel of forest or they must hire someone to look after their forest and to make sure that no other individual gets away with collecting fodder, fuelwood or timber from their forest. Given the nature of use units from forests, it would be very easy for any individual to extract use units from the forest in a reasonably short period of time. If there is no one looking after an individual's patch of forest, another individual can easily enter this particular patch, lop off branches from trees for fodder, or cut trees for timber within an hour or two, and get away without detection. It would be especially easy since his own forest patch may be contiguous to that of another individual, he can enter his forest at any time he desires, and under cover of trees extract use units from his neighbour's forest. Hiring someone to prevent this, or interrupting work in the fields to look after forests at the outskirts of villages, is no solution either.

If government owns the forests, they too have to appoint some agent to look after the forest in each village. Such agents have to be paid some salary by the government. However, there is no guarantee that any agent appointed by the government cannot be bribed by local villagers to look the other way while the villagers are using the forests. Since the agent has no personal interest in protecting the forest (he is neither a permanent resident of the area where he is supposed to supervise the utilization of forests, nor does he receive any benefits from the forest that would make him anxious to protect it) he would be easily prone to

receiving side payments. This would be especially true if the amount of
bribe that is offered is large. On the other hand, whoever is offering
the bribe would like to extract more from the forest than the bribe he
has paid. Clearly there is no incentive for either the government agent
5 or the local population to protect the forest. What is more, if the agent
accepts bribes only if they are large, it is the richer residents of the
village (or from outside the village) that would benefit more from
government's ownership of the forests.

On the other hand, if the community owns the forest, it can use some
10 very simple rules to prevent individuals from using forests in purely
their personal interest. It can institute rules regarding the times at
which users can enter the forest, regarding the kind and amount of
products that can be extracted from the forest at given times, regarding
who can enter the forest, and so forth. Since the forests lie together at
15 the outskirts of the village, a single watchman appointed by the
community may be sufficient to prevent violations of rules agreed upon by
the community, especially if the watchman is paid (partly or fully)
through fines collected from violators. The same factor - spatial
dispersion of forests - that prevents individual ownership rights from
20 being efficient, now acts to make communal arrangements of forest
exploitation more efficient. Under this arrangement, not only will the
watchman try to locate offenders, but even villagers themselves will try
to catch offenders if the rules about violation of use rights are clear
enough. In this context, it is interesting to note that almost all of the
25 cases discussed by Messerschmidt in his articles on community management
of forests (1984, 1987) have a watchman who sees to it that rules

regarding forest use are not infringed, and he is often paid through fines collected from violators.

There is one more aspect of monitoring forest use which I have mentioned already. This is waste arising from careless use of the forests. Clearly, under government ownership and management of forests, local users will have little incentive to be very careful about using the forest. Since we have assumed that it is very difficult, or impossible, to monitor the amount of care that villagers exercise in using the forest, even under community management such costs cannot be avoided unless villagers come to feel that the forest that they are using is their own. The point is that any individual bears some costs if he is to exercise complete care in exploiting the forest and unless there is some cost effective way of externally monitoring the amount of care that a villager is using, costs of careless exploitation under community management are unavoidable. On the other hand, these costs will be absent under private ownership and management of forests. Each individual will try to maximize his returns from the forests in relation to the effort that he is putting into exploiting it, and will not "waste" any part of the resource.

4.3 Costs of Enforcing rules

These are costs that will be incurred in ensuring that once an individual infringement of rules has been detected, it is sanctioned in a manner that will reduce individual motivations for violating the rule in the future, or the sanction compensates the party that is wronged. Such enforcement of rules requires that power to enforce rules is vested in some body which is recognized by all local users of the forests or some

voting procedures need to be agreed upon according to which rules can be enforced in concrete instances. Thus, whether property rights in the forests are private or collective or governmental, enforcement of the rules regarding the utilization of forests would be collectively enforced, unless there is some dictatorial power vested in a single individual.

I want to argue that enforcement of rules through government institutions will be more costly than enforcing them through community arrangements. This is because if all disputes over infringement of rules have to be taken to government very often the benefits from resolving the dispute satisfactorily will be much lower than the costs incurred in resolving the dispute. The dispute may be over matters as small as whether a particular individual removed one or two headloads of fodder from the forest, or whether he entered the forest at unauthorized times. Typically government institutions to resolve disputes will not be located in the village or near the village. Further, using these institutions will require formal procedures and inordinately long amounts of time as compared to communal institutions that are located within the village, which would have better knowledge of the disputants and the facts of a given case, and which can speedily settle a given dispute. Since both communal and private management of forest resources will require a communal form of dispute settlement, costs of enforcing rules under both will be the same unless under private property arrangements, individuals wish to use government institutions of settling their disputes. V.

Further Observations

In the previous section I argued that communal institutions are more cost effective than either private arrangements for using forests or government control and ownership of forests. Geographical and historical factors played an important role in my analysis. It should be noted, however, that I made no claims about how benefits of using the forests will be distributed if they are managed communally. Factors that influence the distribution of benefits from a resource are not necessarily the same as those that make for efficient utilization of the resource.

In this section I want to make some brief observations on the conditions under which communal institutions not be more efficient than government or private control over forests.

One situation will be if hill farmers are connected more intimately with the national economy. Through this development, farmers will no longer have to rely exclusively on animals for manure, draught power, or food. Farmers can choose to specialize in the production of either crops or animals or other forest related products (timber for construction or paper mills, fuelwood and so forth). There will be no more gains from coordinating activities regarding grazing of animals or collection of other products from forests.

Also as there is greater scarcity in the availability of forest products, benefits for some individuals from coordinating their activities with other individuals in the exploitation of forests may not be as attractive as violating collective rules about using forests. The actual violation of rules would depend upon the capacity of the individual to get away with violations of rules - usually these will be the richer or more influential individuals in the village.

Another situation in which communal institutions will not be as efficient as private property arrangements are if trees are located on plots of land owned by individuals and if these plots of land are close to the area in which they cultivate land. Gilmour (1988) refers to increased tree planting on private land near the homestead and to tree planting by individuals on some of their rainfed cultivated land. To protect trees from others on such land, it is neither necessary to hire someone else, nor to interrupt cultivation of land. Communal arrangements to protect such trees will be no more efficient than private protection of trees. However a relevant question in this situation will concern the welfare of the landless who may not own any land on which they could plant trees.

It is not simply external developments that may create a relative scarcity of a particular resource (out of the two resources of cultivable land and forests). Developments internal to the village, such as demographic changes or alterations in the distribution of wealth within the village may also create a situation where existing rules for using forests are no longer viable. This would require that either new sets of communally followed rules are created for using them, or that existing communal institutions break down without being replaced.

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