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SUSTAINABLE AGRICULTURAL DEVELOPMENT: THE ROLE OF INTERNATIONAL COOPERATION

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Management of Common-pool Forest Resources

INTRODUCTION

The use and management of the world's forests has become one of the more hotly debated issues in natural resource policy. In developing countries, the rapid depletion of forest stocks has led many to question the sustainability of economic development efforts. Pressures on forest resources for fuel wood, fodder, timber and new agricultural land have led to rapid rates of deforestation of both moist and dry forests. Deforestation has caused environmental degradation, increased poverty and reduced agricultural productivity. In some developed countries such as the USA, there have been controversies over forest management on public lands, because of disagreements about the appropriate balance of timber versus recreation, wildlife and other service flows. At the global level, there have been concerns raised about maintaining the global environmental services provided by forests, such as biodiversity protection, carbon sequestration and climate regulation.

A common thread linking these forestry issues is the common-pool nature of many forest resources. Certain goods and services flowing from forests are characterized by individual use but not individual possession. Examples include the flow of fuel wood and medicinal products from open-access forests, the wildlife and fish which inhabit forest ecosystems, and the genetic pool inherent in a natural, tropical forest. Each of these examples poses a considerable challenge: how to coordinate use by individuals to attain desired levels of consumption or production for the larger community (Oakerson, 1986). This paper focuses on a broad array of products and services which flow from forest land and its associated resources. Several alternative management approaches at the local, national and global level are examined. As illustrations of these management approaches, we will draw on research we have conducted with colleagues on (1) Van Panchayats, communal forest management systems in northern India, (2) nature reserves and parks in Madagascar, designed to reduce deforestation and depletion of biodiversity, and (3) a proposed Global Nature Fund for addressing 'global commons' issues related to forest resources.

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A FRAMEWORK FOR ANALYSING COMMON-POOL MANAGEMENT

Over the past several decades, writers have often used the term 'common property' in a variety of ways to refer to natural resources not subject to private or state ownership. A point of confusion has been that the term suggests resources held in common, when in fact writers often referred to resources unmanaged by any individual or group. This has created the mistaken impression that group-owned or managed resources were subject to inevitable degradation (Bromley and Cernea, 1989). In this paper, we will use the term 'common-pool' to avoid confusion associated with the term 'common property', since we will describe forest resources that are held under a variety of ownership (property) arrangements.

We define common-pool forest resources as forest ecosystems that produce one or more flows of outputs where exclusion from resource use is costly or impossible and use by one individual reduces the welfare of others. Thus there are two key characteristics of the common-pool forest resource: non-exclusion and separability of consumption. This implies that common-pool forest resources share one characteristic of pure public goods (high exclusion costs) and one characteristic of private goods (rival consumption). (See Olstrom, 1986).¹ The multiple outputs (such as fuel wood, minor forest products and biodiversity protection) and multiple communities (for example, local, regional or global) of users that characterize common-pool forest resources make them quite different from the typical common-pool resource described in the literature (Price, 1990).

Exclusion difficulties arise for common-pool forest resources because of the physical nature of the forest resources. It may be impossible or extremely costly to restrict access to the flow of goods and services from a forest. For example, it has been difficult in many countries to keep people from collecting fuel wood or practising slash-and-burn agriculture in forested areas. Controlling access is also a problem for fugitive resources, such as fish and wildlife, that are a part of forest ecosystems. Furthermore, to the extent that forests provide watershed protection services or maintain gene pools, it is virtually impossible to exclude users or to charge them a price.

The other distinguishing characteristic of common-pool resources, rival consumption, also poses difficulties from the standpoint of efficient management. Since consumption from the pool by one individual reduces the welfare of others, what is economically rational for the individual may not be rational from the collective viewpoint. Hence joint use can lead to over-exploitation. For example, the harvesting of medicinal plants in a natural forest by individual collectors may increase the gathering costs of other collectors. This is analogous to the common-pool ground-water problem; as more wells are drilled into an aquifer, existing users find their pumping costs increasing as water is extracted at rates in excess of recharge capacity.

In analysing the use and management of common-pool forest resources, it is necessary to specify the property rights regimes governing resource access. These property rights can be categorized as: (1) private property, (2) state property, (3) common or communal property, and (4) open-access. Large

amounts of forest resources are found in each ownership category. In fact, a given forest may produce flows that are subject to different property regimes. For example, a forest may be located on land owned by the state, contain trees that are managed and harvested by private firms with concession rights, and provide habitat for wildlife that is available to hunters on an open access basis. A further complexity with management implications is that some environmental services (such as biodiversity protection) can only be provided if the forest is maintained as an intact ecosystem.

Private property is the regime existent when individuals or corporations control access to a resource. Privatization is often promoted as a solution to common-pool resource problems, but there is a danger that privatization (or nationalization) of large forest areas will deprive large groups of individuals of their livelihoods without fulfilling the expectation of better resource management (Bromley and Cernea, 1989). However, particular service flows (such as recreation) may be privatized without privatizing forest land.² State property rights regimes give governments (local, provincial or national) complete control over use of natural resources. There appears to be a move towards increasing public management of forest resources in developing countries. For example, the government of Costa Rica has set aside 9 per cent of its forests as parks and reserves and requires permits for all trees harvested, whether from public or private land (World Resources Institute, 1990). Common or communal property occurs in situations where an identifiable group, using formal or informal rules, is able to exclude non-group users and to regulate use of the resource. Various institutional arrangements have been adopted by communal groups in many parts of the world, with varying degrees of success in managing resource use (Berkes and Feeny, 1990). Open access is the absence of specified ownership or rules governing resource use. Because common-pool resources subject to open access are available on a first-come basis, there is no incentive to manage wisely. Valuable forest resources are available on an open access basis either because they have never been brought into a social regulation system or because traditional communal property regimes have been undermined (Bromley and Cernea, 1989).

Each of these property rights regimes implies different institutional arrangements for managing resource use. The confluence of forest resource phenomena with forest institutional arrangements is depicted in Figure 1. The solid, downward-pointing, lines depict the different types of goods resulting from the physical attributes of different forest phenomena. The solid, upward-pointing, lines show the management approaches resulting from different institutional arrangements. The dotted lines depict matches of management approaches and forest output types. With private property rights, there is free entry to the resource, transactions are *quid pro quo*, and markets can work well to allocate those forest resource flows that are excludable and rival in consumption. On the other end of the spectrum, public management is probably the 'best match' for non-excludable and non-rival public goods such as scenic landscapes. However, for the common-pool resources depicted in the middle of Figure 1, the policy debate is centred on what institutional arrangements will work best to manage resource use (Olstrom, 1986). While open-access arrangements are widely deployed, each of the other property rights regimes

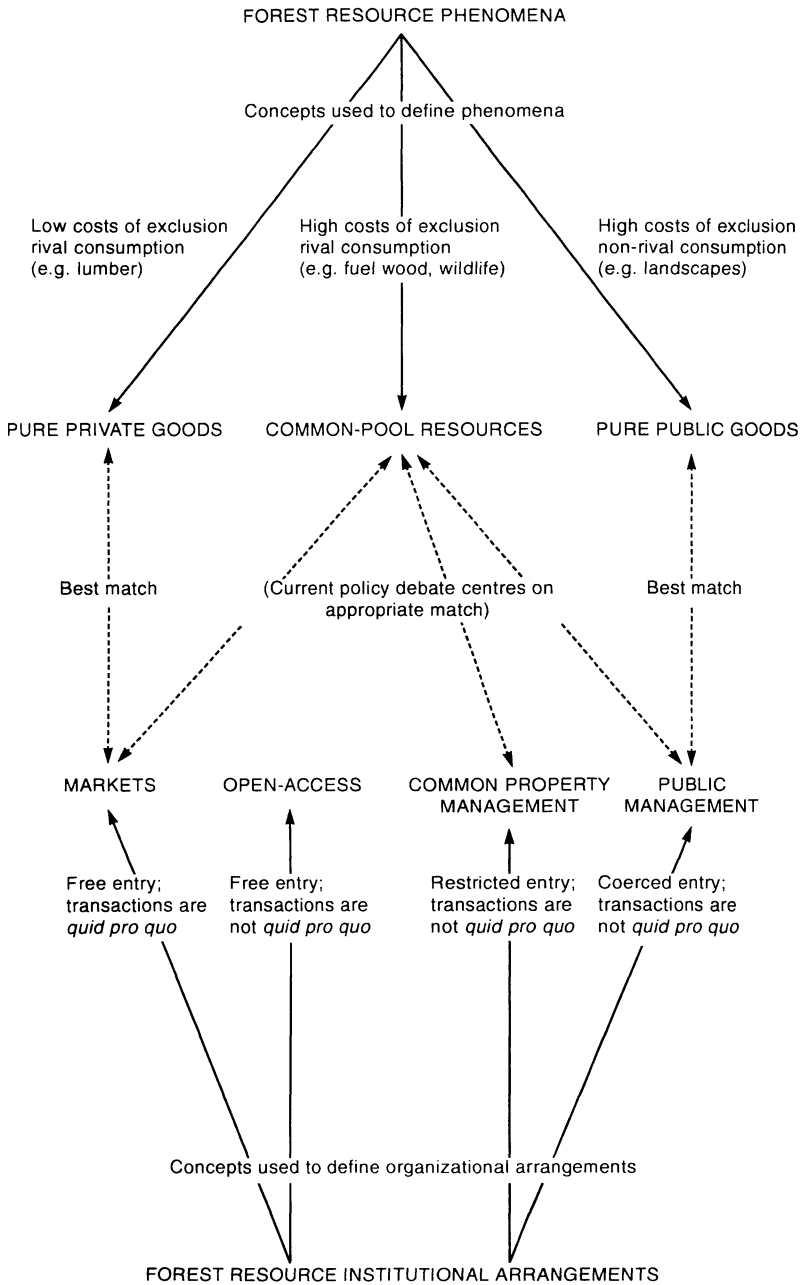


FIGURE 1 *The confluence of forest resource institutions and forest resource phenomena*

Note: Adapted from Ostrom (1986)

has advocates. Some analysts focus on the separability of consumption and argue for privatization (Smith, 1988). Others focus on exclusion problems and recommend public management (Myers, 1989). A third camp argues for common property management, citing examples of successful community institutional arrangements (Berkes *et al.*, 1989). In the next part of the paper we will present one case of common property management (with a long history) and one case of public management (still evolving), and will conclude with a potential management approach involving international cooperation.

MANAGEMENT OF VAN PANCHAYATS

Van Panchayats in India's Uttar Pradesh hills were born out of the conflicts and compromises that followed the settlements and reservations of the forests in the hills at the turn of the last century (Ballabh and Singh, 1988a). In pre-British India, the cultivated land produced a great variety of crops, and the non-cultivated land produced a variety of plant and animal products, largely for fulfilling the subsistence needs of the local populations (Gadgil, 1984). In the Uttar Pradesh hills, people had unrestricted rights in the use of forest resources, except when some forest products were to be exported.

Industrialization in England enlarged the demand for and enhanced the value of forest products. Around the middle of the nineteenth century, the Indian government thought to regulate the utilization of forest products by enacting the Indian Forest Act of 1865 (which was modified in 1878 and 1927) and created the Forest Department to manage India's forests (Ballabh and Singh, 1988b). The passing of the Forest Act encountered resistance in various parts of India, including the Kumaon region of the Uttar Pradesh hills (Guha, 1985). After several periods of social unrest, a grievance committee recommended that forests should be reclassified, and that in areas where local demand was heavy Van Panchayats should be formed to manage the forests.

Following the enactment of Van Panchayat (VP) rules in 1931, over 4000 Van Panchayats were formed by the villagers covering about 15 per cent of the total forest land in the Uttar Pradesh hills. Several observers have claimed that the vegetative coverage of Van Panchayat forests is better managed than in the surrounding reserved forests in their vicinity (Ballabh and Singh, 1988a; Gadgil, 1984; Guha, 1983).

At the village level, the Van Panchayat committee (five to nine members, depending upon the size of the village and forest area) headed by the Sarpanch (President) is the sole arbitrator for management of the Van Panchayat forest. The members of Van Panchayat are elected (informally and not by secret ballot) by the village people every five years. Generally, castes are represented in the committee in proportion to the number of households of that caste in the village. Two important factors help ensure that informal elections are not manipulated by those who are socially and economically strong: (1) the homogeneity of households in terms of caste; and (2) a relatively less skewed distribution of landholdings in the Uttar Pradesh hills compared to the plains. The system provides room for participation across the groups and moderate members of the opposition group are generally included.

The VP forests provide grazing space, fodder, dried and fallen leaves which are used as litter and for making compost, grasses, fuel wood, poles and timber for house construction. The availability of these products is not uniform and depends largely on the type and size of the forest. The land, trees and other resources contained within the VPs are clearly common-pool resources, since consumption of any of these outputs by one villager reduces the amount available for others, and exclusion mechanisms must be employed to prevent people from other villages extracting these valued products. Three methods are used to detect and guard against forest access by non-group members: (1) keeping a paid guard; (2) villagers reporting encroachment to the VP committee (since every villager has a stake in the forest); and (3) the Sarpanch and Panchas visiting the forest occasionally to ensure rule enforcement. The most important of these is the employment of a paid guard.

Ballabh and Singh (1988a) have examined the institutional arrangements in four Van Panchayats. They found that not only does the entitlement of property rights vary, but methods of utilization also vary from one VP to another VP. Even within VPs, both entitlement and methods of utilization vary over time (Table 1). Some of the important characteristics of these methods are worth mentioning. First, the method of utilization varies across the VPs and the rights of the people appear to diminish as resource availability becomes less (for example, see the rights in Parwara *vis-à-vis* Naikada and Devikhal). Second, the VPs have adopted mechanisms to distribute the produce fairly and equally, as in Naikada and in Jeharikhal, and weighing and measuring it accurately.

In spite of successful protection and use of VP forests, recent rule revisions have eroded the capability of Van Panchayats to manage the forest. A major weakness of the present structure of the VP is the generally weak support given to them by the Revenue and the Forest Departments. Although these agencies are responsible for providing technical, personnel and financial assistance to the VPs, these services are rarely provided. Nearly all aspects of the 1976 revisions increased the power of the state government and decreased the power of the VP committee. Now, the Van Panchayats cannot provide any product except grasses and leaves without cumbersome, prior approval from the Forest Department.

Building appropriate institutions is one of the most difficult aspects of any development programme, particularly those programmes concerned with environmental management. Given the great potential for misuse of common-pool forest resources, there is a strong need to adopt strategies including regulatory rules and norms which reduce transaction costs associated with collective management and enable people's participation. Several factors have helped people's participation in Van Panchayats forest management: (1) the high stake of local people in the forest resources, (2) open and informal elections for management committee members, (3) homogeneity in terms of caste and class within a village, and (4) assured and fair distribution of the product. Even factionalism within a village has not hindered proper management of the Van Panchayat forests (Ballabh and Singh, 1988b). The model of Van Panchayats could be effectively utilized in other areas of India (and

TABLE 1 *Rights, restrictions and methods of forest product utilization in selected Van Panchayats in Uttar Pradesh, India*

Particular	Parwara	Devikhal	Naikada	Jeharikhal
1. Area of Van Panchayat forest (hectares)	248.8	20	42.5	22.6
2. No. of compartments	5	3	7	2
3. Rights to outsiders	For dry and fallen leaves to a neighbouring village	nil	nil	nil
4. Grazing	Unrestricted	Prohibited	Prohibited in 3 compartments, open in 4	Prohibited
5. Lopping for fodder	Restricted for 20–25 days in Jan.–Feb. in 1–2 compartments	n.a.	n.a.	A few oak trees are lopped in some years in January
6. Years of rotation for lopping	3–4	—	—	4
7. Grass cutting	Unrestricted	1. Collective harvesting or 2. Parcelling and selling to households for 15 days in Oct.–Nov.	Parcelling and allotment to each household for 15–20 days in October – November	Collectively harvested and weighed or measured by ropes, 15–20 days in October–November
8. Collection of dry and fallen leaves	Unrestricted	—	Unrestricted	Nobody collects, but unrestricted
9. Fallen twigs	Unrestricted	Unrestricted	Unrestricted	Unrestricted
10. Fallen branches and dried trees	Auctioned or given to needy at nominal charges	Auctioned	Auctioned	Auctioned
11. Timber	One tree, for house construction	Not available	One, for house construction, if dead and dry trees are available/household/year	One, if someone constructs house per household/year
12. Any other	1. 8–10 poles if someone is constructing a house per household/year 2. Wood for agricultural implements	One tree for funeral without any charges	Branches are lopped in some parts for fuel and given equally to each member	Every third year branches are lopped for fuelwood. Equal distribution to each household by weight.

Source: Ballabh and Singh (1988b)

perhaps other parts of the world) to rehabilitate degraded and denuded forest lands, provided conditions are created for local participation.

MANAGEMENT OF RESERVES AND PARKS IN MADAGASCAR

Situation off the east coast of Africa, Madagascar is a 1000 mile-long island inhabited by over 11 million people. It has been singled out by the interna-

tional environmental community as one of the ecologically richest countries in the world and one whose biological diversity is at great risk. As much as 80 per cent of the island's plants, all of its mammals, and half of its birds occur nowhere else in the world. At the same time, Madagascar is one of the world's economically poorest countries, with a per capita income of \$250 (World Bank, 1989).

With international assistance, the Madagascar Department of Water and Forests is establishing a system of parks and reserves throughout the country. To assess the effectiveness of this approach to managing common-pool resources, two key questions must be addressed. First, is the institutional structure in the country capable of taking on the responsibilities of managing a large system of parks and reserves and creating the right incentives to reduce encroachment pressure on the protected forests? Second, given that the new public management system is replacing a combination of open access and communally controlled access, will there be positive net benefits from these reforms?

The initial answer to the question of institutional capability appears to be negative. The Department of Water and Forests is under-staffed, has traditionally focused on timber outputs, and has been unresponsive to new funding initiatives for managing protected areas. Recently, the government has been willing to establish a new entity to take over management of the protected areas. The success of the new entity remains to be seen.

To address partially the second question about net benefits from public forest protection efforts, there is a joint Duke University and World Bank research effort to quantify the benefits and costs of a new park being established in the eastern rain forest (Kramer, Mercer and Shyamsundar, 1991). To assess the economic impact of the park, it is necessary to determine how it will affect the total value of the forest. The total value of a moist forest in Madagascar is comprised of both use and non-use values. The use values include what households derive from the flow of fuel wood, building poles, crayfish, fruits, medicine and other products from the forest, as well as nutrients obtained from the forest by means of slash-and-burn agriculture. Use values also include the value to foreign and domestic tourists who engage in recreational activities in the forest, locals who use the forest for religious and cultural purposes, and scientists who use the forest for biodiversity investigations. The non-use values are primarily existence values. Because of the rich habitat provided by forests in Madagascar and the unusually high number of endemic species, many people may value forest protection even though they never plan to visit the forest.

To measure the change in total forest value engendered by the park, there are three empirical analyses under way: (1) use of the travel cost method to measure the value to international and domestic tourists of the new national park; (2) use of contingent valuation and opportunity cost analysis to measure the benefits and costs of the park to local people; and (3) use of productivity analysis to estimate health benefits resulting from decreased deforestation.

The results will provide insights into the potential net benefits of public management of common-pool forest resources in the humid tropics.

A GLOBAL NATURE FUND FOR FOREST MANAGEMENT AND PROTECTION

On a global scale, forests cover about one-third of the total land area. They provide a number of economic and environmental services. At present there is a sharp contrast between forest management in the developed and developing countries. In the industrialized countries, forests are managed with clearly defined private and public property rights. Large forested areas have been cleared in the past, but forests in Europe and North America have now been stabilized. In the developing countries, significant proportions of forests are officially owned by governments but large forest areas are treated as open access. The forested area of developing countries has declined by almost half this century. Especially in the tropics, forests are undergoing rapid degradation or conversion to other land use (World Bank, 1990).

Many developing countries have taken steps to slow deforestation and increase reforestation. However, with limited financial resources and other pressing development needs, deforestation has continued at a rapid rate. At the same time, developing countries have been reluctant to invest in conservation measures (such as biodiversity protection) which would largely benefit the world community.

It is increasingly recognized that the world's forests represent a global common. Forests preserve numerous species and ecosystems which may have present or future commercial value (Kramer, Healy and Mendelsohn, 1990). Of the millions of forest species, over half are found in tropical forests. It is estimated that 4 000 to 6 000 species are lost each year to deforestation (World Bank, 1990). The use of forests is also related to global climate change. Deforestation is second only to fossil fuel use as a human activity increasing carbon dioxide in the atmosphere (World Resource Institute, 1990). Other global concerns related to deforestation are changes in global biogeochemical cycles which affect climate and regional hydrological cycles and contributions to acid precipitation (World Bank, 1990). These are clearly common-pool problems, since the resource use decisions of individuals are affecting the welfare of the larger global community. The benefits of protecting biodiversity, wildlife habitats, and critical forest ecosystems accrue to present and future generations of people within a country, as well as to the world community at large.

One way to address these global environmental concerns, overcome financial constraints in developing countries and enable beneficiaries world-wide to contribute to forest protection measures would be to establish a Global Nature Fund to support forest conservation and sustainable management (Sharma and Kramer, 1990). The fund could be established to supplement the international funding for forestry activities available through the Tropical Forestry Action Plan and other current sources. The fund could be supported

by several alternative funding mechanisms. One would be a contribution of one-tenth of one per cent of GNP from countries with at least US\$6 000 of per capita GNP. This would generate about US\$11 billion and could be replenished every three years. Another mechanism would be to place an import tax in the industrial countries on tropical timber products, including logs. A third mechanism would be to increase International Development Association funding. The fund could be used for investments supporting (1) forest conservation (reserves, parks and so on), (2) sustainable management of natural forests, (3) reforestation and afforestation activities, and (4) institution building and human resource development.

Countries eligible for funding would be all developing countries and Eastern European countries now eligible for funding from multilateral agencies. Countries applying for funds would have to demonstrate strong commitment to sustainable management of critical forest ecosystems. The fund could be operated through the World Bank and the regional development banks (Asian Development Bank, African Development Bank and Inter-American Bank). Through international cooperation, the fund would combine financial commitments from the world community with resolve from sovereign nations to use and manage forests more efficiently for present and future generations.

CONCLUSIONS

Many of the current debates over forest policy and management have their roots in the common-pool nature of forest resources. Forests are characterized by a large number of outputs with both use and non-use values. A single forest may serve different user groups, depending on the particular good or service. For example, local people may consume fuel wood and food products, tourists may consume recreational services, regional residents may benefit from watershed protection services, and the global community may benefit from protection of the genetic stock represented in the forest ecosystem. A variety of institutional arrangements are available for managing the forest resource common pools. In contrast to the single output resource serving an easily identifiable user community, forest resource systems are much more complex from both a social system and natural system point of view. We have presented an overview of three contrasting approaches at three different levels of organization: the communal, the national and the international. We urge social scientists to devote greater attention to the management of these complex, valuable, natural and social systems. The cases we have examined offer some possible directions for this attention.

NOTES

¹Non-exclusiveness is the inability to restrict access and results from an attenuation of property rights. Unrestricted grazing in a forest is an example of non-exclusiveness. Non-rivalness exists when consumption by one individual does not diminish the amount available for other consumers. One person enjoying the scenic beauty provided by a forest does not reduce the beauty available to another viewer. Non-rivalness is a physical characteristic of the resource, not an institutional choice, as a non-exclusiveness may be (Randall, 1987).

²Privatization has also been used to reduce pressure on endangered wildlife species and create new economic opportunities. Through the development of ranching systems, opportunities have arisen for individuals to produce marketable products from captive animals (see Smith, 1988, for examples).

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DISCUSSION OPENING – BEATRICE KNERR*

Beyond any doubt the retreat of the world's forest cover is among the most important challenges to mankind today. Numerous international conferences and an increasing number of government hearings have turned to this problem over recent years, without yet finding any practical solution. Countless governmental and non-governmental organizations are currently concentrating their efforts on projects which might contribute to halting the deforestation process and on reforestation activities, without achieving more than 'a drop of cold water on a hot stone'. Forest destruction has reached its most dramatic level in Third World countries where forests are often treated as a safety-value for increasing population pressure, unequal land distribution, economic decline and social unheaval. Each year an estimated 0.6 per cent of the remaining tropical forests disappear (with the highest losses in West Africa and Central America) and the rate of destruction is still accelerating (FAO, 1988).

The paper by Kramer and Ballabh is concerned with the assessment of different methods of managing common-pool resources in order to contribute to the preservation of forests in developing countries. In its first part it establishes the definition of the concept of 'common-pool forests' as being characterized by non-exclusion and separability of consumption. This is followed by the presentation of three systems of management of such resources: the communal management of Van Panchayats in India, the state management of parks and reserves in Madagascar, and a potential approach involving international cooperation through a Global Nature Fund.

Three questions arise: (a) do the definitions refer to a significant proportion of the forests which are threatened today; that is, do they provide an appropriate framework for finding solutions? (b) are their models transferable to other regions? (c) are their models viable and stable in the longer run, and under rapidly changing conditions? I believe that the concept of 'common-pool forest resources' provides a helpful basis for analysing the problem of forest destruction and for elaborating measures which could be taken to help solve it. However, I question the authors' statement that deforestation 'has caused ... increased poverty'. Starting a search for ways to stop deforestation with this assumption in mind is misleading and obstructs the search for the most important causes of present-day forest destruction. In the long run, the retreat of global forest cover will contribute to the depression of the world's productive potential, but one of the most fundamental conflicts affecting forest destruction is that between the short-term increase in economic well-being

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which is achieved by deforestation, and the long-term deterioration of a country's economic base. This applies at the private as well as at the governmental level. Both try to improve the present economic situation by exploiting the seemingly free forest resources. Most of the external effects which are produced by present-day deforestation are shifted to future generations, notwithstanding the fact that a lot of negative consequences are already felt today.

The Indian example of village Van Panchayats appears to be an ideal solution at first glance. India, however, is a country where the forests are already greatly denuded. Deforestation has slowed down over the last decades only because almost no forest is left, except in some mountainous regions. The last patches of dense forest are highly endangered for economic reasons, as in Kerala, where expansion of plantations into the forested mountain sites leads to increasing fluctuations of water supply in other parts of the state through the loss of the forest protection on the slopes. Also, in the Himalaya region of Jammu and Kashmir, the local people, in spite of a legal ban, find many sophisticated ways to cut and transport big trees under almost uncontrollable circumstances. The major problem with regard to India's forest resources is not that of stopping deforestation but of reforestation. It would be a valuable contribution to save the remaining patches of forest, but it would be a small one.

In my opinion, the Van Panchayat system has very limited applicability. The special village structure presented in the paper does not seem to apply to most of India, where the villages are dominated by social groups who control the largest part of the economic resources. Moreover, experience of Indian land reform demonstrates that even the people who belong to the poorest and most under-privileged groups tend to elect persons from the upper social strata for the Panchayats (Raj and Tharakan, 1983). This might be an advantage for forest conservation because the economically more well-to-do are less dependent on exploiting forest resources for their survival. But it would be disturbing for the establishment of Panchayats for forest control as the poorer strata of the village population might not be interested in establishing such a system.

As regards other parts of the world, in particular Africa, the opinion is growing that traditional systems of communal control might, in principle, be the best ones for conserving forests (Niamir, 1990). However, traditional social systems are increasingly dissolving, younger people are migrating from their traditional regions, and central governments are gaining more and more influence over traditional power structures. At the same time, inherited values which formerly contributed to forest preservation (such as ideas of 'holy forests') as well as adherence to traditional group pressures, are declining.

The management of reserves and parks in Madagascar is another example cited by Kramer and Ballabh. Unfortunately they say nothing about its transferability to other regions, and not much about its contribution to general forest preservation. I fully agree with the authors in their pessimism about the limited institutional capacities for forest control in many developing countries. The state is often not interested in protecting the forests but rather feels urged to exploit them. National parks are accepted only as long as they attract

foreign tourists or some private or public institution is paying for them. In many countries it would not even be possible to establish and maintain natural reserves and parks out of public funds, simply because not enough money is available. The possibilities for establishing parks for tourism are also restricted to a few areas, as the global tourist sector is highly competitive and there is limited demand for specialisms such as the observation of wildlife. Madagascar might be a special case (and therefore an unrepresentative example) since its unique flora and fauna make it of particular interest and therefore put it high on the priority list of funding.

The authors' proposition of establishing a 'global nature fund for forest management' starts from the realistic assumption that a large number of developing countries are not in a position to protect their forests, even if their governments are willing to do so. If the richer nations, in their own interests, want to preserve the forests of the Third World, they will have to pay in one form or another. However, while I agree with the idea I do not believe that it is very likely to be implemented at the moment. In any case, the problem of control over forests still remains. Empirical evidence has shown that state control of forests is not effective, and governments themselves are often the main culprits in deforestation (Repetto, 1988).

So, what can realistically be done to save at least a part of the tropical and sub-tropical forests? In my opinion, a solution can only come from the countries concerned and from support by richer nations. Under the circumstances which prevail in many countries, there is often a very strong incentive to clear forests for growing crops, gathering fuel wood, feeding animals, and other things which are necessary for survival. Governments in Third World countries, faced with the reality of those incentives, often pay much lip-service to forest conservation, but allow the remaining forests to be exploited as a buffer against economic and social deterioration and to secure their own political survival. Given that background, if the industrialized countries wish to preserve endangered forests in the Third World, in their own interest, then there is no other way than to pay for their conservation. Maybe, for the time being, it would be most helpful if international organizations modified policies which contribute to forest destruction and if industrialized nations provided freer access to the exports of developing countries which are not land-dependent. An example of the former is World Bank structural adjustment programmes which explicitly urge many developing countries to expand their production of export crops and to reduce the subsidization of fertilizer, both of which lead to an enlargement of deforested area in many indebted countries. The latter is a matter for GATT negotiations. I must add that I am not very optimistic on either count and can only regret the implications for the situation of forests in two or three decades.

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