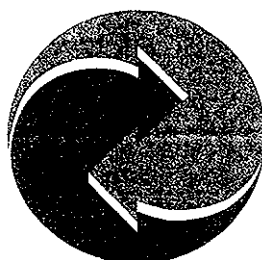


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Forest/Agriculture Interface

**THE IMPORTANCE OF COMMON PROPERTY ISSUES, TENURE
AND ACCESS RIGHTS IN RELATION TO LAND USE
MANAGEMENT AND PLANNING AT THE
FOREST/AGRICULTURE INTERFACE**

by

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INTRODUCTION

This review has been commissioned by the forest/agriculture interface system of the Natural Resources Systems Programme managed by ODA. It forms part of project development work, providing a synthesis and analysis of previous work in the field to aid identification of key areas for research and potential project locations.

The three prescribed purposes of the F/A I system differentiate between production within forest systems and production on land previously under natural forest. The issue of rights of tenure and access to resources is seen as crucial to land use management and planning strategies within both systems. The prescribed outputs for purpose one specifically identify the development of an improved understanding of common property and tenure rights issues for incorporation into improved land use management and planning strategies. This review will identify and prioritise within the context of the F/A I system, the key researchable constraints with regard to common property issues and rights of tenure.

A considerable body of work and associated literature relating to community management of natural resources already exists. The literature covers a broad range of resources, including use of water for irrigation, fishing rights, pastures and forest resources. Attempts have been made, through comparison of detailed case studies, to identify the common factors that determine the success and longevity of common property regimes. Specific focus has been given to the conditions under which institutions form spontaneously and develop systems for the management of resources without outside intervention. Such generic analysis is of necessity non-specific to the resource under scrutiny, although the nature of the resource and techniques used for harvesting products are mentioned as important factors within the analysis. It is suggested that by looking at examples of forest resource management under common property regimes specific conditions which favour successful management will appear. These conditions will include characterisation of the purpose(s) for which the resource is used, structure and organisation of the user group and nature and methods of harvest of the resource.

It is further suggested that a high degree of interaction is likely to occur between the nature and structure of users' groups and workable technical management for a given forest resource. In other words that optimum technical management of a resource is not only dependent on the physical potential and limitations of that resource, but on the strength of the social organisation controlling access and enforcing that agreed access. Access may be exclusively controlled by the group organisation, or include external institutions (in the form of forest department, or police) for the enforcement of exclusion of non-group members.

Users' rights of access and their perceived security of tenure have an important impact on long-term investments such as the protection of trees, and are a crucial factor in motivation and decision making. Consequently there are practical implications for the identification of the key areas in which institutional, tenure and technical interactions occur in the management of common property resources.

Information and case studies relating to these issues are contained within a number of literatures, namely: land tenure; tree tenure; common property resources; indigenous technical knowledge and collaborative forest management literature. Relevant sections of all these

literatures will be considered which will combine economic, anthropological, social science and natural science based analyses.

Scope of the study

Relevant literature contained within CABI, TROPAG, Agricola, AGRIS, and the internal NRI and ODI databases is included, together with key references from the Indiana University forestry database.

FOREST/AGRICULTURE INTERFACE SYSTEMS

Definition

Forest/agriculture interface systems are defined for the purpose of the ODA funded systems programmes as characterised by the coexistence of these two different land use patterns, or habitat types. Such coexistence can be spatial - e.g. agricultural practices at forest margins, and pockets of agriculture within forest areas (or vice versa) - or they may be temporal. Temporal interfaces are those where habitat/land use patterns have changed (or may change) within relatively short time scales and where the legacy of previous land use is likely to influence the sustainability of subsequent usage.

Coexistence of these two land uses depends on a balance being maintained between the benefits obtained from each.

Dynamics at the interface

Where forested and agricultural land co-exist, the forest and / or its products are often vital in support of the farming system; for instance in maintaining soil fertility, and as a safety net in terms of alternative sources of food and income. World-wide the most common cause of deforestation has been agricultural encroachment and conversion of forests to agricultural land (Myers, 1984; Bajracharya, 1983). Strong pressures produced by population growth and low incomes, resettlement schemes, the need for more food crops, and market opportunities for other agricultural, livestock or industrial timber production (Sumantri et al., 1987; Burgess, 1992); have provided the economic rationale for conversion (Table 1).

Economic valuations of natural forest areas have traditionally focused on timber resources and tended to ignore market opportunities for non-wood products such as edible fruits, oils, latex, fibre and medicines. Valuations based solely on readily marketable timber resources produce low net revenue figures which support the financial argument for forest conversion. Detailed accounting of non-wood resources show that these can have significant worth as cash crops and subsistence goods (De Beer and McDermott, 1989). This is particularly true in tropical countries which contain forests of considerable biological diversity and have large populations of marginal farmers. For example, Peters et al. (1989), in a one hectare area of species rich Amazonian forest, found potential net revenues from the sustainable exploitation of non-wood resources to be two to three times higher than those resulting from forest conversion. However, in a similar study conducted in the region, Pinedo-Vasquez et al. (1992) found potential income from non-timber products to be significantly lower than those from forest conversion. This may reflect differences in species composition related to

ecosystem type and site history, but is more likely to reflect the availability of markets or the way in which the two studies were done.

Additional factors working against farmers taking a long-term view on the sustainability of production may be the lack of secure land and resource tenure for individuals and communities. Communities may be unable officially to secure usufruct rights to unconverted forest, while being all too aware of the potential activities of logging companies, able to secure licences to log within a reserve area.

In a separate study of land-use options to encourage forest conservation on a tribal reservation in the Philippines, Stewart (1992) found that alternatives to forest conversion only began to surpass returns under converted land after 5-6 years, as productivity of the soil declined. The initial windfall returns from charcoal making and high rice yields could not be matched by alternative sustainable farming practices.

Table 1 Factors working for and against conversion of forest land to agriculture.

<i>Factors aiding conservation of forest land</i>	<i>Factors encouraging conversion of forest land to agriculture</i>	<i>Key policy factors</i>
Improved agricultural yields (Burgess, 1992)	Greater returns from agricultural production than sustainable use of forest resources (Stewart, 1992)	Farm pricing policies
Economic development (Burgess, 1992)	Low incomes (Sumantri et al., 1987)	Tax and credit subsidies
Important contribution to peoples livelihoods depending on the forest resource (Stewart, 1992).	Agricultural and industrial timber production (Burgess, 1992)	Investment incentives Farm pricing policies
	Resettlement schemes	Terms of logging concessions (Repetto, 1987;
Urban migration	Population growth (Burgess, 1992; Sumantri et al., 1987)	National legislation
	Need to increase agricultural production	

The relationship of agricultural colonisers to forests is very different from that of long-settled forest-edge agricultural communities. The former, with little knowledge of the forest's content, will rely largely on knowledge of agricultural production from outside the area and hence on production from the cleared agricultural land.

The contribution of forest products and the forest environment to the livelihoods and culture of longer-settled communities is much greater, and hence the forest is perceived to be of

greater value. The question of the value of forests and their products to local communities is crucial in stabilising agricultural/ forest interfaces.

Where there is outside national, or international interest in preserving a unique forest environment or biodiversity in such areas, suitable benefits to the local community for such preservation need to be introduced. Economic pressures, even when they do not lead to full forest conversion, may cause increased exploitation of the forest resource which, above a sustainable level, will cause degradation of the resource. Degradation will ultimately lead to a reduction in sustainable offtake from the forest.

TENURE RIGHTS AND ACCESS TO RESOURCES

The findings of historical and anthropological studies show that property regimes, with regard to land and trees grown on that land, cannot be simply classified as privately, communally, or state-owned. Land tenure can be usefully viewed as a bundle of rights that may be held by different people, at different times with reference to different aspects to the land (Riddell, 1985). Tenure regimes are socially defined rules for access to resources and rules for resource use that define people's rights and responsibilities in relation to resources. As social creations, tenure regimes are subject to revision and security of tenure is never absolute, but depends on social understandings that are shaped by widely recognised social and political arrangements (Forster and Stanfield, 1993). Tenure rules may be codified in legally enacted written law (de jure rights), or can be part of the unwritten but commonly understood rules of the people of a particular area, (de facto rights). In a predominantly agrarian society, natural resource tenure is a very important social institution which influences all aspects of rural life; forced changes in tenure regimes weaken the whole social fabric of rural societies (Birgegard, 1993).

The nation-state, local government body, community or clan which legitimises the tenure rules usually retain some rights to the resource, while the designated users (individuals, households, firms, or groups) hold other rights. The division of tenure rights reflects power relationships and is often conflictive (Forster and Stanfield, 1993).

Private ownership produces the most concentrated holding of the rights bundle. However the rights of others always impinge to some degree, for instance in preventing use that would decrease the utility or value of neighbours' land (Riddell, 1985). Not all private ownership determines exclusive access at all times. On privately owned crop land, off season grazing and fodder collection rights may be held by others (Jodha, 1985). The land in this case although de jure private property, is used as a de facto common property resource during certain seasons. Inconsistencies between de jure (supported by law) and de facto (supported by common practice) rights are common, particularly where the nature of tenure has recently changed. In the case of seasonal common grazing in Nepal, much of the presently privately owned land was common property land before the land reforms in the early 1950s, (Jodha, 1985).

The observation that within a single common-pool resource situation a mixture of de jure and de facto property rights may exist which overlap, complement, or even conflict with one another (Schlager and Ostrom, 1992 in the context of fisheries) can equally well be applied to a forestry context. A government may grant forest users de jure, or accept de facto, rights of

access and selective product harvesting, while retaining formal rights of management, exclusion and alienation for itself. Forest users may co-operate and exercise rights of management and exclusion, defining among themselves how and when harvesting should take place and by whom. In remote areas, where the resource is of little marketable value, where officials are over stretched and/or have little incentive to interfere with community activities, communities may be left with autonomy over resources over which they have little formal jurisdiction.

There is a close relationship between management and the tenure arrangements under which the resource is held. Intensively cultivated agricultural land, such as that closest to the homestead, has the most exclusive tenure, with that further away, visited less often and with certain rights of access and use shared with other community members.

Under pastoral systems the sharing of rights and strength of rights over different areas of the grazing lands is also linked to management. Rights of access and ownership to key resources such as water sources are usually clearly defined. In Africa, pastoralists have often managed large grazing areas on a lineage basis, with the whole subdivided into blocks managed by lineage subsections. The effect has been for any one area within the whole to be owned simultaneously by small numbers of people with strong claims, and large numbers of people with weak claims to it (Behnke 1985).

Similarly within communally-managed forest resources there usually exist different tenure arrangements for different areas of forest (often calculated in terms of remoteness from the village/s managing the resource) and different rules for different products within the forest. (Shepherd 1992; Shepherd 1993).

Separate tree tenure rights

Certain rights connected with the cultivation and harvesting of tree products may sometimes be held separately from those connected with the land. Fortmann in Fortmann and Bruce (1988), identifies four major components of tree tenure rights: the right to own or inherit, the right to plant, the right to use, and the right of disposal. Division of these rights reflects protection of different users interests and in some instances attempts to change and influence individuals' behaviour. Tree cultivation is encouraged where ownership and inheritance rights reserve the benefits of tree products for those that invest in planting.

Trees may be owned, while the land on which they are grown is not. The opposite may also be found, with private land-owners unable also to own the trees that grow on their land. In Ghana, for example, Stool Chiefs have absolute rights to the land, while the government (since colonial times) has held the right to trees inside and outside of forest areas (Adegboye, 1973). Individual ownership of trees on communally, or state held land serves as an encouragement to plant trees, securing benefits to the cultivator. Legislation to prevent ownership of trees and hence rights of disposal on private land was introduced in an attempt to prevent further felling on land recently converted to agriculture. However, rights of tenure associated with land may be (and usually are) closely linked to tree-rights.

The investment of labour and the interrelationship of tree and land tenure rights

Forest clearance is in many situations associated with giving cultivators rights over the land, both in new settler situations and within established communities, because it is necessary to prove intention to make productive use of allocated land by clearing. This has been widely seen in resettlement programmes (Blowfield, 1995; Ghimire, 1992) and in programmes aimed at increasing agricultural production. It has unfortunately been a further major factor in continued forest conversion to agriculture. The reverse may also be true, in that the planting of trees on agricultural land gives the cultivator more long-term rights to land.

Indeed, many examples make it clear that it is the investment of labour which creates ownership. In the case of land, this means, for the agriculturalist, being the first to clear and plant land once under forest (e.g. Benneh 1987 and Manoukian 1950, in Shepherd 1992). In all cases until state tenure systems intervened, such cultivated land reverted, when no longer cultivated, not to the wild but to the group to which the clearer belonged (e.g. Beidelman 1967), so the individual had created rights for others as well as himself. Pastoralist tenure in semi-arid Africa is renewed each dry season, and is manifest partly in the successful defence of the key dry season assets of graze, browse and water (e.g. the Turkana as described in Barrow 1986a; 1986b; 1987). It is also reaffirmed through labour investment in the repair of waterpoints, wells or clay-lined reservoirs (e.g. Behnke, 1980; Shepherd 1989a). Indeed labour creates ownership in all kinds of ways. Even banging climbing pegs into a tree suitable for hanging honey barrels in, among the Tanzanian Sukuma, ensures exclusive access to the tree (Malcolm, 1953, in Shepherd 1992).

It is clear that tenure has to be worked at in some of these cases and that, as a general rule, individual tenure comes from the most, and the most constant, labour investment. In Senegal (Postma, 1990), land was lost to the owner if it remained uncultivated for more than ten years. Tree-planting, because it is more work than tree-use, also creates tenure.

Planted or preserved trees, particularly valuable or exotic trees, belong to the individual who has gone to the trouble to plant or protect them, and are likely to strengthen that individual's rights to the land on which the trees are found. By the same token, the clearing of trees in heavily forested areas (i.e. the investment of labour in the creation of agricultural land) will confer tenure rights. *De jure* tenure has been able to recognise the acts of land-clearance and planting as acts which fit with European ideas of land title. However, tree-usufruct and tree-preservation activities practised communally have been less well understood and recognised. Local people who manage an existing forest resource which originally regenerated naturally, rather than having been planted or cleared, tend to have weak rights under a formal system. The actions they have taken tend to be invisible: hence the weak position today of many forest dwellers. The State also, not surprisingly, finds it difficult to concede that the strongest forest rights belong to those who live nearest the resource (Shepherd 1986).

As a rule then, rights depend on the most constant and the most long-term investment of labour. The only exceptions are if the fruits of one's labour are the property of another as in the case of slavery (Swift and Purata, 1987), or paid labourers.

However, the case of tenants is less clear. While in theory their contract with the landowner clearly excludes ownership, their constant and long-term labour inputs to the land tend to create a claim on it. As a result it is common to find land owners forbidding tree-planting by

tenants, or establishing plantations on previously agricultural land in order to weaken tenants' moral rights over the land (Kiff, personal observation, the Terai, Nepal).

Where *de jure* and *de facto* rights co-exist, confusion may exist over user rights, with different individual interpretations practised. Speth (1990) documents different individuals' understanding of rights over tree products from rented, communal and government owned land in Nepal. Whether the tree was planted or was the result of natural regeneration, and the nature of the relationship between landlord and tenant were taken into account when calculating rights to tree products on rented land.

Tenure and access to forest products

Tenure rules dictate access to forest products, first in defining the outer limit of territory and then the category of people who may use a particular resource. Finely graded rules further determine the extent to which legitimate users may use the resource.

The right to use trees and their products is of particular relevance within communally managed forest resources. Such rights may be subdivided as to the type of product, where it is found and time of collection/harvest. In the communally managed natural forest in Nepal, the forest may be open for gathering of deadfall fuelwood at all times, for fodder and lopping of dead branches at set times of the year only, and special permission necessary from the forest users committee to cut a living tree for timber (Speth, 1990). In general the right to use produce under trees has been less restricted than other rights, but increasing intensity of free grazing can threaten natural regeneration of the forest system and so is starting to be controlled in some areas (Carson, 1992).

A contrasting example of property rights is shown by the arrangements governing Honduran Resin Tappers. The state owns the forests and assigns use rights and establishes contracts for the rate of extraction of forest products (tree sap, wood, cones etc). Trees are assigned to individual tappers (approximately 6000), over half of whom are organised into co-operatives which serve a crucial function in forest protection and exclusion of non-members. The success of individuals' management of this state resource depends largely on the strength of co-operative organisation and their ability to further members' interests in terms of protection from outside incursion and negotiation of product price and taxes (Stanley, 1991).

Such zonation by need, and type of collector, is widely encountered. The Tswana of Botswana, for instance, live in villages which are permanently sited, surrounded by a grazing zone, an outer ring of bushland and ultimately, some miles away, by farmland. A village's 'lands' can be up to 15 miles away, and major cattle rearing areas even further. Concentric circles of fuel-wood ownership, each with differing rules, surround the village.

Chiefs would ban the cutting of any trees within the village because they were valued for shade and cover. Within a 2-3km radius trees were regarded as the exclusive property of village women and children for firewood purposes, and non-villagers were chased off. Collectors were expected to leave the most accessible wood for the elderly; had to walk straight outwards from their homes and not use the fuel resources from the other side of the village; and might not take living wood. No poles might be taken from here. Village collectors with transport (always male) had to go beyond the 'collection by foot' area and to go even further away if they were after poles. They shared this area with other men from the

same tribal subsection. Finally, non-local commercial traders would be encouraged to travel to still remoter areas. Heavier tools were used and live trees were at times felled. (Shepherd et.al., 1985).

Specific individuals may be recognised as having special needs with regard to specific products. The village blacksmiths in some villages in Nepal may have special rights to collect fuel-wood throughout the year from communal forests when they are closed to other villagers, a recognition of their greater resource needs in providing an important service to the local community. Similarly, in the assignment of fodder collection rights from trees within the communally managed forests in Nepal, households requiring larger amounts of fodder will collect from more trees, but those further away from the village. Thus their greater use of this particular resource is partially off-set by their expenditure of more labour in collection (Kiff, pers. obs. 1991).

Influence of history on exclusion and access

Sustainable management of tree resources requires some forbearance/ sacrifice of immediate benefits for future gains. Users will only sacrifice present benefits for future gain when they, or their heirs have some security of receiving those future benefits. How secure users feel in their access to resources will depend on both their *de jure* rights, the strength of their legal ownership title and/or *de facto* rights, longevity of traditional access to the resource. In Nepal the nationalisation of all communally managed forests in 1957 is considered by many researchers to have been a major cause of the degradation of forest resources in the mid and high hills that occurred between then and the late 1970's. The state was unable to adequately protect the newly nationalised forests and local communities, many of whom had practised sustainable management for generations, no longer had the incentive of benefit assurance to prevent exploitation (Metz, 1991).

On a larger scale in Asia, the demand for timber to furnish colonial navies in the eighteenth and nineteenth centuries, was a major factor in motivating the imposition of new forestry policies over vast areas (Colchester, 1994; Guha, 1983). In the process, forest peoples lost control of much of their ancestral lands to newly created government agencies, a situation which is perpetuated by the modern state today. Such alienation of forest peoples and villagers from their commons' have undermined, or destroyed traditional systems of village management of resources.

Many of West Africa's high forest areas were reserved during the colonial period for commercial, or environmental reasons. These areas are now seen as important sites for the conservation of biodiversity, wildlife, climate, soils and hydrology. Such concerns are of importance on global and regional environmental agendas, but which are not necessarily shared by local populations (Fairhead and Leach, 1994). Forestry reserves and national parks established on indigenous lands, but which deny local rights to the resource, turn local people from hunters and cultivators into 'poachers' and 'squatters' (Colchester, 1989). Historical evidence suggests that certain of these areas considered to be 'pristine' contained at an earlier time settlements, or even fully cleared sites, and that other forest 'islands' are not relics of previous forest cover, but have been purposely enhanced by local communities. Such examples of local community initiatives in tree resource conservation and development

challenge the belief that conservation requires reserves that protect natural resources from use by people.

Despite such evidence, there is still reluctance on behalf of governments to change tenureship of the forest reserves, preferring to allow a certain degree of regulated use. The legacy of previously imposed external policing and exclusion of local communities from the reserves makes these communities wary of participation where they are offered no security of tenure to the forest land, or its products (Fairhead and Leach, 1994).

The context of current tenure debates - in particular in Africa

It is commonly recognised that tenure regimes in sub-Saharan Africa were misunderstood by incoming colonial rulers from a far more densely populated Europe, where common property regimes had on the whole long ago given way to private, permanently settled, contiguous farms. Ignoring their own history, and using an evolutionist 'civilisation' model for the difference between what they were familiar with and what they found in Africa, they recognised only permanently farmed land as having an owner. Both fallows and common property resources were classified as state land and thereby turned into open access resources at a stroke.

Few independent countries have as yet challenged the tenurial regimes established during their respective colonial periods and had the courage to try to revert to the kinds of land tenure which worked so well before, Tanzania being a rare exception.

Governments have on the whole been eager to show their muscle in the tenure arena. Ethiopia, for instance, with a sharply recalled feudal past still has a strongly centralised state. It has chosen equity over sustainability and constantly re-allocates smaller and smaller parcels of land to a larger and larger population, instead of allowing permanent heritable plots which would encourage investment and exert a downward pressure on the number of children born per household.

The governments of countries with rainforests such as Cameroon and the Congo have tended to be blind, not only to the CPR management that is often going on in forest fringes, but to swidden and fallow farming systems. This has led to a misconception of both private and community land.

The issues continue to be complex. Despite the fact that population densities have risen dramatically by comparison with the past, there is still a role for common property regimes in many areas. The issues of 'common property' versus 'private' land are in many cases unnecessarily clouded by the prejudices of the international donor community. They are driven on the one hand by a fear of failed externally-imposed marxist experiments which made 'communal' a dirty word, and on the other by an international development fashion for individual entrepreneurship and the market, and an aversion for notions of state control or anything that sounds socialist.

Meanwhile, at the local level, indigenous tenure systems have survived where they could, and mutual recognition and respect of boundaries is usually afforded at this level. An important characteristic of these systems is their flexibility, encompassing a range of individual, household, clan and group rights.

The need now is for the recognition of the logic and durability of many indigenous tenure systems, and the alignment of national-level tenure laws to accommodate them (Birgegard, 1993; Shepherd 1992).

Implications for gender and generational equity of changes in resource tenure

Traditional systems of resource tenure are characterised by their multi-layered nature, with rights to use, or harvest specific products and areas of a resource held by different individuals and groups. Rights in decision-making over use and management of the resource were likewise held by a number of individuals and/or groups. Changes in tenure brought about by land titling and privatisation tend to simplify tenure arrangements and in the process, to concentrate the multi-layered bundle of tenure rights into a single ownership package. For example, under traditional systems in South Sumatra, Central Sulawesi and Irian Jaya, women had some say in how land was bequeathed. This is lost under individualised tenure systems because land certificates (and this includes some forested land, secondary forest as part of a swidden cycle, and forested land reserved for future cultivation) are issued in the man's name as head of family (Blowfield and Ruwiasuti, 1991; Ruwiasuti, 1989). Similarly, rights of harvest and use of certain areas and products (frequently held by women) have been judged secondary rights to those of land (held by men). Traditionally in Central Sulawesi if a man planted a tree in a forest area, when he dies the right to harvest that tree is inherited by his wife. The land, however, is inherited by the husband's brother. In the process of land registration these separate rights are not recognised and a single certificate is issued in the brother's name. The widow's rights to the tree are ignored and subsequently taken by the brother (Li and Sulaiman, 1991).

Where women are not allowed to hold title deeds to land, for example in India and...., a change from communal to private ownership will have consequences for women's access to resources. Access will now be determined by their relationship with individual men, rather than their membership of the wider community (Mishra 1994).

COMMON PROPERTY RESOURCES

Historical background to common property regimes

Historical records and studies show that the practice of common property resource management has been a widespread and key strategy for natural resource management in Asia, Latin America, Africa and Europe. We know that many of these systems are ancient; it is known, for example, that forest resource management in Nepal or the commonfield system in Medieval England may have continued uninterrupted for hundreds of years (Campbell and Godoy, 1992). Such an historical perspective is important in considering recent biological degradation of some communally held resources.

Widespread condemnation of traditional common property regimes followed the observation of marked degradation in some communally held resources, the inherent nature of the tenure system charged with leading to resource degradation (Runge, 1992). Hardin's famous article entitled the 'tragedy of the commons' (1968) referred to the use by herdsmen of open-access pasture land. The hypothetical model presented highlighted the theoretical divergence

between individual and collective rationality. It postulated that individual herdsmen would find it profitable to graze more animals than the pasture could support, because each took all the profits from an extra animal, but bore only a fraction of the cost of overgrazing.

In extending this model and suggesting that it apply to all resources held in common, a false perception was introduced of equating communally owned (group owned and managed) resources with open access (no ownership) resources. Despite this fundamental flaw in Hardin's argument, it has been used to symbolise the 'inevitable' degradation of the environment that supposedly occurs when many individuals use a limited resource in common. Hardin's central theme, the lack of alternative to private, or state ownership and control over resources to ensure sustainable management, has been supported and reiterated by many researchers and policy makers. It has underpinned policies that have supported externally applied solutions to common property resource management.

Researchers have now successfully challenged this condemnation of common property regimes. Historical accounts of sustainable CPR management, together with current successful examples, have proved the viability of the property regime. Detailed case studies show that breakdowns in common property systems are frequently foreshadowed by a weakening in property rights, institutional arrangements and often a breakdown in local authority systems leading to *de facto* open access situations. Thus failure of the systems are linked to institutional changes, rather than the viability of common property regimes per se (Jodha, 1986; Bromley, 1989; Marathia, 1993).

A considerable literature has developed around the theories for collective action, including modelling of individual's "rational" decision making, which is well reviewed in Ostrom (1990). Much is made of the free rider problem in collective action, the temptation offered by potential additional benefits to be gained by an individual, by not adhering to agreed rules. Formalised by Dawes (1973,1975) in the Prisoner's dilemma game where conditions allowed no communication between players, limited rewards for co-operation and a lack of penalties for non-co-operation. Such an environment is very different to that surrounding individuals involved in community enterprises. Within a community the multiple, interlinked economic and social interests that join individual, family and clan groups ensure that there significant advantages attached to co-operation and penalties for non-co-operation (Runge, 1992).

Nature of common property resources at the F/A I

Common property resources can be descriptively defined as those used by a specific community without any exclusive individual ownership, or access rights (Jodha, 1985). Common property regimes provide a complex system of norms and conventions to regulate individual rights to use a variety of natural resources, including forests, range and water (Runge, 1992). Ostrom (1990) goes further to suggest the reason for such tenure arrangements as being assigned to natural, or man-made resource systems that are sufficiently large so as to make it costly, though not impossible, to exclude potential beneficiaries from obtaining benefits from their use. At the forest/agriculture interface such resources include common grazing land, land growing thatching grass, waste land and the forest itself.

The literature suggests that there is a need for recognition of resource scarcity for the innovation of an organisation/ institution to manage the resource. However, degree of

scarcity can both facilitate and hinder innovation, in that when scarcity of a resource is severe, the costs of introducing and maintaining management are high (Magrath, 1989).

Following Ostrom's (1990) distinction between the resource itself and the flow of benefits produced from it, the resource can be seen in her terms as a stock variable (standing capital) capable of producing a maximum quantity of flow variables ('income') without harming the resource itself. In the case of a single product such as water, maximising sustainable water delivery is a clear objective all users can support. In the case of forests, users may differ in the priority they would give to various products. Since a forest cannot maximise output of all products, decisions are necessary about harvesting. Where the resource is limited, compromises will need to be reached between different users' requirements.

Relationship of users to forest resource: stakeholder analysis

Resources may be valued solely for their commercial value; contribution to subsistence needs; as a safety net or additional security; as a home' and livelihood base, or a combination of the above. Some uses are complementary, others conflicting. Forest resources can be particularly important for food security, providing an important buffer during certain seasons and /or major periods of stress, particularly to vulnerable groups such as women, children and the poor. They can also supply vital nutritional supplements to diets based largely on carbohydrate-rich staples.

Wild resources are of particular importance to the rural poor, women and children, especially at times of stress such as drought, changing land availability or ecological change (Guijt et al 1995). These groups generally have less access to land, labour and capital and thus need to draw more on wild resources that only require their own labour for collection.

Lower returns from on-farm cultivation necessitate the diversification of income sources, for example in India , poorer households obtain 15-23% of their total income from common property resources, compared to 1-3% for wealthier households (Jodha, 1985). Collection and processing of forest products can be an important livelihood, or income source for landless peoples, for example wild palm products in Brazil (Hecht et al. 1988) and frequently offers a more lucrative occupation than wage labouring. For example, sale of wild palm fruits by the Huottuja Amerindians netting 30% more than wage labouring (Melnyk, 1995).

Grimble et al. (1995) attribute the failure of many attempts at natural resource management to inadequate attention being paid to the particular interests of the various stakeholders involved. Stakeholders include all those who have an interest in the exploitation and management of tree resource, including forest dwellers, local farmers, logging companies, forest and other government departments and national and international policy makers and planners. Each stakeholder group can be expected to have rational, but different interests concerning the use and management of tree resources. Policy makers' and planners' failure to recognise the different and potentially conflicting interests of the various stakeholders, and what each stands to lose or gain from exploitation or conservation, has frequently led to local resistance to policies and projects which therefore fail to meet their intended objectives.

The various layers of tree resource stakeholders within a society can be represented as shown below in table 2.

Table 2. Tree resource stakeholders

Continuum level	Examples of stakeholders	Environmental Interest
Global and international wider society	International agencies Foreign governments Environmental lobbies Future generations	Biodiversity conservation Climatic regulation
National	National governments Macro planners Urban pressure groups NGOs	Timber extraction Tourism development Resource and catchment protection
Regional	Forest departments Regional authorities Downstream communities	Forest productivity Water supply protection Soil depletion
Local off-site	Downstream communities Logging companies and sawmills Local officials	Protected water supply Access to timber supply Conflict avoidance
Local on-site	Forest dwellers Forest-fringe farmers Livestock keepers Cottage industry	Land for cultivation Timber and non-timber forest products Cultural sites

(Grimble et al., 1995 p11)

Interactions will occur between stakeholders interests involving conflicts (competition and/or disagreement between stakeholders) and trade-offs (where the management objectives of a single stakeholder, or stakeholding group cannot be simultaneously achieved and therefore a certain sacrifice of use for one purpose is required to satisfy another.)

Classification of trade-offs and conflicts of interest between and within the layers of stakeholders are identified in table 3.

The approach of stakeholder analysis can be used in project and policy planning and also as a tool to support participatory efforts at conflict resolution between groups. The authors identify two significant limitations to the approach when applied to the latter situation. Firstly the identification of stakeholder groups as distinct entities is rarely true in practice, where many overlaps between groups occur. Secondly, there exists the danger of gathered information on stakeholders interests being used by more powerful groups to further their own interests at the expense of less powerful groups.

Tabel 3. Trade-offs and conflicts of interest between and within stakeholding groups

Level	Trade-off	Conflicts of Interest
Macro-macro	Between policy objectives (e.g. environment vs. economic growth vs. equity)	Between national institutions or line departments (e.g. a forestry vs. agricultural department)
Macro-micro	Between national and local interests (e.g. ban on forest clearance affects cassava production)	Between national institutions and local people (e.g. a forestry department vs. farmers)
Micro-macro	Between internalities and externalities (e.g. a farmer uses pesticides which affects biodiversity)	Between local people and society at large', or farmers and environmental lobby groups
Micro-micro	On-farm resource allocation (e.g. short-term vs. long term, or forest products vs. cash crops)	Between different sets of local people (e.g. farmers vs. pastoralists over use of forest land)

Grimble et al., 1995, p13

Gender specific roles in management and relationship to CPRs

Women in many societies are primarily the collectors, managers, processors and vendors of wild flora resources. The resources can provide a vital source of personal income for women, enabling them to have a degree of independence within the household (Guijt et al., 1995). Many women in a cross section of societies are responsible for the provision of fuel for the household, during the collection of which they may harvest many other products from the forest. Initial costs to a community, or household of reduced common resources may be borne almost exclusively by the women in terms of longer journeys to collect products, greater difficulty in harvesting/collecting and poorer quality of fuel for cooking and food available for consumption (Wickramainghe, 1994). Other costs borne by women include health problems associated with carrying heavy loads long distances, eye and respiratory infections caused by emissions from alternative fuels and excessive daily work loads. Where women are not involved in decision-making over natural resource management, or have only indirect representation in such decisions, scarcity in resources over which they have jurisdiction are likely to receive lower priority.

The common gender separation of community management activities (often undertaken by women) from community politics activities (most frequently undertaken by men) may lead to communication gaps and information gaps in the setting of community development agendas (Moser, 1993). Community management is defined as the work undertaken at the community level, around the allocation, provisioning and management of items for collective consumption, such as water, health care and education. It could be argued that the management of common property forest resources be included within community management activities, for although women's collection of a variety of products is mainly for individual household use, collection is frequently undertaken with others, products have an important impact on health, both nutritionally and as medicines and their management is as a

common property resources. Community politics activities, most frequently undertaken by men, involve community-level organising at the formal political level (Moser, 1993). Hence, where forest management committees are instituted as part of joint forest management initiatives, there tends to be little representation of women, or their experience and knowledge of day-to-day management of the resource on the official decision-making body. While women may individually have an indirect path of representation through a male relative, women's collective experience as the most frequent managers of the resource is not represented. As with other cases of racial and ethnic under-representation in policy making, problems are too easily seen and therefore ignored as an individual problem, not one facing the community as a whole.

Common property: hypothesized myth and empirical reality

In table 4 below, some of the common CPR myths are set beside their reality on the ground. Just as in the days of Hardin, much debate unfortunately goes on the basis of the former rather than the latter.

Table 4. Myths and Reality

MYTH	REALITY
1. Individual gain provides a stronger motivation than communal good and as a result CPRs are over exploited.	1. Individual survival and security, both in terms of material resources and social identity, is dependant on community survival and support, particularly within a harsh environment.
2. As a resource becomes more valuable and/or there is an increased pressure to use that resource, over exploitation and a cycle leading to degradation is inevitable.	2. If increased pressure on CPRs comes from within the society of the original resource users, they will evolve responses to manage it. However, if it comes from more powerful outsiders, CPR organisational rules will be ignored, and local protests over-ridden.
3. CPRs are 'impure' public goods (where one person's use subtracts from the use of others). This subtractability works in two ways; firstly any user of the commons subtracts from a flow of benefits to another; and secondly, cumulative use by increasing numbers will eventually lead to a reduction in the productive capacity of the resource.	3. In reality, CPR management decisions are constantly be taken and enforced. 'Free riders' are quickly sanctioned. The economic model fails to understand the interdependence of the kinds of communities which manage CPRs, share maintenance of canals, forest paths, bridges, springs and canal, etc. Active management, such as tree-coppicing which stimulates further growth and production of poles and fodder, can increase the value and usefulness of a resource.
4. Privatisation of the resource is the most efficient and effective way to control access and provide the motivation to stop degradation.	4. Common property ownership is be the most egalitarian way in which to manage resources. Privatisation of CPRs has led to increases in inequalities as the more powerful and influential are able to secure more of the commons as private property for themselves and their families.

<p>5. Common property management is an inefficient way to manage resources. Such systems rarely maximise production.</p>	<p>5. Common property management is the most efficient way of managing certain resources, for example rangeland with limited, seasonal water sources.</p> <p>Maximising production is not always user's main aim. Reducing, or spreading risk is often important, together with the presence of a safety net in times of hardship.</p>
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The above statements are all true in more or less limited circumstances. Those in the first column were thought to apply more widely than is now accepted. Consequently, past policy has tended to follow and be based on these assumptions. Contemporary research and development activities in the area focus largely on investigation the circumstances, breadth and limitations, to the applicability of statements in the first column. Innovative policy interventions are beginning to reflect these challenges to Malthusian philosophy.

STRATEGIES FOR MANAGEMENT OF CPRs

Centralised control v privatisation v local management v open access.

Feeny et al.(1990) identifies four potential property rights within which common property resources may be held, open access, state property, private property and communal property. These four property rights broadly relate to four potential strategies for the management of common property resources, although in practice many resources are held in overlapping and sometimes conflicting combinations of these regimes. Selection of a management strategy reflects the purpose(s) for which the resource is to be managed and the mechanism(s) by which access is to be controlled.

Practical management plans may include elements from more than one strategy, such as joint forest management plans in India and Nepal that combine some centralised control with local management.

The combined strategies reflect multiple objectives of contributing to government revenues, making products available for urban areas, meeting rural subsistence requirements and possibly allowing some private and community revenue raising.

Open access

Open access is characterised by the absence of well defined property rights. It is rarely associated with active management, as access to the resource is unregulated and is free and open to everyone. Few resources are now unregulated in this way, although open access conditions have been created by the destruction of existing communal land tenure and forest management systems. For example by the imposition of colonial rule in sub-Saharan Africa (Birgegard, 1993) and Nationalisation of forests in Nepal (Carson, 1992).

Various interventions, involving centralised control, have been suggested to resolve inefficiencies in resource use patterns within open access situations. These involve incentives and sanctions with regard to individual use, to keep use near optimal management levels (Magrath, 1989).

The classic economist's recommendation for the elimination of a deviation between social and private costs and benefits is a tax. The logic of taxation schemes is to raise the private costs of entry (or to lower the benefits) to the point at which individual action will result in the socially optimal level of resource use. Analogous to taxation is the sale of transferable permits, or harvest quotas. There is no theoretical preference for either type of control, but in practice, quantity restriction may be easier to administer and control (Magrath, 1989).

Centralised control

The need to exploit forests as an economic resource has meant that rulers have long tried to exert control over the way that forests are managed. This has been true of sultans and kings in Indonesia and parts of Mogul and India as well as a policy of nationalisation. State control of forest resources has been introduced by both colonial regimes and independent governments in many countries, including West Africa, South East Asia, India and Nepal.

In Central Java, sultans had exclusive rights to forested areas and local people required permits to extract firewood and other products (Ruwiastuti, pers. comm.). In Mandi (now part of Himachal Pradesh, India), members of the royal family distributed usufructuary rights linked to agricultural land (Hobley, 1992). While such centralised control, backed by strong enforcement may have successfully prevented over exploitation of the resource, issues of efficiency of management and equity were not addressed.

In Niger the policy of nationalisation of forest resources was first implemented under French Colonial rule, ostensibly to prevent erosion of the forest stock. A system of cutting licenses was introduced to limit wood harvest. However the regulatory systems of fines introduced at the same time was largely replaced by informal systems of bribes. It is not unusual for a nationalisation strategy, by overriding existing structures of resource ownership, to both undermine private, or community incentives for management and create an environment for rent seeking behaviour. Where public employees are paid less than a living wage, the temptation for forest guards and police to extract bribes from harvesters in lieu of collecting official fines is high (Thomson, 1977 in Magrath, 1989).

Centralised control of forest resources, when treated as a specific form of privatisation, has not been very successful in the experience of many countries, either the promotion of sustainable use of resources, nor the equitable sharing of resources. Frequently this has been attributed to inadequate investment by governments in management, supervision and control of the resources (Magrath, 1989), rather than as an inappropriate tenure regime for the resource and its main users. The powerful disincentive to local populations of having existing ownership rights and specific individual usage and tenure rights supplanted is less frequently mentioned, though now tacitly acknowledged within the newly introduced collaborative forest management schemes (see below).

Privatisation of national forest assets

Privatisation of the bulk of forest land is not feasible for most countries in the Third World because of the dependence of a large number of people on forest resources for daily subsistence and a very small per capita forest area (0.266 ha. for tropical Asia, FAO, 1982 in Kant and Nautiyal, 1993). Concentration of ownership among a few large companies would lead to conflicts with local users, and the division of the resource into very small parcels would lead to the loss of the forest ecosystem. Conflicts between logging companies and local users are occurring in such a situation in Indonesia, where logged-out production forests (which formally are under state custodianship) are effectively being privatised at the end of concession licenses. Logging companies are being allowed to set up tree plantations which means that the land is no longer available for community use.

Privatisation over the last fifteen years has become a fashionable direction for government policy and the forestry sector has not been exempt. The largest moves towards privatisation have been made in the more industrialised nations, with New Zealand leading the field in sale of over 344,000 ha of *Pinus radiata* plantations (the trees, but not the land) (Brown and Valentine, 1994). Privatisation was accompanied by the establishment of two government agencies, the Ministry of Forestry and the Department of Conservation with responsibility for planted and natural forests respectively. This formalised the separation of commercial and conservationist values attached to the nation's forests, with only the Department of Conservation retaining forest management responsibilities. The Ministry of Forestry now regulates plantation management solely via government policy (Brown and Valentine, 1994).

Local management

The term local management embraces an array of systems. Although typically it is used to imply a discrete, localised system where users have developed and are the members of organisations responsible for management of the resource, local management systems include larger entities. Sultans and kings in Java, South Sumatra and West Kalimantan (Indonesia) and in parts of Mogul and southern India, for instance, exercised control over forests.

The type of government system and its strength at different moments in history affected the decision-making process. Local Stool Chiefs in Ghana's high forest zone decided how forests were divided amongst their own people and migrants (Adegboye, 1973), but were ultimately responsible to the Paramount Chief who held the land in trust for the clan as a whole (Quan, pers. comm.). In Mogul India, and also in smaller sultanates such as that in Danau Sentarum, Kalimantan, taxes and tribute greatly affected the way forests were managed (Aglionby, pers. comm.).

In less extensive, localised management systems, kinship is typically at the heart of authority and legitimacy. Although there are exceptions, kinship-based management systems do not view land as a commodity and it cannot be permanently alienated from the kinship group (Ruwiastuti, 1989). However, typical of such systems are mechanisms to accommodate outsiders. Granting of usufruct is common (Blowfield and Ruwiastuti, 1991; Ngo, 1992), while in the Asmat region of southern Irian Jaya outsiders are adopted (metaphorically reborn) as members of a kinship group in order to obtain rights (Mansoben, 1974). Problems appear to arise when there are large numbers of migrants which can give rise to disputes over access rights and a breakdown in indigenous management practices (Sarin, 1993). Indigenous

systems are able in some cases to accommodate large numbers of migrants, as the development of the company system for migrant cocoa-farmer areas of Ghana shows, (Hill, 1970). Often it is not the local management systems that is unable to adapt, but the tenuous position these systems hold in relation to formal law.

Where there is sufficient forest, kinship-based systems are effective at allocating resources and individuals are able to call on other kin members to resolve conflicts. They can be weak at resolving internal conflicts, however, because of vested interests of all members and the very strength of kin loyalty, (Koch, 1974). Kinship-based systems also offer limited avenues for resolving conflicts with neighbouring groups. In the Asmat, a community member with an ancestor from the opposing community is used as a go-between, but this is not very effective and oral histories repeatedly tell of wars between neighbouring communities (Blowfield, 1989). Today, in areas where such systems predominate (e.g. Papua New Guinea, Irian Jaya), 'land problems' are often considered the major constraint to economic development (Knetsch & Trebilcock, 1981).

The emergence of the nation state as the typical geo-political model has meant that where local management systems still exist they have been affected by regulations, norms and perceptions that have their roots outside of the community. The impact of the nation state on local management systems varies from country to country. In Ghana, colonial and post-colonial governments have exerted a right to the trees but the kinship (clan) system overseen by Stool Chiefs has continued to manage the allocation of rights to NTFPs and non-forested land. The Stools also receive a share of the royalties from logging (Quan, pers. comm.). In India, areas of production and conservation forest were removed from local management in colonial times, and local communities were largely regarded as 'biotic interference' (Palit, 1993).

The importance of local management is being recognised today with the growth in joint forest management (JFM), (see below). In some cases, JFM or similar programmes are implemented through established local forest management institutions, although these have often been weakened by years of anti-people policies. In other cases, new local institutions or mechanisms have to be established. In both cases the history of local usage and management is important in understanding current practices, perceptions and possibilities. Hobley (1992) shows how separate forest policies evolved in two different regions of Himachal Pradesh, India, and how this affected colonial and post-colonial forest management as well as joint forest management today.

In Indonesia, central government forestry policy has been strongly influenced by the system imposed by Java's sultans who regarded all forests as state land, and severely restricted the rights of their subjects to its use. This is an attitude embodied in Indonesia's basic forestry law, even though it contradicts the practices of the majority of local management systems (Ruwiastuti, 1990).

A central problem in fostering local management is achieving an attitudinal change amongst the professional forestry community so that community-forester relations are a partnership rather than a confrontation of conflicting interests (Sarin, 1993). Promotion of local management is often seen as a return to a traditional, more sustainable partnership between local people and the forests, but this need not be a prerequisite for success. *Ejidors* migrants have formed effective forest management bodies in Mexico (Richards, 1992), while

traditional communities may have less interest in forest sustainability and show less flexibility in management than migrants (Sarin, 1993). In any case, tradition is notoriously difficult to define [see for instance the evolution of *talukdar* into landlords in Oudh, India (Brennan, 1978)], and reliance on traditional institutions may be reliance on historical accident (Sarin, 1993).

The key challenge for local management today is to establish mechanisms that represent the interests of all stakeholders. Traditional institutions have often proved unwilling to address the needs of women, the poor and marginal groups such as pastoralists or members of other communities with secondary interests in the forests (Sarin, 1993). They may have initially been established for other ends such as community protection and choose leaders without referring to the new demands (Blowfield, 1989).

User groups as institutions

Institutional structure is important because of its role in expanding human choice. Institutions effect human choice by influencing the availability of information and resources, by shaping incentives, and by establishing the basic rules of social transactions. Institutional innovation contributes to development by providing more efficient ways of organising economic activity (Ostrom, Feeny and Picht, 1988). User groups can be usefully considered as institutions. Institutions can be defined as the sets of working rules that are used to determine who is eligible to make decisions, what actions are allowed or constrained, what aggregation rules will be used, what procedures must be followed, what information must be provided and what payoffs will be assigned to individuals, dependent on their actions (Ostrom, 1986).

Ostrom (1990), usefully distinguish three levels of rules that cumulatively affect the actions taken and outcomes obtained in using CPRs. *Operational rules* are defined as those that directly affect the day-to-day decisions made by users concerning when, where, and how to use resources, who should monitor the actions of others and how, and what rewards and sanctions will be assigned. The second layer of rules, *collective-choice rules*, are those that govern how operational rules are devised and modified. The third layer, *constitutional choice rules*, determine who is eligible to be involved and how the second layer collective-choice rules are determined. Thus at each level changes are made within the framework of a currently fixed set of rules at a deeper level.

Stability of mutual expectations among individuals interacting according to a set of rules is dependent on this nesting of rules, and the greater difficulty and cost involved in changes to deeper level rules.

Neither old nor new institutions can be expected to develop roles in an environment at least partly defined by external events (e.g. development projects) without institutional strengthening. Forest Departments and NGOs are often charged with this role. For FDs this means changing from a regulatory/enforcement role to one of facilitation and education. It is vital that the methods adopted and the timescale for implementation are realistic and appropriate, so that local institutions are adequately prepared to fulfil their roles.

Characteristics of long-term, self governing institutions

A theory of self-organised collective action is important in order to predict when individuals will be able to solve a common problem through self-organisation and when outside policy intervention might be effective in helping solve particular problems.

From the results of a study of a wide range of successful and long-enduring CPR institutions, Ostrom (1990) highlights essential factors that help account for their success. These are presented as design principles, rather than specific rules.

Table 5 Design principles illustrated by long-enduring CPR institutions

1. Clearly defined boundaries Individuals or households who have use rights must be clearly defined, as must the CPR itself.
2. Operational rules suited to local conditions. Operational rules governing time, place, technology and /or quantity of resource used and cost in terms of labour, materials, and /or money need to be appropriate to local conditions.
3. Collective choice arrangements Individuals affected by the operational rules can participate in modifying the operational rules.
4. Monitoring Monitors who actively audit CPR conditions and user behaviour, are the users, or are accountable to them.
5. Graduated sanctions Users who violate operational rules are subject to sanctions dependent on the seriousness and context of the offence.
6. Conflict-resolution mechanisms Users and their officials have rapid access to low-cost local arenas to resolve conflicts among users, or between users and officials.
7. Recognition of rights to organise The right of users to devise their own institutions is not challenged by external governmental authorities.

Adapted from Ostrom, E. 1990 p90

The above seven design principles include only one, recognition of rights to organise, that clearly refers to factors external to the user group. Conflict resolution mechanisms may refer to external as well as internal local arenas.

Experiences from India (Sarin, 1993; Arnold and Stewart, 1991), Indonesia (Blowfield, 1994) and the Philippines (Wollenberg & Hobley, 1994) highlight a further three external design principles for the development of effective local management (Table 6). While all are important, autonomy is one that is often overlooked. Forest Departments may seek to hold the right to dissolve local institutions, something that has been problematic in parts of India (Sarin, 1993). External factors may also have a negative impact on local management, as when government agencies and timber companies try to control newly formed institutions through funding or the imposition of their own representatives on committees (Blowfield, 1994).

Table 6. Important external design principles

Requisite Element	Explanation
Mechanisms to resolve internal conflicts	Includes access to impartial outside individuals or bodies, delegation of arbitration powers.
Autonomy	Local institutions should be independent of government or other interested parties.
Access to external support	Resources necessary for institution building available to local institutions in a timely, sustainable manner.

In addressing the question of what conditions are necessary to trigger local people to implement their own institutional arrangements, Hobley (1995) identifies a supportive policy framework as a key enabling structure. Community forestry in Nepal gained impetus after government passed legislation that provided forest department staff and users a legitimacy for their actions. Specifically, the policy affirmed the legitimacy of local people's usufruct rights. While acknowledging the importance of policy support, Arora (1994), in the context of joint forest management schemes in India, recommends caution in reliance on outside sources of capital, technical resources and skills. Such material support can lead to dependency and consequent failure of the user group when support is withdrawn. Such external, material support is often offered in return for participation in centrally planned programmes and projects. Use and development of local knowledge for management is not necessarily promoted, turning people into tools of implementation, rather than encouraging interactive participation. Frequently 'participation' is promoted and permitted only as far as it does not challenge the centrally planned programmes.

Not enough research has been conducted as yet to determine which of these principles are fundamental to collective forest management. Much can be learnt, however from failures of collective action as well as achievements. In a review of case studies covering a wide range of common property resources, Ostrom (1990) found poor conflict-resolution mechanisms and rights to organise as common factors among failed and fragile local institutions. Clear boundaries for both the resource and users' group were also shown as important, while insufficient arenas for collective-choice action weakened group ability to respond to change. The issues can be summarised in the following chart.

Table 7. Key physical, social and institutional conditions to be considered in development of local resource management plans.

<p>Physical and technical characteristics of the resource system</p>	<p>Physical</p> <ul style="list-style-type: none"> • Size of resource (absolute and relative) and clarity of boundaries • Boundedness of resource <p>Ecological status (quality, resilience, density of resource base)</p> <ul style="list-style-type: none"> • Predictability of flow of benefits from resource in quantity and across time • Condition of the resource • Nature of resource - does it lend itself to excludability? • Divisibility of resource/ subtractability/ jointness <p>Larger ecological context (eg. frontier or area of intensive production)</p> <p>Accessibility, infrastructure within area and outside it</p> <p>Resource type: ecological zones, climate, rainfall soils, topography, altitude</p> <p>Past and present human use patterns and present management regimes / farming system(s)</p> <p>Technology</p> <ul style="list-style-type: none"> • used for obtaining resources • used for exclusion • cost (if any) of exclusion technology
<p>Characteristics of the group of users</p>	<p>Culture and history of collective action</p> <p>Population characteristics (homogeneity-heterogeneity) subcategories of pop. and their spatial distribution.</p> <p>Presence of catalysing factor (leader, problem, opportunity...)</p> <p>Demographic change (growth, decline, in-migration)</p> <p>Relevance of local knowledge to management challenges</p> <p>Access and control over resources including specific products</p> <p>Density and proximity of people</p> <p>Mobility, permanency of population</p> <ul style="list-style-type: none"> • Number of members: size of resource • Proximity of users to resource and to each other • Extent of interaction and mutual obligation • Homogeneity vs heterogeneity of interests • Clarity and durability of membership; (migration and mobility effects?) • Users' dependence on and need for the resource's benefits • Power structure; skills of leaders; egalitarian social structure and/or shared norms of behaviour/tradition • Extent of competition from alternative institutions / organisations

<p>Local Institutional arrangements</p>	<p>Design principles</p> <ul style="list-style-type: none"> • Membership and access rules • Resource boundary rules • Use rules • Arrangements for discussion of resource problems, rule-changing, decision-making • Monitoring and sanctioning rules • Relationship between users and state: <ul style="list-style-type: none"> • recognition of right to organise by external agents; • supportive or punitive external legal and political environment;
<p>Economic</p>	<p>Existence and nature of market demand (structure activities and prices) Major contribution of resource to livelihoods and economy Incentives to sound management (sound in ecological and social sense) Access to credit Relationship of forests to the economy Profile of local livelihoods and economic alternatives Access to market, transport, communication Extent of monetization of economic activities How far food security strategies depend upon group activity Scarcity/abundance of soil and water relative to minimum needs for production Average and distribution of farm size</p> <p>Market conditions for the resource</p> <ul style="list-style-type: none"> • Are users interested in the resource for subsistence / support to farming, or do they want to sell products obtainable from it?
<p>Political Governance, regulations, etc</p>	<p>Presence, activities of and relationships with external agencies, local, national, international - donors, NGOs, religious bodies etc Right to organize and be recognized (legal personality) Availability of conflict resolution mechanisms for conflict among locals and with outsiders Commitment to local devolution and development De jure and de facto citizenship and voting rights of diverse groups; Enabling policy for resource Presence, role and orientation of relevant (govt) resource agencies Partisanship and factionalism</p> <p>Security of land/water tenure (legal or de facto) Restrictions on technology (harvesting: timber, transit, sale: NTFP, sale, processing, licensing/permits) Taxes, fees</p>

Chart devised by Gill Shepherd, based on Wade R. 1988 *Village Republics* Cambridge: Cambridge University Press; Tang, S. Y. 1992 *Institutions and Collective Action: self governance in Irrigation* San Francisco: Institute of Contemporary Studies Press.

Collaborative forest management

An initiative by the state to formally include communities in the management of forest resources. This followed the recognition by the state that despite clear definition of property rights, they are unable to enforce exclusion of local uses and /or that forceful exclusion is politically undesirable (Kant and Nautiyal, 1993). The government has an interest in managing forests for national needs, such as timber, fuelwood for urban areas, pulp and conservation, and international concerns such as biodiversity maintenance and tourism. Local communities on the other hand are likely to give greater priority to meeting local needs for food, fodder, poles and small timber. Such differences in desired products and use of forests potentially leads to conflicts in management objectives and hence choice of species, rotations and harvesting schedule.

Collaborative management aims to take into account multiple-use objectives, negotiate conflicts and trade-offs between stakeholders and devise an agreed plan for management of an area which is supported by all parties.

Although now formally supported by the government and individual states, joint forest management policies in India were initially introduced to legalise already existing informal arrangements between communities and forest officers (Poffenberger and Singh, 1993). Recognising the physical impracticability and social cost of trying to forcibly 'protect' forests from local users, individual forest officers had made agreements with local communities over restricted use (mostly of non-timber products) of the forest in return for community protection against outside and unapproved use. The obvious success of these schemes, some of the earliest being started in West Bengal in 1971-2, was recognised by the government in strong support to joint forest management within new forestry policy introduced in 1988. Further interpretative guidelines acknowledged the type of produce required by local users and supported management for these objectives.

The Indian National Forest Policy of 1988 envisages people's involvement in the development and protection of forests. *The requirements of fuelwood, fodder and small timber such as house-building material, of the tribals and other villagers living in and near the forests, are to be treated as first charge on forest produce.* The policy document envisages it as one of the essentials of forest management that the forest communities should be motivated to identify themselves with the development and protection of forests from which they derive benefits (Indian Ministry of Forests and Environment, notification 6-21/89-F.P. quoted in Poffenberger and Singh, 1993, *italics added*).

While access to non-timber products is allowed from inception of JFM agreements, shares in timber harvest, which range from 25% to 50% of net returns, is delayed until communities have demonstrated successful management for 5 years.

The joint forest management scheme in India has been successful in enshrining de facto rights of forest use within law and widespread retraining programmes are now reorienting forest officers and rangers away from their forest policing role, to that of community facilitators. Disincentives to community involvement remain, however, including some that could be addressed by changes in policy. These include lack of consultation by forestry officials of user groups in working plan development; lack of stipulated time frame for community management and hence insecure tenure over forest products, lack of legal documentation to

support user group's protection of the managed area and high management costs of forest departments (over 50% of gross product initially in West Bengal). Such high costs leave user groups with a much smaller share from timber harvest than envisaged and bring into question the concept of "fair share". User group costs in terms of protection and benefits will vary between groups according to their size, the size and productivity of the resource and pressures existent on that resource. Where natural forest resources are limited, there is argument that all produce should be for local production (as is the case in the hills of Nepal), and that plantations should be the source to supply national needs (Shah, 1994).

The incentive for local communities to participate in forest management is high where returns to protection are likely to be rapid and high, as in the increased availability of grasses and non-timber products and in the rapid coppice regrowth of species such as Sal. Where the land is less productive and stumps removed so that rapid coppice regrowth is restricted, other incentives such as wage payments for soil conservation and afforestation works may be necessary to reward people's effort in forest management (Tewari, 1993).

The concept of offering economic incentives to safeguard environmental resources also underlies the example of resin tappers in Honduras. By tying peoples' (particularly farmers') livelihoods to forest production, the state seeks to gain communities support and action in forest protection and to halt agricultural encroachment. Stanley (1991) finds this approach to have worked in some areas, but not in others. Success appears to be linked with strength in group structure and leadership, a good relationship with forestry and marketing institutions and relatively high productivity of the resource. The last two factors, which have a direct impact on economic returns from the enterprise, underscore the importance of integrating environmental protection with poverty reduction (Stanley, 1991). Immediate productivity of a resource may of greater importance to certain communities and members of a community than others. Where a heavily cut/grazed area is being strictly protected in order for regeneration to occur, individuals heavily dependant on that grazing or scrub resource may require access to other resources/sources of livelihood to enable their forbearance on resource use and survival (Poffenberger et al., 1990).

Knowledge bases underpinning management systems

Traditional forest management systems are by definition based on indigenous knowledge. Growing interest in the subject has yet to lead to clarification of the multiple strands that make up the concept, a variety of similar terms being used by researchers; ethnoecology, peoples' science; indigenous technical knowledge; traditional knowledge; village science. Indigenous knowledge has been defined as 'the sum of experience and knowledge of a given ethnic group that forms the basis for decision making in the face of familiar and unfamiliar problems and challenges' (Warren 1991). Considerable debate continues as to the key differences between scientific and local knowledge systems. Walker et al. (1991) suggest that the difference between indigenous and scientific knowledge are not at a fundamental, conceptual level, but in terms of formal structure, institutional framework, technical facility and ability and scale of perspective. DeWalt (1994) summarising various post-modernist critiques of scientific knowledge systems, in contrast suggests a fundamental difference between both the results and the processes involved in gaining knowledge within the two knowledge systems. Describing the goal of science as the production of information that can be transferred without transformation to any spatial or social context "immutable mobiles",

he describes its achievement through the approach of Cartesian reductionism which involves the subdivision of a problem into discrete components, analysing these separately and then reconstructing the system from the interpretations of the parts. Local knowledge, on the other hand is described as producing "mutable immobiles", information finely tuned to changing circumstances that define a particular locality, but has little utility outside of that locality.

DeWalt further argues that complex environments 'do not lend themselves to the kind of reductionist agricultural research that breaks problems down into their constituent parts'. Much can be learned from local people who have sustainably managed fragile, biodiverse ecosystems for generations and are beginning to be considered in Latin America as potentially the best resource managers for threatened tropical forest ecosystems (Davis and Wali, 1994). Mapping exercises with indigenous peoples in Honduras and Panama found that the Indian lands closely coincided with those regions where the ecosystem was still intact and not degraded by extensive deforestation (Denniston, 1994). Earlier efforts at including local groups within designated reserves and their buffer zones limited the role of the people to that of passive inhabitants of the forest, 'museum tenants' with no input into design and management and little security in rights of access and use of the natural resources. The assumption underlying this approach was that any change in local peoples' traditional modes of livelihood would be a threat to the park and should be resisted with fines and threat of relocation. This position has been challenged by the inability of government wildlife agencies to protect parks from outside encroachment together with a growing recognition of local groups as valuable national human resources. An emerging position is that local people should be given a more equal role in the design and implementation of protected-area management plans, with tenure agreements that would provide the incentive to communities to protect their lands against outside encroachment (Davis and Wali, 1994).

Scientific research, although tending to be reductionist in nature, does have contributions to make in informing decisions over management at the forest/agriculture interface. Combining scientific approaches with local knowledge and experience can be particularly fruitful.

Forest users require information about how much of one, or a variety of products can be sustainably harvested from an area. Local knowledge may indicate what has been sustainably harvested in the past and identify what range and quantity of products are required for the future, however has no method except trial and error to see if required off-take levels are sustainable. The effect of increased, or changed off-take practices will emerge only gradually and if unsustainable and practiced over a wide area, may have considerable effect on resource capital.

Natural forest management trials have been instigated in Nepal with the objective of giving quantitative measure to the range of produce and offtake levels possible under simple coppice systems, coppice with standards and high forest systems within the three major forest-types in the country (Tamraka, 1993). Such information, though subject to considerable soil and aspect variations, gives some indication of potential productivity of given forest areas. The drawback of such trials is the length of time for results to emerge. Community-forest projects in the country are taking a more action-research approach to the problem, monitoring on sample plots within the forest the effect of new management initiatives (Branney and Dev, 1993). Both research plots and sample plots have great value as a demonstration to user-

farmers and professional foresters of the potential productivity and control introduced by such a management approach.

Gender and generational dimensions to local knowledge

The gender-based division of labour leads to the majority of women having a major role in attending to the daily needs of the household. In rural societies this includes the harvesting of minor forest products such as foods, fodder, fuel and herbal medicines. In a study in Sri Lanka including forest products gathered by peripheral dwellers of the Adam's Peak wilderness, women were found to be the primary gatherers of 21 of the 23 types of product collected (Wickramasinghe, 1994).

The internationally recognised, growing fuelwood crisis, (Foley G and Barnard, G, 1984) has particular relevance to women in terms of time and energy spent in collecting fuel. This in turn effects women's participation in crop production and often reduces the variety of foods consumed by a household as homegardens receive less attention and foods requiring long-cooking processes are avoided. As Cecelski (1992) points out 'how energy and environmental-sector problems and objectives are perceived and defined is crucial in the light of whether women and their concerns are seen as essential, or marginal.' Projects aimed at alleviating domestic rural fuel shortages, such as woodlots, may have little relevance to the majority of women where the species (such as eucalyptus) is grown exclusively for poles and fuelwood sales, and furnishes little other produce. The majority of rural women do not buy fuelwood and require multiple produce from the trees, not only poles, timber and fuelwood. Cecelski (1992) goes on to attribute this not to oversight, or exclusion, but to the fundamental definition of the problem. 'In the conventional energy establishment, women have not been necessarily excluded intentionally, or their energy-related activities overlooked; they have simply been defined as outside the energy sector'. Such experiences highlight the need to include women not just in token numbers on forest user committees and in planning community developments. Women's distinct experience and knowledge in community resource management is crucial in both planning and implementing initiatives.

Women's indigenous knowledge is socially constructed and passed on from one generation to the next. Studies show that different pools of knowledge are held by the women and the men in society (Mishra, 1994; Shepherd, 1989).

Changes leading to loss of indigenous knowledge/ fewer holders of the knowledge

Indigenous knowledge about management and potential use of resources is in danger of being lost when it is no longer seen as useful and when large scale out-migration leaves few members of the younger generation in rural areas. As knowledge is usually passed on orally from one generation to the next, information can easily be lost from a community within two, or three generations. The resurgence of interest in bamboo as an economic crop in Maharashtra State in India has shown that only a few members of the community now know about management of the crop due to reduced interest in cultivation over several generations (Blowfield pers comm.).

Buffer zones

The creation of protected areas has often been top-down, based on elitist concepts of land use and surrounded by restrictive legislation (Davies and Johnson, 1995). This has led to conflict with communities living within and close to the boundaries where livelihoods are affected by the new legislation. Buffer zones attempt to address such conflicts by offering incentives to local communities to protect the reserve, while providing a physical and social barrier to encroachment into the reserve. Incentives may include the sharing of certain resources from the reserve, such as bush meat or revenues as in Zimbabwe's "Campfire" project (Child, 1993); allowing traditional hunting and gathering activities in delineated areas (Dunn, 1995), and credit, conditional on establishment of silvipastoral systems (Davies and Johnson, 1995).

The extension of existing complex agroforestry systems as an option for buffer zone development on the periphery of Kerinci Seblat National Park, and more generally on the periphery of forest margins, is suggested by Aumeeruddy and Sansonnens (1994). In Kerinci the production from the complex agroforestry systems is as high, or higher than on monocultural plots. This offers a method to increase production on a given area and hence a way of alleviating land pressure caused by population pressures, one of the factors leading to encroachment into the forest areas. Such methods would be of particular benefit to farmer-cultivators, if not the large landholders. By forming a physical and socially patrolled buffer zone, it is suggested that a community-managed agroforestry belt would be more successful at limiting agricultural encroachment and access to the remaining forest reserve area, than previously unsuccessful government control measures. Close collaboration would be required between communities and government agencies to reinforce community control of resources, allow necessary changes in land tenure and develop commercial channels for the diversity of agroforestry products (Aumeeruddy and Sansonnens, 1994).

Linking conservation with development

Governments are increasingly seeking local peoples' participation not only in buffer zone formation, but in sustainable management of resource reserves. The gradual abandonment of coercive approaches to conservation reflects an increased awareness and acknowledgement of the positive aspects to indigenous management, the difficulty of controlling illegal and uncontrolled use and the political unsustainability of exclusion policies. Dunn (1995) details varying degrees of participation by communities in a selection of projects world-wide. Projects include reserve areas that have been partitioned to allow controlled multiple use by communities, tourism areas and biodiverse reserve areas. Successful participation has been linked to certain characteristics within communities such as identifiable and strong leaders and/or institutions with which officials can negotiate. Problems are met where leaders have limited authority, cohesion of the community is weak, outsider contact unwelcome because of introduced disease problems and there is no tradition of regulating access, or use of resources (as with the Yanomami peoples in the Upper Orinoco -Casiquire Biosphere Reserve, Venezuela) (Dunn (1995). Nurse et al.(1995) link biodiversity conservation with community forestry plans in the Cameroons, suggesting that long term aims of conservation are best met by strengthening the rights of local people as stewards of resources which they can manage and conserve for their own benefit.

EXAMPLES OF SUSTAINABLE MANAGEMENT OF CPRS

What constitutes sustainable management?

The concept of sustainable development, made popular by the United Nations' World Commission on Environment and Development, refers to development that attempt to meet the needs of the present, without compromising the ability of future generations to meet their needs (WCED, 1987). Colchester (1994) makes an interesting distinction between the WCED definition of sustainability, with its emphasis on human needs and sustaining livelihoods, and the more technical definitions in terms of ecosystems functions and biodiversity adopted by many development institutions (World Bank, 1991; ITTO, 1990). Such technical definitions obscure the social and political dimensions of sustainability inherent in the concept.

It has been suggested that to be sustainable, development (or management) must meet the needs of local people, as if it does not people will be forced to take more from the environment to survive. In this way sustainability is linked to concepts of social justice and equality, both within generations and between generations (Colchester, 1994).

Traditions of sustainable management

The picture which is gradually emerging from detailed, often unconnected social studies of indigenous peoples, is of widespread sustainable natural resource management through many generations. The idea that present generations are merely stewards of ancestral land which is held in trust for future generations is echoed in many indigenous cultures (Colchester, 1994). Such a concept is often found alongside community-based management systems for land and other major resources. Resources that are not seen as individually owned, or as having exclusive ownership by the present family, or clan cannot then be seen as assets to be sold, or bought. The inalienability of land and other resources such as forests under traditional systems is the key difference between these systems and that which most states try and impose.

The infiltration of market forces into community -based subsistence economies has been cited as an important factor in increasing pressure on natural resources and the institutions governing them (Ostrom, Feeny and Picht, 1988).

Causal factors to decline in common property resources

Magrath (1989), referring to an analysis of a range of different common property resources, cites a number of factors that can lead to the failure of common property systems. Key factors include: population growth; greater involvement in market economies; colonialism and centralised government; environmental stress such as climate changes and drought; and technological change (Table 8).

Overuse of forest resources in order to acquire market products and to fulfil new tax obligations are frequently cited reasons for decline in CPRs (Ciriacy-Wantrup and Bishop, 1975). Changes in land tenure brought about by government-sponsored land adjudication programs have been linked with forest depletion in parts of Kenya (Brokensha and Riley, 1984) and Nepal (Bromley and Chapagain, 1984). A reinforcing combination of factors may be involved where a complete collapse in a resource management arrangement occurs.

In a review of the Ford Foundation's community forestry programmes in Asia (specifically Bangladesh, China, India, Indonesia, the Philippines and Thailand) Dove (1995) highlights the common difference between government worker and local community views on the causes of deforestation. The frequently held governmental view that deforestation is a gradual process driven by community-based factors, is challenged by local communities who see external, political-economic factors to cause deforestation in a more stochastic manner.

The local community view is supported by the findings of a detailed study of agricultural, property and population records for Rajasthan, India. Jodha (1985) finds institutional factors and market forces to have a greater direct effect on common property resources than rapid population growth. Over a twenty year period following land reforms in the early 1950s, croplands increased by 50% from 1951 to 1961 and 7% from 1961 to 1971 with a corresponding reduction in common property resources of approximately 16% and 7% respectively. Population in the arid zone over the same periods increased by 29.8% and 27.9%. Previous to the land reforms introduced in the early 1950s a feudal landowner was the sole custodian of village lands, charging substantial rents (one-fourth to one-half of farm produce) for land cultivated and various taxes for collection of products and grazing on communally used land. Such high rents restricted cultivation to the relatively high production areas and numbers of animals grazed on the common lands. Privatisation of land, low state taxes and removal of private cost to common land use led to the economic feasibility of marginal land cultivation and increased livestock numbers. A technical innovation, the tractor, also aided the conversion of marginal common property land to cropped land by overcoming the major constraint of time taken for animal traction to prepare the land for sowing.

Table 8 Factors influencing the practice of sustainable management

Factors promoting sustainable management	Factors that may undermine sustainable management
Basic needs are met (Colchester, 1994;)	Changes in perceived value of the resource
Resources subject to local control (Colchester, 1994;)	Change in tenure and /or access to the resource.
Local communities have a decisive voice in planning (Colchester, 1994;)	Change in users and /or their relationship to the resource
Local communities represented through their own institutions (Colchester, 1994;)	Conflicts in management for multiple objectives (Sarin, 1993)
	Market pressures (Jodha 1996)
	Technological change (Jodha 1985)
	Demographic change
	Colonial/ State policies (Guha, 1983; Metz, 1991; Fox, 1993)

There is growing recognition of the importance and potential contribution of indigenous natural resource management practices to future land use planning and management.

Traditional forest management arrangements practiced by communities in Nepal and India before the nationalisation of forest resources and continued by some communities in remote areas, are now forming the basis for joint forest management plans. These are the legal basis on which the government is transferring rights of management and access to local forest resources back to villagers and their forest management committees.

What motivates sustainable management?

Hostile forest policies and a Euro-centric attitude to both forestry research and management have until recently posed severe threats to local participation in sustainable forest management. Inherent in this attitude is a specific world-view that has long been the norm in much of the Western world. Two beliefs central to this world-view are that a) an object's primary value is its economic value and b) any object can be alienated from its owner.

For many forest-dependent people, such a world-view is not only alien but, if adopted, would form a threat to sustainable management. As mentioned earlier, many people do not feel that they 'own' land, rather that it is entrusted to them for the benefit of later generations. Consequently, they cannot 'sell' the land (i.e. alienate it from the owner) as it is not theirs' to sell. A 'thing' may change hands, the rights to land or natural resources included, but while in Western cultures this would normally mean that the giver (seller) had no more right in that thing, in other cultures it establishes a relationship between giver and receiver (see for instance Mauss, 1925).

This difference in perception between cultures that regard objects as alienable and those that see them as tools to develop reciprocal relations is often the root cause of conflict between local populations and outsiders (Blowfield, 1989). When reciprocity is strong, then the potential for co-operation increases. When it is weak or negated, (e.g. by national law), the cultural basis for the local management system is weakened. Typically problems arise when outsiders believe that they have acquired or purchased a right and have no further obligations to the other party, while the other party perceives that the transaction has established an obligation. When this obligation is not recognised, or fulfilled it is felt that an injustice has been committed.

Acknowledging the validity of alternative political economies is essential to achieving community participation in forest management. Equally there is a need to recognise belief systems and that forests can have a social as well as an economic function. In southern India traditionally crop diversity was encouraged by religion and this included each family having a bamboo clump. As these beliefs have declined, so has the cultural motivation to plant and managed bamboo (Krishnankutty, 1995).

Andean farmers have appealed for a greater understanding of the role of their belief systems in natural resource management. No aspect of Andean peasant life is purely utilitarian, everything (sowing, harvesting, irrigating, clearing) assumes a religious character. The whole of nature is seen as a living being. The mountains, moon, sun and stars are perceived as a community that behave like people. They have powers and decide which land should be used

for what purpose, and this knowledge is then communicated to humans. Farming activity/cycles are inseparable from ritual activity/cycles and agricultural knowledge is contained in stories, myths and is integrated into religious practices. Technology and science are not secular, they are a part of life and cannot be understood in isolation (Salas, 1994).

KEY ISSUES FOR FUTURE RESEARCH FOCUS

Encouraging and monitoring sustainable management

Whatever the kind of forest biologically, an issue of particular concern is how to enable management that will have the support of local people and also preserve biodiversity, ideally at the gene, species and ecosystem levels. This is a highly complex task and research is underway all over the world on how to facilitate this process. It implies the juggling of biological and social issues at the forest-agriculture interface as well as deep in the forest, but also the setting of examples of local management in a national and international context where such conservation must complement other initiatives.

Experience to date indicates that sustainable forest management requires people's long-term commitment. Such commitment is strengthened if people derive cultural and/or economic benefits from the resources, and have a role in defining how resources will be used and how benefits will be distributed. Involving people in planning resource use, clear allocation, and the guarantee of future benefits from the resource can act as incentives to sustainable management. Key research questions that still require addressing in this area are:

- To what extent can different resource managers define and enforce their own tenure regimes?
- What is the appropriate role for outside institutions (state, NGOs?) both in support of management groups and in direct management of resources?
- Are conservation and economic productivity goals with regard to forest areas compatible? How can they be made more compatible?
- How can acceptable and workable solutions to conflicts and trade-offs between different resource users be achieved?
- How can remote sensing methods be incorporated into local management strategies so that monitoring of the resource can become a part of active management?
- Which is the best strategy? - improving land access for people in potentially highly productive agricultural areas, or providing livelihoods for more people in fragile forest areas?

The nature of the policy and legal framework

This is a potent area for historical enquiry: both within particular countries, and regionally, there is often enough comparative evidence which can be mustered without too much difficulty to show what has already happened as a result of particular policies and laws, and what these historical findings suggest for the particular situation.

A further important research area is that which looks at policy and legal interventions which could increase the value of forest to people who live near it. Extractivism in Latin America has been one such attempt. Again, an important way of adding value for local people is to make sure that they own the forest rather than being seen as squatters. This must effectively precede any other attempts to add value.

- What strategies are needed to protect sustainable management systems from sudden shifts in economic incentives

- There is a need for the co-ordination of agricultural and forestry planning at national level to develop policy that affords protection for forest land while providing incentives for agricultural use of potentially more highly productive lands.

Implications of the purpose for which the forest is being managed

Depending on what national level forest categories exist, the legal status of the forest beyond the forest boundary will have profound implications for the farming system and livelihood choices that are located on the boundary's other side. The forest may be a state forest reserve for timber or fuelwood; a logging concession; a national park or conservation site; a community forest used for locally-managed resource extraction and hunting; or a common property resource forest which is sustainably incorporated into local land use and primarily used for nutrient extraction in support of farming, in the form of a fallow system where land alternates between forest and farm, or a grazing source for cattle whose manure is used on farm.

For instance, the managing of the conservation boundary is currently receiving a lot of attention, but no obvious solutions are yet in sight where few tourists to the conservation site are expected, and there is no obvious alternative income for local people: while savannah gameparks are managing to bring benefits from tourism to local people, rainforest sites have proved much more recalcitrant. Yet attempts to compensate local people for loss of access to forest they previously had rights in and benefits from have usually greatly undercosted the benefits foregone.

- what is the relationship between types of management and sustainability given the presence of local people?
- what tenurial relationships best protect forest in these circumstances?

The strength, capability and orientation of the country's forestry institutions

Almost all developing countries could either do with more forestry staff (most of Africa) or need profound retraining of employees accustomed to regulation rather than dialogue (India, Indonesia, etc) in the context of Forest-Agriculture interface issues.

- what are the best strategies where forestry departments are understaffed and demoralised?
- what are the best strategies where forestry departments are large, powerful and well-trained for regulatory work?

The nature of the farming systems on the forest boundary

The forest-agriculture interface is profoundly affected by the extent to which the agriculture is dependent on and complementary to the forest and in need of its benefits.

- Under what conditions can land-use intensification at the forest boundary take place?
- Under what conditions will the stabilisation of agriculture destroy the forest faster than allowing small numbers of people to carry on with traditional swidden-fallow agriculture.
- Where land-conversion is taking place, what are the subsidies for land conversion (deliberate or accidental) in existence?
- What conditions make difficult-to-control migration from elsewhere take place?

- What are the most effective methods for community organisation around forest management planning in areas experiencing rapid colonisation?
- How do social cohesion and a forest culture develop?
- Resource use practices by colonists and private firms.

The existence and nature of communal resource management arrangements and external pressures upon them

The area which still needs the most research is the articulation of CPR management systems with formal state systems. Who will play the role of 'translator' of each set of rules to the other party, and will work on harmonising contradictions with each? In the short run, NGOs can play such a role, but in the longer run, foresters and villagers will have to have been trained to deal more directly with one another.

- what fora need to be set up so that better interchange occurs?
- how can we best support the process?
- How can the sustainable management practices of traditional forest cultures be maintained and/or adapted in the face of demographic and generational change and increased market penetration?
- What should be the strategies to resist outside intrusion into traditional forest cultures, including the role of outside agencies.
- How can we monitor forest cultures' resource use practice over the long run?
- By what processes are resource use and access rules together with monitoring procedures strengthened as population and market pressures increase?
- How can tenure regimes cope with sudden economic shifts such as trade liberalisation?

Improving equity

- Strategies to overcome specific constraints on women's participation, conditioned by cultural and social norms of their communities and by time, age, and social grouping constraints.
- Research and education on appropriate silvicultural methods to help assure resource regeneration and equity for future generations.
- Making access rights heritable in systems (such as in joint forest management, JFM) where they are not at the moment

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PART B . ANNOTATED BIBLIOGRAPHY

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INTRODUCTION

This annotated bibliography has been produced in support to a review of the importance of common property issues, tenure and access rights in relation to land use management and planning at the forest/agriculture interface. It forms part of project development work for the forest/agriculture interface system of the ODA Natural Resources Systems Programme, providing an analysis and synthesis of previous work in the field to aid identification of key areas for research and potential project locations. The bibliography is designed to be a resource, providing information from a number of literatures, infrequently published together and not readily available to all researchers in the field.

Forest/agriculture interface systems are defined for the purpose of this review as characterised by the coexistence of these two different land use patterns, or habitat types. Such coexistence can be spatial - e.g. agricultural practices at forest margins, and pockets of agriculture within forest areas (or vice versa) - or they may be temporal. Temporal interfaces are those where habitat/land use patterns have changed (or may change) within relatively short time scales and where the legacy of previous land use is likely to influence the sustainability of subsequent usage.

The forest/agriculture interface represents a boundary not only between land use systems, but often involves a divide in the tenurial relationships to the land and its produce. Rarely is there a simple division in tenure between private and communal ownership/management. In some agrarian societies where population density is low, farmland is still held by individual farmers under a usufruct arrangement with the group to which they belong, the clan, the lineage, or the village. In these circumstances, group-held common property resources constitute the land which has not been allocated to individual farmers. Common property resources are generally held under a usufruct arrangement, even where individuals hold rights of disposal over individually cultivated land. Where tenurial arrangements have developed in situ they represent practical needs for local resource management. Introduction of outside tenurial arrangements also involves the introduction of another group's interests. This may support, or undermine the sustainability of local management practices. Land use management and planning strategies have to take into account not only the purposes for which the resource is used, but how access to and use of the resource is best managed.

SCOPE OF THE STUDY

Relevant literature contained within CABI, TROPAG, Agricola, AGRIS, and the internal NRI and ODI databases is included, together with key references from the Indiana University forestry database. Abstracts have been taken from the four abstracting journals referred to under "DATABASE" as CABI, AGRIS, TROPAG and Agricola, or have been written by the authors in which the DATABASE entry reads NRI, or ODI.

ANALYSIS

General comments

The bibliography has been prepared specifically to help inform researchers in their development of concept notes to address outputs within purpose one of the forest/agriculture interface system of the NRSP. The information will also be of relevance to researchers working within forest/agriculture systems in the other RNRs programmes and hopefully to all researchers working in the subject field.

The review provides a general analysis of the literature cited. Within the bibliography, references are divided between sections, and keyworded to facilitate cross-referencing and to give an overview of the spread and depth of coverage on specific topics.

Sectional analysis

Each of the references has been placed in one of four sections that we consider represent the main topic areas that influence policy, planning and strategies for management of CPRs at the forest/agriculture interface.

- Tenure rights relating to forests, trees and agroforestry systems (section A)
- Management of common property forest resources (section B)
- Collaborative forest management (section C)
- Forest conversion and agricultural encroachment (section D)

Tenure rights relating to forests, trees and agroforestry systems (section A)

Section A is the largest section, with 153 references and reflects the importance of peoples' legal and felt security in access to resources, to their subsequent management of those resources. The influence of history on exclusion and access to resources is a recurring theme, particularly striking being the influence of sudden changes introduced by colonising powers and new State institutions. Implications for gender and generational equity of changes in resource tenure are areas that have only recently received attention.

Management of common property forest resources (section B)

This section contains references relating to the evolution and management of locally instigated common property management systems. The references show the practice of common property resource management to be widespread geographically and to have lasted for considerable periods of time. The sustainability and relevance of these traditional systems to present resource management dilemmas are discussed.

References include studies of long-standing CPR management arrangements; the importance and contribution of indigenous knowledge in these systems; the balance between conservation and resource use in sustainable systems; factors causing change; and the ability of systems to cope and adapt to change.

Collaborative forest management (section C)

Sections B and C may at first appear similar. However B contains references on locally developed and instigated systems of management, while C's refer to systems with external support in their instigation and/or maintenance. While there may be similarities between the two sections in terms of practical methods of resource management and institutional arrangements; the presence of external input influences management, particularly institutional structure and functioning.

There is a heavy weighting of references in this section from Asia (64 out of 78), reflecting the lead India and Nepal have taken in this area, both in terms of practical projects and in making national policy changes. In India this slant may also reflect the the strength of state tenure and of forestry department management of forest lands. Such control makes the existence of informal common property systems of the kind so common in Africa, far less possible. Reference is made from all geographical areas on the need for professional's re-orientation; including forest guards, district officers and researchers, from a timber focus and policing role to that of encouraging users participation in planning and management for multiple purposes.

Forest conversion and agricultural encroachment (section D)

World-wide the most common cause of deforestation has been agricultural encroachment and the conversion of forest to agricultural production. This deceptively simple analysis compounds complex interactions of population pressure, resettlement schemes, market pressures and opportunities, pricing policies, timber extraction policies and practices and different communities knowledge of natural resource utilisation. The section contains references on these varied topics together with recent challenges to the underlying economic rationale for conversion.

Keyword category analysis

In addition to the sectional allocation of references, each has been keyworded with regard to their geographic, institutional and disciplinary focus. Keywords also cross-reference with regard to nature of the resource, areas of management covered and type of publication. A seventh category contains topical keywords that link references across the other categories, such as conflict resolution, policy and research requirements.

Category 1 Geographic area

Category 2 Institutional focus

Category 3 Subject focus

Category 4 Nature of the resource

Category 5 Areas of management covered

Category 6 Type of publication

Category 7 Miscellaneous

Category 1 Geographic area

The reliance on European-developed databases has led to a strong representation of these countries traditional development recipients, particularly Africa and South-East Asia. There

are comparatively few references from Latin America where debate about forest to agriculture conversion is particularly active.

Category 2 Institutional focus

Analysis on an institutional basis shows a considerably stronger representation of non-government (NGO) and local voluntary (LVO) organisations compared to national and international organisations. This reflects the community-focussed nature of much of the research and studies. The fairly strong representation of donor organisations reflects their support of NGOs/LVOs and projects involving these organisations. ODA is the most prominent UK implementing organisation, with ODI and IIED involved in research, the publication of studies and in providing fora for discussion of issues. No particular association with UK universities emerges from the analysis.

Category 3 Subject focus

Social organisation is the most frequently included subject focus, closely followed by sustainable development/management. Formalisation of social organisation in institutions (institutional development) forms the next largest subject area, together with forestry. The term forestry is used to include management of forest resources for all products. Where specific importance is placed on non-timber products, this is keyworded separately. The economics section follows in size, reflecting the importance of production levels and the value placed on various products in determining how the balance between agricultural and forest production is maintained.

Category 4 Nature of the resource

Natural forests are by far the most common resource referenced, followed at some distance by plantations and trees on farms. Cultivation of trees appears to become more important as naturally regenerated resources decline and may have particular importance for specific groups under certain tenure laws. Savanna woodland has also a number of references, important under pastoral systems and in semi-arid areas.

Category 5 Areas of management covered

External and internal organisational arrangements and regulations dominate the areas of management covered. Organisational development and tenural change and evolution indicate the degree and direction of change occurring within these arrangements. Surprisingly few entries deal with technical methods of resource management. An important issue within management that is just beginning to be addressed, is the issue of equity. Equity with regard to socio-economic, gender and generational issues.

Category 6 Type of publication

The published material in the bibliography is found in number of forms. Journal articles are by far the most common form, a reflection to certain extent of the sources to which the databases refer. The considerable number of proceedings indicates the present dynamic development of the topic at workshops and other group meetings. In both, case studies have

proved the first vital stepping stone leading from discussion of experience to a widening of perceptions and the base of material from which theories are constructed.

Category 7 Miscellaneous

An additional miscellaneous category brings in topical keywords that have not been included within the other categories. These describe approach in terms of conflict resolution and empowerment; level of intervention for instance in aid allocation, policy, project methodology, research requirements and training; and cross disciplinary terms such as tourism, water catchment and soil fertility.

The above categories are further subdivided as outlined in the keyword definitions section that follows.

COLLECTION OF MATERIAL

NRI's library services provide access to four major literature databases held on CD-ROM. CABI, AGRIS, TROPAG and Agricola. These were searched using the keywords: common property resource(s), joint forest management; community forest management; collaborative forest management; indigenous knowledge; local knowledge; local technical knowledge; indigenous technical knowledge and tenure relating to forestry/trees/agroforestry. NRI and ODI internal databases were also consulted and additional abstracts written where necessary by the authors. The searches brought up a selection of over 900 references, 410 of which have been chosen for inclusion within the bibliography. The three databases CABI, AGRIS and TROPAG have kindly agreed to the our use of their abstracts at no charge for the purpose of this bibliography.

Each reference has been assigned to a single section as described above and a set of keywords ascribed to define the reference. To standardise the allocation of keywords, seven caegories of keywords were used relating to geographical location, institutions involved, subject focus, nature of the resource, areas of management covered, type of publication and topical subjects included.

Each reference was formatted using the standard layout given in the two examples from sections A and D below:

A24

Author	Brokensha, D.W., Castro, A.P., Kundu, M. and Hewlett, B.
Title	Fuelwood, agro-forestry, and natural resource management: the development significance of land tenure and other resource management/utilization systems.
Source	64 pp. Institute for Development Anthropology; Binghamton, New York; USA.
Year	1984
Language	English
Abstract	An examination of natural resources management and interlinkages in relation to local environmental factors in developing countries. There are 4 main parts to the paper. The first of these, 'Significant resources and relationships for tree management and wood fuel use', considers the major technical factors which have to be considered in assessing the suitability of social forestry projects in a given area; these are discussed from the point of view of ecosystems and ecozones, including social and cultural aspects. The second main section, 'Resource management strategies, land tenure and modes of

livelihood', is of more general agricultural interest. It includes a section on 'Irregularities and social forestry' which discusses inequalities in land ownership, asking how the poor and landless can benefit from social forestry programmes. The third section discusses 'Government interventions in forest, tree and land management' and the fourth 'Problems of social forestry' (Communal woodlots, Distribution of benefits, Use of 'waste' lands, Participation, Variation and Conflicts). The concluding parts of the paper outline emerging issues and policy recommendations.

Keywords community woodlot; external organisational arrangements; forestry; geographically non-specific; institutional development; paper; plantation; social organisation; socioeconomic issues; technical methods; wastelands

Database CABI

D13

Author Castro, A.P. and Brokensha, D.
Title Institutions and foodsecurity: implications for forestry development.
Source Main paper presented February 1988, Bangalore for Expert Consultation on Forestry and Food Production/Security. FAO, Rome.
Year 1987
Language English
Abstract The subject of the paper is Mbeere, Kenya, a physically marginal area with uncertain rainfall and generally poor soils. It was initially savanna woodland. Until well into the colonial era, with a low population and an abundance of woodland, rights to woodland were not regulated. Even by 1970 probably 90% of Mbeere material culture came from woody vegetation, shrubs, lianes and grasses. In pre- and early colonial times some trees were recognised as individual property, especially building trees that had been individually planted like *Melia volkensii*. There was evidence of 'inadvertent conservation' for example sacred groves, the pollarding of trees and the careful propagation of desired species. But the degradation of the forest resource increased with rising population, and the introduction of improved communications, which led to production and curing of tobacco and facilitated the sale of charcoal to urban residents.

Keywords Africa; charcoal production; crop production; environmental degradation; historical perspective; internal regulations; paper; population pressure; savanna woodland

Database ODI

Although each category was considered for each reference, not all categories were found relevant for each reference. Similarly, up to three keywords were assigned for a single category where relevant.

An index of subject matter keywords and authors' names is included at the end of the bibliography.

KEYWORD DEFINITIONS

Category 1- Geographical area

The geographic areas covered by the bibliography have been classified as:

Africa

Asia

Caribbean

Europe

Latin America - Central and South America

North America - USA and Canada

Oceania

Non-specific geographically - subject of paper not specific to any region, though may include specific examples.

Category 2 - Institutional focus

Asian Development Bank

Bangladesh Forest Department

Beijer Institute of Sweden

Burkina Faso Forestry Department

Cameroon Forestry Department

CARE (Co-operative for American Relief Everywhere)

CFMRD (Common Forestry Management for Rural Development)

Commonwealth Science Council

CRP (Contract Reforestation Programme)

FAO (Food and Agriculture Organisation)

Ford Foundation

FORSPA (Forestry Research and Support Programme for Asia and the Pacific)

FPC (Forest Protection Committee)

FTP (Forest, Trees and People Programme)

Ghana Forestry Department

GO (Government Organisation)

Haiti Agroforestry Programme

ICRAF (International Council for Research in Agroforestry)

IIED (International Institute for Environment and Development)

IITA (International Institute of Tropical Agriculture)

ILCA (International Livestock Centre for Africa)

India Forestry Department

IUCN (World Conservation Union)

JFM (Joint Forest Management)

Kenya Forestry Department

KIFCON (Kenya Indigenous Forest Conservation Programme)

KWDP (Kenya Woodfuel Development Programme)

KWT (Dutch Society for Science and Technology)

LTC (Land Tenure Centre)

LVO (Local Voluntary Organisation)

Mali Forestry Department
Nepal Forestry Department
NGO (Non Government Organisation)
Niger Forest Service
NRI (Natural Resources Institute)
ODA (Overseas Development Administration)
ODI (Overseas Development Institute)
PADF (Pan American Development Organisation)
Philippines DENR (Department of Environment and Natural Resources)
Plan Sierra project
SIDA (Swedish International Development Agency)
STK (Sit Thi Thamkin - Right to Harvest Land Certificate)
TCDC (Technical Co-operation among Developing Countries)
Tropical Forestry Action Plan
UMN (United Mission to Nepal)
UNEP (United Nations Environment Programme)
USAID (United States Agency for International Development)
Vietnam / Sweden Plantation and Soil Conservation
Winrock Institute
Wood as Fuel Program
World Bank
WWF (World-wide Fund for Nature)

Category 3 - Subject focus

This category was limited to three keywords for each abstract so only the major subjects are listed. Where many subjects were mentioned they may have been included under broader keyword's such as non-timber products, or farming systems.

Agroforestry - production systems managed for both tree products and agricultural produce.

Animal production - management of animals for production in agricultural, savanna or forest systems.

Beekeeping

Biodiversity - only used where biodiversity was given particular focus. Related keyword is environmental conservation

Charcoal production

Crop production - production of agricultural or horticultural crops.

Deforestation - where current management practices are causing a reduction in forest cover.

Economics - specific reference to economics of project, forest and agricultural systems or general economic issues.

Environmental conservation - includes policy, management and impacts on ecosystem, biodiversity, flora and fauna, or soil and water conservation

Environmental degradation - loss of biodiversity, ecosystem, flora and fauna or soil and water values.

Ethnobiology - specific references to the study of the relationship between humans and other living organisms (including plants)

Farming systems - description of systems of cultivation of animal, plant and tree products.

Fodder production - cultivation and collection of plant material for animal feed.

Forestry - management of forest resource for timber or non-timber products.

Fuel wood - use of tree/shrub products for fuel.

Indigenous knowledge - reference to local knowledge based on local beliefs and experience in use and management of resources.

Institutional development - development of organisations, tenure systems and society with respect to management of resources.

Land use patterns / mapping - mapping of land use - increasingly used in assessing and managing resources.

Non-timber products - includes products from trees and forests other than timber or poles, such as medicinal products, honey, fruit and other crops, raw material for crafts, gum etc.

Reforestation - specific projects aimed at planting trees to reforest land

Sacred sites - sites of specific sacred importance to the local people.

Social organisation - organisation of people involved with management and tenure of the resource.

Sustainable development / management - management and development of resources that do not compromise their future use

Timber / pole products - use of trees for timber (eg for construction) and poles (eg for fencing)

Category 4 - Nature of the resource

Alley farming - cultivation of small crops between rows trees.

Community woodlots - a stand of trees managed for community use.

Enriched forest areas - natural forests which are managed to increase their productive potential, for example planting productive exotic species within the forest.

Fallow systems - systems where land is left to regenerate after harvest or planted for the purpose of renewing the resources. Often involves removal of trees to allow a period of crop production after which the area is left to regenerate into forest.

Forest margins - management and tenure issues at the margins of forests.

Intercropping - any mixed crop situation. Practiced to achieve efficiency of land / labour / fertiliser use and /or to reduce pest and disease problems.

Natural forest - native forest where controlled harvest of certain products may be practiced but there is little interference with natural regeneration.

Plantation - exotic or native trees planted for production purposes.

Taungya systems - plantation of crops between trees during the establishment of trees. The tree focus is on tree growth and the crops are eventually shaded out.

Trees on farms - plantation of trees on farms for production or improved soil and micro-climatic effects

Wastelands - areas of land not used for production, often consisting of marginal agricultural land.

Category 5 - Areas of management covered

Equity

Gender issues - issues concerning gender equity particularly regarding tenure rights, or definition of specific gender roles and responsibilities.

Generational equity - consideration of future generations rights in relationship to present generation needs.

Socioeconomic issues - issues concerning issues of economic and social equity.

External organisational arrangements - formal arrangements between outside organisations and local people (often including state organisations) with regard to management and tenure of land trees and products.

Internal regulations - regulations of resource use and management which are controlled within the local community

Organisational development - development of organisations to manage and use resources.

Technical methods - description of technology used for forestry and agricultural production

Tenural change and evolution - changes and development of tenure with respect to land and trees.

Category 6 - Type of publication

Bibliography

Book

Case studies - includes specific case study publication and other publications which include case studies in their text.

Chapter

Conference proceedings

Journal article

Paper

Report

Review

Seminar proceedings

Survey / questionnaire - any publication which includes a survey or questionnaire as a major part of the study,

Symposium proceedings

Thesis

Category 7 - Miscellaneous

) Aid allocation - specific reference to appropriate use of aid resources.

) Concession management - the state allows areas of forest to be used for specific purposes (usually timber extraction by commercial firms).

) Conflict resolution - methods and approaches to resolve conflict and disputes.

) Empowerment - specific attention to empowerment of local people through management and development of local resource systems.

) Historical perspective - includes historical perspective on systems for management and tenure of trees and land

) Policy - existing or future needs for tenure and management policy.

) Population pressure - effect of increasing population on the use and status of forest and land.

) Project methodology - specific reference to the procedures used in the projects.

) Rapid appraisal - reference to approach and techniques used for rapid assessment of needs in a given situation.

) Remote sensing - use of satellite imagery or aerial photos for assessment of forest and land cover and condition.

) Soil fertility/nutrient cycling - the effects of forests, deforestation and agriculture on the fertility and nutrient cycling in soils.

) Stewardship - tenurial relationship between group, or individual, and the state that confers rights of use and disposal over (certain) products of the state resource for a given period of time (cf JFM agreements where the state retains the rights to withdraw a group's right of access to the resource at short notice).

) Tourism / recreation - reference to tourism and recreational use or potential in forest areas.

) Training / extension / technology transfer - communication of relevant information and skills to local communities and those involved in resource management.

) Water catchment - effects of forest management or deforestation on the water catchment.

