

CHAPTER 4

COMMON POOL RESOURCES AND ITS ANALYTICS

4.1 Concepts and Definitions

The present study involves basically, the question of common pool resource management (CPRM). CPRM cuts across boundaries of several disciplines. To understand its precise meaning we need to make clear the meaning of two key concepts, namely, 'property' and 'rights' on which hinges the notion of CPRM. According to Bromley (1991), '....property is a benefit [or income] stream and a property right is a claim to a benefit stream that the state will agree to protect through the assignment of duty to others who may covet, or somehow interfere with the benefit stream'. In this sense property is not just a physical object but also a social relation. Depending upon the nature of rights to a resource or property, one could conceive of four broad categories of property, namely, private or exclusive property, State property, common property, and non-exclusive or nobody's property. Exclusive property and non-exclusive property are the two extremes on a continuum of property rights. In between these two extremes lie State property i.e., property owned by the State and Common property, i.e., jointly owned by more than one individual. Private property is said to be exclusive because the rights holder can exclude others from appropriating the property and/or benefits from it. In this sense, private property is the legally and socially sanctioned ability of the holder to exclude others (Bromley, 1991). Nonexclusive property is so called because nobody can be excluded from appropriating its benefits, or, in other words, it is accessible to everybody (open access) without any restraints.

In contrast to non-exclusive property or open access the notion of common property subsumes a set of social conventions, norms, legally enforceable rules, procedures for regulating its use. In most situations prevailing in developing countries of the world, it is difficult to distinguish between common property and open access because what apparently appears to the casual observer to be open access may in fact be common property with its joint use by individual belonging to a particular group being regulated by some conventions or tacit understanding and cooperation among the users. Whereas the

problems of common property stem from the structure of joint-use rights, problems of open access arises from free and unrestricted access or entry from absence of any ownership of the resource by any person (Singh, 1994). There is some truth in the dictum that "everybody's property is nobody's property" (Gordon, 1954) and hence open access is likely to be abused, misused, and over-exploited more than private property or common property. Over time due to increase in the population of resource users and hence in the demand for the resource/resource commodities, and weakening of the social conventions and institutions that were established to regulate the total use of a CPR by its claimants, CPR may become an open access for its co-users (Bromely, 1991).

Since property rights in a resource like forest lands are less common in expanding but economically underdeveloped parts of the world, sometimes it is said that resources owned by nobody are 'common property' and give rise to "common property problems" or the tragedy of the commons. A simple static micro theoretic illustration in the following fig 4.1 highlights the problem. A "cut-and-run" logging operation can sell the harvested trees as lumber at price, say, P_1 along the demand curve denoted by d_1 . If the resource is owned by nobody then the harvester need to pay "royalty" or "stumpage" charges for the right to harvest the tree. There are costs of cutting, bucking, transport, processing and delivery to market. The marginal cost of doing all these rises as more of the less accessible forest area is harvested. This is shown by the rising marginal cost (MC curve in the figure). The forest harvesting profit is maximised at X_1P_1 , where price equals marginal cost.

As illustrated, only a part of the forest is harvested, measured left to right, by O_1X_1 on the horizontal axis. The rest of the forest, measured right to left by O_2X_2 remains virgin in less accessible areas. It is to be noted that the logger have responded rationally to market 'signals' being sent by the rest of the economy by following the principle of private profit maximisation. But as time passes the frontier is absorb. Virgin forest becomes scarce and valuable for some other uses (for example, for sustainable recreations, scientific and environmental purposes). The demand is now for live, in-situ trees, not lumber. But by this time O_1X_1 of the original forest has disappeared.

This new demand is measured downward on the vertical axis at P_2 which shows the values of virgin trees along the demand curve d_2 . The remaining stock of these virgin trees O_2X_2 is measured right to left on the horizontal axis. These will be preserved.

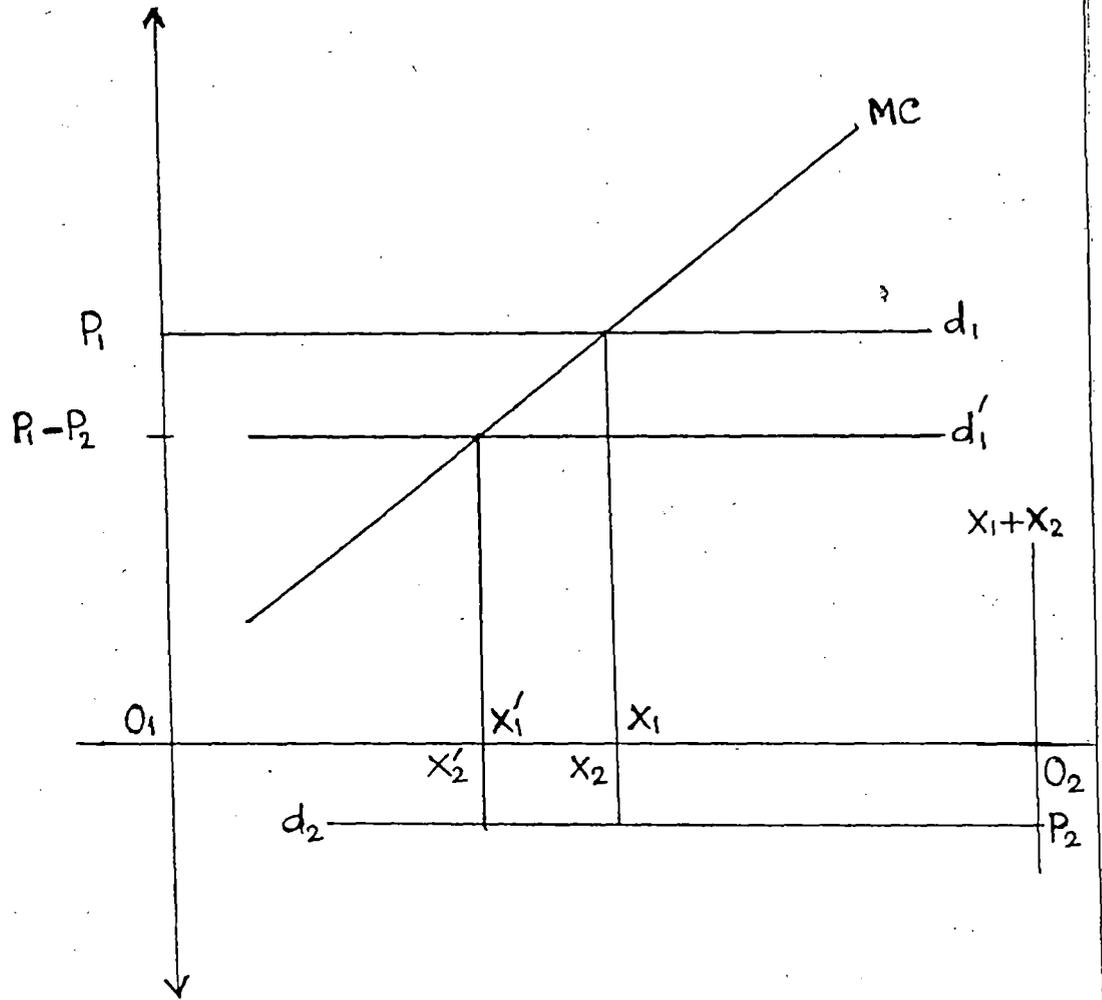
The allocation of X_1 and X_2 trees would possibly have been made better. Suppose the rights to property of the forest had been established then an owner logger or a community of owner loggers with some foresight might have foreseen future uses of virgin forest. Instead of maximising only his/ their logging profit, he/they would have maximise logging profit plus the value of remaining trees. Each tree cut for lumber would be worth P_1 minus value to him/them of saving the tree for future returns. If the value of a standing tree is P_2 during the cutting period as well as later (we assume this for the sake of simplicity), the net revenue from cutting a tree is $P_1 - P_2$. Thus the net addition to revenue over the two periods (let us say, present and future) from cutting a tree in the first period is the price of the trees' lumber in the first period minus price of the trees as standing timber in the second period. In this way, the cognisance of future in-situ timber value lowers the effective net lumber price and reduces the harvest from O_1X_1 to O_1X_1' . The second period timber supply rises from O_2X_2 to O_2X_2' .

A property right may be lodged in the private sector individual, corporation, government or responsible group such as organised community. The important characteristics of property rights is whether it is secured so that expectation of future benefits can be realised as compensation for present sacrifices.

This observation highlights the importance of bringing to bear collective wisdom, wit, and will to control forest resource use. It is not generally the case that ordinary markets naturally spring up to do the job (Neher P.A, 1990). Some alternative institutional arrangements may thus, be desirable.

The terms common property resource (CPR), common pool resource (CPR) and commons are often used synonymously and connote an economic resource or a facility which is communally or collectively held/owned by an identifiable community or a

FIG. 4.1



group of people and is, de facto, if not de jure, accessible to and jointly used by all members of the community/group. Collective ownership of CPR implies lack of well-defined individual private property rights of co-users in the CPR. Thus, a CPR is, 'subject to individual use but not to individual possession' (Oakerson, 1986). CPRs are free goods for the individual but scarce goods for society (Gordon, 1954). In true common property situations, use rights are shared co-equally and are exclusive to a well-defined group of people.

In this study I am concerned with common pool forest resource which may be defined as those resources that are accessible to and jointly used by people living in a particular geographical location such as a village or a cluster of villages. In the context of recreation of forest resource I also consider privately owned farm forests (planted after harvest of crops and before the next sowing), forests on common property lands (e.g. village panchayat grazing lands), forest on state property (e.g. revenue lands) or on near open access resource. Following Singh (1994) some salient distinguishing characteristics of private property resource (PPR), CP_rR, open access resources (OAR), and CPR are summarised in Table 4.1.

Some Salient distinguishing characteristics of PPR, CP_rR OAR and CPR

TABLE 4.1

TYPE OF RESOURCE

Characteristics	PPR	CP_rR	OAR	CPR
1. Property rights are well-defined	Yes	Yes	No	Yes & No
2. User/users' group is identifiable	Yes	Yes	No	Yes
3. Resource is accessible to everybody	No	No	Yes	No
4. Resource is used in common	No	Yes	Yes	Yes
5. Rules, regulations & conventions governing the use of resource exist	Yes	Yes	No	Yes & No
6. Exclusion of free-riders is difficult	No	Yes	Ye	Yes
7. Use of resource is subtractable	Yes	Yes	Yes & No	Yes & No

This distinction between CP_rR and a CPR is not even meaningful in many situations. My study here concerns with the

natural resource that is used in common by identifiable groups of people, irrespective of whether they do or do not have well-defined property rights in them. CPRs in this sense constitute a subset of a bigger set of CPRs.

An unambiguous definition of the term 'management' in the context of the use of CPRs is also necessary at the outset. In this study, by 'management' we mean human intervention in a CPR system with a view to restoring it, or conserving it, or augmenting and sustaining its productivity, and/or regulating its use. The intervention could be in the form of application of labour and/or material inputs, creation of institutions or modification of existing institutions, enactment of laws, and so on (Singh, 1994).

4.2 CPRs in India.

Common pool natural resources in India include such diverse things as village panchayat grazing land, privately owned fallow land, privately-owned cultivated land lying vacant in between two crop seasons, community threshing floors, degraded revenue land, degraded forest land, protected and unclassed forests, village forests and woodlots, land lying alongside railway tracks, roads, water reservoirs, tanks, ponds, lakes, rivers, streams, nalas, groundwater basins, marine fisheries, public (State) and community inland fisheries, and so on. In the Indian context, it is important to note that public land such as the degraded revenue land owned by the State Revenue Departments and degraded forest land owned by the State Revenue Departments and degraded forest land owned by the State Forest Departments are also de facto CPRs in the sense that they are accessible to and used in common by the villagers in whose (village) jurisdiction they lie. The rights and practices that determine who has access to and can use such public land are generally a matter of convention (Singh, 1994).

The availability of CPRs, and hence their role, varies widely from region to region in India depending mainly on the ecological conditions and agricultural systems prevailing there and partly on the present and past land settlement and land tenure systems. These factors affect not only the nature and extent of CPRs but also the broader institutional framework that governs their management and their integration with PPRs.

Arnold and Stewart (1991) identify three regions in India which exhibit markedly different patterns of endowment, use, and management of common property land and related resources. The regions are : (1) semi-arid and arid regions; (2) hill regions; and (3) forested tribal regions. The forested tribal region stretching from West Bengal to Gujarat is characterised by a great variety of forest and land resource use and management systems, and forest communities. Compared to the hilly and the semi-arid and arid regions, CPRs are relatively less important as a source of inputs for agriculture in this region but are very important as a source of minor forest produce for sale, and sites for shifting cultivation. Irrespective of their actual use and management, many areas in this region are classified as forest or revenue lands with very limited private or village rights.

4.3 Problem of CPR

Although common pool natural resources include such diverse things as community pastures, lakes, rivers, streams, ground water basins, forests, fishing spots, etc. they all face one common problem of how to coordinate the actions of individual users to attain an optimal rate of production or consumption for the whole community (Oakerson, 1986). Need for coordination and management generally becomes apparent when the flow of benefits or services from the resource is insufficient to meet the demand of the Community. The primary causes of the demand for products/services of a CPR exceeding their supply are increase in human and animal population, discovery of new uses for the CPR and/or its products, development and availability of new technologies for exploiting the CPR and for processing, transporting, and marketing its products discovery of new markets, and launching new public policies and programmes. Over a relatively short period of time when demand is constant, a CPR problem may occur due to a decline or deterioration in the supply of the resource caused by such factors as degeneration due to natural processes, destruction by natural and/or man made calamities, lack of necessary maintenance, etc. If a community of users is unable to control the use of its CPRs under changing circumstances, destructive competition or conflict among the users is bound to follow, which eventually results in depletion or degradation of the

resources. Hardin (1968) characterises this eventuality as the 'tragedy of the commons'.

Mckean (1987) enumerates the following three conditions under which co-owners of a CPR usually fail to cooperate in using the CPR optimally and consequently the problem of non-cooperation or cheating arises and spreads through the group.

1. When the perceived private costs to individuals of cooperating may exceed the perceived private benefits of cooperating;

2. When individuals feel that their own contribution to the collective goal is minuscule and would not be missed if withheld because others will continue contributing, enabling them easily to free ride on the contributions of others; and

3. When individuals have no assurance or certainty that the other members of the group will make their contributions (or cooperate) and that their lone contribution to the effort would be sufficient to produce the desired outcome. Hardin makes an implicit assumption that 'commons' are open access. This is not true even in the example of the medieval English grazing pastures that he used (Berkes and Farvar, 1989). The 'tragedy of the commons' in India is evident from the continued and unabated degradation of the CPRs. Community pastures are rendered completely denuded of any vegetative cover due to over-grazing, and community forests due to indiscriminate lopping and illicit felling.

The CPR problem represents a class of human problems which can be called 'no technical solution problems' (Hardin, 1968). For example, a typical technical solution to the problem of overgrazing of common pastures is erecting barbed-wire fences and/or deploying guards. It is common knowledge that this solution does not work; the fences are broken and the guards beaten up or bribed by those who are adversely affected by the solution. The real solution lies in helping the graziers to locate alternative sources of fodder for their animals and by educating, motivating, persuading, and organising them so they on their own can regulate and monitor the grazing without any external support or intervention. Similarly, other CPR problems like environmental pollution and degradation, congestion, excessive pumping of groundwater, encroachment of CPRs, etc. can not be resolved by introducing only technical changes : they require changes in human values, attitudes, behaviour, and in

the institutional foundation of the system (Singh, 1994).

4.4 CPR and Rural Development.

Even after extensive commercialisation, privatisation and encroachment on natural resources, quite a significant portion of these resources, is still held communally or collectively and used jointly by people in most of the developing countries of the world, including India. It is generally believed that the individually-owned resources or PPRs are better managed than those collectively held/owned or common pool resources. This belief is derived from the private profit motive which drives an individual to make the best possible use of his PPR. Such a motive does not operate in the case of a CPR whose benefits are shared by all its co-owners/users, irrespective of whether they do or do not contribute to its maintenance. However, there are many factors inherent in the structure of rural economy of most developing countries that make it desirable for these countries to hold as common property as much of their natural resources as possible (Singh, 1994). First, the low levels of income and literacy of rural communities make it impossible for them to meet the high financial, transaction, and enforcement costs. These are often beyond the managing capacities of formalised private property institutions. Second, a high degree of dependence of most people in rural areas for their survival on natural resources makes them more prone to natural calamities like droughts, floods, etc. whose incidence is highly unequally distributed in both time and space. Joint use rights in natural resources under those conditions may contribute to both the economic and social stability of rural communities. Third, common property may be an appropriate institutional insurance against individual failure; the right to be included in a group reduces the risk from individual failure by spreading it uniformly among the members of the group. A more plausible justification for retaining and promoting common property resource management is the tenacity of traditional institutions and therefore the high cost of changing these well-established practices and substituting new ones (Runge, 1986).

A large number of people, particularly the rural poor, all over the world depend to a large extent on the natural resources of land, water, forests, and fisheries for the supply

of many basic necessities of life, e.g. food, fuel-wood, small-wood, shelter, etc. (Gibbs and Bromley, 1989). According to Bromley (1986), some 80 per cent of the world's population depends on natural CPRs for their spare and precarious existence.

One of the major causes of poverty in India, as also in other countries of the world, is lack of natural resources available to the poor. That is, most poor people are poor because they do not possess any income-generating PPRs and do not have access to CPRs or CPRs are not locally available at all in their area. Conversely, it is also true that most rich people are rich because they possess PPRs and/or have access to CPRs. Distribution of PPRs today is the outcome of a process of interaction of various historical cultural, social, legal, political, and economic factors. In the initial stages of privatization of CPRs, availability of man power, as determined by the size of family, particularly the number of adult male members in a family, was a major determinant of the endowment of PPR of a household. This was so because a great deal of human labour was required to clear and enclose open access land, to make it fit for production of crops, to grow crops, and to domesticate wild animals. Resources were also acquired by use of force, as in wars of all sorts and of all scales. Afterwards, other factors such as economic power, social status, inheritance laws, political power, etc. played a dominant role in determining the resource distribution pattern in a community. The poor people had to depend on whatever CPRs were left out accidentally in the initial stages of privatization or afterwards deliberately set aside for communal use. These resources became, through convention and tradition, accessible to all the people living in a community located closest to the resource. But since the poor did not have any PPRs of their own, they depended on the CPRs for their livelihood to a degree for greater than those who had expropriated enough CPRs for use as PPRs. The dependency on CPRs was and still is higher in the tribal areas than in the non-tribal areas. This is because, historically, the tribal people have always lived in forests and depended for their livelihood on them (Singh, 1994).

Even today, most of India's rural poor depend, to a great extent for their livelihood on CPRs. They collect free of charge, firewood, crop wastes, cowdung, weeds, fodder, organic manure (dry leaves, forest litter), building materials (poles,

thatch and silt), fruits and vegetables, herbs, fibre etc. from CPRs. Water which is essential for survival is also collected from community ponds, lakes, rivers, etc. Besides, CPRs also provide raw materials for traditional occupations, including art and craft, and thus indirectly support employment in these occupations.

But with growing commercial exploitation of CPRs that is now going on, the poor find it increasingly difficult to meet their basic requirements from the CPRs. Evidence of their growing misery due to wanton depletion of CPRs abounds in the reports of research studies conducted in various parts of India (Agarwal, 1985). Depletion of CPRs of land, forest, and water has increased the misery and drudgery of the rural poor, particularly women who now have to travel many kilometers to fetch fuel-wood, fodder, and water (Nagabrahmam and Sambrani, 1983).

4.5 Analytical Aspects of CPR Problem

The logic of main stream economics emphasises private resource allocation decisions, under a smoothly functioning competitive market system. This system involves both the nature of goods traded and the characteristics of the market within which the trade occur. In brief, the conditions are; there must be perfect competition in the private factor and the product markets. Competition, in turn, requires, besides others, that a) each industry exhibit increasing costs; b) all goods and services produced and traded must be exclusive; c) absence of goods which exhibit jointness in supply such that one individual consumption does not diminish any other individual use of the good (non-rivalry in public goods); d) ownership rights are clearly assigned and can be enforced to all goods and services to be traded in the economy (Young and Haveman, 1985).

On several scores, either forest product as commodity or the markets in which they are actually bought and sold fail to meet the above requirements. This is more so in a less developed country. Some of the primary characteristics of forests which account for the inadequacy of the market can be listed as follows : a) the exclusive property rights which are the basis of an exchange economy are difficult to establish and enforce - mainly because of communal use requirements; b) forests create a capacity for assimilating and absorbing pol-

lutants controlling floods, soil erosion, recreational facilities etc. c) managing these characteristics is, in essence, the allocation of a collective good, one that exhibit non-rivalry in consumption; d) forests involve complementary uses for more than one purpose - and private ownership may capture only a part of this complementarities - solution of conflict of alternative uses may call for alternative allocative institutions; e) relative costliness of enforcement of property institutions in forest resources yields 'open access' problem; f) prevalent cultural and social values with regard to forestry may be conflicting. The sacredness of forests as a symbol of ritual and purity exempts forests in many areas, in some degree, from the rationality of the market. Market induced shift of forests to commercial use would alter the natural environment of the existing forest-dependent social structure. For such reason, some cultures proscribe allocation of forests produced by market forces.

Where markets are thin or absent, or where the demands or supplies exposed to markets capture only a portion of the full social costs and benefits, or when the forests resource in some role has the public good characteristic, public intervention may allocate resources more efficiently. But Government intervention may also fail because of the problems like free-riding, strategic behaviour, non-enforceability, exclusion of the vulnerable section of population (like some aspects of National Forest Policy 1980 etc.). In an imperfect world with imperfect and costly information, a combination of market and non-market resource allocation mechanism may yield better results.

In a market economy there is every likelihood that all outputs and inputs will not figure in the cost-benefit calculations of the individual economic agent either because they are intangible, in the sense of not being quantifiable, or they are non-marketable, such as collective goods, in the case of which, for instance, it is not feasible to exclude non-payers from the enjoyment of such goods. In such cases, it becomes necessary to undertake some other institutional arrangements to achieve the social optimum. The less developed the economy is and more backward the society, the more likely to be less perfect, less pervasive, less informed and less uniform. Economic inequalities tend to be more pronounced as social relations are less voluntary in a relatively more feudal society. Again, normative

considerations may be more important to the political leadership, expressed in a concern for social justice, income redistribution and protection of less privileged.

Even in the domain of main-stream Neo-classical economics it is being increasingly accepted that non-market considerations can and, from a social optimum point of view, ought to influence economic decision. The whole literature on "externalities" deals essentially with such concerns. Economic motivation need not necessarily lead to the social optimum, making social regulation desirable (Price, C. 1976).

Beyond externalities that affect society at a point in time, there is the need to consider intertemporal inequities. The Pigouvian "defective telescopic faculty" of the individual would undervalue the future, leading to inadequate provision for society of the future. If costs are pushed on to future generation by the unbridled operation of private economic activity, even the market mechanism can not come into play to readjust allocations because future generations remain unrepresented in present market transactions.

Externalities, distributional interest and intertemporal considerations are likely to be more inextricably interlinked in an underdeveloped economy than in a developed economy. An underdeveloped economy is usually characterised by wide disparities and inequitable distribution of income. Thus, it is more likely that those who suffer adverse external affects will have little economic power and they will be unable to force (some kind of Coasian) compensation solely through market pressure. The future generation are at double disadvantages and market pressures are likely to force external costs on to this generation.

Mancur Olson (1971) has challenged a generally held view that groups of individuals having common interests usually work together to achieve them. He argues that "Unless the number of individuals in a group is quite small, or unless there is coercion or some other special device to make individuals act in their common interest, rational, self interested individuals will not act to achieve their common or group interests (Olson, 1971). In general, the larger the group, the less noticeable the actions of its individual members, the higher the transaction costs of bringing them together, and hence the higher the tendency among its members to free ride. This is why large

groups frequently fail to provide collective goods for their members. Olson (1971) has shown that "Certain small groups can provide themselves with collective goods without relying on coercion or any positive inducements apart from the collective good itself. This is because in some small groups each of the members, or at least some of them, will find that his personal gain from having the collective good exceeds the total cost of providing some amount of that collective good.

More generally, the level of private provision of a collective good that individual will find profitable can be determined through simple maximisation exercise. Following Olson (1971) let the level of output of a collective good be given by T ; the size of the group by S_g ; cost of providing the good by $c=f(T)$; value or benefit to the group from the collective good by $V_g = S_g.T$; benefit to the i th individual member of the group by V_i ; and fraction of the group benefit gained by the i th individual by $F_i = V_i/V_g$.

The net benefit to the i th individual A_i is simply benefit to the individual less cost C , i.e. $A_i = F_i S_g.T - C = V_i - C$. To maximise A_i , we take the first derivative of A_i with respect to T and set that equal to 0 as follows :

$$d A_i/dT = d F_i S_g.T/dT - dC/dT = dV_i/dT - dC/dT = 0$$

$$\text{Or since } dV_i/dT = F_i(dV_g/dT) \text{ we have } F_i(dV_g/dT) = dC/dT$$

In words, for an individual the optimum level of private provision of the collective good will be when his marginal private benefit equals the marginal cost. In contrast, the optimum level of provision for the group would have the marginal cost equated with the marginal group benefit, i.e. $dV_g/dT = dC/dT$. This means that normally a rational individual member of a group will not provide a collective good in quantities that are optimal for the group as a whole.

Olson defines three sizes/types of groups, namely, the smallest type group or the 'privileged' group, the intermediate or 'oligopoly sized' group, and the very large or the 'latent' group. For the privileged group, for at least one i , gains from providing the collective good (V_i) exceed his own private cost (C), i.e. $V_i > C$. This means that for at least one of the members of the group it is profitable to provide the collective good entirely at his own private cost and free-riders are privileged

by the self-interested provision of the collective good by that individual. In this type of group 'there is a systematic tendency for exploitation of the great by the small' (Olson, 1971:29).

At the other extreme, there is a very large 'latent' group for which $V_i < C$ for all i . Large groups are likely to suffer without the collective good because no individual member of the group will have the incentive to provide the good privately. This is why a CPR jointly used by a large group of people is often over-exploited and degraded, i.e. the group fails to derive the optimum rate of output (Collective good) from the CPR. A latent group may, however, be coerced into providing collective goods in which case it is termed a 'mobilised latent group'. In between the privileged and the latent groups are what Olson calls 'intermediate groups'. Intermediate groups are vaguely defined as ones which at least two individuals must act together to provide the collective good but will always require some group coordination or organisation for provision.

Olson does not specify the number of individuals that would make up the very small group but he asserts that the group should be small enough so that 'the individual actions of any one or more members are noticeable to any other individuals in the group'. An important implication of Olson's theory for managing CPRs is that if a group using a CPR is very large and heterogeneous, it should be divided into a number of small and homogeneous subgroups and each subgroup randomly assigned a portion of the CPR that should be as far as possible proportionate to the size of the group. If there are marked variations in the quality of the CPR, the assignments may be rotated every year. This is, however, possible only if the CPR is divisible and if some arrangement exists for dividing and apportioning the CPR among the subgroups (Singh, 1994).

According to Olson, despite the free-rider problem, voluntary groups can provide collective goods in a wide variety of areas, including education, labour unions, and natural resources. He suggests that the success of the political entrepreneur will be related to his ability to utilise selective incentives to motivate participation in collective action. We concur with the opinion of Singh (1994) that in the context of CPR management, another important role of the political entrepreneur

neur is to provide requisite assurance to CPR users that expected benefits from collective management would actually accrue to them and the benefits would be equitably distributed among them.

James M. Buchanan and Gordon Tullock (1965) have propounded a theory of collective choice that is very similar to Olson's theory. In the context of CPR management, a key question is : what are the conditions under which a group comprising free and national utility-maximising individuals choose to formulate and abide by a rule or set of rules of restrained use of CPRs? Buchanan and Tullock's answer to this question can be summed up as follows : A group would choose a collective mode of action when each of its individual members finds it profitable to act collectively rather than individually, i.e. when his perceived costs include both external costs and decision-making costs.

Buchanan and Tullock (1965) argue that 'it is the existence of external costs that rationally explains the origin of either voluntarily organised, cooperative, contractual arrangements or collective activity. They use two cost functions - an external cost function and a decision-making cost function - to determine the 'optimal' or most 'efficient' decision-making rule for an individual. The external costs are considered to be a decreasing function and the decision-making costs as an increasing function, of the number of individuals required to reach an agreement (fig 4.2).

The optimum decision rule for an individual is derived by minimising the sum of expected external costs and expected costs of decision-making. Graphically, the two cost functions shown in fig 4.2 can be added vertically and the resultant composite cost function shown in fig 4.3. The optimum decision-making point is shown by the lowest point on the composite function. This means that the individual in question will choose the rule that requires the K/N of the group to agree to take collective decisions.

Buchanan and Tullock's approach represents an improvement over Olson's theory in that it explicitly relates the costs to the number of individuals in a group i.e. the size of the group and thereby resolves the question of the size of the group whereas Olson leaves the question unresolved. Their theory makes it clear that what is important in determining the

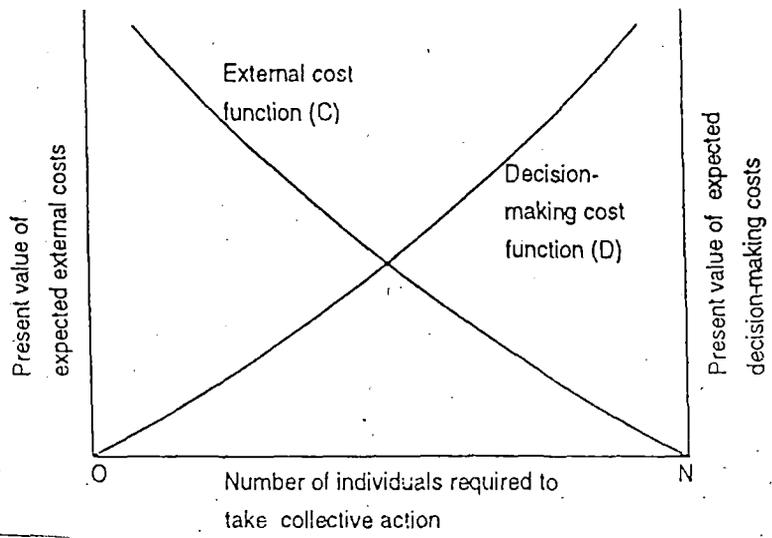


FIG. 4.2 External cost and decision-making cost functions (Buchanan and Tullock, 1965)

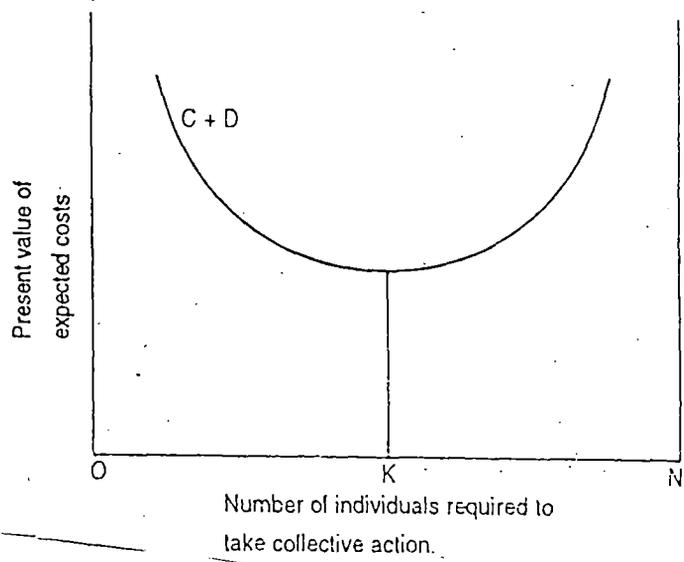


FIG. 4.3 Composite cost function

optimal rule or choice is the cost (external + decision-making) and not the size of the group. Thus, Buchanan and Tullock's theory could explain successes in CPR management where large groups are involved, eg. in Raymond, West and Central Basins in California (Ostrom, 1990) whereas Olson's theory cannot. Of course, the cost function employed by Buchanan and Tullock are too simplistic to approximate the real world cost functions. However, the framework provided by Buchanan and Tullock is broad and general enough to accomodate many details.

Recently, game theory has been used as an analytical tool for exploring the effects of different systems of property rights on common property resource management (Gardner and Ostrom, 1987). In this type of analysis, the structure of a game and its resultant equilibria are considered as dependent upon : (a) a set of institutional rules, and (b) the technical and physical characteristics of the CPR in question.

Many CPR problems have been formulated and analysed as a N-Person Commons Dilemma Game and a Prisoners' Dilemma (PD) Game (Campbell 1985) where decisions facing the users or appropriators of a CPR is analogous to the decision confronting each prisoner in the PD game situation.

The Classic PD game is analogous to many situations that prevail in the use of CPRs, such as communal grazing lands, common pool surface and ground water resources, marine fisheries community forests etc. The two-person game can easily be extended to a multi-person game played repeatedly if for Prisoner I, we substitute any CPR user or group of CPR users and similarly for Prisoner II, all the other CPR users. Such extensions are more plausible than the original two-person game because in the real world situations many persons use or share a CPR and face the PD situation repeatedly i.e. day after day or year after year (Singh, 1994). In India, CPR users are non-formally divided into caste-based or ethnic groups. These groups pursue conflicting interests and hence are comparable to players of a game whose outcome is controlled jointly by the players.

Following Singh(1994) the analogy between the classic PD situation and a CPR use-situation can be illustrated with reference to any CPR. Consider a hypothetical village in Eastern India with : 1) a population of 50 herds man divided in two caste groups of 25 each, each herdman owning only two

animals (whether cows, buffaloes, goats, sheep etc.); (2) 10 ha of common grazing land that can sustain at a reasonably good level of productivity on 50 animals per season; and (3) no formal or informal authority or leader or organisation acceptable to both the groups for arbitration on matters of grazing. In the absence of any authority or organisation, owners of herds do not negotiate individual grazing that would lead to socially optimum levels of grazing and do not have any grazing norms, rules or regulations - a no-holds barred situation. Following the structure of the classic PD game, we take one of the groups to represent prisoner I or Herder I and the other group to represent Prisoner II or Herder II. There are two strategies open to each herder group : (1) to cooperate with the other group by sending only one animal per member for grazing; and (2) do not cooperate and send any number of animals (more than one) per member for grazing. We can show the expected outcomes of these two strategies in TABLE 4.2 :

		Herder II	
		Cooperate	Not cooperate
Herder I	Cooperate	125,125	40,160
	Not cooperate	160,40	75,75

Suppose if, prior to each grazing season, the community of herders is indifferent to the distribution of potential benefits from grazing between Herder I and Herder II, then the payoffs are highest (250) when both the herders' groups cooperate, and lowest (150) when they do not cooperate. Using the same reasoning as each of the prisoners used in the PD game; each herder group finds that it is better off by 'not cooperating' whatever the decision of the other group. So, both the groups home in on (75,75) which is the second best alternative for them. This means that 'non-cooperation' is the dominant strategy in this game. This outcome or solution of the game, which is a non zero sum game, is a Nash equilibrium (NE). An outcome of a game (a strategy pair) is an NE if, taking the strategy of the other party as given, neither party can improve his position by revising his own strategy (Hirschleifer, 1987).

The PD game has fascinated many scholars and its analogy used to understand and explain so many complex problems related to use of CPRs. The outcome of the game is a paradox, in that it shows that individually rational strategies lead to collectively irrational strategies (Campbell, 1985 :3). However the paradoxical outcome of the PD game is very much contingent, as in other games, on the structure and rules of the game. Structures of many real world situations where CPR problems exist are not similar to the structure of the PD game in that the resource users may be free to communicate with one another and enter into mutually binding contracts, i.e. both the structure and the rules of the game can be changed. When this is so, the dilemma can be resolved by cooperative action of the group members. Also, when a situation is repeated again and again, rational resource users could learn from the past sub-optimal decisions and select strategies that yield a collectively rational or optimum outcome (Braybrooke, 1985, Hardin R, 1982).

Theoretical, experimental, and empirical studies of multi-person repeated games suggest that cooperation can emerge under a wide variety of circumstances and that issues of strategy, ethics and expectations play bigger roles in multi-person games than in single person games (Magrath, 1986 : Axelord (1984). Several propositions, dealing with the emergence of cooperation in iterated prisoner's dilemmas can be advanced. The most important among them is that the threat of and the willingness and ability to retaliate against defections is vital to the emergence of cooperation. In the Hawk-Dove game type situations, the 'first come first served' of 'weaker yields to stronger' convention could avoid conflict and produce cooperative behaviour (Hirschleifer, 1987).

Ronald J. Oakerson has developed such a model which can be used to analyse common property problems whatever the particular resource or facility (Oakerson 1986). An analyst who is familiar with the problem situation can use the framework of that model to sort out the available technical, historical, cultural, economic, political and administrative/ managerial information, establish relationship among the key attributes/ variables involved, diagnose what is wrong and why, and offer potential solutions of the problem. There are four components in the model, namely : (1) the technical and/or physical

attributes of the specific resource or facility; (2) the decision making arrangements i.e. organisation and rule that currently govern relationships among resource users; (3) the patterns of interaction among decision-makers; and (4) outcomes and consequences.

Following Oakerson, a diagrammatic representation is given in Fig. 4.4. In the short run, components 1 and 2 are treated as exogenous and components 3 and 4 as endogenous, but in the longrun all the four components 3 and 4 as endogenous, but in the longrun all the four components of the model are treated as endogenous variables, that is, they can all change. The basic relationships among the four components in the shortrun are shown by the solid lines and in the long run by broken lines in the Fig. 4.4.

In his analysis Oakerson uses three economic concepts, namely, jointness in consumption, exclusion and indivisibility to explain the physical and technical attributes of a CPR. Jointness refers to use of a resource by more than one individual simultaneously, each with or without subtracting from the quantity available to the others, depending upon whether the CPR is mixed collective good¹ or a pure collective good². The term 'exclusion' refers to meant whether it is or is not possible to exclude from the use of a CPR those potential users contributing nothing to the maintenance of the resource in productive form, or in other words, those who are free riders. Indivisibility refers to the quality or attribute of non-divisibility, in the physical sense, of a CPR. A CPR may be divisible or indivisible in this sense. In general, most of the CPRs are characterised by partial jointness and some difficulty in excluding the free-riders. However, the precise characteristics may vary from CPR to CPR and from situation to situation.

Decision-making arrangements mainly consists of those rules, procedures, norms, customs, traditions, etc. Which influence individual and collective choices in the use of the CPR

1. A mixed collective good can be used jointly by many individuals but in such case each individual's use reduces the quantity available to the others, i. e. the consumption is subtractible.

2. A pure collective good is one that can be consumed/used simultaneously by many individuals without any adverse effect (subtraction) of consumption of any one of the individuals on the consumption of the others.

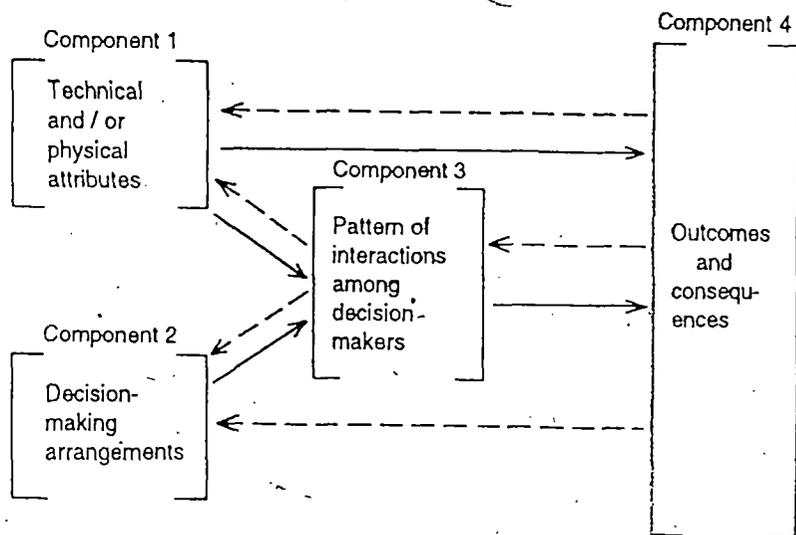


FIG. 4.4 A diagrammatic representation of the Oakerson model (Oakerson, 1986)

in question. Decision making arrangements or rules may be identified and listed at the operating level, collective choice level, and constitutional choice level (Kiser and Ostrom, 1982). Decision-making rule at each of the three levels can be changed by an appropriate authority located either at the same level or at the next higher level.

Patterns of interaction are reflected in the ways the individuals choose their strategies and relate to one another in a given situation. Presence or absence of reciprocity among a group of resource users determines whether the group will succeed or fail in the joint use of the resource in the larger interest of the group. Reciprocity requires that members of a resource user group contribute positively to each other's welfare; over a period of time. The absence of reciprocity is reflected in free-riding behaviour of members of a group and may lead to mutually destructive competition and/or conflict. Decision-making arrangements should encourage reciprocity among resource users and curb tendencies to free-ride.

Patterns of interaction produce outcomes that should be evaluated to determine the performance of the regime under which a CPR is being managed. Oakerson (1986) suggests the criteria of efficiency and equity for this purpose. The efficiency criterion can be operationalised by using the test of Pareto- Optimality : if, as a result of a change in the existing resource-use pattern, none of the members of a group could be made better off without making some one worse off, then the existing use pattern and its outcome are Pareto-optimal; conversely, the proposed change is Pareto-efficient. The main objective in applying this test is to identify a Pareto-efficient change, i.e. improvement in efficiency rather than on determining whether the present resource use pattern, or proposed change in it is Pareto-optimal. The equity criterion could be operationalised by asking this question: Is each member of the group going to get returns/benefits from the CPR commensurate with his contribution? If the answer is yes and if the efficiency criterion too is satisfied, then the present outcome passes the tests of both efficiency and equity.

Now let us see how the Oakerson model can be used to diagnose CPR problems and identify their root cause(s). To start with, we look at the outcome of a particular resource-use region and evaluate it using the sustainability and equity

criteria. If the outcome passes the tests of both sustainability and equity, then it can be said that there is no problem and the present management regime is Pareto-efficient. If the outcome is wanting on one or both the grounds, then we have to work backward through the model to trace the cause(s) of the problem. And for the purpose we may ask the following question : Is there anything wrong in the existing patterns of interaction (component 3) that is creating the problem? which characteristics of the decision-making arrangements (component 2) and the CPR in question contribute to the existing patterns of interaction and choice of present resource-use strategies? Is there any inconsistency or lack of congruence between the technical and physical attributes of the CPR (component 1) and the decision-making arrangements (component 2)? Is there any obstacles in the organisational structure that explain the observed pattern of interaction or whether there is difficulty at the constitutional level, i.e. in the by-laws of the organisation in question, which can be rectified only by an amendment of the by-laws. In the answer to these questions we may get the clues to the possible problems and also to their possible solutions.

Once the problems are diagnosed, to find solutions we need to work prospectively forward through the model. Looking at the components 1 and 2 we can ask ourselves about the kinds of modifications necessary in the physical and technical traits of the CPR in question and in the decision-making arrangements that would produce the desirable pattern of interaction and collective choice strategies and hence desirable outcome. We may also ask whether the benefits from these modifications would substantially exceed the costs. Answer to the former would need to be empirically substantiated and to the latter could be found by using the technique of social cost-benefit analysis.

The analytical models presented in this chapter are very much useful for diagnosing and analysing CPR problems. They are also very helpful in identifying the possible solution to them. In most cases, the solutions can be identified in the very process of diagnosis and analysis. In diagnosing and analysing a CPR problem, the CPR analyst could benefit from the logical use of conclusions reached by all the models.

4.6 Social Forestry : Origin, Evolution and Importance

The word 'Social Forestry' was first used by a forest scientist Westoby (1968) who defined it as 'forestry which aims at providing flow of protection and recreation of benefits for the community' (Tiwari, 1983). Thus conceptually there is no difference between 'traditional forestry' and 'social forestry', since both provide social benefits in one form or the other. But Westoby differentiated between these two by allotting production function to production forestry and protection as well as recreation function to social forestry. While the traditional forests meet the long term needs of the society in respect of oxygen supply, gradual release of water, large size timber etc., social forestry meets the immediate day to day requirements of fuelwood, leaf fodder, small timber etc. (Tiwari, 1983).

In reality, the concept of social forestry is a changing one and it varies from place to place and time to time. In the Indian context 'social forestry' has been defined as the science and the art of growing trees and/or other vegetation on all land available for the purpose, mainly outside traditional forest areas, with intimate involvement of the people to provide a wide range of goods and services to the individuals as well as to the society. In this respect, social forestry may be defined as the forestry of the people, by the people and for the people (Tiwari, 1983)

However, the full credit for evolving the integrated and dynamic concept of social forestry in the context of India goes to National commission on Agriculture. The commission (G.O.I, 1973) adopted the following as the objectives of social forestry, in order to fulfil the basic and economic needs of the community and thereby improving the conditions of living: i) fuelwood supply to the rural areas and replacement of cowdung, ii) small timber supply; iii) fodder supply; iv) protection of agricultural fields against wind; and v) recreational needs. Conceptually, it includes 'Farm Forestry' 'Extension Forestry', "Reforesting in degraded forests", and "Recreation Forestry", "Farm forestry implies raising rows of trees on the bunds or boundaries of fields and the individual trees in private agricultural lands; 'Extension Forestry' is mixed forestry, comprising raising of grass and leaf fodder, fruit trees and

fuel wood trees on suitable waste lands, panchayat lands¹ and on village commons, shelter-belts, & raising of plantations of different quick-growing species on lands on sides of roads, canal banks and railway lines; 'Reforestation in degraded forests' and 'Recreation Forestry' are more or less self explanatory.

The Commission advocated for a separate wing in the Forest Department for social forestry which is to act as catalytic agent for adoption of social forestry projects in India. At present all the State are implementing social forestry programmes of one kind or the other. It is interesting to note that some of the individual components of the present day integrated concept of social forestry in India were thought of more than a century ago. In 1873 it is Dr. Brandis, the first Inspector General of Forests who realised the importance of village forests to meet the needs of the rural people. In 1893, the importance of fuel, fodder plantation in the economy of India was recommended by Voelcker and accordingly in the next year Government of India issued the forest policy resolution of 1894. The Royal commission on Agriculture (Anonymous, 1928) and many other experts on rural development opined for the creation of village forests in order to meet up the requirements of the rural population for fuel, fodder, timber and raw materials for cottage industries. Though the idea of village forest were there, programmes were not carried out sincerely (Chaturvedi, 1950). After independence though the idea of Vanamahotsav² was accepted in 1950, it failed due to lack of concerted efforts. The National Forest Policy (Anonymous, 1952) recognised the need for evolving a system of balanced and complementary land use. During the Second Five year plan period farm forestry and extension forestry programmes were started in many states and implemented with varying degrees of success, depending upon the availability of financial, administrative and other supports. During the same period, gradual clearance and reduction in the area of forest brought about all the hue and cry of lessening of the forest areas, and acute shortage of firewood for the rural people. Under this background, it is the

1. Land owned by village level local governments (Panchayats).

2. Festival of the tree plantation during monsoon.

National Commission on Agriculture (1976) which stressed the socio-economic importance of social forestry in the rural community as well as in the management of forest resources. It was stated that by taking up the programme of raising trees, grasses and fodder in the farmer's own lands, village commons, wastelands and degraded forests close to habitations, it would be possible to meet the requirement of fuelwood, fodder, small timber for rural housing and agricultural implements, thorns for fencing etc. It was also stated that at the same time these programmes would remove a serious impediment in the practice of production forestry (GOI, 1976).

The Government of West Bengal adopted the social forestry programme after the forestry conference held in 1980 with the concept of forest resource development 'by' and 'with' the people instead of the usual 'for' the people (GOWB, 1983). In its guiding principles, the government recognises that forest management and planning in this state have to have two basic elements - "Production Forestry" and "Social Forestry" - not in a mutually exclusive manner, but as a complement to each other.

The most distinguishing feature of this programme is the people's participation in the management. Social Forestry in India is intended to be people's programme with technical and financial input from the Government, though there are two diagonally opposite views about the role of the people in the management of forest. According to the proponents of one of the views, the people have been provided unduly large concessions and rights in the forests and this has led to depletion of the forests (GOI, 1976). The other view holds that India's forest policy has alienated the people from forests with which they have lived symbiotically through the ages and this has caused deterioration of our forests (Guha, 1983). The latter of the two views is supported by Nadkarni (1989). According to him "minor and such other forests which could be called people's forests could be brought under cooperative community management, provided for equal rights to the produce of the forests.....". In his opening statements on "participatory forest management in West Bengal", Banerjee (1989) the then Additional Chief Conservator of Forests, West Bengal, says that State's disappearing forest can only be saved through a system of participatory resource management in which local people are meaningfully involved. The emerging new concept of joint forest

management, recognises that confrontation between forest departments and local communities should be removed. It has been given legal basis through the national government order of June 1, 1990 which clearly states that "The National Forest Policy, 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 (GOI, 1988). Joint forest management of India's degraded forest lands offers great hope for the empowerment of local communities and new direction for India's forester (Campbell, 1992). Involvement of local people in forest management for reforestation on degraded forest land at Arabari in South West Bengal is a success story. Thus community involvement is not merely a goal, in the context of social forestry, but also a necessity if the forest needs are to be met (GOWB, 1986).

The existing practice of forestry is lagging far behind the need of the people—mainly the rural people. They want thorns for fencing, protection of agricultural lands against wind, agricultural implements, construction materials etc. To meet these demands 'social forestry' with its own institutional framework may be a more fruitful strategy.

Most of the rural people of the country have been getting their requirements of fuelwood partly from the tree grown on farm (extension forestry) and partly from the protected and reserved forests. But the demand has been rising continuously with the increase in population. It appears that there is no other viable way to fill up this widening gap except 'social forestry'.

Social forestry may provide an important source of income and employment in the rural areas since a number of people may find employment in groundwork, planting, protecting, tending, harvesting etc. Many may find employment in ancillary occupations. Chetty (1985) lists 69 cottage and small scale industries which get raw materials from social forestry.

Over grazing by ever increasing livestock population is a

chronic problem in the country like India. 'Social Forestry' can mitigate the problem by providing green or dry fodder or by providing grazing facilities to the cattle.

The report of the Fuel policy committee shows that fuelwood continues to be the main source of non-commercial fuels in the rural areas (GOI, 1965). The study of Chhedilal (1970) indicates that in India about 4000 million tonnes of wet dung are used as domestic fuel annually. Social forestry programme can release cowdung for its more valuable and cheaper use as manure and thereby enhance agricultural productivity by providing adequate fuelwood at reasonable prices. Success of social forestry can ensure the flow of all the environmental implications of forest resource.

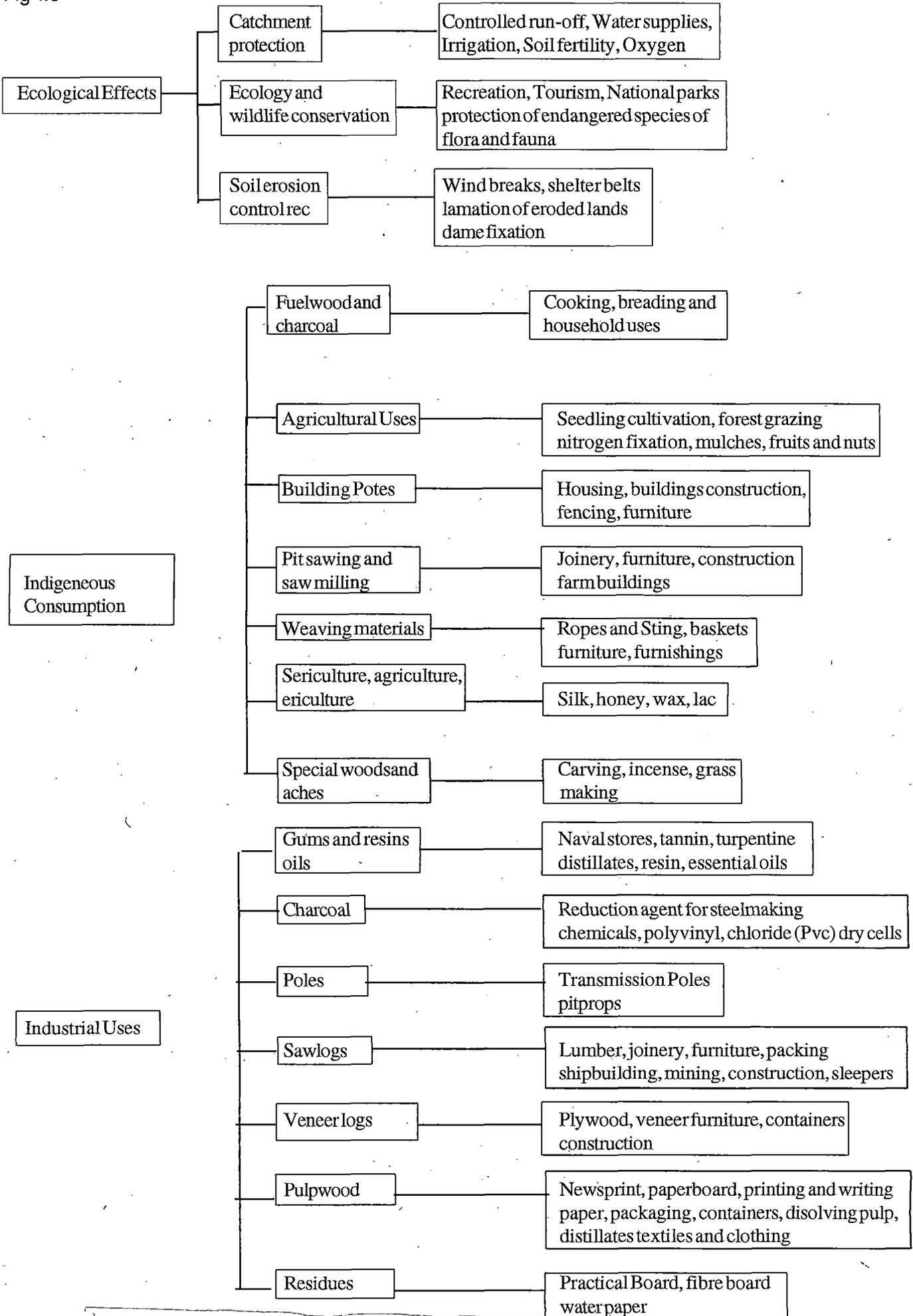
4.7 Social Forestry as a vehicle of rural Development

Social forestry can contribute greatly to rural development. Besides many direct benefits it has as already mentioned, many indirect benefits in the form of poverty alleviation, unemployment mitigation, increased consumption etc. Social forestry with its different components like, farm forestry, extension forestry, agro forestry, mixed forestry, village woodlots, community forestry etc. can help in catalysing the socio-economic development and checking the age-old rivalry between the major land uses particularly in the developing countries like India where capital is scarce, surplus labour is abundant, land-man ratio is high. It can offer the opportunity of creation of stocks of disposable assets in the form of renewable trees to supplement the subsistence requirements of the poor, who have little purchasing power, scant assets, and little political influence, in normal times and in contingencies. The multiplier effects and forward and backward linkages of social forestry in an agrarian economy such as India are enormous (Sharma et. al., 1990).

We may point out three important ways in which social forestry may contribute to rural development (FAO, 1981) :

a) maintaining its ecological balances; b) increasing the supply of products for local consumption; c) improving the benefits from industrial uses of timber. This role of social forestry in rural development can better be explained with the help of the following schematic form (figure 4.5) :

Fig 4.5



Source : World Bank. Forestry : Sector policy paper, washington. D.C.

Under 'ecological effects', some of the major conservation measures necessary to ensure catchment protection, soil erosion control, maintenance and safeguarding of supplies of usual species of flora and fauna have been included. The products of all the factors which are of concern to the maintenance of a viable farming system are included under "indigeneous consumption". The supply of fuelwood and charcoal is the main source of energy for the rural population and is also important in many places to the urban communities. Local supplies of forest products are the principal source of building materials, fencing and furniture in rural areas and in some places other products such as honey, silk and wood for carving are major sources of income.

"Industrial uses " include all major forest products which are produced for commercial purpose the sawlogs, poles, pulpwood etc. The possibility of income generation to the rural dwellers from the "industrial uses" depends upon the employment possibilities in felling and extraction, the economies of location of the processing plant etc. There are various factors which are very much important in determining the place of forestry in rural development as it has been explained in F.A.O forestry paper (FAO, 1981) as shown in figure 4.6 in the next page.

4.8 Working of the social forestry scheme in West Bengal.

As we have discussed in chapter 2, West Bengal , with an area of 88,752 sq. kms. extending from the sea coast in the south to the Himalayas in the north, supports a population of nearly 68 million with a high population density of 766 per sq. kms. as per 1991 census. The forest area of the State is only 13.4 per cent, bulk of which occur in three distinct zones in the north, south-west, and south. Despite of 125 years of scientific forest management in the state, the forest has been destructed, land has been degraded and thereby created a serious ecological and socio-economic crisis. In the three districts of Midnapur, Bankura and Purulia of the State, 272,000 ha land is suffering from serious land degradation (GOWB, 1992:P.5). The land utilisation position and the extent of different categories of wastelands available in the State is shown in table 4.3 and 4.4 repectively. These two tables show

FIGURE 4.6: FACTORS ANALYSING THE PLACE OF FORESTRY IN RURAL DEVELOPMENT

Factors

Possible response

Competition for land (trees are less intensive use of land than crops)

Intercrop trees and Crops

Competition for forest land

Allocate forest land rationally between trees and crops

Improve non-food benefit to forest Communities : forest and forest industries employment, Secondary forest product income, Social infrastructure

Competition for crop and grazing land to afforest

Plant trees on road sides, riverbanks field boundaries and other unused areas, areas marginal for crop production erodable areas unsuitable for crop production and grazing

Improve productivity on the better arable areas in order to release land for tree growing

Plant multiple - use species or mixtures of species to increase productivity

Intercrop trees with other crops or combine with grazing

Introduce additional sources of income (e.g. beekeeping)

Time scale for Forestry (delayed returns from tree growing)

Plant multiple - use species, or mixtures of species, which give some early return

Output from trees will not meet immediate needs

Provide financial support during the established periods : low-interest loans, grants, subsidies, wage employment

Introduce or expand complementary non-forestry sources of income

TABLE 4.3 LAND USE CLASSIFICATION OF WEST BENGAL (THOUSAND HECTARES)

Reporting area	Forests	Area put to non-agricultural uses	Barren and un-culturable land	Permanent pastures and other grazing land	Land under misc. tree and groves not included in net shown area	Culturable waste land	Fallow land other than current falllows	Current fallows	Net area sown	Total cropped area	Cropping intensity	Net irrigated area	Gross irrigated area
8846	1184	1293	121	4	162	374	61	82	5562	7004	125.9	1834	1834

Source : Government of India, National Wasteland Development Board, Ministry of Environment and Forests, Mission Document 1991, P.1

Table 4.4 Extent of different categories of Waste lands in West Bengal

(Area in Sq. Kms)

Name of Districts	Gullied or ravinous land	Upland with or without Scrub	Water logged and Marshy land	Land affected by Salinity/Alkalinity -coastal -inland	Underutilised degraded notified forest land	Shifting cultivation area	Degraded land under plantation crops	Degraded pastures /grazing lands	Mining Industrial wastelands	Sands/Deserts coastal	Steep sloping area	Bare Rocky /stony waste/sheet rock area	Snow Covered or glacial area	Total	Geographical area of district
Bankura	58.79	363.49	1.13	0.00	191.02	0.00	0.00	0.00	0.00	0.00	0.00	19.94	0.00	634.37	6882.00
Purulia	68.85	498.32	0.00	0.00	172.34	0.00	0.00	34.80	0.00	0.00	4.54	103.54	0.00	883.39	6259.00
Midnapur	43.08	118.37	11.06	32.23	232.82	0.00	0.00	23.48	0.00	126.80	0.00	6.56	0.00	594.40	14081.00
Total	171.72	980.18	12.19	32.23	596.18	0.00	0.00	58.28	0.00	126.80	4.54	130.04	0.00	2112.16	27222.00

Source : Government of India, National Wastelands Development Board, Ministry of Environment and Forests, Mission Document, 1991, P.31.

that there is enough scope of social forestry and indeed, the implementation of social forestry programmes has played an important role in this state in general and in the three districts viz. Bankura, Midnapur and Purulia in particular. This social forestry project-third in India, has been functioning with the assistance of World Bank since the year 1981-82. The objectives of this programme, as it has been stated in the guiding principles, social forestry project, west bengal (GOWB, 1980 : P.26) are :

a) To meet the most urgent requirement of fuelwood in the shortest possible time and to provide poles, small-timber, bamboo, fodder, fruits and other minor forest products for the basic requirements of the rural populace;

b) To induce community participation in creating, maintaining and protecting the plantation programme to be launched for such purpose so as to share the benefits in the contemplated joint management programmes; and

c) To provide employment to the unemployed and underemployed local people particularly the landless agricultural labourers including tribals, scheduled castes, other traditionally weaker sections of the rural communities. The programme includes creation of farm forestry on private lands of small and marginal farmers, establishment village woodlot, in the community land with the help of panchayat, plantations along the strips of roads, canals and railroads, reforestation and rehabilitation of degraded forests etc. There were twelve different models under the following four components of social forestry in the state (GOWB, 1982):

i) strip plantation (Model 1-4) ie. Model-1 : National Highway (Broad); Model-2 : National Highway (Narrow); Model-3 : State Highways and other roads; Model-4 : Embankment, canal bank, river bank, railway side.

ii) Village woodlot (Model 5-7) ie. Model -5 : Panchyat or other common land of Hill; Model-6: Government vested land, panchyat land of Gangetic plain; Model-7 : Panchayat lands of Laterite Zone.

iii) Farm Forestry (Model 8-10) ie. Model -8 : Private land in Hill; Model-9 : Private land in Gangetic Plain; Model-10 Private land in Laterite zone.

iv) Rehabilitation of Degraded forests (Model 1-12) ie.

Model -11 : Government forest land where there are more than 200 trees/stem.

The performance of social forestry project in West Bengal till 1990 is very satisfactory when compared with any other state of India. The following table (Table 4.5) gives a glimpse of this.

TABLE 4.5 : Abstract of Physical Progress (1981-90) of West Bengal social Forestry Project

Components	Appraisal Target (ha)	Actual Achievement (ha)
1. Strip Plantations	20,000	23,784
2. Village Woodlot	6000	2405
3. Farm forestry	75000	1,50,554
4. Rehabilitation of Degraded Forests	15000	65,011
Total	1,16,000	2,41,754

It is observed from the table that the actual achievements have far exceeded the appraisal targets. In its completion report (GOWB, 1992), Forest department remarks, "The project has exceeded the overall planting targets set at appraisal. A total of 2,42,000 ha of plantations, including 1,50,000 ha of farm forestry, were established, or 260% of the appraisal target. However, seedlings planted were mainly fuelwood and timber species. Survival rates ranging from 60% to 80% under RDF (Rehabilitation of Degraded Forest), the Social Forestry Wing established a total of 11,926 ha of replanting of gaps using mainly eucalyptus in the complete sal degraded forest areas and managed about 53,100 ha of coppicing of sal stumps. The replanting was undertaken also with soil and water conservation measures and its performance was satisfactory".

Social forestry wing has successfully implemented the plantation programmes in the 7 divisions and 16 districts. Districtwise achievement of different categories of plantations are shown in table 4.6.

From table 4.6 it is clear that achievements in farm forestry were beyond expectations. A total of 266.5 million seedlings were distributed to about 4,60,000 farmers covering

TABLE 4.6 : DISTRICT WISE ACHIEVEMENT OF DIFFERENT CATEGORIES OF PLANTATIONS (in Ha).

District	Road side	Cannal bank	Embankment	River bank	Railway side	Village woodlot	Farm forestry	RDF(p)	RDF(C)	Total
Darjeeling	252	145	5	494	10	209	7,857	286	-	9,258
Jalpaiguri	502	41	40	1225	100	216	8,310	551	-	10985
CoochBehar	400	20	70	640	50	105	7590	500	-	9375
West										
Dinajpur	571	261	180	238	162	153	5885	145	-	7595
Maldah	564	248	222	145	168	152	361	158	-	5267
Murshidabad	562	222	66	55	184	22	2095	63	-	3269
Nadia	688	235	95	110	213	33	328	88	-	4750
Birbhum	933	1680	24	552	270	183	12,555	1340	1280	18817
Bankura	870	715	90	120	185	253	20282	3645	11156	37316
Midnapur	1244	1810	499	460	206	632	35701	3,465	28383	72400
Burdwan	887	874	71	231	291	262	14495	975	2618	20704
Purulia	533	135	-	120	330	60	13144	530	9648	24500
Howrah	181	259	17	40	71	21	3990	-	-	4579
Hooghly	131	118	22	40	51	63	4236	-	-	4661
24- Parganas	350	102	35	10	44	41	7516	180	-	8278
Total	8668	6865	1436	4480	2335	2405	150554	11926	53085	241754

Source : Monitoring Information 1981-90, Monitoring and Evaluation cell, social forestry wing Government. of West Bengal. about 1,50,554 ha of plantation, though the survival rate was low at about 46% due to inadequate maintenance and protection resulting from inadequate technical advice from social forestry wing (GOWB, 1992). In the state plantations were established in three different agro-climatic zones : one percent in the coastal zone, 24% in the alluvial zone and 75% in laterite zone. The project has increased the forest cover in the state. This is shown in table 4.7.

TABLE 4.7 : Districtwise % increase in tree cover from 1981 to 1990

District	Area (Ha)	Afforestation in Non-forest Area (Ha)	Percentage
Darjeeling	3,14,900	8,972	2.85
Jalpaiguri	6,22,700	10,434	1.68
Cooch Behar	3,38,700	8,875	2.62
Bankura	6,88,200	22,515	3.27
Midnapur	14,08,100	40,552	2.88
Burdwan	7,02,400	17,111	2.44
Purulia	6,25,900	14,322	2.29
Birbhum	4,54,500	16,197	3.56
Hoogly	3,14,900	4,661	1.48
Nadia	3,92,700	4,662	1.19
Murshidabad	5,32,400	3,206	0.60
Malda	3,73,300	5,109	1.37
West Dinajpur	5,35,800	7,450	1.39
24 Paraganas			
(incl. Calcutta)	14,24,000	8,098	0.57
Howrah	1,46,700	4,579	3.12
Total	88,75,2000	176,743	1.99

Source : Monitoring Information 1981-90, Monitoring and Evaluation Cell, Social Forestry wing, Government of West Bengal.

Field achievement of the project is also well beyond expectations which are in Table 4.8

1. Total Road length covered :
 - a) National Highways -1113 kms.
 - b) Other Road -12763 kms.
2. Total Length covered for :
 - a) Canal Bank -3922 kms.
 - b) River Bank -2546 kms.
 - c) Embankment -846 kms.
 - d) Railway Land -1341 kms.
3. No. of Panchayats involved in Village woodlot : 1939 Nos.
4. In farm forestry component :
 - a) Seedling distributed -26 crores 80 lakhs
 - b) Villages involved - 14580 nos.
 - c) Participants Received Seedlings - 429332 Nos.
 - d) Persons received incentives - 212275 nos.

Source ; Social forestry projects, West Bengal, highlights (1981-90), Monitoring and Evaluation cell Social Forestry Wing, 1992.

Before the publication of "Monitoring Information 1981-90" and "Highlights (1981-90)", social forestry wing published the following four interim evaluation reports covering upto 1988 plantations : i) "Evaluation : An interim report " covering plantation of 1981-82; ii) "Evaluation : Second Inerim Report" covering plantation of 1983, 1984, 1985; iii) "Interim Evaluation Report, second Assessment (1981-86)" containing review of plantations from 1981-85 and the first evaluation of the plantations of 1986; and iv) "Interim Evaluation Report 1987 and 1988"

Key findings of these four evaluation reports are almost the same and these can be summarised as follows :

- i) The project in general has been progressing well.
- ii) It was possible to identify the target group & response from them was overwhelming (where target group refers to rural

landless poor).

iii) Village woodlot could not make much headway.

iv) Social forestry was emerging as an alternative rural economy.

v) A shift from monoculture to polyculture could be effected successfully.

vi) Group farm forests was practised wherever possible.

vii) There was a glut in marketing of farm forestry produce.

viii) Marketing support system is not good.

ix) Staff shortage became a constraint.

x) Strip plantation and regeneration of degraded forests are satisfactory.

In these reports the Forest Department identified the key contributing factors for the success of farm forests. They are - i) availability of the wastelands, ii) Free supply of seedlings with additional materials like fertilisers, insecticides etc. and cash grants for compensating national income foregone; iii) Setting up of a network of well distributed nurseries within the convenient distance from the villages; iv) excellent interaction of field staff with the target groups; and v) prospect of favourable marketability of produce.

On the other hand, the Forest Department identified the following reasons for shortfall of village woodlot :

i) Lack of community land; ii) lack of suitable local leadership; iii) lack of technical and financial capacity; iv) somewhat obscure perceived individual benefit from village woodlot; and v) absence of social cohesion and the community being highly fragmented professionally and economically.

In its project report (GOWB, 1992), the social forestry wing claimed that overall, the project achieved its main objectives that are as follows : i) In terms of rural employment about 25 million mandays of employment were generated during the project implementation period compared with the appraisal estimate of 15 million man-days. Most of the people benefiting from employment were landless farm labourers, scheduled castes and tribes. ii) By and large, this programme stimulated people's awareness of the economic importance of

trees. There has been a marked improvement in enthusiasm of the people who got deeply involved in the programme and adopted it as an alternative farm production system and this has contributed to increase gross rural wealth. In the rural side, people are becoming more conscious about the land use pattern in the sense that they can put their so long unproductive capital to some use by way of tree planting which can generate subsidiary income for them in future years. Thus the object of the programme to enable poor rural populace including the tribals to lead to a life of more dignity and less tension has been fulfilled atleast to a limited extent.

iii) Social forestry programme developed sufficient awareness among the people for the ecological importance of trees. Long stretches of strip plantation, river bank plantation, reforestation of degraded forests and farm forestry become possible without fencing. In real sense, the attitude of the people has been changed and people developed a love for trees.

iv) This programme reduced the gap between forest officials and local people. Many forest officials have become people-oriented and have developed the skill of involving people in forestry activities. As a result community participation, in planning, management and benefit-sharing, though lacking in initial years, has considerably increased.

v) The project has developed sufficient skilled manpower for social forestry development programme and achieved the project objectives of forest production. There would be about 10.6 million tons of fuelwood 120000m³ of timber 15.7 million tons of fodder, and 15.9 million tons of poles and pulpwood. (GOWB, 1992). Winning the four "Indira Priyadarshini Brikshamitra" awards in 1987, the state positioned itself in the frontline of the social forestry programmes in India (GOWB, 1987). It also won the 'Paulgauti' award given by the World Wildlife Fund in 1994 for the best performance in India. These speak enough about the working of the schemes under social forestry programme in West Bengal.