Chapter 1
Introduction

1.1 Introduction

India is one of the twelve "megadiversity" countries of the world, which is rich in natural resources and geographical diversification (SFR, 2009). With 10 bio-geographic zones and 25 biotic provinces, all major eco-systems are represented here. India is a landmass of nearly 32,87,263 sq. km. with over 1.02 billion people (Census, 2001). The country has a coastline of 7,616 km. and 14 different types of climatic forests the total forest cover in India is about 6,50,000 sq. km. India is the home land of 13,000 species of flowering plants, 20,000 species of fungi, 50,000 species of insects, 65,000 species of fauna including 2000 species of birds, 350 of mammals and 420 of reptiles. It covers nearly 7 percent of world's flora and 6.5 percent of world fauna of which 33 percent flora and 62 percent fauna are endemic. India has over 30 National Parks that constitute 1percent of the landmass and 441 sanctuaries that constitute 3.5 percent of the area.

The country is fortunate to have distinct and varied forest vegetation – from tropical, wet evergreen forests in the North-East and in the Western Ghats to the dry alpine forests of the Himalayas. Within this broad classification there are semi-evergreen forests, deciduous forests, littoral and swamps forests, thorn forests, mountain temperate forests and alpine meadows. These forests are store house of extremely rich wealth of bio-diversity in form of animals and plants. The estimated biological diversity is over 45,000 plant species and 81,000 animal species which represents about 7 percent of the world's flora and 6.5 percent of the world's fauna, respectively. The country has vast stretches of forest, repository of timber, fodder and other non-timber forest products. The country also has large deposits of various minerals.

India is but one of many developing countries subjected to ecological pressure today. Degradation of the environment in India is manifested in the desiccation of natural forests, recession of water tables, erosion of topsoil, increasing incidences of landslides and floods, conversion of arable land into wasteland and rising air and water pollution. The consequences in most cases are borne principally by the sections of people whose survival depends on natural resources. Natural resources are important to the livelihood and coping strategies of the poor for providing food, livestock feed, household products, income, medicine and also environmental services (Scott[1], 2006). Resource scarcities sparked by rising demand and

rapid depletion in stocks create sharp conflicts between competing groups of resource-users. These conflicts are usually between groups of poor who vie with each other to draw upon natural resources because they have no alternative. However, dramatic conflicts also occur as an offshoot to prevailing social and economic disparities between the rich and the poor. The Chipko Movement (1973) and the currently ongoing Narmada Bachao Andolan against the expropriation of common lands and resources are instances where the poor have risen in struggle against existing distributional inequities in Indian society.

An obvious distinction contrasts these grassroots struggles from the post-industrial environmentalist movements of the developed countries which emerged after economic prosperity had increased leisure to the point where people began to place a premium on their occasional escape from the city into more natural surroundings. From the viewpoints of the latter, dubbed as 'deep ecology' (Johns[2], 1990), conservation of the biosphere became virtually synonymous with total preservation of flora and fauna, which were accordingly given protection under writ of law. In India, environmental movements like Chipko were more often than not part of a class conflict of deeper ecological implications, with *distributive justice* as the core issue to which ethnicity, religion and class struggle could all be related. Protest launched in various forms with massive mobilisation of support and mass participation gave enough distinctive character to these movements for them to be labelled as 'the environmentalism of the poor'[3] (*op cit*). This protest of the poor resulted directly from their struggle to maintain control over the natural resources they needed for subsistence, rather than as an indirect consequence of their seeking qualitative betterment of their lives.

1.1.1 Resource need of rural poor

During the last three plan periods, India has witnessed rapid and sustained economic growth. The rate of growth in income achieved during this period has never been attained in the past. Yet, the country has the largest number of people living below the poverty level. The high rate of growth achieved is also accompanied by a highly skewed distribution of income and wealth. Poverty in India is characterized by its spatial concentration, ethnic orientation and resource relationship. It is more rural than urban, mostly amongst tribal and marginalized people, and more in forest areas than agricultural or industrial areas.

The importance of local natural resources in rural economy is not just confined only in its role for providing livelihood security to rural poor, but its importance lies in the fact that, unlike the rich, the poor are worst affected due to lack of substitution possibilities of such resource. Thus, when wetlands, ponds and lakes, woodlands, forest and grazing field are

damaged due to encroachment, construction work, or usurpation by the state, traditional dwellers suffer (Dasgupta and Mäler[4], 2004). In his pioneering study Jodha (1986) reported evidence from over 80 villages in India, that among the poor families 15-25 percent of income accrue from local resources which are held in common. Corroborating Jodha's findings, the NSSO 54th round and Cavendish (2000) study showed that the dependence of the poor on local resources was actually even higher. In their study both Jodha and Cavendish reported that, local resources as proportion of household's total income were higher in case of poor household than the rich household. For these reasons natural resources in rural regions of developing countries are often communally owned or even communally managed by the poor people. Community ownership of resources enables the poor to mitigate the risk by pooling resource ownership than would be made possible under the private ownership system. Such a system of resource ownership has evolved overtime rather than being a favour from any devolutionary policy of the state.

By means of community ownership and management of natural resources the poor have attempted to conserve such resources and thus help evade "tragedy of the commons". Study of the environmentalism of the poor however quickly leads to a critical dimension in social and economic ecology, namely *ecological property rights* or the pattern of ownership of natural resources. Considerable divergence of opinion exists regarding the influence that property rights have on the agenda for environment conservation. Among various forms of resource proprietorship ranging from *open access*, *common property*, *state property* and *private property* (Klink[5], 1994), the management of resources under community ownership has often been observed to comply very closely with the objectives of environmental conservation. Terracing of agricultural lands for soil conservation, collective village systems of agricultural rotation, and community rules governing the use of grazing lands may be cited for instance as factors that are notably supportive to conservation[6].

CPRs have been a major source of livelihood security for the poor and other marginalised sections like women in resource poor areas (Jodha, 1990[7] and Cavendish, 2000). The rapid deterioration and decline of CPRs like forests, grazing lands and water bodies has jeopardised the livelihoods of the poor besides giving rise to the debate on the possible poverty and environmental degradation rhetoric (Dasgupta and Mäler, 1997)[8].

The direct poverty alleviation programmes implemented, for self-employment or wage employment have had only a marginal impact on poverty (Rath[9], 1985) either because of its

limited reach or they lacked an integrated approach necessary for eradicating poverty. On the other hand, the green revolution technology has largely bypassed the resource poor areas inhabited by the bulk of poor (Shylendra[10], 2002). As a result there has been a shift in the policy emphasis from merely attacking poverty directly to one of providing larger livelihood security for the poor by ensuring multiple livelihood opportunities[11]. CPRs being one of the primary sources of livelihood support, efforts to restore or rehabilitate them could therefore become a potential strategy for poverty alleviation and livelihood improvement.

The common property concept jointly originates from the definition of the *commons* such as a village grazing pasture, and of *common pool resources* such as oilfields or marine fisheries, where a single pooled resource is subjected to extraction at different points. However, *common property resource* (CPR) regimes and *open access* regimes differ, in that under the former, the use of resources is restricted to defined individuals and groups, whereas extraction in the latter is in effect a free-for-all. Nevertheless, '*open access* is *not* the *commons*'[12], CPR regimes are however not necessarily incompatible with open access, even though user-groups can impose self-regulating controls and limits on access. CPRs are an important element of natural resource endowment of the rural communities in developing countries[13].

The problem of managing CPR systems relates squarely to determination of the optimal levels of exploitation of CPRs. Overexploitation of resources, because of development and modernisation, can force a breakdown in traditional common property systems. Success in the management of CPR regimes therefore depends on the existence of clearly-defined boundaries of resource availability, and the congruence of management rules and individual rights under prevailing local conditions. Success also depends on collective choice mechanisms, *i.e.* on whether user-sections affected adversely by certain operating rules can participatively modify these rules without disturbing the rights of other users. Frequent monitoring of the CPR stock is also necessary to prevent overexploitation of resources. Appropriate quotas and sanctions may need to be imposed to limit further exploitation of resources by user groups who violate CPR-access rights. For disputes that originate in conflicts of interest between users, easy access to conflict-resolving mechanisms becomes imperative to maintain CPR exploitation rates at judicious levels. To prevent occurrence of such conflicts, it thus becomes fruitful to organise an institutional structure for regulating CPR-use, with full user-participation in the laying out of extraction norms.

1.1.2 Statutory & Incentive-based CPR Management Systems

The *commons* refer to economic as well as noneconomic resources that are held in common, *i.e.* without individual rights of ownership being assigned. The two senses in which the commons have increasingly entered environmental literature are in terms of *global* and *local* commons. While conceptual awareness about the nature of *global* commons such as water or air quality has increased in recent times with media attention and the spread of green consciousness across the planet, more intractable dilemmas usually attach to *local* commons, such as the woodland or pastures which surround a village and are put to common use by village residents. Open-access permanent village pastures in India range widely from the gairan lands of Karnataka to the gauchars in Northern India. Other instances commonly found in the Himalaya are the mountain springs or jhoras, which are the primary source of water for rural residents, or the plants and minerals found nearby which serve various utility purposes. Access to such resources is open and nonexclusive and is exercised without hindrance. Interference with such access rights has however been a common consequence of growing populations and resource scarcity. While, theoretically, access rights to the commons are to be universally exercised, the axe is often found to have fallen on the poor and the impoverished whenever the need has arisen to restrict access rights in the context of environmental protection and biodiversity preservation. The Himalaya has not been an exception to state policies more oriented to serving the interests of urban communities rather than of the rural poor.

The defining feature of any *resource-management system* (RMS) is its ability to bring resource demands into conformity with existing resource supply. A more subtle onus placed upon the RMS is however to balance resource demands and supplies over time - an area in which CPR systems may often fail. The failure is the result of the *resource stock* entering the balancing system, which is a more difficult quantity to optimise since its present use prejudices its future stock, subject to a certain level of uncertainty. An RMS based somewhat myopically on maximisation of current resource-use value may thus find it much easier to bring demand and supply into conformity without thought being given to stock depletion, than an RMS which maximises overall resource-use value by balancing present demands (*i.e.* resource flows) against future demands (*i.e.* resource stocks). For this reason, open-access CPR systems often wend their way into the so-called 'Tragedy of the Commons'[14] where unhindered current use without any restriction on usage rates allows depletion of resource stocks to levels at which the resource system as a whole faces imminent collapse.

The justification for having CPR systems is drawn from the more general issue of *property rights*. This issue stems from the difficulty of framing enforceable command and control institutions, which can administer the RMS to the overall benefit of the community. While in standard practice the world over, enforceability depends on the existence of legal sanction; two variants of legal enforcement can usually be discerned. The first of these is *common law* (alternatively, *customary* law) such as *panchayats,* legal sanction of which draws weightily upon tradition and past precedents. Common law systems are not uncommon to the Himalaya; they are used extensively, for instance, to administer *jhum* (swidden) lands in the North East, or civil (*soyam*) forests in the Western Himalaya. However, for common law systems to work efficiently, there must be established precedents and identity in circumstances which creates obvious difficulties when population grows, land availability changes and scarcity increases. Other difficulties in administering common law relate to the high transaction costs of having to handle each decision individually and limited information and expertise, especially if the nature of conflicts is new.

An alternative legal system, well reflected for example in Indian Forest Law, is *statutory law*, by which all rights and prohibitions are duly recorded and generally administered under Courts of Law. Such a system, while having the advantage of lowered as well as uniform transaction costs, has the disadvantage of being inflexible unless periodically amended. A more serious failing of the system arises when the number of access right holders multiplies beyond control, as for instance when both populations and resource dependence increase, since the burden of enforcement in a statutory law system lies with a neutral authority rather than with the users themselves. In effect most often a *free rider* situation ensues where the effective penalties are minimised in several cases because of lack of detection.

However the primary difficulty with both legal systems - customary or statutory - is the lack of an adequate incentive structure that ensures optimal resource management. This difficulty is centered around the problem of property rights, in the sense that precedence of access rights to common resources and the nature of allowable *versus* disallowable uses is not well defined and to complex and interlinked to be written as a formal contract[15]. It is interesting to note that the existence of property rights is also essential to the working of markets. If property rights are well defined, enforceable and transferable, and markets exist where these can be traded among users under competitive conditions with reasonable efficiency[16], the outcome of market trading in access rights can lead to a socially desirable result which balances resource supply with all potential needs of the community.

Efficiency in market-incentive based RMS systems rests on the well-known Coase Theorem of environmental economics[17]. Briefly stated, the theorem applied to CPR contexts argues that when a set of holders of access rights are empowered to extract a penalty against resource overuse by another set of rights holders, the extent of resource depletion will ultimately be limited to the point where the penalties that the latter are willing to pay exactly compensate the former for resource needs that have remained unfulfilled. What is important for the theorem to work is that the access rights are well defined and the penalties enforceable, so that the socially optimal level of resource use can be determined by trading behaviour between the two sets of users. Reinterpretation of the theorem[18] particularly in community-based natural resource management systems again postulates that voluntary negotiation between CPR-users can substitute for market transactions in achieving a 'fully efficient outcome', when (a) initial rights of access are well defined; (b) negotiations between users are costless; and (c) there are no income effects. State intervention is no longer necessary to achievement of a Pareto-efficient resource allocation through negotiation, since the negotiations remains costless. Since, moreover, the allocation is *optimal*, independently of the initial assignment of access rights no tragedy of the commons need occur to an unregulated common property resource, since negotiations between users would inevitably avoid an inefficient outcome.

It needs to be noted that for the property rights system to operate, CPRs have to be made a private property institution. This must not be confused however with *individual* property rights, since the private right may well belong to a community group rather than to its individual members. The Coase Theorem moreover works irrespective of which group is assigned the initial property right since the results of bargaining lead the community to the same outcome. In substance, therefore, the approach is conceptually suited to managing fuel and fodder access rights without legal intervention in rural communities, provided such rights are unhindered, enforceable and tradeable, and recognised as such by government.

State mediation and other intrusions in CPR systems ultimately bring market integration in their wake, a glaring consequence of which is the alienation that users feel from resources which are no longer attached to traditional community settings. The alienation disrupts the frequency of interactions among rights holders, impairing their incentive "to adopt cooperative behaviour"[19]. Another adverse impact of market integration arises from the demonstration effect it has on individual user preferences. The shift to individualistic consumption patterns and modes of living often compels users to sell productive assets in

their drive to acquire hard cash. Even the poor may resort to sale decisions, which precipitate drastic changes in "ecological and socioeconomic environments'[20].

However, besides the impact of state mediation and market integration, the most crucial factor responsible for altering traditional CPR systems is population growth. The consequences of an unabated rise in population and a constant resource base fall most severely on collective property rights-holders causing a decline in their individual resource shares and gradual erosion of social power. Ultimately, this threatens the viability of the traditional RMS system and only through provision of alternative income and employment opportunities can the negative impact on CPR allocation and management rules be contained.

Despite the apparent rigor of incentive-based RMS systems, instances of management failure occur frequently in income-poor regions and countries, primarily because the incentive structures that exist are not in tune with resource priorities and needs. The mismatches are often most evident in the rupture of fuel, fodder and landuse systems leading to widespread rural poverty. The problem is delineated over several successive stages, each denoting further internal collapse within the RMS system, until the poor are driven to migrate and seek shelter in other places and occupations[21]. Usually triggered again by rapid population growth, the chain of occurrence commences when the local commons on which village communities depend for fuelwood and fodder are taxed beyond their replenishment thresholds by increasing resource drawals. As forest cover and usufruct yields decline, other substitute biomass resources available locally, such as cowdung, straw and crop residues are diverted from manuring and fodder uses into meeting energy demands, causing a continuous decline in crop yields. Not till forest usufructs become *priced* rather than *collected* commodities does the collection of these generate notional savings for the rural families. Till then, collection pressure continues to fall on forest lands rather than common lands. The crisis however deepens uncontrollably when the biomass CPRs are transformed into priced resources, escalating their depletion rates with the materialisation of fodder and fuel markets. The stripping of vegetative cover from common lands accelerates erosion and further reduces agricultural production, until even the bare subsistence needs of farm families cannot be met without selling off landed assets and property. Faced with no further options after all assets have been lost, the pauperised farm family is forced to migrate into other occupations and eventually to urban areas to swell the ranks of the assetless urban poor.

1.1.3 Growth of natural resource economics

Destruction of natural resources especially those held in common has a direct bearing on the livelihood security of the poor. It is therefore, important to know what would be the optimal rate of extraction of such resources such that the resource base is not altered adversely. Traditional resource economic theory addresses this particular problem of optimal extraction under a competitive market conditions in the framework of a capital market structure (Hotelling rule), under imperfect competition under monopoly and cartels, and optimal revenue and Pigouvian taxation. Excellent exposition of these topics have been elaborately dealt in the classic text by Dasgupta and Heal (1979), Howe (1979), Fisher (1976), Dasgupta[22] (1982), Neher[23] (1990), and Kneese and Sweeney (1993). An important issue in natural resource economics is the definition and assessment of indicators of resource scarcity. The three different approaches in this regard are based on classical, neoclassical and biophysical models of scarcity. Three major natural resources extensively studied are fisheries, forests and water. In these areas, important research issues are alternative management techniques, uncertainty, investments, and their multiple uses.

The value of a natural resource is more generally derived from its usefulness, but there are resources whose value is aesthetic (e.g. Kanchanjanga mountain), or intrinsic (e.g. sacred groves), or a biodiversity which is a combination of all the three aspects. The economic worth of a natural resource is measured on the basis of what is extracted from it (timber, fishes, water etc.), or from its stock that offer us service (wetlands, forest cover, backwaters), or on both (aquifers). A major problem in natural resource economics is that markets for many of its outputs simply do not exist. This has been generally referred to as market failure. Market failure can take place when there is externality (divergence between private and social valuation), asymmetrical information, absence or ill defined property rights structure. The market failure leads to suboptimal outcome in resource use resulting in a rate of extraction of natural resources that far exceeds the rate of replenishment of the resource a phenomenon that has come to be known as "tragedy of the commons". This requires that either a method of valuation of resources for which markets do not exists is developed or create conditions that may help to build the market in the first place. The former has received sufficient attention in environmental economics, on a theoretical and methodological level (Freeman 1993, Johansson 1987 and Bromley 1995). The main methods cover market and surrogate market techniques recreation demand models, hedonic pricing models, and contingent valuation

(CV) models. A brief survey of the various methods used in such valuation techniques is given in Table 1.1.

Table 1.1 Methods for Valuing Forests

Valuation Method	Relevant forest benefits	Strengths &Weaknesses
Market Prices: Use data from surveys of producers and consumers, adjusted if necessary, to account for seasonal variation, value-added processing and/or public policy distortions.	Price-based valuation is commonly applied to non-timber forest products which are partly or informally traded, in order to estimate subsistence and/or unrecorded consumption.	Market prices clearly reflect consumer preferences, but often need adjustment to account for public policy distortions or market failures. Aggregation or extrapolation of values based on potential production is not valid effects (elasticity of demand).
Surrogate Markets: Travel cost – use survey data on direct cost (e.g. fares, accommodation) and, in some cases, opportunity costs of time spent traveling to and from a site, evaluated at some fraction of the average wage rate.	Travel cost is often used to estimate demand for forest recreation at specific locations. Related methods used mainly in developing countries estimate the value of non-marketed, non-timber forest products in terms of the opportunity cost of time spent collecting and/or processing them.	Provided the relation between the benefit being valued and the surrogate market is correctly specified, and prices in the surrogate market are not generally reliable
Hedonic pricing – use statistical methods to correlate variation in the price of a marketed good to changes in the level of a related, nonmarketed environmental amenity.	Hedonic pricing is used to estimate the impact of proximity to forested land and/or logging on the prices of residential and commercial property.	Travel cost estimates may need to account for various objectives (benefits) in a single trip.
Substitute goods – use market prices of substitutes for non-marketed benefits.	Substitute goods approaches may be used whenever close market substitutes for non-timber benefits exists.	Hedonic pricing requires large data sets, in order to isolate the influence of a non-market benefit on market price, relative to other factors.
Production Function: Change in production method - use data on the physical relation between level (or quality) of non-market benefit and level (or quality) of output of a marketed good/service.	Change in production (or "input-output" or "dose-response") methods are used to estimate both on- and off-site impacts of land use change, e.g. the effect of logging on hunting, downstream water users, fisheries climate	Change in production method requires good data on biophysical relationships (dose-response).

Stated preference Contingent valuation method – use consumer surveys to elicit hypothetical individual willingness to pay for a benefit, or willingness to accept compensation for the loss of that benefit.	Recreational values are often estimated using contingent valuation.	Contingent valuation estimates are generally considered reliable if strict procedural rules are followed.
Contingent ranking /focus groups –use participatory techniques in group setting to elicit preferences for non-market benefits, either in relative terms (ranking) or in monetary terms.	Stated preference methods such as CVM are the only generally accepted way to estimate non-use values, e.g. Landscape or biodiversity values, for which price data do not exist and/or links to marketed goods cannot easily be established. Contingent ranking may be used where target groups are unfamiliar with cash valuation.	Participatory techniques are more experimental and not widely used to estimate non-market forest benefits. They are good at eliciting qualitative or "contextual" information, but there are doubts about their reliability for estimating willingness to pay.
Cost-based approaches: Uses data on the costs of measures taken to secure, maintain and/or replace forest goods and services.	Cost-based approaches include replacement/ relocation cost, defensive expenditure and opportunity cost analysis; may be used (with caution) to value any type of forest benefit.	Cost based approaches are usually considered less reliable than other methods. One test of validity is evidence that people are prepared to incur costs to secure relevant benefits.

Source: Mathur and Sachdeva[24] (2003)

The later requires creation of property rights structure that is well defined, enforceable and a minimum transaction costs. A detail overview of various issues related to property rights has been dealt in chapter two of the thesis.

1.2 A Review of the Literature

The review of literature has been done in two parts; the first deals exclusively with the growth of natural resource economics as a separate discipline within economics, and the second part is on common property resources. The literature on common property resources over the years has evolved as a multidisciplinary discipline. Following two sections are based on the literature review of the subject being studied:

1.2.1 Literature on Natural Resource Economics

The first part of this review surveys natural resources as they are understood in economic theory. Reconstruction is also attempted of the chronology of important theoretical developments in the literature as the 'limits to growth' concepts proposed in Mishan (1967)

aligned with scientific evidence on the environmental impact of agricultural extension as embodied in Rachel Carson's *Silent Spring* (1962), and led to synthesis of the new discipline of resource economics within economics. Theoretical conflicts concerning the place of natural resources within economics might be viewed as a legacy of the implicit definition of land as the primary resource and agriculture as the primary economy activity within classical political economy. Thus Ricardo perceived "the original and indestructible powers of the soil", in his formulation of classical dynamics, as endowing natural resources with immunity to qualitative degradation, while Marx defined production in his labour theory of value as the process of value-creation by the exertions of man on "objects of labour spontaneously provided by nature."[25] A paradigmatic shift from this view of natural resources as free gifts of nature only occurred after Hotelling (1931) outlined the limitation imposed on production possibilities by the exhaustible nature of resources. Exploring the resource needs of agricultural growth from a historical perspective, Boserup (1965) perceptively observed that the true limits to agricultural production possibilities were set not by absolute human numbers or by the extent to which free land could be seized and brought under the plough for the sustenance of growing populations, but by the degree of technological advancement in agricultural land-use. Although for another decade or so, the theories of resource-use and resource-depletion continued to evolve within agricultural economics, they slowly began to acquire a distinctive identity. The first major survey of literature on environmental and resource economics made at that time is found in the review article by Fisher & Peterson (1976) which primarily addresses the economics of exhaustible resources and environmental externalities. The unification of the logical apparatus of resource economics and environmental economics first proposed in Fisher (1971) has been well accepted, allowing environmental costs to be logically subsumed as additional input costs within production analyses, as pointed out in Ellis & Fisher (1987). Following Hardin's classic exposition of market failure in relation to resources, several studies of pricing in resource markets were made with the intention of reestablishing the workability of market processes. Pindyck (1981) is one such study which models viable pricing behaviour in exhaustible energy markets. Extending pricing analysis to the commodity markets for exhaustible natural resources, Slade (1982a & 1982b) outlines the principal empirical determinants of short-run and long-run trends in resource prices.

A distinct area of discourse within theoretical literature that is easily extended into empirical studies of natural resource-use focuses on the welfare-theoretic definition of intergenerational

resource equity. Considering the theoretical feasibility of utility allocations over time, Diamond (1965) had earlier demonstrated the nonexistence of a continuous social welfare function that could satisfy conditions of Pareto optimality across generations. However, by relating resource allocation processes to the welfare externalities of environmental degradation, a more recent survey on the theme in Goran-Maler (1993) argues that market failure might be partially explained by the divergence between *private* and *social* optima. An area in theoretical resource economics literature closely aligned with long-term resource allocation deals with the optimality of *dynamic* or *intertemporal* resource-use decisions. Among theoretical studies of this problem, mention may be made of those that employ the 'optimal control' paradigm in the presence of environmental externalities, such as Brown (1974), Dasgupta & Heal (1979a & 1979b), Berck (1981) and Chapman (1987). The stochastic allocative device employed in most cases is the rational expectations postulate of complete contingent forward markets for resources which allow dynamic optimisation to simultaneously address current and future resource allocations[26]. Intertemporal and intergenerational resource-equity are then the necessary consequence of forward allocation. Stavins (1990) is a more recent contribution to the theory of dynamic optima in intertemporal resource allocation, which specifically addresses renewable resources. Although well-defined and enforceable property rights play a fundamental role in all neoclassical studies of market allocation, Perrings (1987) observes that the generation of a viable price mechanism also depends on positive-valued inputs being expended on the production of resources. When rights-owners are unable to establish physical possession of the resources, resources remain 'free goods' open to access by all users.

The capital-theoretic characterisation of natural resources seen in the literature sometimes refers to exhaustible resources alternately as *irreplaceable* assets. With the short-run allocation decision being irreversible for such resources, dynamic optimisation must bring in an analysis of the opportunity costs of resource-use, referred to otherwise as *option-use values*. Canonical analyses of the economics of option-use value such as that presented in Henry (1974) are able to incorporate the role of long-term uncertainties into resource allocation problems. Fisher & Krutilla (1975) discuss the intertemporal relation of environmental and resource conservation with neoclassical discounting procedures adapted from Hotelling[27] being used in determining present values for resource stocks. Considering the externalities involved, the use of *social* discounting rates is advocated in replacement of private costs. With option-use values accruing from the option of deferred use of natural

resources, two orders of uncertainty enter intertemporal optimisation procedures. Firstly, uncertainty prevails about the potential character of resource-needs in the future. Secondly, uncertainty also prevails about the potential size of resource stocks which will fulfil these. Although initially developed to fit the context of exhaustible resources, the analysis of option-use values is quite amenable to application in long-run renewable resource contexts such as land-use or timber forestry, as Zinkham (1991) has shown.

Juxtapositioning the exhaustibility of natural resources with the possibilities for technological substitution, Dasgupta (1993) shows that scarcity pricing of resources holds an important position in the conservation of resource stocks because of the encouragement it provides to the development of resource-substitutes. However the maintenance of intergenerational equity in dynamic resource allocation remains a potential pitfall in discounting procedures. For exhaustible resources, a necessary condition is that the capital-elasticity of production must exceed the resource-elasticity of production so as to allow the maintenance of a permanently sustainable level of output through technological resource substitution which compensates for the depletion of the natural resource-base[28]. A similar argument, albeit resting on historical rather than theoretical foundations, is also adopted in Boserup (1981) to negate the Neo-Malthusian thesis behind resource-depletion which holds that continuous growth of population ultimately diminishes existing agricultural yields to the point where a part of the population is displaced and forced to commandeer new lands for settlement and cultivation. Citing historical instances, the counterargument proposes that a rising population provides incentives for the diffusion of agricultural technology, multiple cropping practices and the intensification of cultivation to sustain the increase in numbers. However, possible fallacies in this essentially neoclassical argument are pointed out by Victor (1991) within a capital-theoretic framework. Since technological capital too requires that natural resources and particularly energy be expended on its production, the substitution of natural resources by technological resources calls for increasing current drawals from natural resource stocks. Ultimately the growth made possible by technological capital becomes unsustainable because of overdepletion of current resources leaving too small a resource stock to sustain future production. More damaging perhaps is the impact that optimistic expectations about the emergence of technological substitutes are likely to have in accelerating current rates of resource depletion.[29]

Starting from the mid-1980s, the discipline of resource economics began to move from conceptual to operational platforms under impetus from the environmentalist movement. That

the transition was not untroubled is exemplified by the clash of opinions between ecological conservationists and development economists around the relative feasibility of 'growth versus the steady state'. A considerable body of theoretical literature has since developed around the operationalised concept of sustainable development, the importance of which lies in the association of resource-use with long-term demographic change. Krischner *et al* (1985) presents a World Bank perspective on sustainable development, introducing *carrying capacity* as the resource relationship that qualifies sustainability. Carrying capacity is technically defined by the authors in intergenerational terms as the 'maximum population of a given species that can be indefinitely maintained without a degradation of the resource base that might lead to a reduction of the population in the future'[30]. However the concept has frequently been challenged on the ground that persisting economic inequality between populations and not their growing numbers in the LDCs *per se* can be held more responsible for resource depletion. Carrying capacity is also often discarded during the operationalisation of sustainable development since precise information on migration patterns, and the political and territorial distribution of populations, living standards, and wealth and income inequalities required to statistically evaluate regional carrying capacity are usually unavailable. Thus the indicators of sustainable development are not merely demographic in origin. The pioneering influence of environmental and resource economics in formulating the operational character of sustainable development is outlined in Barbier (1989), a logical chain that is also explored in Barbier & Markandya (1990) and Daly (1991). This influence however has become the bone of contention between ecological economists and resource economists, after the Brundtland Report cited poverty rather than wealth as the fundamental cause of environmental degradation, and recommended an economic growth rate of 3 percent p.a. across the board for both developing as well as developed nations as being 'sustainable'. McNeely (1988) similarly argues the IUCN case for using development with economic incentives as the instrument for conservation in poor countries. Differences between ecological and economic concepts of sustainability identified in Norton & Toman (1997) have allowed multilateral economic institutions like the World Bank to project a case for 'limited' growth rather than a rejection of growth altogether as sought by ecologists. Two recent papers by Chichilnisky (1996 & 1997) which postulate a theoretical structure for sustainable development using the welfare-theoretic framework indicate the maturing of this view. That such prescriptions cut across the principle of resource equity and perpetuate the inequality between the rich and the poor for all time to come has not been missed by countries from the economic South.

The controversy has had far-reaching economic ramifications. At the core of the Brundtland recommendations lies a neoclassical emphasis on the Pareto optimal impact of technological substitution[57] in permitting further growth of the world economy. Technological substitution however cannot remain confined to resource flows alone but must also affect and reorder energy flows. Pimental *et al* (1973 & 1979) and Leach (1975) therefore propose technological advancement as a device of hastening the shift from nonrenewable to renewable energy, which Boserup[58] believes can also come about through the intensification of agriculture under the impetus of increasing populations. However pronounced inequalities are already apparent in the global energy situation where, according to UNDP (1998), the US with 5 percent of the world's population consumes over a quarter of the world's petroleum-based energy. Consequent pressure on developing countries to substitute renewable energy resources such as hydel power for hydrocarbons to meet development needs has forced the annual eviction and relocation of between 1.4 million to 2.1 million indigenous people over the period 1979-1985, as reported in Cernea (1988). The insistence of the Northern institutions on the maintenance of high growth and high energy consumption rates over the more humane considerations of resource equity and well-being has been widely criticised by environmentalists in the South as well as in comments by ecological economists. Norgaard (1999), for instance, notes that while many renewable energy projects themselves have adverse environmental impacts, increased use of fossil energy by developing countries would lessen the rate at which cultivation is being extended onto marginal lands which harbour the remaining biodiversity.[59] Another major point of dissent relates to the reliance on the neoclassical approach to derive utilitarian values and 'efficient' market control mechanisms which tacitly protect the current distribution of property rights, when possibly the true corrective to resource depletion is a redistribution of rights. Sustainability, the ecological economists say, is a matter of intergenerational equity, not of Pareto optimality.[60]

The association of poverty with the degradation of natural resources has been widely debated in the literature, without a common hypothesis emerging. The debate nevertheless has largely been bipolar, with the role of the poor in magnifying resource depletion being counterposed against the long-term sustainability of traditional low intensity resource-use systems. An ethical question of fixing responsibility between the rich and the poor for global degradation of the environment then arises. While the rural poor collectively account for the mass of *resource depletion* because of their vast numbers and low access to technology in the LDCs, the urban rich cause the mass of *environmental pollution* because of their high intensity of

resource use in the advanced countries.[61] The failure of ecologists and resource economists to discern differences between degradation of resources and degradation of the environment confuses the issue, although the two sources of degradation become interrelated whenever high per capita consumption levels of the rich are based on the degradation of rural resources. Lipton (1977) therefore observes that most of world poverty arises from unequal struggle between urban and rural class interests. With the bulk of assertiveness and power being accorded to urban population segments by development process, the incidence of poverty today falls mainly on the rural segments.[62] A similar characterisation of the North-South debate on development and the environment refers to it as a 'debate between rich environmentalists and rich developmentalists over moral dilemmas where the rich themselves are absent.'[63]The body of critical literature that has sought to resolve these issues has acquired the distinct philosophical identity of 'social ecology'.

An interesting although equally controversial area in empirical literature on the relationship between the environment and development has focused on the environmental Kuznets curve hypothesis proposed independently in Panayatou (1992) and Rogers (1992). Developed on cross-sectional international data on pollution, deforestation and income levels, the hypothesis states that industrialisation and development at the takeoff stage is accompanied by rising degradation of natural environments because of inadequate environmental concern. Thereafter, when living standards improve and more attention and resources are committed to environmental concerns, an improvement in environmental status is witnessed. While Rogers focuses mainly on the inverted-U relationship between per capita GNP levels and SO2 emissions, Panayatou directly measures the Kuznets relationship between economic growth in developing countries and the accompanying levels of tropical deforestation using least-squares. He finds that deforestation rates increase to a maximum annual level of 3.5 percent at annual GNP levels of USD 823 per capita, and gradually decline beyond that. However the correlation between the two rates does not become strongly negative till per capita income levels rise to USD 3000 p.a., indicating an ecological threshold at that point, below which countries are too poor to be green. While empirically tested, the inverted Kuznets curve hypothesis has not yet been been cross verified in time series data, leaving the apparently causal relationship between poverty, development and environmental degradation unexplained. The fact that environmentalist action arises partly because of a global demonstration effect would seriously challenge the hypothesis. Nevertheless, the environmental Kuznets relationship provokes searching questions about the factors that lead

to environmental degradation during the process of industrial accleration and takeoff, where very often the backwardness of the technology adopted imposes huge resource costs. This itself would argue the case for egalitarian technology transfers between nations as a possible way out, rather than the restriction of industrial development *per se* in the LDCs which would worsen both poverty and the environmental crisis.

1.2.2. Literature on Common Property Resources

An important indirect comment on the economics of CPR resources has emanated from studies of property rights and laws. Articulating the opinions of the property rights school regarding the efficiency of private markets, Demsetz (1967) argues that private property is the most appropriate institution through which individual resource users can be made to internalise externalities. While the incentives for this are created by assignment of exclusive rights to use resources, the efficiency of the property rights mechanism follows from the *universality* and *transferability* of property rights. Grim consequences of resource-use without the intermediation of property rights and markets are outlined by Hardin [74] as the 'Tragedy of the Commons'. Thus the literature on the economics of *local commons* which has followed Coase (1960) makes out a case for property rights institutions and market allocative processes as the means to achieve allocational efficiency. Berck (1979) returns to Hardinian arguments while investigating the impact of *open access* regimes on species-loss and extinctions. However this apparent consensus about the inefficiency of nonmarket allocative processes is by no means universal, as indicated in Dutta & Sundaram (1993), since the presence of externalities in resource markets can also pose insurmountable obstacles to market efficiency. For property rights based systems to operate efficiently, Cohen & Weitzman (1975), Gilles & Jamtgaard (1981) and Karanth (1992) argue that the rights assignment must be complete, perfect and exclusively defined for all potential resource-uses. Apprehension has however been voiced by Hardin (1977) and again by Bhatia (1992) that privatisation of property rights may create new externalities in the form of local monopolies and monopsonies, leading once more to systems failure and inefficiency.

Dissenting from the opinion that property rights stimulate allocative efficiency, Bromley (1989) cites the instance of private land markets, pointing out that the land property rights which have a special role in determining access rights and option uses for natural resources, are also simultaneously instrumental in determining the option costs of agricultural development. Since the option uses of land would therefore not be traded with each other after property rights have been assigned to land, the market allocative process would fail.

Better understanding of the collective property relations that evolve on common lands thus becomes necessary, since land degradation is usually the consequence of a breakdown in incentive mechanisms, rather than being a direct consequence of the property rights regime. The necessary precondition for sustainable use of open access resources therefore appears to be their conversion into CPRs rather than into private property systems. Pursuing the dissenting note further, Larson & Bromley (1990) establish that, in presence of unmitigated externalities, even private property-rights regimes can result in resource depletion. Logical difficulties of this nature have led to considerable refinement in property rights and access rights concepts as noted by Klink [75], with important distinctions now being drawn between *regulated* and *unregulated* rights.

Because of the fundamental schism between private property rights based neoclassical mechanisms of market allocation and alternative collectivist nonmarket mechanisms for CPR control, a recent upsurge of research interest may be noticed regarding the practical working of traditional CPR systems that are found across the world. Discussing the merits of alternative property rights systems for managing forests, Bruce & Fortmann (1989) enumerate several advantages that community-controlled regimes offer versus the sequestration of the forests into small private holdings. Community control firstly allows holistic management of resources by avoiding the cumulative spillover that would arise from myriad private user decisions. Natural regeneration is improved because resource drawals are dispersed over a wide area instead of being concentrated within a single location. Being unrelated to individual property rights, the distribution of forest usufructs across the community is more equitable and the forest is utilised according to the collective need of the community, rather than being plundered by individualistic needs. Finally, the combined physical and social might of the community provides much greater protection to the forest against unregulated resource drawals by outsiders. Analyses of the workability of self-governing collective property rights regimes on local commons in Ostrom (1990), Schlager & Ostrom (1992) and Ostrom (1992), and further pursued at the international symposium reported in Bardhan (1993) have however brought out the additional need for regulatory mediation to impart intertemporal viability to the resource allocations made by local resource-use systems. While possible incentive structures for this are proposed in Seabright (1993), Sethi & Somanathan (1996) more recently have explored the process of evolution of social norms in CPR systems. Such norms are important to the social regulation of open access rights, as Homan & Wilen (1997) point out. It may also be noted that tragedies of the

local commons brought on by open access are neither confined to the LDCs or to the 20th century, but have occurred very widely in the past in Europe and America, as reported by Southgate (1990), Southgate *et al* (1991) and Binswanger (1991). However failures of CPR systems that operate under clearly defined rights of exclusion rather than open access are more related to Prisoner's Dilemma-like situations where the degree of inefficiency in resource management is scaled proportionately to the number of agents that operate on the commons. Dealing extensively with practical experiences of natural resource management by village communities in the LDCs, Baland & Platteau (1996) therefore observes that when there are fewer agents, the negative consequences of their actions on the productivity of CPRs are better accounted for .

With reference to the property rights structures of natural forests in the tropics, it is noted by Panayatou & Ashton (1992) that although most such forests are state property under statute, they are subject to *de facto* open access by an undefined but very large number of non-exclusive users.[76] (Panayatou & Ashton, 1992:201) The high drawal pressures and inadequately enforceable access restrictions combine into high rates of deforestation in a repetition of the tragedy of the commons. While restoration of local control over the forests through changes in the property rights structure might be advocated as a means of resolving resource-conflicts on Coasian arguments, Bromley & Cernea (1989) remark that the alternative rights structures available would all in practice involve either the privatisation of property rights relating to the forest, or the restitution to the community of common property rights to forests and forest usufructs. Clear reversals of forest degradation are observed in Fortmann & Bruce (1989) whenever indigenous community groups have been assigned the inalienable right to draw usufructs.

While acknowledging that degradation of CPRs in India is rooted in general economic causes such as overexploitation because of the growth of population, or privatisation and commercialised interference, Bokil (1996) investigates the sociological causes of encroachment and privatisation of the gairan commons or open access pasturelands of the dry region of Marathwada. Tracing the encroachments to the assetless poor mainly comprising the dalits or lower castes, the study finds that periodic regularisation of encroachment upon the commons by the state encourages the occupation of depleted commons by the poor as a strategy for being conceded private property rights. Thus for practical reasons, it may be worthwhile to assign property rights to the community and privatise access rights. Stating, however, that no one-to-one correspondence may be established between poverty and the

rates of natural resource extraction, Jodha (1998) argues that resource depletion is more the result of the development of market links between isolated rural outposts and the mainstream economy. Traditional grassroots resource-use systems and their internal mechanisms for resource conservation both rely on collective stakeholding, since the survival of self-dependent communities with weak external links depends on the maintenance of adequate resource stocks. The twin regulatory principles that evolve in these contexts are of *local control* of resource stocks and *social sanction* of resource-use. The penetration of exogenous economic forces into grassroots resource systems alter this scenario. Such penetrations weaken community stakes and disenfranchise the community of the right to manage its resources. In so doing, they relegate the age-old local knowledge systems of conservation to the rubbish heap, and push natural resource stocks into a spiral of overuse and depletion. Considering whether restoration of traditional community-based resource management would arrest the present degradation of natural resources, Jodha notes that the transition which integrates traditional communities into modern society is *irreversible*. The linking of markets, the subdivision of community stakes between factional stakeholders, and the erosion and substitution of the culture of group action by the politico-legal administration are all inexorable changes that brook no reversal. But a modern control system seeking to reverse resource degradation must draw upon three strengths of traditional resource-management systems, which are namely (a) the assertion of precedence of *community* stakes over *individual* stakes; (b) the assertion of *local control* over *local resources*, and (c) the rehabilitation of traditional *knowledge systems*. While functional substitutes for traditional modes of resource management - such as comanagement in the case of forests - would evolve from research & development, decentralisation and participatory decision-making would be necessary cornerstones. Interestingly, unlike the rights concessions to minor forest products (MFPs) such as herbs, flowers, seeds, etc., which have been conceded under Joint Forest Management, Jodha's far-reaching prescriptions for sustainable management of forest systems argue for restoration of community stakes to high-valued forest products. A highly depleted resource-base, he states, is not able to offer a large enough participatory stake in comanagement to the community in terms of MFPs alone.

The contradiction of purposes between timber forestry and the extension of agriculture had been acknowledged in the Voelcker Report (1893).[77] However settlement-related deforestation usually involved changes in landuse and the occupation of derelict lands that

had already been degraded by extraction of biomass resources at unsustainable rates. The steps in this degradational process are :

A: Excessive extractions of timber, fuel and other forest produce because of the coincidence of subsistence removals with commercial activity, led to the appearance of gaps within the forest;

B: The natural processes of regeneration and biomass renewal were interrupted by use of clearings and forest-gaps as grazing grounds by the subsistence-users and by the use of fire on wastelands to improve grass yields.

C: The lands were degraded to the point where the restoration of forests proved impossible. They were then handed over for cultivation and settlement to the fast-growing human population [78] (Flint, 1998:422)

1.3 The Research Problem

State forestry in India assumed shape during the second half of the 19th century when British colonial interests had metamorphosed from mercantilist trade to revenue administration. In 1850, the State Commission appointed to take stock of forest resources in British India concluded that forests were being decimated through mismanagement by native peoples[32]. The views voiced by the Commission eminently suited the colonial design of expropriating forest lands for conversion to revenue purposes, including the clearing of forests for cultivation and settlement. The actions initiated over the next five years to execute this design included the establishment of a Forest Department and the appointment of the German forester Dietrich Brandis as its first Inspector General. It also proved convenient to adopt the German model of state forest management in order to initiate 'scientific forestry'. The first forestry laws which followed soon after gradually expanded state control by abrogating and limiting the erstwhile user rights and privileges of local communities.

Colonial forest policy in India might be said to have evolved through three distinct phases after the state takeover of forests in British India under Lord Canning through the first Indian Forest Act of 1865 (IFA 1865) and its subsequent legislative refinements in 1878, 1894 and 1927. Greatest attrition of access rights occurred in the *reserved* forests which included forests designated for future commercial development as well as forests deemed critical to the protection of climate, water and soil resources in ecologically sensitive areas. The mode of restriction adopted in this case was to record the community rights hitherto exercised, to transfer some of these to the state forest authority and to commute several others, thus greatly

reducing allowable rights to a limited subset of the original CPRs. Prohibition in this case was applied on the exercise of any right that had not been explicitly recorded. In *protected* forests on the other hand, the prohibitions were listed and extensively recorded[34]. Because of these differences, while CPRs were confined in reserved forest to the few recorded access rights, CPRs in protected forests extended to all access rights that were not expressly prohibited.

Revision of the 1865 forest policy to facilitate further restriction of community rights while expanding state prerogatives over forests was stoutly resisted by indigenous communities through mass movements that have since come to be known as the 'forest satyagraha'[37]. Following such protests, the administration in the Madras Presidency took the progressive step of assigning management responsibilities for certain unclassed forests to local communities through the means of an elected forest panchayat, on the strength of a recommendation that had been made by the Royal Commission on Agriculture in 1928 for interspersing forests with cultivable lands[38]. However, because of opposition from forest officials, the new dispensation was confined only to forested lands not vested with the government[39]. Another experimental departure from centralised management of forests by the state was made again through enactment of the Van Panchayat Act of 1931 in the United Provinces, following strong resistance to IFA 1927 from forest communities living in the Middle Himalaya. The Van Panchayat Act, which created the new category of civil or soyam forests in the Uttarakhand Himalaya, was the harbinger of comanagement arrangements with user-communities and facilitated the creation of local institutions which in time came to manage a significant proportion of local forests[40].

It would be pertinent to consider certain other dimensions of colonial forest policy over the period during which the fundamental categorisations of Indian forests were made. State forest policy as such extended to British India alone, allowing the native and tribal states to follow their own separate dispensations in this respect. This accounted for persistence of a fairly significant proportion of unclassed *community* or *private* forests which remained under CPR or private proprietary control (albeit under policy regulation) till the time of Independence. Nevertheless, the primary objectives of forest management in the native states came to be increasingly modelled around the Indian forest legislations leading to slow usurpation of CPRs. Only in forest lands where tribal control was retained (*e.g.* in the North East) were community access rights actually protected. With the takeover of private forests after

Independence under the Forest Policy of 1952, these and the sacred groves found in several parts of the country in fact became the last surviving bastions of forest CPRs.

1.3.1 Forests in the Himalaya

Studies of recorded forest cover in the Himalaya shows that the proportionate cover of classified forests is generally higher in the North East. An intriguing feature however is the predominance of unclassed forests in the region, accompanied by lower proportionate presence of reserved and protected forests. A considerable part of these unclassed forests are managed under customary law systems, in contrast to reserved and protected forests elsewhere which are managed under statutory law by the Forest Acts. Significant differences exist therefore in the ratio of classed to unclassed forests between the Western and Eastern Himalaya, and in recent times, the latter has suffered considerable deforestation

The two northernmost districts of the West Bengal Himalaya, namely Darjeeling and Jalpaiguri, present a similar scenario of forest depletion and economic distress. They span a collective area of 9376 sq. km. (10.56 percent of the state area) and are inhabited by 50,10,345 people[31] . Most North Bengal forests are in reserved or protected areas directly under state control. Recorded forest cover in the two districts stands at 1244sq.km and 1789 sq. km., respectively[32]. The region is characterised by endemic poverty, high migration and rapid population growth, expansion and proliferation of urban settlement and high rates of dependence on primary resources, subject to diminishing culturable and common land per capita. Rural scenarios on the energy side also show high dependence on non-commercial energy sources (*i.e.*collected fuels), scarcity of fodder and continuous extraction of forest biomass by the rural people for subsistence. An overload is added to this by commercial felling of trees to meet growing urban needs. Conflict therefore arises between the survival necessities of the poor and the luxury consumption of the rich, with far-reaching consequences.

1.3.2 Subsistence Agriculture & CPRs in the Himalaya

Several studies have noted that the dependence of hill populations on regional forests is extremely high[33]. The causes are found as much in agroclimatic factors as in the nature of hill agriculture. Both land scarcity and low crop yields account for the prevalence of mixed farming in mountainous regions like the Himalaya. Thus a switch entirely to cash crop cultivation generally proves unsuccessful because of problems of food, fodder and fuel security. As it has evolved, the Himalayan farming system combines cultivation with

livestock farming. Heavy forest-dependence consequently exists for meeting energy and animal husbandry requirements. Communities of the Himalaya who live in close contact with Himalayan biodiversity moreover collect several local forest usufructs, including various wild fruit, wild vegetables and herbs, medicinal and utility plants, etc., besides more commonly known NTFPs (non-timber forest products). Forest biomass in the form of fuel and fodder nevertheless constitutes the most important usufruct drawn by the rural population, both in the Himalaya and elsewhere. Total fodder drawals in the Western Himalaya (excl. the UP hills), and the Eastern Himalaya (excl.Assam and the Darjeeling region) were estimated at 37.36 million tonnes (MT) dry-weight for a combined domestic animal population comprising 18.4 million livestock heads in 1989[34]. Almost all of this consumption is drawn as a CPR.

General inferences can thus be drawn *a priori* about forest CPRs in the Darjeeling region. The settlement history of the region over the British period placed a very large population in close proximity with the forests over a very short space of time. The ability of this population to access regional forests was however limited by the prior acquisition of forests by the state. Thus, unlike forests in the North East which have remained under customary law, the forests of the Darjeeling region have been under statutory law from the time of settlement of the district. Despite these differences, dependence of the people on forest resources has not been lessened. With high rates of conversion of reserve forests in the district over the previous century, timber and fuelwood flows were traditionally high and permitted the steady growth of settlement and occupancy by tea gardens. Usufruct and fuelwood pressures were not felt therefore till the end of the 1970s because of the relative abundance of these flows, even though they were achieved at the cost of very high rates of deforestation. Till that time, the legal outflow from government forests was adequate to take care of the needs of the tea industry and the population of the tea-growing areas, while other sections of the rural population were able to subsist on CPR forests in the khasmahal areas. Pressure on these CPR forests was also accordingly lower since fuelwood outflow from government forests was high. Little energy substitution took place therefore and despite the nominal difference in access rights between community and government forests, the energy-use profile of the Eastern Himalaya has been characterised uniformly by almost total dependence on fuelwood. The limitation of access rights in government forests in the Darjeeling region was therefore compensated by high rates of working in reserve forests. This gave timber and fuelwood resources a *de facto* CPR character.

During the 1980s, timber extractions and fuelwood outflows began to show a declining trend, reflecting the downturn in forest workings. But with rapidly rising fuel demands in the absence of energy substitution, legal extraction from the forests was substituted by an increase in illegal entry and outflow. The fuelwood requirements of tea garden residents are now also being met from nearby reserve forest areas. What the region has witnessed in consequence has been the forcible conversion of reserved forests into CPR forests by the rising wood demands of the local population, leading also to a rise in the rate of deforestation. This is because rural communities living conveniently close to reserved forests have forced access into these forest, and have supplemented their own fuelwood extractions by further commercial extraction for the needs of less favourably located communities and urban areas. The solution thus lies not in stepping up enforcement, but in a reconsideration of the CPR question as a whole.

1.4 Research Hypotheses for the Study

Review of the research issues raised in the literature brings out the importance of property rights regimes in determining the control systems for resource-use and resource-conservation. However, whether all forest resources share the same property rights structure or not will depend on the extent of access rights committed. Thus while timber, fuelwood and other related forest resources may be turned into tradeable goods by regulated access, forest CPRs such as fodder, seeds and fruit may remain untransacted in the absence of a market for forest usufructs. While all forests and forest resources were CPRs when they were administered by the local communities, the situation changed materially after they passed into state ownership. An issue that has never been satisfactorily addressed by the state concerns the customary rights of indigenous forest-dwelling communities. Although community forests are preserved in large areas in the North East, pressure of population, settlement-growth and declining forest cover have altered the public perception of these rights, and also of whether forests as such constitute *local* or *global* commons. The main hypotheses to examined during the study are now listed below.

1.4.1 Hypotheses relating to the Development Impact on Forests

In resource economics literature, forests are identified as common pool resource so long as property rights do not hinder the rights of access. However in India, property rights were instituted by the first forest legislations in the 1860s while usufructuary rights were notionally

preserved elsewhere. This transformation in rights structure and deforestation through the subsequent period would give rise to certain research hypotheses:

1.1 Loss of forests in the study region over the past century has resulted from direct collision of subsistence needs of a growing population with a limited natural resource base.

1.2 Changes in property rights through the alienation of forests and the reallocation of natural resources from subsistence users to private, government and commercial users has further catalysed this collision

1.3 In the light of the concentration of property rights in the hands of the state and the resultant change in community perceptions of access rights, the forests in India do no longer constitute *local* commons.

1.4 State management of forest property rights has hastened the market integration of isolated and independent indigenous communities in both economic and non-economic terms

1.5 Growth of population and settlement significantly affect the principles and modes of forest management through redirection of forest policy and forest land management.

1.6 Market integration greatly reduces the weight of collective decision-making within indigenous communities regarding the utilisation of local CPRs.

1.7 Greater urbanisation and development of transportation links brings additional resource demands from distant settlements to bear on contiguous forested regions, accelerating the rates of resource depletion

1.8 Alternative paired hypotheses that link the growth of fringe populations with economic development and with landuse conversion and deforestation will also be explored contextually relate to whether

1.8.1 Rising per capita incomes in conjunction with population growth raise the demand for fuelwood energy in an income-elastic response.

or conversely

1.8.2 Rising per capita incomes in conjunction with population growth reduce fuelwood consumption in a fuel-substitution response.

1.4.2 Hypotheses relating to Forest Resource Markets

Valuation of resource flows on market principles alone eventually justifies very high rates of extraction as resource scarcity increases leading ultimately to the possibility of exhaustion. Certain other difficulties also arise when market mechanisms are applied to equilibrate supply and demand within forest resource systems. Firstly, as renewable resources, forests yield additional future returns when preserved *in situ*. Secondly, a large part of forest produce comprising collected usufructs will be nontradeable, where price mechanisms do not operate. Difficulties also arise in administering forests under market-based property rights institutions since market trade ignores the *transfer* and *reciprocal* externalities between generations, and also does not take account of the fact that the resources that are preserved (*i.e* that are not extracted) also yield returns. A set of hypotheses arise therefore regarding potential valuation of production flows from a resource-base under different property rights regimes:

2.1 People living at the forest-fringes with greater livelihood and usufruct dependence on the forest appraise both resource stocks and flows on *usufruct* principles, while Forest Departments which focus on valuing steady-state flows use *market* principles.

2.2 This difference in valuation principles results in non-identical valuations of the same resource.

2.3 The onus of preserving forests in statutory protection systems lies with the administering authority, while in community-based protection systems, the onus is shifted to the transacting agents.

2.4 Rising costs of resource preservation can result in a change in valuations, as a result of which forest CPRs which have previously been well conserved, are exploited at accelerating rates.

2.5 The social priorities of ecological conservation of forests and forest biodiversity cannot therefore be internalised in market transactions, but remain an externality under both CPR and private property rights regimes.

2.6 Ecological conservation of forests can therefore only be achieved through imposition, *i.e.* through statutory regulation.

1.4.3 Hypotheses on Policy-related Issues

Another set of hypotheses specifically address the impact of national forest policy in India on the present state of forest cover in the Himalaya. These are:

3.1 Forest depletion in the Himalaya is closely associated with the transfer of forest lands into alternative uses.

3.2 Devolution of the property rights to forests to State Forest Departments is thus responsible for the depleted state of forests in the Himalaya.

3.3 Leasing out of forest 'wastelands' for tea plantation has been a more dominant cause of deforestation than the transfer of lands to agriculture.

3.4 Unsustainable forest-use practices in the region were masked in the past by apparently abundant outflows of forest product resulting from mass conversion of natural forests to monocultural 'created' forests.

3.5 Absence of a policy for fuelwood forestry in post-Independence forest management has aggravated the depletion pressure on the forests of the Himalaya.

3.6 Forest management under statutory law has not been sustainable because of its high conversion rates and low replantation rates.

3.7 Participatory management under JFM is a desperate reaction to acute ecological pressure falling on the forest environment

3.8 Alternatively, participatory management represents a partial concession made to increased local democracy and local empowerment of indigenous communities which are now demanding control of their local resources

3.9 Alternatively again, participatory management and partial social control of forest resources has only been conceded to get impoverished and illiterate communities to reforest degraded forest land without demanding compensation for their labours.

1.4.4 Hypotheses relating to CPRs & Participatory RMS Systems

A set of hypotheses also arise in relation to the biomass and fuelwood usufructs which meet the fodder and energy requirements of fringe communities.

4.1 The poverty of fringe-communities in the Himalaya and the marginal character of ex-forest lands on which they are settled have dictated their adoption of a mixed farming model.

4.2 Mixed farming in the Himalaya which combines agriculture with horticulture and animal husbandry and leads to a swelling of livestock populations increases the dependence of these communities on forest CPRs

4.3 Differences in forest access rights and property rights structures between different parts of the Himalaya (*e.g.* the North East) exercise considerable influence on the nature of usufruct dependence of local communities.

4.4 Extension of statutory law to forests without increasing rural access to viable alternatives to forest usufructs cannot relieve current depletion pressures on CPR resources.

4.5 The sacrifice of potential roles of the community in managing CPRs because of institution of the state forestry system has primarily been responsible for creating *free rider* situations where forest resources are exploited without let or hindrance.

4.6 The survival of customary law institutions in the North East Himalaya has proved more conducive to the maintenance of forest cover and forest quality.

4.7 When both customary law and statutory law systems are found to be wanting, partial induction of property rights into usufruct management systems, *e.g.* through JFM, can provide a more effective way of managing the forests.

1.5 Objective of the study

The proposed study shall examine forest-settlement equations in the Eastern Himalaya in the light of these hypotheses. The basic issue for study concerns whether the definition of forests as a CPR remains valid after a market for forest usufructs has grown with the proliferation of settlement in the region. The second major aspect that the study will examine is whether notional extension of usufructuary rights as currently understood is indeed responsible for external pressures and the unsustainability of present forest-use practices in the Eastern Himalaya. The third major issue that the study will deal with is related with the concept of property rights. The points of debate centering around the proposed forest legislations will be considered within the framework of these issues. Among these will be concepts of community forestry and community-based conservation, alternative participatory forest management, and the renegotiation of usufructuary rights. Usurpation of these rights by the commercial forestry sector, and the pressures that induce local communities to illegally enter forests will be separately studied to arrive at a prescription for sustainable forestry in a situation of constantly rising demand for forest-based resources.

1.6 Structure and Methodology of the Study

The study includes eight chapters, of which the first is chapter is an introductory chapter, and it lays the foundation for the study, highlighting the importance of common property resources in rural livelihood. The review of literature on natural resource economics and common property resources has been separately dealt with to bring out the important issues in the two areas. Based on the literature review the objective of the study and research issues to be dealt with in the thesis has been explained.

The second chapter brings out the importance of property rights in the context of resource use in general and natural resource use in particular. The chapter will enquire into the type of property rights structure that will ensure optimal allocation of natural resource. Considering that the success of CPR depends on the community's ability to act collectively, the underlying factors that generally obstruct co-operation from evolving in a rural community shall be dealt under a game theoretic framework.

Community rights in forests have evolved through usage, rather through any piece of legislation. Forests are therefore, an easy target of usurpation by the State, because there tend to be no legal documents proving ownership title of the communities. Chapter three therefore as natural continuity to the earlier chapter on property rights, will enquires the position of community rights in forests in India in general. The chapter will also trace the course of forests legislation in India and identify particular provisions in the forests legislation that have abrogated communities' rights in forests.

State ownership of forests gives rise to a particular type of forestry, based on similar principles of capital investment theory. This leads to a divergence in valuation of forests between State and local communities. Whereas, the state wants to maximise the rent in land, the communities on the other hand tries to maximise the biodiversity value of the forests. Chapter four will enquire the major lacunae in state forestry, and shall also study government failure in optimal allocation of resources. In this context the chapter would further study how inappropriate policies affect land tenure security thereby affecting the land use of a country and its consequence on the environment.

The fifth chapter will enquire the pattern of human settlement in different regions of the Himalayas, and also study the livelihood patterns of the people in the hills. It will also examine whether differences in forest access rights and property rights structures between different parts of the Himalaya exercise considerable influence on the nature of usufruct

dependence of local communities. Amongst the three zones of the Himalayas, the forests in the Eastern Himalayas are almost under the Reserved Forests category. Its implication thus on forests CPR thus requires an enquiry.

The next two chapters are based on the enquiry of the forest communities living in the study area i.e., Darjeeling and Jalpaiguri districts in West Bengal. The political history of these two districts have their own uniqueness. Moreover, different forest communities living in these districts are different though there is some commonality in their land use pattern. Both the districts have large areas under tea in their northern part. The present areas under tea estates in the districts are leased lands which were earlier forests lands. Using secondary data the study shall enquire into the land use changes, livestock and population dynamics of the region.

The study shall also use secondary sources like Working Plan of the Forest Divisions and trace the growth of State Forestry separately for the two districts in chapter six and seven. The history of forest management and forestry practises shall also be examined in detail. This will help us to understand the manner in which forests has been worked, what were the extent of community rights recognised, the nexus between industry demand and State Forestry. In chapter seven using household survey data of forest villages in the two districts, we will enquire the extent of household dependence on forest for their sustenance. OLS method shall be applied to estimate the relationship between household's dependence on forests and the corresponding explanatory variables and to find regional variations if any. We will also enquire whether the nature of dependence on forests CPRs has any implications for forest management.

The eighth chapter is the concluding chapter that will be based on a brief review of our study. Two separate sections will deal with major findings and policy prescription. We will also try to identify some areas for future study.

Chapter Notes and References

[i] Scott, L. (2006): "*Chronic Poverty and the Environment: a Vulnerability Perspective*", Chronic Poverty Research Centre Working Paper 62 (ISBN Number 1-904049-61-3),p.14, London

[ii] Johns, D.M. (1990): 'The Relevance of Deep Ecology to the Third World: Some Preliminary Comments', *Environmental Ethics*, Vol. 12, No. 2.

[iii] *op cit.* pp. 16

[iv] Dasgupta P. And K.G. Mäler. 2004: *Environmental and Resource Economics: Some Recent Development*

[v] F. Aguilera Klink, 1994

[vi] *ibid.*

[vii] Jodha, N S (1990): *Rural Common Property Resources: Growing Crisis.* Gatekeeper Series 24, International Institute for Environment and Development, London.

[viii] Dasgupta, Partha and Karl-Goran Mäler (eds.) (1997): *The Environment and Emerging Development Issues*, Clarendon Press, Oxford.

[ix] Rath, Nilakantha (1985): 'Garibi Hatao: Can IRDP Do It?', *Economic and Political Weekly*, 20(2), pp 238-46.

[x] Shylendra, H.S. (2002) "Environmental Rehabilitation and Livelihood Impact: Emerging Trends from Ethiopia and Gujarat", *Economic and Political Weekly*, August 3, pp. 3286- 92.

[xi] Farrington *et al*: (1999)

[xii] *ibid.*:73

[xiii] Jodha, N.S. (2001), p.120.

[xiv] Garett Hardin, 1968

[xv] Seabright, P. (1993)

[xvi] Field, B. C. (1996)

[xvii] Coase, R. (1960)

[xviii] Farrell, J. (1987)

[xix] Baland, J.M. and Platteau, J.P. (1996), p281.

[xx] *ibid.*

[xxi] Kenneth J.Newcombe, 1989, pp117-138

[xxii] Dasgupta, P. (1982): *The Control of Resources*, Basil Blackwell, Oxford.

[xxiii] Neher, P.A. (1990): *Natural Resource Economics: Conservation and Exploitation*. CUP, New York.

[xxiv] Mathur, A.S. and A.S. Sachdeva (2003): "Towards an Economic Approach to Sustainable Forest Development", *Working Paper Series*, No. 2/2003, Planning Commission, GOI.

[xxv] *cf.*Shah, 1999:3293

[xxvi] Dasgupta & Heal, 1979b, p472

[xxvii] *op.cit.*

[xxviii] Dasgupta & Heal, 1979b, pp200-205

[xxix] Victor, 1991, p199

[xxx] Guha, Martinez-Alier, 1998, p52

[xxxi] Census: 2001

[xxxii] GOWB: 2005

[xxxiii] Singh, 1992; Negi & Bhatt, 1993; Negi, 1995; Vir Singh, 1992

[xxxiv] FSI, 1989