PARTICIPATORY APPROACH TO SUSTAINABLE MANAGEMENT OF FOREST COMMONS: AN ECONOMIC ASSESSMENT OF PERIYAR TIGER RESERVE, KERALA

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Thesis submitted in part fulfillment of the requirements for the degree of

MASTER OF SCIENCE (AGRICULTURE) IN AGRICULTURAL ECONOMICS

to the Tamil Nadu Agricultural University, Coimbatore-3.

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CERTIFICATE

This is to certify that the thesis entitled "**PARTICIPATORY APPROACH TO SUSTAINABLE MANAGEMENT OF FOREST COMMONS: AN ECONOMIC ASSESSMENT OF PERIYAR TIGER RESERVE, KERALA"** submitted in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE (AGRICULTURE) IN AGRICULTURAL ECONOMICS** to the Tamil Nadu Agricultural University, Coimbatore is a record of bonafide research work carried out by **Miss. SOUMYA SUNNY** under my supervision and guidance and that no part of this thesis has been submitted for the award of any degree, diploma, fellowship or other similar titles and that the work has not been published in part or full in any scientific or popular journal or magazine.

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ABSTRACT

"PARTICIPATORY APPROACH TO SUSTAINABLE MANAGEMENT OF FOREST COMMONS: AN ECONOMIC ASSESSMENT OF PERIYAR TIGER RESERVE, KERALA"

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SOUMYA SUNNY

Degree: **MASTER OF SCIENCE (AGRICULTURE) IN AGRICULTURAL ECONOMICS**

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2011

The commons, as shared resources are an integral part of many resource management systems the world over. The forests are among the most critical common resources, characterised by a large number of forest dwelling and forest dependent communities. Persistent dependence on forest resources by the local communities as a result of poverty has lead to the depletion of natural resource base of the ecosystem. The National Forest Policy of India (1988) declared that local communities were to be involved in natural resource conservation. The co existence of nature with impoverished communities offers an opportunity for participatory management approaches and community based ecotourism. The new theoretical paradigm of commons management advocates cooperative management institutions for the sustainable maintenance of Common Property Resources. Considering the importance of participatory

management mechanisms, a study was undertaken to examine the effectiveness and impact of an existing participatory management strategy initiated through India Eco Development Project (IEDP) in one of the protected areas in India, the Periyar Tiger Reserve, Kerala. The objectives of the study are: (1) to examine the effectiveness of the participatory institutional mechanisms in the Periyar Tiger Reserve for the sustainable management of forest commons (2) to analyse the impact of India Eco Development Project (IEDP) and Ecotourism initiatives on ecosystem conservation and local livelihood (3) to measure the Willingness of tourists to Pay for conservation of Periyar Tiger reserve and to assess its economic value; and (4) to investigate the possibility of extension of the management mechanism in the study area to similar areas elsewhere.

The sample respondents for the study comprised of the members of the different types of Eco Development Committees in PTR constituting a sample size of 60 and the tourists visiting PTR (both domestic and foreign) constituting a sample size of 50. The collected data were analysed by adopting percentage and tabular analysis, Ordinary Least Square Regression, Lorenz Curve, Gini Coefficient and Logit model. The following findings and policy implications were emerged from the study.

The grass root level Eco Development Committees and the Community based Ecotourism (CBET) initiatives contributed to the conservation and maintenance of PTR. The establishment of a harmonious relationship with the local communities was the core of IEDP in the participatory common resource management and it has given way for a cooperative collective action for the management of CPR.

There is total reduction in the consumptive extraction of forest resources like sandal wood (100 per cent), timber (100 per cent), and considerable reduction in firewood (73.7 per cent), black dammar (97.4 per cent), cinnamon bark (100 per cent), other NTFPs and hunting of wild animals (100 per cent). The biomass and wildlife of PTR are highly conserved post IEDP. After the implementation of IEDP, the number of forest dependent people among the sample respondents is only 26 per cent, compared to the previous 85 per cent.

Analysis of the socio economic impact of IEDP on the fringe area people revealed noteworthy changes. The average monthly household income of the sample respondents increased by 39.5 per cent. Lorenze curve and Gini coefficient analyses showed a considerable reduction in income inequality (29.3 per cent). The asset position of the sample households recorded a very high increase. The social empowerment resulted from involvement in EDC activities was also significant.

Majority of the EDC members had a positive perception towards the participatory management mechanism and it could be observed from the OLS estimates that occupational dependency on PTR, in

terms of status as office bearers of EDC and absence of conflicts influenced the positive perception significantly.

The Bequest value accorded to the PTR by the fringe area people was estimated from their willingness to pay and was found to be Rs. 3.38 million per year.

The total economic value of PTR comprising recreation use value and preservation value estimated using Logit model from the willingness to pay of tourists was found to be Rs.534.52 million per year and it fairly justified the cost involved in the IEDP for its conservation.

The participatory management mechanism in PTR was found to be a success in managing forest commons as it could ensure local people a better livelihood. The mechanism followed was a cooperative grass root level institution (EDC) well coordinated by the institutional mechanism of Periyar Foundation as a hierarchical organisation. It highlighted the need for legitimate institutional mechanism to preserve CPRs. This can be replicated to other protected areas where similar situation persists. It also narrated the fact that addressing the basic needs of the local communities is an important factor in ensuring cooperation in common property resource management.

While creating participatory management institutions for commons management, thrust should be given to build up the social capital and empower the stakeholders so as to make these institutions sustainable in the long run. The community-based ecotourism (CBET) programmes created some local employment and generated revenues that enhanced local incomes or help support conservation activities and extent the EDC activities beyond the project period and it is contributing manpower for the protection of PTR.

The willingness of the tourists to pay higher amounts as entrance fee can effectively be harnessed to mobilize money for conservation and maintenance of PTR ecosystem.

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CHAPTER I

INTRODUCTION

The commons, as shared resources are an integral part of many resource management systems the world over. The forests are among the most critical common resources, characterised by a large number of forest dwelling and forest dependent communities. Many of India's forests are common property resources (CPR), considered 'traditional commons' and have been often governed by the forest department but used by local communities, either tribal or 'forest dwelling' people for their subsistence requirements. Persistent dependence on forest resources by the local communities as a result of poverty has led to the depletion of natural resource base of the ecosystem. Poverty is the main cause of environmental degradation, as the poor are not in a position to use the natural resources in a sustainable way (Lele, 1991). Institutional mechanisms that incorporate a participatory approach to management of commons, acknowledging the positive role and potential of communities in achieving sustainable forest management can therefore contribute to forest conservation, livelihood security of the dependant communities and development of the region. The National Forest Policy introduced in 1988 thus recognized environment conservation and meeting rural peoples' needs as important objectives of forest management.

Protected areas (PAs) on the other hand are central to most national policies to conserve forest and wildlife the world over (Terborgh and Van Schaik 1997; Chape *et al.,* 2005). In Indian context, the exclusivity of Protected Areas (PA), as envisaged in the developed countries is only rarely possible, due to human dominated landscapes in and around them. The population is largely rural that draw on the resources of the PA for subsistence**.** Furthermore, many species of wildlife usually stray into human inhabited areas beyond PA boundaries causing conflicts between wildlife and people, resulting in economic loss to local communities. In turn, this can lead to loss of support for wildlife conservation as local communities are rarely adequately compensated. Hence, Community-based Conservation (CBC) has emerged as a solution to offset the costs of living with wildlife (Wells, Brandon and Hannah 1992; Hackel 1999; Salafsky and Wollenberg, 2000).

Past surveys showed that in India over 65 per cent of the protected areas were characterized by human settlement and resource use (Kothari *et al.,* 1989). Attempts to protect PAs from human intervention by coercion have often led to hostile attitude of local people towards wildlife management and sometimes to open conflict (Nadkarni, 2001). The National Forest Policy of India (1988) declared that local communities were to be involved in natural resource conservation. This is where the participatory management assumes importance.

‘Participatory Management’ is a situation in which two or more social actors concerned about a territory, an area or a set of natural resources, negotiate, define and guarantee amongst themselves a fair sharing of the management functions, entitlements and responsibilities. Participatory approaches to conservation and resource management are increasingly being adopted worldwide with an increasing range of involvement; activities from small scale involvement of locals to well developed systematic structures of communities managing their resources legally and scientifically. Community based conservation is a management based means to achieve conservation and development simultaneously so that the wildlife populations and their habitat are not conserved at the expense of the economic interests of the communities. Anthropological studies suggest that the community based approach with abundant local participation has generated positive attitudes towards conservation amongst the local residents as compared to the state led approach with minimal local involvement (Lepp and Holland, 2006).

The co existence of nature with impoverished communities also offers an opportunity for community based ecotourism. Community Based Eco Tourism (CBET) arose after the Earth Summit in 1992 at Rio de Janeiro in accordance with the Agenda 21. "Community Based Eco Tourism is tourism that takes environmental, social and cultural sustainability into account. It is managed and owned by the community, for the community, with the purpose of enabling visitors to increase their awareness and learn about community and local ways of life" (REST, 1997). Sustainable tourism development meets the needs of the present tourists and host regions while protecting and enhancing the opportunity for the future. It is envisaged as leading to management of all resources in such a way that economic, social and aesthetic needs can be fulfilled, while maintaining cultural integrity, essential ecological processes, biological diversity and life support systems (World Tourism Organization, 2004). In developing countries, tourism could be a means of redistributing economic resources, mitigating the socio economic situation both at local and national scale contributing to biodiversity conservation (Western and Henry, 1979; Boo, 1990).

Ecotourism is one of the fastest growing tourism sectors throughout the world. It can provide an alternative livelihood that is based on sustainable use of ecosystems and can bring clear conservation benefits. It is nothing but an environmentally responsible travel and visitation to natural areas to enjoy and appreciate nature that promotes conservation of the environment and sustains the well being of a local people. Community-based Ecotourism is where local people have substantial control and involvement in an ecotourism project and majority if not all benefits remain in the community (Kunga, 2002).

In many parts of the world, tourism has contributed to the dual goal of poverty eradication and conservation of natural resources. Tourism is the largest industry in the world comprising 10 per cent of the world economy and employing eight per cent of the global workforce. By 2013, earnings from

tourism are estimated to be around USD 530 million per year (NTA, LAO PDR, 2004). Since the past two decades the focus of biodiversity conservation has shifted to new models such as Integrated Conservation and Development Projects (ICDP) due to increasing population pressures around and within the PAs, and the escalating conflict between wildlife managers and local communities (Gubbi, 2008).

1.1. India Eco-development Project (IEDP)

India is rich in biodiversity and is one of the 12 mega-diversity countries in the world (McNeely *et al.,* 1990). It hosts three of the world's 34 biodiversity hotspots (Myers *et al.,* 2000). The country harbours 7.6 per cent of world's mammal species, 2.6 per cent of its bird species, 6.2 per cent of its reptile, 4.4 per cent of its amphibian, 11.7 per cent of its fish, 6.1 per cent of its invertebrates and six per cent of its floral species (WII, 2006). To reduce the depletion of biodiversity due to human dependence, the Government of India initiated the India Eco-Development Project (IEDP) under World Bank assistance, to reduce impacts of local communities on the PAs, and vice versa.

Ministry of Environment, Government of India had undertaken the India Eco-development Project as a five year pilot project to run from October 1996 to June 2002 to promote local community participation in forest management in seven PAs in the country. The PAs are located in different bio-geographic regions namely; Ranthambore in Rajasthan, Pench in Madhya Pradesh, Periyar in Kerala, Palamau in Jharkhand and Buxa in West Bengal, all of which are tiger reserves, and Gir in Gujarat and Nagarahole in Karnataka which are both national parks (Figure 1.1.). Tigers were the flagship species in all project areas except in Gir National Park, which supports the only surviving wild populations of Asiatic lions, and which served as the flagship species in place of tigers.

The IEDP had five specific objectives (World Bank, 1996). They were to:

1. Improve the capacity of PA managers to conserve biodiversity and increase opportunities for local participation in PA management activities and decisions;
2. Reduce negative impacts of local people on biodiversity and of PAs on local people and increase collaboration of local people in conservation efforts;
3. Develop more effective and extensive support for eco-development of PAs;
4. Ensure effective management of this project; and
5. Prepare future biodiversity projects.

1.2. IEDP at Periyar Tiger Reserve (PTR)

Periyar Tiger Reserve, Thekkady, is an example of nature's bounty, with great scenic charm, rich bio diversity and providing veritable visitor satisfaction. Sprawled over an area of 925 Sq km. Periyar is one of the 39 tiger reserves in India and the sole Tiger Reserve of Kerala.

The IEDP at Periyar Tiger Reserve was sanctioned in 1996 and was implemented from 1998 after thorough field investigations through participatory rural appraisal, focus group discussions and interaction with the local communities to prepare a micro plan for implementation. The India Eco-development Project around Periyar Tiger Reserve (PTR-IEDP) in southern India received USD 6.0 million, of which 43.2 per cent was spent on community-based conservation activities. The major components of IEDP were improved protected area management, village eco-development, nature education and training, research and monitoring. At the end of the project period, in accordance with the tripartite agreement signed between the external donor agencies (World Bank and IDA), Government of India (GOI) and Government of Kerala (GOK), 72 eco-development committees were formed covering 40,000 people from the forest fringe area to provide viable and innovative livelihood options for the local people, simultaneously involving them in forest conservation and protection.

People oriented and park centered community based ecotourism is the hallmark of Periyar Tiger Reserve, resulted from the implementation of IEDP. These programmes are conducted by local people responsible for the surveillance of the vulnerable parts of the reserve. By taking tourists along, they are involved in the conservation of the forests of PTR and some valuable revenue is generated for community welfare. People who once made a living by illegal operations in the forests have since become forest protectors and earn their livelihood through these programmes.

1.3. Background to the Conception of IEDP

During the pre inception period of the project, there was critical unemployment prevalent among the fringe area communities which made them heavily dependant on forest. The target people of the Project, the inhabitants of the fringe area, particularly the poor and marginalised like the lower castes and women used to depend on the PTR resources in various ways. These included heavy biomass extraction of non-timber forest products, poaching of wildlife, felling of trees, cultivation of *cannabis*, and so forth. Obviously this nonviable kind of dependence on forest products, irrespective of how heavy or light, extensive or limited, and occasional or frequent, led to the deterioration of forest resources.

The land the tribes held and the pepper and coffee crops grown were already pawned to the local moneylenders for meager sums taken as advance. As a result their actual earning from the farm became a meager. Since mostly the same merchant moneylender renewed the mortgage of the home garden every year, the tribal neither did know the actual worth of their farm nor did they have a sense of belonging with

the farm. Most members of the hamlet had taken to drinking. Interactive relations were not strong enough to promote education of children or collaboration with fellow members in cultivation or any other long term income generating investments. The illicit brewing, an activity common in the recesses of the forest was reportedly leading many to alcoholic addiction and debt traps of exploitative intermediaries. In the set up of unequal exchanges the relation between the tribes and other settlers turned naturally exploitative.

Under this predicament of the local community, the Forest Department intervened through the India Eco-development Project. The extent of positive and negative impacts between the forest and local community was assessed through participatory rural appraisal, focus group discussions and interactions with community people. Huge efforts were required from the Forest Department to convince and educate the people on the motives and benefits of the project and to make them involved in Eco-development Committees (EDCs). As an entry point activity, a huge sum was pumped into the community to repay their debts and free them from the clutches of money lenders. A centralized auction system was established for the marketing of their farm produce. When they earned money, it was pooled into a Community Development Fund (CDF) which would serve as a source of interest free loan during the lean season, thereby leaving the forest unexploited for livelihood.

1.4. Eco-Development Committees

A participatory management strategy of Protected Areas, eco-development aims at conserving the biodiversity by addressing both the impact of local people on the PAs and the impact of the PAs on local people. The goal of the project was biodiversity conservation through people's participation. The EDCs were formed around PTR during the project period based on resource use patterns and social structure, to implement village eco-development and other activities (Uniyal and Zacharias 2001; KFD, 2001; Sharma *et al.*, 2004). Now**,** there are 79 EDCs operational in the area. The EDCs have been classified as follows: (i) Neighborhood/ Village EDCs (ii) User group EDCs (iii) Professional EDCs (iv) SAPP EDCs; and (v) Staff EDCs.

The IEDP continued up to 2004. In order to sustain the process of participatory management which has grown and evolved many folds beyond the project period, Periyar Foundation took birth on 27th July, 2004. Till date, The Eco-development Committees (EDCs) serve as platform for nature conservation and ecotourism activities in the reserve.

1.5. Activities under IEDP

The following activities were taken up under the IEDP.

1. Protection oriented camping and adventurous trekking in the Tourism Zone

2. Tribal tracker cum guides' service in the tourism zone

3. Harvesting of fodder and thatching grass in specified areas

4. Regulated fishing in specified areas of Periyar Lake by tribals

5. Sabarimala pilgrimage facilities

Ecotourism activities such as Periyar Tiger Trail, Bamboo Grove, Jungle Inn, Jungle Camp, Bullock Cart Discoveries**,** Tribal Heritage Museum, Nature Walk, Clouds Walk, Bamboo Rafting, Border Hiking, Jungle Patrol, etc, conducted by trained EDC members plays a major role in vigilant monitoring of the forest area for intruders and thus contribute to protection and conservation of the reserve besides earning their livelihood.

1.6. Participatory Approach to Conservation of PTR

The main strategy of IEDP was involving local people in conservation of protected areas. Around 25000 people living around the reserve, who used to exert considerable pressure on the forest resources for their sustenance, were transformed to conservators by addressing their social and economic needs employing novel and sustainable approaches. This also ensured reciprocity in forest conservation which will ideally act as a social fence around the PA. The opportunities of employment to the members of EDCs in various PA Management activities such as; habitat improvement, fire protection, ecotourism, etc., reduced the pressure on forest resources. As per the provisions contained in Section 33 of the Wildlife Protection Act (1972) certain intervention in a PA is allowable so long as they assist in restoration of the habitat.

1.7. Problem Focus

Since the past two decades, the focus of biodiversity conservation has shifted to new models such as Integrated Conservation and Development Projects (ICDP) due to increasing population pressures around and within the PAs, and the escalating conflict between wildlife managers and local communities. The India Eco-Development Project (IEDP) was implemented to reduce impacts of local communities on the PAs, and vice versa.

The initial goals of the project were to alleviate poverty among the local community and maintain environmental sustainability. Over a decade after the implementation of the project, the social framework of the locality might have changed. The analysis of the present status and tempo of activities of EDCs and people's perception towards it will be helpful in revisiting the management strategy if needed.

The study therefore seeks to analyse; the success and impact of India Eco-development Project (IEDP) implemented in the study area. Effect of ecotourism initiatives on a community basis on the

livelihood of local people and its contribution to the conservation of the common forest resources in Periyar Tiger Reserve (PTR), Thekkady is also covered under the study. The Economic Value of the Ecosystem of the Periyar Tiger Reserve which is an example of nature's bounty, with great scenic charm, rich bio diversity and providing veritable visitor satisfaction, will also be estimated by eliciting the Willingness to Pay of tourists. Collectively, these contributions also constitute a remarkable step toward improving our understanding of how resources can be governed better. The overall objective of the study is therefore to examine the effectiveness of institutional mechanisms in place for the participatory management of the forest resources of PTR, Thekkady. The specific objectives are given below.

1.8. Objectives of the Study

1. To examine the effectiveness of the participatory institutional mechanisms in the Periyar Tiger Reserve for the sustainable management of forest commons.
2. To analyse the impact of India Eco-development Project (IEDP) and Ecotourism initiatives on ecosystem conservation and local livelihood.
3. To measure the Willingness to Pay of tourists for conservation of Periyar Tiger Reserve and to assess its economic value.
4. To investigate the possibility of the extension of the management mechanism in the study area to similar areas elsewhere.

1.9. Hypotheses

1. Community based participatory approaches are not the effective means of managing free rider problems associated with common property resources.
2. Provision of an alternate income generating activity cannot always contribute to poverty reduction and ensure cooperation of the dependant communities in the sustainable management of commons.
3. People acknowledge the economic and ecological value of PTR but are not willing to contribute towards its conservation.

1.10. Scope of the study

The study of forests as commons has been one of the central sources of stimulus to the development of scholarship on common property (Agarwal, 2007). Participatory management and governance of commons is in a phase of revival across the globe. The evaluation of a project like IEDP may point towards the possibility of much greater participatory management of the commons elsewhere. The relevance of common property institutions must be tested by examining institutions that have emerged locally and formed with external assistance and which are vulnerable to fluctuating markets and

other aspects of the broader political economy of the region in which they operate (Morrow and Hull, 1996). The analysis of the institutional mechanism in place at PTR will thus reflect the possibility of extending the approach to other protected areas.

In India, forest felling causes one to two per cent depletion of forest annually and nearly three million people directly depend on forest for their living. Provision of alternative income generating activities only can reduce the forest dependency of poor communities. IEDP at PTR was a step forward in this direction. Ecotourism has emerged as an alternative income source and conservation measure. The evaluation of the relationship between ecotourism and commons management will reflect the opportunities for collective action to manage common pool resources, including wildlife and forests. The analysis of the effect of IEDP on reducing forest dependency and its impact on the livelihood of local people at PTR may provide beneficial guidelines in devising sustainable management measures for forest commons elsewhere.

Forest conservation and protection receives greater emphasis globally and huge outlay of money is allocated for it. Forest resources have economic value since they are scarce and are capable of providing stream of services, which in turn generate human welfare. The valuation of these economic benefits is difficult as the markets are imperfect or absent for these ecosystem services. The justification of cost involved in conservation of forest ecosystem necessitates the economic valuation of the ecosystem. The need to examine the social desirability of forest conservation efforts highlights the importance of economic valuation. General opinion of the people to protect the forest and their perception towards the various problems threatening the ecosystem in and around PTR is also elicited in the study, because understanding the people's attitude and preferences is also important to plan an effective community based conservation program to protect the natural resources.

1.11. Limitations

This study is based on the primary data collected from sample respondents by personal interview. As they do not maintain any records, they had to give information from their memory and hence there is possibility of recall bias. However, efforts were taken to minimize such bias through cross checking the data when collected. To assess the impact on conservation, direct evidence based evaluation of changes in densities of plant or animal communities can provide biologically based indices to assess the success of Community Based Conservation (CBC) projects. But it depends on the availability of secondary data. So, short term evaluations carried out through analysis of process based measures that takes into account the perception of people associated with it might equally well illuminate the success or otherwise of CBC projects. This study lacks any biological indicators to assess either the positive or negative impacts of the IEDP on PTR habitat, however relies upon socio-economic indicators and levels of empowerment and perception of the respondents about the economic value of PTR and the surrounding ecosystem.

1.12. Organization of the Thesis

The study is organized in the following chapters.

Chapter I Introduction: It includes introduction, problem focus, hypothesis, objectives, scope and limitations of the present study.

Chapter II Concepts and Review: In this chapter, a detailed review of important concepts used in the study along with a brief review of related past studies are presented.

Chapter III Design of the Study: It specifies the sampling design, method of investigation and tools of analysis used in the conduct of research and analyzing the data.

Chapter IV Description of Study Area: In this chapter, description of the study area showing geographical features, biological importance and socio economic features are presented.

Chapter V Results and Discussion: The results obtained in the study are presented and discussed along with the inferences drawn.

Chapter VI Summary and Conclusion: It summarises the findings and policy implications drawn from the findings.

CHAPTER II

CONCEPTS AND REVIEW

Review of related concepts and past studies will help in analyzing and understanding the current problem in proper perspective. In this chapter, definitions and concepts related to the present study, besides past studies are reviewed and presented under the following headings.

2.1. Review of Concept

2.1.1. Commons

2.1.2. Theories on CPR

2.1.3. Management of Commons

2.1.4. Ecotourism

2.1.5. Community Based Ecotourism

2.1.6. Eco - Development

2.1.7. Economic Valuation

2.1.8. Contingent Valuation Method

2.2. Review of Past Studies

2.2.1. Commons

2.2.2. Management of Commons

2.2.3. Evaluation of Participatory Management of Commons

2.2.4. Ecotourism

2.2.5. Community Based Ecotourism

2.2.6. Eco - Development

2.2.7. Contingent Valuation Method (CVM)

2.1.1. Commons

The commons is a general term for shared resources in which each stakeholder has an equal interest. Common Pool Resources (CPRs) are natural or human made resources where one person's use subtracts from another's use and where it is often necessary, but difficult and costly, to exclude other users outside the group from using the resource. The majority of the CPR research to date has been in the areas of fisheries, forests, grazing systems, wildlife, water resources, irrigation systems and agriculture.

Concepts

According to Wantrup and Bishop (1975), as an institution common property is to be distinguished from free and open access, where there are no rules regulating individual use rights.

According to Chopra and Kadekodi (1990), as a resource category, CPRs lie between the two ends of the continuum between private property (i.e. exclusive possession) and free good (i.e.non possession). CPRs such as forests possess the property of non excludability even when the benefits accruing from them are subtractive.

McKean and Ostrom (1995) defined common property or common property regime as “property rights arrangement in which a group of resource users share rights and duties towards a resource”. Central to this definition is communal ownership and management where no member has exclusive rights over the resource.

McKean and Ostrom (1995) opined that “common property is not access open to all but access limited to a specific group of users who hold their rights in common”. “Common property regimes are a way of privatizing the rights to something without dividing it into pieces. Common property also offers a

way of parceling the flow of skimmable or harvestable ‘income’ (the interest) from an interactive resource system without parceling the principal itself”.

Swallow and Bromley (1995) considered a common property regime “to be a set of institutional arrangements that define the conditions of access to and control over a range of benefits arising from collectively used natural resources”.

Jodha (1995a) defined common property regimes (CPRs) as “institutional arrangements evolved by communities to collectively manage and use their natural resources”.

Jodha (1995b) also defined CPR as a community’s natural resource, where every member has access and usage facility with specified obligations without anybody having exclusive property right over them.

Richards (1997) stated that “Common property is created when individuals agree to limit their individual claims over a resource in the expectation that other group members will do the same”.

NSSO (1999) defined Common property resources (CPRs) as resources accessible to and collectively owned/held/managed by an identifiable community and on which no individual has exclusive property rights are called common property resources. Accessibility to a resource is determined either by legal status or by convention. The term “Collectively owned or held” presumes a legal status. Thus, a resource collectively owned or formally held (by legal sanction or official assignment) by a community is considered to be a common property resource. Identifiable community means that co-users of the resources are a well defined group of persons.

McKean (2000) defined the regimes of common property as informal collective institutional arrangements that regulate the access, use, management and ownership of natural resources.

IIT, Bombay (2004) in their CEP Course brochure referred to the term "common-property resource" as property owned and defended by a community of resource users, to property owned by no one, and to property owned by a government.

Glinfskoi and Nordi (2006) stated that the term “common property” refers to the assemblage of regulations and rights established by a local community for the use of a particular common resource.

Chhatre and Agarwal (2008) defined Forest commons as forests for which boundaries of the resource, identity of users, and property rights to benefits are well defined; users have a stake in governing, central governments formally or informally recognize local interests.

Ostrom (2008) stated that Common pool resources share two characteristics that have direct relevance to ecotourism. One is the difficulty of exclusion or controlling access to potential users, and the other is the fact that any resource user can subtract from the welfare of all others.

Stronza (2010) stated that when common pool resources like wildlife, forests, and landscapes are commodified through ecotourism, they shift from being solely local commons to global commons. In the process, they become more difficult to manage.

Marothia (2010) defined Common Pool Resources (CPRs) as those resources which are used by an identifiable group of people irrespective of whether that resources are owned or not owned by them.

In the present study, the common property resource considered is forest commons for which the boundaries of resource, identity of users and access rights are well defined and the local people have a stake in governing and use of the commons.

2.1.2. Theories on Management of Common Property Resources

2.1.2.1. Hardin's Theory

The tragedy of the commons is a dilemma arising from the situation in which multiple individuals, acting independently and rationally consulting their own self-interest, will ultimately deplete a shared limited resource (Common Pool Resource) even when it is clear that it is not in anyone's long term interest for this to happen. This dilemma was first described in an influential article titled "The Tragedy of the Commons," written by Garrett Hardin and first published in the journal *Science* in 1968.

Articulating solutions to the tragedy of the commons is one of the main problems of political philosophy. In the absence of enlightened self interest, some form of authority or federation is needed to solve the collective action problem. Another solution for certain resources is to convert common good into private property, giving the new owner an incentive to enforce its sustainability. According to Hardin, 'tragedy of the commons' was inevitable if not owned by government or private parties.

2.1.2.2. Coase' Theory

Coase theorem is the proposition that in the absence of transactions cost; the level of production of goods or services in an industry in which there are externalities is independent of whether or not the party who perpetrates negative externalities is legally liable for the costs of the externalities on other parties.

The "Coasian" solution to the problem of tragedy of commons is also a popular one, whereby the people formerly using the common each gain their own individual part of it instead - so it is no longer a common - and do not have to support one another so as not to deplete the resource. The resource users themselves can cooperate to conserve the resource in the name of mutual benefit.

2.1.2.3. Game Theory

In game theory, which constructs mathematical models for individuals' behavior in strategic situations, the corresponding "game", developed by the ecologist Garrett Hardin, is known as the Commonize Costs — Privatize Profits Game (CC–PP game).

The literature examining CPRs generally focuses on three basic institutional approaches to overcome externalities: private, state and common property. In some cases, private regimes are preferable, while in others more of a conventional state regulatory regime is required, and in others a cooperative management regime involving the community of resource users collectively holding some private form of rights may be most beneficial. Other possibilities include a combination within the range. A model for analyzing CPR situations is presented in Figure 2.1.

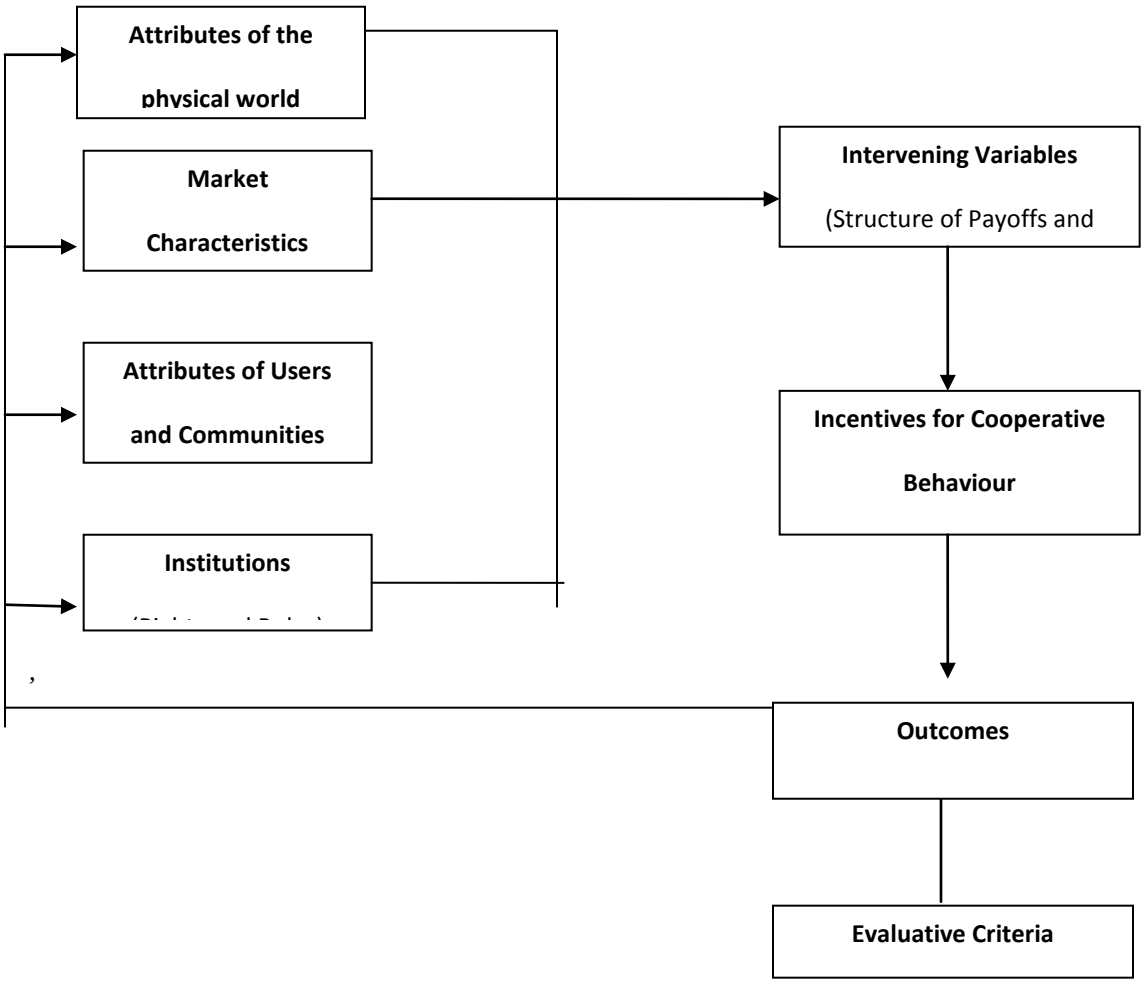

Figure 2.1: A model for analyzing CPR situations (Mitchell, 1997)

Prior to any move towards institutional change, users, or "appropriators," of the resource must be able to recognize the costs and benefits of change. If the benefits of change do not clearly exceed the costs of both change and the enforcement of the new rules, users will not willingly adopt the new management regime. Choosing which alternative may successfully address a particular CPR depends on a range of characteristics, or as Ostrom (1990) calls them **"**situational variables" that relate to the costs and benefits of change and the ability to accommodate the new rules of management. Fundamental to the efficacy of any approach to managing CPRs are "institutions that authorize and secure use by a particular group of users (to the exclusion of others)" (Arnold, 1998).

2.1.2.4. Evolutionary Theory of Commons Management

Common property and common pool resources dilemmas are examples of the broader problem of cooperation, a problem that has long interested evolutionists. The strategies for successfully managing commons are generally institutionalized in sets of rules that have legitimacy in the eyes of the participants (Ostrom, 1990).

Richerson *et al.* (2001) analysed the current theory to draw lessons from the evolution of human cooperation for the management of contemporary commons.

Evolutionary theory is in essence a theory of preferences in terms of rational actor theory and is thus complementary to the bounded rational choice models that underpin so much theorizing in the social sciences. Thus, the theory suggests a source for prosocial impulses, and leads to predictions about the limits of human altruism and constraints likely to be imposed upon the evolution of social institutions. Tribal level institutions typically maintained peace between bands, made provision for emergency aid to fellow tribe members, celebrated communal rituals, defended the tribe against predatory raids by neighbor tribes (and often a specific territory from encroachment by other tribes), and legitimated the punishment of tribal miscreants. Institutions for making collective consensus decisions about war, peace, resource exploitation, institutional changes, and the like existed. Rudimentary cooperative institutions created by cultural group selection would have favored genotypes that were better able to live in more cooperative groups. The tribal social instincts hypothesis states that the long exposure of human populations to group selected cultural norms and preferences is likely to have resulted in an innate psychology adapted to living in egalitarian, cooperative societies of a few hundred to a few thousand people.

Contemporary human societies differ drastically from tribal societies in which our social instincts evolved. The evolution of complex societies in the past few thousand years constitutes a series of natural experiments that test this hypothesis. If it is correct, the institutions of complex societies must somehow take advantage of the prosocial elements of the tribal instincts while finessing the problem that the tribal social instincts are ill adapted to life in large, hierarchical, inegalitarian societies with extensive dominance of subordinates by elites, termed as work-arounds hypothesis. Evidence from studies on commons management suggests that efficient commons management is frequently provided by tribal-scale political entities embedded in complex societies. Many of the toughest problems in effective commons management involve dysfunctional vertical linkages between levels of organization. The most important cultural innovations required to support complex societies are command and control institutions that can systematically organize cooperation, coordination, and a division of labor in societies consisting of hundreds of thousands to hundreds of millions of people. Commons management bureaucracies, even in relatively successful democracies such as India, often legislate away tribal scale commons management systems and replace them with bureaucracies that do a much worse job. Tightly organized, large command and control bureaucracies only function properly when the institutions that regulate their behavior favor efficiency and honesty. Otherwise, the ever present selfish, nepotistic, and tribal-scale motives will support the emergence of corruption at every level of the hierarchy.

Successful commons management on any scale requires a system of legitimate institutions. Where these do not exist, appropriate organizations may arise spontaneously at the tribal level, especially if the state does not actively interfere. In cases where the scale of the problem is larger, the whole panoply of work arounds must act with enough efficiency to create large scale management systems, such as ministries of the environment. When such bureaucracies work well, they are likely to adopt some tribal attributes. Individuals will have high loyalty to the organization and a deep commitment to making it function. In many societies, these institutions remain distressingly lacking in such attributes. Indeed, the contemporary enthusiasm for conservation and development projects to protect biodiversity in poor countries is an effort to cope weak national institutions that are the backbone of biodiversity conservation in the wealthy nations.

Rupasingha and Boadu (1998) examined the evolution of economic theory to explain the emergence and maintenance of cooperation among users of local commons. The conventional view that "free riding" prevents cooperative solutions to the commons dilemma is challenged under new theories rooted in evolutionary paradigm and the institutional matrix within which individuals find themselves. Contrary to the prediction of the conventional view, modern evolutionary theories provide ample empirical and theoretical evidence in support of a community's ability to self organize to preserve the local commons.

2.1.2.5. Cultural Theory and Management of Common Property Resources

Buck (1989) in his paper explained the evolution of cultural theory from its anthropological roots to its applications in ecological management and then applied cultural theory to a typology of common property resources and illustrates its usefulness by examining grazing subsidies in the American southwest.

Cultural theory utilizes concepts drawn from social anthropology, sociology, and organization theory to explain the social and cultural biases of policy actors and interest groups. Certain ideas of nature are associated with each cultural bias; these ideas of nature are in turn associated with types of resource management institutions. By identifying an actor or group's culture bias, analysts can explain the success or failure of different management activities.

Wildaysky (1987) described four categories of cultures derived from grid-group dimensions.

Table 2.1. Models of Four Cultures

Number and variety of prescriptions	**Strength of group boundaries**	
	weak	*Strong*
Numerous and varied	Apathy(Fatalism)	Hierarchy (Collectivism)
Few and similar	Competition(Individualism)	Equality(Egalitarianism)

The **individualists** seek open competition. They support social differences and avoid hierarchical categories of class or economic status. The market is used to achieve maximum individual gain. It is these highly competitive entrepreneurs who, others insist, risk the "tragedy of the commons" in their use of resources because they have such low affinities for group norms or for cooperative regulation.

The **hierarchs** favor institutionalized authority. They believe that organized inequality, which perpetuates social and economic class systems, is helpful in establishing division of labor and role specialization, both of which enhance social harmony and stability. Hierarchs are inclined toward technical fixes for resource problems, and they seek regularized control of the system in which they operate.

Egalitarians, who have strong groups but few prescriptions, share a "life of voluntary consent without coercion or inequality". They prefer to reduce differences among people, and they tend to be small groups and short-lived. Because egalitarians are inherently suspicious of the external "system," they resist external controls; because they value equality, they will impede a peer's progress rather than see him get ahead of the remainder of the group.

The fourth group, the **fatalists**, is not of great interest in setting policies. They are apathetic and under the virtually complete control of outside forces. Thus, there is "no point in their having preferences on public policy because what they prefer would not, in an event, matter".

In cultural theory, there are no resources that are inherently common property. Everything can be privatized or, conversely, communalized. Some common property resources are managed successfully. Successful management of a renewable common property resource maintains an ecological sustainability while reducing the traditional user pool as little as possible. For most common property resources, a user pool already exists with expectations of access. Most schemes to limit access involve initial access rights for current users with incentives, disincentives, and entry regulations to manipulate the user pool size in the future. One could also argue that because of capital investment costs, the rational person will deplete the resource quickly, and then move his investment to other enterprises.

It may thus be concluded that the CPRs being used or largely controlled by weak group-weak grid entrepreneurs will fall prey to the tragedy of the commons unless either the entrepreneurs can be converted to hierarchs or a sufficiently strong opposition can be mounted to maintain a balance of power and a constant state of tension or conflict. In a similar fashion, we could demonstrate that those common property resources that are managed successfully are controlled by users with either the egalitarian or hierarchical ideas of nature.

2.1.3. Management of Commons

The tragedy of the commons, the term first described by Hardin (1968) is a dilemma arising from the situation in which multiple individuals, acting independently and rationally consulting their own self interest, will ultimately deplete a shared limited resource even when it is clear that it is not in anyone's long term interest for this to happen. In order to avoid this dilemma many mechanisms like privatization, state control and assigning Property Rights have been proposed by different scholars. But recent research

acknowledges the importance of collective action and participatory management in addressing a wide range of social problems associated with commons. ‘Participatory Management’ is a situation in which two or more social actors concerned about a territory, an area or a set of natural resources negotiate, define and guarantee amongst themselves a fair sharing of the management functions, entitlements and responsibilities.

Concepts

It was thought that a resource held under a common property resource (CPR) regime is inherently inefficient since individuals do not get proper incentives to act in a socially efficient way. As a consequence scholars have long questioned the incentive for efficient use of common pool resources under CPR regime (Gordon, 1954; Scott, 1955; Hardin, 1968) and solutions have been proposed, such as state control and management (Hardin, 1968) or privatisation of the commons (Demsetz, 1964).

An increasing number of scholars, however, advocate that decentralized collective management of CPRs by their users could be an appropriate system for overrating the 'tragedy of commons' (Jodha, 1986; Chopra *et al.* 1989; Ostrom, 1994).

Chopra and Kadekodi (1991) defined participation as the initiation and continuance of an active process by which beneficiary groups influence the direction and execution of development activity. In the context of resource management, participatory institutions often present an alternative when the market and / or the state fail to maintain resource stocks at desirable levels.

Beck (1998) opined that Successful management of a renewable common property resource maintains an ecological sustainability while reducing the traditional user pool as little as possible.

According to Agarwal and Ostrom (2001) decentralization typically refers to a transfer of power from central authorities to lower levels in apolitical administrative and territorial hierarchy. They have reported that national governments in almost all developing countries have begun to decentralize policies and decision making related to development, public services, and the environment. But most analyses, especially where environmental resources are concerned, have been less attentive to the political coalitions that prompt decentralization and the role of property rights in facilitating the implementation of decentralized decision making.

Dietz *et al.* (2003) suggested that locally evolved institutional arrangements governed by stable communities and buffered from outside forces have sustained resources successfully for centuries, although they often fail when rapid change occurs. Ideal conditions for governance are increasingly rare. Critical problems, such as transboundary pollution, tropical deforestation, and climate change, are at larger scales and involve non local influences. Promising strategies for addressing these problems include

dialogue among interested parties, officials, and scientists; complex, redundant, and layered institutions; a mix of institutional types; and designs that facilitate experimentation, learning, and change.

Berkes (2004) stated that Community-based conservation (CBC) is based on the idea that if conservation and development could be simultaneously achieved, then the interests of both could be served. He opined that scholars of forest commons more often focus on forest conditions, livelihoods, and equity related issues as measures by which to evaluate outcomes.

Lemos and Agarwal (2006) opined that changes in forest governance are for the most part related to nonhierarchical governing involving stakeholders and actors from different levels in formal and informal processes of cooperation and interactions from local to global level. Like in other sectors, forest governance not only refers to governmental regulation and law enforcement for sustainable management but also involves the political, organizational, and cultural frameworks through which diverse interests in natural and cultural resources are coordinated and controlled.

Larson and Soto (2008) reported that forest and biodiversity resources have been the most important component of natural resource decentralization policy debates and most studied in natural resource literature

Abbasi and Khan (2009) stated that community based conservation can make a conceptual change and can be seen as a systems view that includes humans in the ecosystem and manages ecosystems in a participatory manner.

Stronza (2010) opined that Commons management may be improved through community based enterprises like ecotourism. It can strengthen networks and organizational capacities of communities. It can also generate economic incentives to manage resource use for sustainability.

Tucker (2010) referred “Sustainable forest management”, in ideal terms, as the maintenance of a forest, including ecosystem functions and its native biotic and abiotic components. Sustainable management exists as long as perturbations of natural or human origin permit recuperation.

According to Tucker (2010), governance, institutions, and sustainable forest management interrelate closely. They are jointly necessary to the concept of successful forest governance. Herein, “successful forest governance” involves exercising authority and developing institutions to maintain forests in good condition with respect to the given biome, ecosystem functions, species composition and human needs.

Large scale natural resources are CPRs and pose diverse and difficult challenges than those posed by private and public goods. Marothia (2010) observed that global attempts at democratization and decentralization have resulted in creation of wider opportunities for people's participation in governance.

In the present study, the management regime considered is a participatory approach where the Eco-development Committees with forest dwelling and fringe area people as members function as grass root level management institutions in coalition with the official governance mechanism of forest department in the form of Periyar Foundation.

2.1.4. Ecotourism

Ecotourism is defined as environmentally responsible travel and visitation to natural areas to enjoy and appreciate nature that promotes conservation of the environment and sustains the well being of a local people.

Concepts

Ceballos (1991) defined ecotourism as 'Tourism that involves traveling to relatively undisturbed natural areas with the objective of admiring, studying and enjoying the scenery and its wild plants and animals, as well as any cultural features that may be found there.'

Valentine (1993) stated that ecotourism is restricted to that kind of tourism which is;

(a) based on relatively undisturbed natural areas;

(b) non-damaging, non-degrading, ecologically sustainable;

(c) a direct contributor to the continued protection and management of the natural areas; and (d) subject to an adequate and appropriate management regime.

Forestry Tasmania (1994) stated that Nature based tourism is focused on provision of learning opportunities while providing local and regional benefits, while demonstrating environmental, social, cultural, and economic sustainability.

Australia Department of Tourism (1994) defined Nature based tourism as that involves education and interpretation of the natural environment and is managed to be ecologically sustainable. This definition recognizes that natural environment includes cultural components, and that ecologically sustainable involves an appropriate return to the local community and long term conservation of the resource.

According to Tickell (1994), Ecotourism is travel to enjoy the world's amazing diversity of natural life and human culture without causing damage to either.

Wallace and Pierce (1996) defined that Ecotourism is travel to relatively undisturbed natural areas for study, enjoyment, or volunteer assistance. It is travel that concerns itself with flora, fauna, geology, and ecosystems of an area, as well as the people (care takers) who live nearby, their needs, their culture, and their relationships to the land. It views natural areas both as 'home to all of us' in a global sense ('eco' meaning home) but 'home to nearby residents' specifically. It is envisioned as a tool for both conservation and sustainable development especially in areas where local people are asked to forgo the consumptive use of resources for others.

Barkin (1996) suggested ecotourism as a key to sustainable development of protected areas.

According to Blamey (1997) an ecotourism experience is one in which an individual travels to a relatively undisturbed natural area that is more than 40 km from home, the primary intention being to study, admire, or appreciate the scenery and its wild plants and animals, as well as any existing cultural manifestations (both past and present) found in these areas. An ecotourist is anyone who undertakes at least one ecotourism experience in a specified region during a specified period of time.

According to Lindberg and McKercher (1997) Ecotourism is tourism and recreation that is both nature based and sustainable.

Isaacs (2000) considered ecotourism as an economically viable activity that can minimize negative impacts of humans on natural habitats and wildlife, thus providing an incentive/benefit to stakeholders to preserve natural areas and their inherent biodiversity.

Wearing (2001) defined ecotourism as a different entity based on the involvement of local populations in all aspects of tourism. Indigenous populations are the most knowledgeable about the area, and they possess the practical and ancestral knowledge of the natural features of the area. He considered ecotourism as something that always takes place in the nature or a peripheral area. But, in order to be called ecotourism, the actions that take place in that area also have to benefit the environment or the people living there.

Herath (2002) opined that ecotourism creates an enhanced environmental awareness and concern for the environment and thus encourages participants to protect the environment.

Page and Dowling (2002) enlisted the socioeconomic and environmental costs and benefits associated with ecotourism. Some economic benefits can be that the local economy is benefited and gets new money, people are encouraged to start up new businesses, and the local economy gets a better structure and balance. The costs can be that the economy becomes too dependent on one specific activity only. The environmental benefits are that environment is protected, habitats are restored, and tourists assist by donations or maintenance in order to enhance habitats. The costs can be an over exceeding of

carrying capacity as this is very difficult to estimate, pollution, wildlife being disturbed (animals get stressed, breeding season being distracted), overdevelopment in small places that cannot handle it.

Turner *et al.* (2002) reported the key components of ecotourism as the following:

- Contributes to biodiversity conservation
- Sustains the well-being of local people (stakeholders)
- Includes and interpretation/learning experience
- Involves responsible action by tourists/tourism group
- Is delivered primarily to small groups by small-scale businesses
- Requires low consumption of non-renewable resources
- Stresses local participation, ownership and business opportunities for rural people

According to Dowling (2003), there are four main dimensions to the environmental maintenance of a successful ecotourism program: it must have a strong nature base, support for conservation in the area, sustainable management practices, and an element of environmental education for locals and tourists.

Dowling *et al.* (2003) described the socio cultural benefits and costs of ecotourism. The socio-cultural benefits are more opportunities for employment among the locals, ecotourism brings an aesthetic and spiritual experience, and the cultural heritage is protected. The costs are that the local and remote cultures might be distracted, the locals lose control of the business; they risk to not get the jobs due to foreigners in-migrate to seek the same jobs, tourists do not understand the local cultures and traditions, the tourists can start to irritate the locals and that creates a bad and non friendly atmosphere in the destination

Daniel *et al.* (2005) viewed ecotourism or nature tourism as a form of sustainable tourism.

Cusack and Dixon (2006) viewed Ecotourism as a strategy for developing countries to create sustainable economic development while pursuing conservation objectives by balancing between the often conflicting goals of poverty reduction and biodiversity conservation. Ecotourism is considered as a win-win solution to advance resource conservation and poverty reduction, which is mutually reinforcing goals if it is well planned and managed by the local communities.

The International Ecotourism society (TIES, 2006a) defined ecotourism as ‘responsible travel to natural areas that conserves the environment and improves the well being of local people’.

The Australian Commission on National Ecotourism Strategy's definition of ecotourism is "nature based tourism that involves education and interpretation of the natural environment and is managed to be ecologically sustainable" (Untamed path, 2007).

Honey (2010) defined Ecotourism as tourism that involves travel to natural areas, minimizes impacts, build environmental awareness, provides direct financial benefits for conservation, provides financial benefits and empowerment for local people, respects local culture, and supports human rights and democratic movements.

In the present study, Ecotourism is defined as a strategy for sustainable management of forest commons, where the major thrusts are protection, conservation, earning a livelihood for the forest dependent people and revenue generation for the maintenance of PTR.

2.1.5. Community Based Eco Tourism (CBET)

Community based Ecotourism is where local people have substantial control and involvement in an ecotourism project and majority if not all benefits remain in the community.

Concepts

According to Sproule (1998), CBET refers to ecotourism enterprises that are owned and managed by the community. Furthermore, CBET implies that a community is taking care of its natural resources in order to gain income through operating a tourism enterprise and using that income to better the lives of its members. Hence, CBET involves conservation, business enterprise and community development.

World Bank (2000) defined Community Based Tourism as tourism that emphasized the ownership, management and involvement of communities' members in the tourism activities. CBT is not just an ecotourism. While ecotourism focuses on ecological friendliness, community based tourism focuses on the participation of villagers in the tourism activities and the sharing of tourism benefits among villagers.

UNESCO (2001) defined Community based eco tourism as tourism that is based on a combination of both cultural and natural attractions. It therefore usually takes place in natural areas and involves local communities which still retain traditional cultures and which actively participate in the development and management of tourism activities.

According to United Nations (2001), the latest approach to community participation in tourism development revolves around the concept of community based sustainable tourism (CBST). This was developed as a way to overcome or minimize the negative effects of tourism in remote, rural areas. CBST was developed as a form of tourism aimed at empowering local communities to be self reliant, use group

processes for local decision making, support human rights and capabilities, and help people to generate incomes and improve their standard of living on their own terms. Local knowledge, community participation, support for local capabilities and cultural exchange with tourists are expected to help sustain both cultural and natural resources.

According to WWF International (2001), community based ecotourism takes the social dimension of ecotourism a stage further, by developing "a form of ecotourism where the local community has substantial control over, and involvement in, its development and management, and a major proportion of the benefits remain within the community." Community based ecotourism, therefore, fosters sustainable use of land and natural resources.

According to Zimmermann and Mayer (2001), active community involvement is fundamental to local tourism development as the attitude of residents towards tourism is one of the key elements in achieving sustainable tourism.

Berkes (2004) opined that community based conservation is based on the idea that if conservation and development can be simultaneously achieved, the interests of both are served.

TIES (2006b) defined the terms community based tourism (CBT) and community-based ecotourism as the type of tourism that, recognizes the significant social, environmental and economic impacts tourism can have, primarily focuses on tourism's benefits to the local communities.

In the present study, the community based ecotourism is a part of participatory forest management policy where the once forest dependant people have been rehabilitated as ecotourism guides and thereby involved in forest protection and conservation. Here, the CBET is a means to reduce the consumptive use that depletes forest resource by providing an alternative livelihood to the forest dependant people and to ensure protection of forest.

2.1.6. Eco-Development

According to Manoharan (1996), Eco-development is a strategy for protecting ecologically valuable areas (PAs) from unsustainable or unacceptable pressures resulting from the needs and activities of people living in and around such areas.

According to the World Bank Project document (World Bank, 1996), the central process of participatory micro planning starts with the formation of Eco-Development Committees (EDCs). 'Without people organised in to such committees, there can be no eco-development, in the parlance of the Bank. The basic premise of Eco-development is that local communities will conserve natural resources if their economic stake is clearly defined in the path of sustainable development.

The World Bank (1996) also stated that the scope of eco-development is beyond keeping tribes off the forests by providing other means of subsistence. It stretches into various positive aspects like CPR, grassroots democratisation, corporate capacity building, alternative institutional development, removal of tenurial contradictions and exploitative intermediaries, cooperativising, preservation of local knowledge, ensuring of distributive justice in benefit sharing, checking of further cultural disruption and so on.

According to United Nation's document (1997), Eco-development refers to development at regional and local levels, consistent with the potentials of the area involved, with attention given to the adequate and rational use of natural resources, technological styles and organizational forms that respect the natural ecosystems and local social and cultural patterns. The term is also used to describe an integrated approach to environment and development.

Badola *et al.*(2002) opined that Eco-development and Joint Forest Management (JFM) are celebrated strategies for bringing people back to PAs or of making local people stakeholders and partners in wildlife conservation and forest protection .

Bhardwaj and Krishnan (2004) reported Eco-development (ED) as a strategy that recognises the traditional dependence of people on the forest resources for domestic use as well as supplementing livelihoods, and seeks to rationalise the demands of the community by facilitating alternatives for resources and livelihoods. The approach involves evolving and implementing a package of measures, which enhance the productivity of the rural ecosystems, including the agricultural areas and the use zones within the PA. At the same time it includes provisioning means and facilitating activities, which promote use of alternate energy, resources and livelihoods and help in reducing forest dependence. In essence, the ED strategy aims at strengthening nature conservation in participation with and through empowerment and the socio-economic wellbeing of the local people.

In the present study, Eco-development Committees are participatory institutions involving the fringe area people of the forest for conserving it by reducing the negative forest dependency and protecting it from external threats.

2.1.7. Economic Valuation

Economic Valuation refers to the process of assigning monetary values to the non marketed assets, goods and services, where the money values have a particular and precise meaning. Non marketed goods and services refer to those, which may not be directly bought and sold in the market place. The measurement of the economic value of biodiversity is a fundamental step in conserving this resource.

The economic value is broadly divided into use value and non use value. Use value represents the utility enjoyed by people who directly use some aspect of environment. It can be classified as

consumptive (e.g. timber, non timber forest products), noncosumptive (e.g. Recreation) and indirect (e.g. watershed protection, carbon storage). The non use values also known as preservation values reflect the value that people assign to aspects of the natural environment that they care about but do not use in a commercial, recreational or other manner. The nonuse values comprise of option value, existence value and bequest value.

The method of economic valuation can be broadly classified as stated preference method and revealed preference method. Revealed preference methods like Travel Cost Method is based on how individuals actually behave and stated preference methods like Contingent Valuation Method is based on how individuals say they would behave in a hypothetical situation.

Concepts

Bishop and Haberlein (1979) reported that given the uncertainty about the future values, the Option value represents the willingness to pay to retain the option of preserving the access to diverse range of habitats/species/genes.

The total economic value is composed of use value and preservation value (non use value). Use value is related to consumer surplus benefits from actual recreational use, while preservation value is related to benefits from non-use satisfaction. Preservation value includes option value (retaining the recreation opportunity for possible future use), existence value (knowledge that natural resources are preserved), and bequest values (satisfaction derived from endowing future generations with natural resources)
(Greenley *et al.* 1981).

According to Randall and Stoll (1983), the benefits derived from natural resources such as the use value (Consumptive and non consumptive), option value, existence value and bequest value are collectively referred to as Total Economic Value (TEV).

Adger *et al.* (1995) explained that TEV consists of use value and non use values in a broader sense. Each of them can be classified into sub values. Use values are composed of direct use values, indirect use value and option value. A direct use value of a forest is the revenue from timber, firewood and non timber forest products. Indirect use values include watershed protection, carbon storage, and nutrient cycling and so on. Option value is the expected value of information on the benefits of an asset, conditional on its preservation enabling an increase in stock of knowledge relevant to the utilization of the asset.

Loomis and White (1996) categorized the anthropocentric and human centered benefits of protecting threatened and endangered (T&E) species into several categories. (a) Use value such as

viewing the species, (b) Option value to maintain the genetic information provided by populations of T&E species that may be useful for medicinal and genetic engineering applications. (c) Existence value derived from the satisfaction of knowing that a particular species has a sustainable population in its native habitat (d)The bequest value that the current generation receives from knowing preservation today provides this species to future generation.

Pearce (2001) opined that the measurement of economic value of biodiversity is a fundamental step in conserving this resource, since the pressures to reduce biodiversity are so large that the chances that we will introduce incentives [for the protection of biodiversity] without demonstrating the economic value of biodiversity are much less than if we do engage in valuation.

Pearce (2002) defined Economic Valuation as the process of assigning monetary values to the non marketed assets, goods and services, where the money values have a particular and precise meaning. Non marketed goods and services refer to those, which may not be directly bought and sold in the market place.

Christie *et al.* (2006) stated that the huge outlay of budgets involved in conservation activities necessitates the economic valuation of the benefits of ecosystem to society and human welfare, to substantiate the cost and environmental valuation techniques can provide useful evidence to support such policies by quantifying the economic value associated with the protection of biological resources.

In the present study the total economic value is considered as the sum of use value and non use value. Here, the use value is the non consumptive use value derived from tourism recreation and the non use value (preservation value) which included option value, existence value and bequest value. The total economic value considered here is the aggregate non consumptive value. Also the bequest value accorded to PTR for protecting it for the future generation by the fringe area people is estimated separately in this study.

2.1.8. Contingent Valuation Method (CVM)

The Contingent Valuation Method was first proposed by Ciriacy Wantrup in the year 1947. CVM is used when markets do not exist for environmental resources. Contingent Valuation method involves the use of survey questionnaires to elicit hypothetical willingness-to-pay (WTP) information. This method is used for valuation of wilderness, as well as of common environmental facilities like forests, common lands, common water bodies, etc. The WTP is elicited using survey methods, either open ended questionnaire or bidding game technique (Hackett, 2009).

In the present study, CVM using bidding game technique is used to elicit the WTP of the tourists to measure the total economic value of PTR. Here, the truncated mean WTP calculated using LOGIT

model is aggregated to obtain the TEV. To estimate the WTP of EDC members to obtain the bequest value, open ended CVM was followed.

2.2. Review of past studies

2.2.1. Commons

Jodha (1986) observed that rural poor are heavily dependent on CPRs for their livelihood. In a study of 21 districts of seven States of India he found that the privatisation of CPRs as a strategy to help the rural poor yielded a negative results and also reduced the productivity of the commons.

Iyengar (1989) in his study of Gujarat, India has observed that it is the population pressure induced privatisation that is mainly responsible for the degradation of CPRs.

Chopra *et al.* (1990) used a nine fold land use classification data to estimate the total area of CPRs. They suggested that 'other than current fallow', 'cultivable waste', 'pastures', and 'protected and unclassed forests' can be broadly categorised as CPRs. Based on this classification, they concluded that 21.55 per cent of all land in India (1980–81 figures) were CPRs with the rider that this estimate might be slightly high given the fact that not all protected forests are CPRs.

Menon and Vadivelu (2006) explored the (1) variations in the extent and use of different CPR products across agro-climatic zones, (2) differential dependence on CPRs by farmers with different operational-size holdings, and (3) legal access to CPRs (*de jure* and *de facto*). They reported that the value of CPRs as a percentage of consumer expenditure is only 3.02 per cent at the national level. States that have marginally higher income dependence on CPRs in terms of percentage are Orissa (5.59 per cent), Madhya Pradesh (4.93 per cent) and Assam (4.89 per cent). States with a lower level dependence include Kerala (1.17 per cent) and West Bengal (2.09 per cent).

Agarwal (2007) observed that the study of forests as commons has been central to the development of scholarship on common property. In consonance with much research on other types of common pool resources, scholars of forest based commons also focus primarily on how variations in institutional arrangements shape resource related outcomes.

2.2.2. Management of Commons

Chopra *et al.* (1989) in their study of Hariyana highlighted the importance of participatory management in controlling the CPRs. They argue that government's failure to preserve CPRs together with their excessive exploitation for developmental activities has led to serious degradation of the environment with ecological repercussions.

Ostrom (1990) found that when groups have experience in cooperating, share common understandings, trust each other, and invest time and labor to joint governance, common property arrangements can be as effective, or more so, than private or public tenure.

Chopra and Kadekodi (1991) opined that in the context of resource management, participatory institutions often present an alternative when the market and or the state fails to maintain resource stocks at desirable levels. Based on two case studies on the evolution of participatory institutions, they have shown that the evolution, sustenance and replication of participation and its impact on levels of resource conservation depends on; (a) the nature of links between common and private property resources; (b) the possibility of taking advantage of scale economies; and finally (c) the distributional rules and arrangements.

Fisher (1992) while discussing the indigenous forest management in Nepal argued that common property is not a problem in Nepal. In his studies, he has explored the implications of the emerging knowledge of indigenous systems of locally initiated forest management systems to theories about the management of natural resources as common property.

Murthy (1994) in his paper found that the voluntary collective action may be an alternative to market and government in the management of common property resources. He argued that there can be mutually beneficial sharing arrangements between government and village communities for the management of local forest resources.

Taylor's (1995) research highlighted the fact that although the need to involve the community in commons management is widely accepted, the mechanics of community participation require a clearer definition.

Morrow and Hull (1996) opined that the relevance of common property institutions must be tested by examining institutions that have emerged locally and formed with external assistance and which are vulnerable to fluctuating markets and other aspects of the broader political economy of the region in which they operate.

Recognizing the important and unclear effects of heterogeneity on the governance of the commons, Baland and Plateau (1996) provided an initial attempt to classify them into three types: endowments, interests, and identities. They hypothesized that heterogeneities of endowments have a positive effect on resource management, whereas heterogeneities of identity and interests create obstacles to collective action.

In a study in North Western Himalayan region, Singh and Ram (1997) argued that the success of a strategy for CPRs often depends upon local participation and institution.

According to Ostrom *et al.* (1999) an analysis of ecotourism and commons management must include a focus on the ability of local residents to act collectively to control problems of exclusion and subtraction. The strength of collective action also determines how effectively communities can monitor their resources, especially those being exploited for ecotourism, establish rules for use and conservation, and sanction rule breakers.

Gurung (1999) studied the local institutions, cultural practices and resource management in a mountain village of West Nepal. His analysis was based on the etho-historical data collected from several mountain villages, particularly Tara Khola in West Nepal. He argued that local institutions are effective and legitimate for managing CPRs.

Adrian and Lemon (2001) through a study of joint forest planning and management in the Western Ghats of Karnataka, argued that local contexts require fuller understanding and that local agency can only be facilitated where policies and legal frameworks are more receptive to local negotiation.

Agarwal (2001) reported that Joint Forest management (JFM) programmes arised from the recognition that sustainable resource management can never be independent of sustainability of collective human institutions that frame resource governance, and that local users are often the ones with the greatest stakes in sustainability of resources and institutions.

Adhikari (2001) opined that the recognition of community based resource management leads to the devolution of natural resources from centralized government management to local user groups in Nepal and other South Asian countries. Devolution of forests has been underway in Nepal since 1990s under which national forests are handed over to forest user groups (FUGs) under a community based property rights regime. The Government has been issuing policy initiative for encouraging participation of rural households to strengthen community based institutions for the control and sustainable management of local forest resource.

Heltberg (2001) analysed the local institutions for forest conservation and management based on data from 37 villages and 180 households randomly sampled from a protected area in Rajasthan, India. Local management institutions are described, factors affecting inter village differences in management institutions and collective action are analysed in a Logit model, and the impact of institutions and other variables on common resource dependency and forest outcomes is tested using instrumental variable regression. It was concluded that local management institutions play a positive role in the area, but their impact appears insufficient to safeguard forests and commons from continued degradation.

Onguo (2001) opined that there would be an increasing recognition of community participation in the management of forests and woodlands in the Eastern African region. According to them countries like

Ethiopia, Kenya and Uganda had been still searching for appropriate institutional arrangements and structures to deliver benefits to local communities while at the same time assuring forest sustainability.

Eco-development Projects (EDPs) have been implemented across various parts of the world including India to enhance CPR based livelihood support and reduce people's dependence on protected areas (PAs). But, Kothari (2002) reported that available evidences on EDPs are not encouraging as it has been found that the EDPs have alienated local communities from their resource base and caused severe hardships, and alienation resulted in breakdown of traditional practice, erosion of traditional knowledge, loss of desire to protect resources from degradation, and hostility towards official conservation efforts.

Nagendra *et al.* (2004) identified that creating partnerships offers a way to overcome gaps in understanding and construct mutually beneficial relationships. Through partnerships, local groups can access resources, information, technology, and training that support their governance efforts. In some cases, financial and technical support from external sources may be critical, although questions arise as to what will happen when the support ends.

Cash *et al.* (2006) opined that recent commons scholarship stresses that local levels of collective action are necessarily linked to higher levels of social and political organization in a globalized world.

Berkes (2007) stated that recent studies of successful governance point to the importance of linkages among groups and entities operating at different levels, or in parallel, with local forest appropriators and owners.

Shylajan and Mythili (2007) in their study explored the factors determining the dependence of local people on protected area of forest based on household analysis of a Protected Area from Kerala. The findings confirmed the hypothesis that alternative income source would greatly reduce the dependence and hence ease the conflict between local people's interests and forest management in conservation activities.

Uprety (2008) in his paper based on the indigenous resource management systems in Nepal has underscored the role of local institutions and organizations for the sustainable management of forest and pasture as common property resources.

Ashenafi and Tefera (2011) examined the shared governance in conservation of biodiversity in Guassa area of Ethiopia, which had always been a valuable natural resource for the local communities, which depend on it primarily for thatching grass, firewood and grazing. They have concluded that the Guassa community conserved area represents a model of community led natural resource management system that supported rare and endangered biodiversity and improved the livelihood of rural community in fighting poverty and food insecurity.

Rokeya (2011) conducted a study of Madhupur National Park, Bangladesh on people's livelihoods and involvement in Co Management. Natural forests in Bangladesh have been severely degraded due to overexploitation, encroachment, fire, uncontrolled and wasteful commercial logging, illegal felling, over grazing and the collection of fuel wood to support the energy needs of a large population. In 2003, Forest department with the assistance of USAID launched the Nishorgo Support Project (NSP) to test a participatory co management approach to protected area management. The project lasted until 2007 and was followed in 2008 by the Integrated Protected Area Co Management (IPAC) project with the aim of improving local people's livelihoods through greater access to and control over local forest resources. Their study sought to understand the livelihoods of local people and their involvement in management of Madhupur National Park. The study concluded that potential exists for various alternative income generating activities to improve the livelihoods of the local people and the management.

Garcia and Ghazoul (2011) analysed the needs, limits and pitfalls in the management of protected areas. They viewed that many of the protected areas have been imposed over pre existing rights held by indigenous or rural communities. There exists a cost of maintaining the biodiversity which is born by the local communities.

Gole and Merga (2011) examined the socio economic and demographic correlates of participatory forest management and the attitude that the local communities have towards the approach. Correlates of participatory forest management were analysed by descriptive, bivariate and logistic regression models. The study recommended creating off farm employment opportunities and alternative income sources to develop the PFM approach as strategy and policy nation wide.

Roksena (2011) conducted an evaluation of Nishorgo Support Project (NSP) in Bangladesh which aimed at reducing Forest dependency of local people. They have assessed the effect of collaborative management activities on rural livelihoods in four villages outside Satchari National Park. The results revealed that the NSP had a positive impact on the livelihoods of the people who participated in them with only five per cent of them were involved in forest resource extraction whereas 47 per cent of non participants engaged in forestry related activities.

Alvarez and Lujan (2011) analysed Mexico's sustainable forestry development based on the community forestry for achieving sustainable forestry development with vision action in long term and competitiveness. Their forest policy applies strategies such as community forestry development, environmental services, competitiveness and ecotourism, among others. They have concluded sustainable community forestry as an effort with vision action towards a sustainable forestry development in the global context.

2.2.3 Evaluation of participatory management of commons

Zhu *et al.* (2011) evaluated the community-based co-management mechanism (CBCM) of forest resources in Baishuijiang National Natural Reserve, China. In this study, they focused on how local villagers perceived the effects of CBCM project on their livelihood, and identified the changes by comparing income and consumption data to support the perceived impacts. Their goal was to get a more comprehensive and objective understanding about current CBCM mechanism through first hand survey data analysis, and to find some ways to improve it. To do so, they had chosen efficiency, equity and sustainability as three main evaluation indices for evaluation of CBCM mechanism. The efficiency was tested by consumption amount of forest resource before and after the CBCM project. The index of sustainability was tested through the improvement in the degree of livelihood from CBCM projects, which was achieved by comparative analysis on both 2006 and 2010 household surveys of family income at the same region. It accompanied with the hypotheses that, a bigger livelihood improvement for CBCM project participation is a more sustainable way for long term forest resource protection. The equity was mainly judged by a group of sub-indices. They were participation percentage of project, proportion of gender, proportion of minorities, information obtaining approach, equity of project participation test, competition of project participation, and satisfaction of project participation.

2.2.4 Ecotourism

Boo (1990) reported that values of ecotourism development to local communities are rarely studied and it is often claimed that ecotourism promotes conservation of natural and cultural heritage of an area and may improve the standard of living of local residents.

Agardy (1993) opined that Ecotourism interests can also convince local people that their resources are as, if not more, valuable when intact than when extracted from the ecosystem. When a user fee or visitor admission fee structure is imposed, real economic incentives for protected areas can catalyse their formulation.

Ruyooka and Mugisa (1992) argued that ecotourism in tropical moist forests offers a practical and effective means of attaining social and economic conservation of natural and cultural heritage.

Gossling (1999) stated that ecotourism can contribute to safeguard biodiversity and ecosystem functions in developing countries, even though meeting the requirements for ecotourism is extremely difficult. He compared the use and non use values of the rainforests with the opportunity costs, environmental damage costs and maintenance cost. A cost-benefit analysis of those ecosystems richest in species diversity, i.e., tropical rainforests, leads to the conclusion that non-use values often outweigh the

values of conventional uses (clear-cutting, pasture, etc.), but are hardly considered in development decisions. Therefore, tourism and its high direct use value can play an important role as an incentive for protection.

Kilkollins *et al.* (1999) assessed the costs and benefits of ecotourism and nature tourism development to Cheticamp, Nova Scotia by analyzing various secondary data. They have opined that Tourism is a growing industry throughout the world. One sector in particular is responsible—the natural resource based tourism sector that includes both ecotourism and nature tourism. Tourism's role in society has evolved largely due to increased opportunity and changing consumer demand.

Abdus Salam *et al.* (2000) suggested that nature oriented tourism can be one means to help achieve sustainability in the reserve forest as well as protecting the important world heritage site. Well planned tourism could provide economic and political incentives for proper management and for conservation and could bring additional benefit to local communities and regional economies. He also reported the potential harmful effects of Ecotourism like harassment of wildlife, forest fire and trampling which cause destruction of the vegetation and wildlife.

Aronsson (2000) considered birding and wilderness exploring as a popular form of ecotourism, an activity that may ultimately help governments improve their management of natural resources. Ideally, eco-tourists visit sites to observe wildlife and as a result spend money in the area. Governments and local people have economic incentives to maintain these areas in a natural condition to ensure continued visits by eco-tourists. Ecotourism is therefore being promoted as a tool for biodiversity conservation and rural development.

Tisdell and Wilson (2000) in their study on impact of ecotourism on environmental education and conservation highlighted the importance of environmental education as a component of ecotourism. The extent of environmental education and its impact on attitudes to conservation of sea turtles and actions by ecotourists to support such conservation as a result of their visits to Mon Repos Conservation Park (Queensland), an important Marine Turtle Rookery, is examined. To do this, results from 519 usable survey forms completed by ecotourists were analysed. It was found that a considerable amount of environmental education was obtained by visitors and that this had positive and statistically significant impacts on their desire to protect sea turtles and their intended actions to do so.

MacKinnon (2001) reported that wildlife conservation and protected areas in many countries would only be sustainable if local communities become an integral part of conservation efforts and benefit economically from those efforts.

Ogutu (2002) conducted a study on the impact of ecotourism on livelihood and natural resource management in the periphery of Amboseli Biosphere Reserve in Kenya. He found that the ecotourism initiatives are benefiting the local community in terms of income, improved infrastructure, employment opportunities and exposure. The community's capacity to facilitate resource related conflicts has improved following support from development institutions. An expanding livelihood base is reducing local vulnerability to disaster and people–wildlife conflicts. The numbers of resident wildlife species in the conservation area have increased due to regeneration of woody species and reduced frequency of livestock.

Spenceley and Safe (2003) studied the strategies, impacts and costs of pro poor tourism in South Africa. They reported that the most significant benefits to the poor clearly arise from direct employment within the tourism industry. Waged staff from rural communities frequently supports 7-8 people, who rely on these salaries to pay for food, clothing, and schooling.

Diamantis (2004) opined that support for conservation and sustainable management are especially important to ecotourism destinations because they are "usually concentrated in sensitive and unique environments".

Thampi (2005) evaluated the ecotourism project at the Periyar Tiger Reserve (Thekkady), in Kerala, India. He remarked that the success of the Eco-development project in the Periyar Tiger Reserve reflects the concern for achieving a balance between conservation of the sanctuary and livelihood of people living in and around it. He stated that the involvement of local communities in Ecotourism activities is a step in the right direction. It provides for alternative sources of income to local communities, which live in and around protected areas, thus decreasing their dependence on forest resources and increasing their commitment to keeping the forests intact.

Baker (2008) based on a research conducted in Sango Bay wetland of Rakai district in Uganda, evaluated the socio economic benefits of consumptive utilization practices of wetland resources, the recreation and Ecotourism potential of the wetland, its sustainability and contribution to poverty reduction among the surrounding communities. The results indicated dominance of consumptive resource utilization practices and the failure to reduce poverty levels.

Mathew and Joseph (2008) conducted an explorative study to find the relevance of organizational development (OD) interventions in ecotourism in Kerala. They concluded that OD interventions have got great impact in improving the operational efficiency of ecotourism and can be applied among local people who act as tourist guides in ecotourism destinations.

Joshi and Dhyani (2009) studied the tourism trends to map the state of progress and prospects of tourism in the state of Sikkim, and for the general understanding of patterns of tourist influx. The trends revealed that Sikkim tourism is in the developmental stage of increasing growth of tourist influx. Simulations based on three scenarios suggest that approximately 7.6–10.4 lakh tourists would visit Sikkim during the year 2017, which would also have implications on the infrastructure, environment, natural resources, culture and eco-tourism of the state.

Nowaksec and Smale (2010) proposed a multi-dimensional scale for identifying travellers' predispositions to qualify as ecotourists. Six foundational dimensions were identified – ethics, education, culture, nature, specialisation, and contribution – that provided the conceptual basis for the development of the Ecotourist Predisposition Scale.

Ezebilo *et al.* (2010) in their study estimated the community willingness to contribute for an ecotourism improvement project and its determinants in the Okwangwo Division of the Cross River National Park, Nigeria. The study showed that the respondents were willing to contribute an average of about one per cent of their mean annual income per year. Determinants of the respondents' willingness to contribute the amount were estimated with the aid of the Ordinary Least Squares (OLS) and Tobit models. The results showed that willingness to contribute were influenced by factors such as income, distance of respondents' residence to the park, post-high school education, occupation and membership of an environmental conservation group.

2.2.5. Community Based Ecotourism

Furze *et al.* (1996) suggested that protected areas can provide development opportunities for communities.

Gunatilake (1998) examined the community dependence in the tropical rain forest in Sri Lanka. The case studies were conducted at two sites, *viz.*, Knuckles and Sinharaja forests. The results of the analysis in both sites indicate that the opportunities of income generation from non-agricultural and non-forestry activities reduce forest dependence, even though some of the variables such as distance to the forest and debt level produce different results between the two sites.

Wunder (2000) analysed and conceptualized the link between tourism, local benefits and conservation empirically, using data from the Cuyabeno Wildlife Reserve in the Ecuadorian Amazon region, near the border of Colombia and Peru. It was concluded that in the whole study area, tourism has actually provided significant additional income and in villages specialised in tourism, income flows raised environmental awareness and gave incentives for a new rationality in traditional resource use.

Brennan *et al.* (2001) reported that CBT was also included in national development strategies of several countries such as South Africa..

A study by Smith and Maltby (2001) revealed that in Cambodia urgent efforts were needed to address the threats to tigers from rapid habitat loss and hunting pressure. A community based tiger conservation project has been developed with the goal "to conserve biodiversity by promoting local education and participation in conservation of tigers as an umbrella species".

Kunga (2002) opined that CBET, if well established can play a reasonable role in community development and bring people closer to conservation. If all the virtues of CBET are utilized, and local people participate effectively in its development, species will be saved from extinction for some of the rare and endangered organisms which exist within local reserves and communal lands. Local sustainable development due to benefits from CBE would ensure all people supported conservation of resources.

Turner *et al.* (2002) in a study of the Negros Rainforest Conservation Project found that the benefits of 'direct' ecotourism to local communities are maximized due to the unique way in which the project is structured, managed and funded. The project promoted local ownership, involvement and benefit, and the operational structure (utilising self-financed volunteers) meant there was virtually no cost to the host country or local NGO. Additionally, there was always an immediate net benefit to local communities via the generation of alternative livelihood opportunities.

Tisdell (2003) identified possible economic and conservational benefits from developing ecotourism or wildlife based tourism benefits for local communities and possible economic costs to such communities. The consumptive and non consumptive use of ecotourism and potential negative impacts were enlisted. The development of wildlife-based tourism should contribute positively to the total amount of funds available for nature conservation, add to overall conservation efforts and provide enhanced economic benefits to local communities.

Kiss (2004) reported that Community Based Ecotourism (CBET) has become a popular tool for biodiversity conservation based on the principle that biodiversity must pay for itself by generating economic benefits, particularly for local people. The attraction of CBET is the prospect of linking conservation and local livelihoods, preserving biodiversity whilst simultaneously reducing rural poverty, and of achieving both objectives on a sustainable (self-financing) basis. He suggested ecotourism as a fairly good tool for biodiversity conservation, but not as good or effective as pure protection. It can generate some income and contribute to community development.

Michael (2009) in his thesis discussed the involvement and participation of local communities in tourism development in Tanzania using a case study of local communities in Barabarani village, Mto wa

Mbu, Arusha. To explore this research topic, the thesis examined three key concepts: community participation in the tourism development decision-making process and community participation in the sharing of tourism benefits; and the contribution of tourism development to poverty alleviation.

Neba (2009) in a study investigated the environmental sustainability of game reserves using a sample of the Kimbi Game Reserve. He concluded that the development of ecotourism in partnership with local communities and conservation projects can restore local livelihoods. In this way villages can learn how to manage the wildlife and landscapes in a sustainable manner, making sound livelihood decisions without sacrificing their cultural values. It provides investment for tourism and enhances the living standards of local people by providing opportunities for employment.

Goodwin and Santilli (2009) in their research identified and analysed examples of community based tourism projects which were identified by funders, conservationists and development workers (the experts) as successful. They found social capital and empowerment as the most frequently cited criteria for the success of a community based ecotourism project, other criteria being commercial viability and conservation or environmental benefits.

Pillai (2010) stated that Ecotourism in PTR is an ideal community based nature tourism programme as the entire benefits ultimately goes to their community.

Pongponrat (2011) explored a community participation approach in local tourism development planning initiated by the small local community of Samui Island, southern Thailand. The results showed the innovative approach of adapting the community participation concept to diversified local conditions. The paper concluded that, along with the participatory management process, there was a significant role played by the local leader and by cooperation among tourism stakeholders in the planning and implementation that led the community to pursue local tourism development.

2.2.6. Eco- Development

Uniyal and Zacharias (2001) reported that the eco-development strategy addressing the dual agendas of conservation and poverty alleviation is being applied with some success in Periyar Tiger Reserve, Kerala where, park staffs are working with local communities and user groups to strengthen park protection and reduce pressure on park resources. Through participation and development opportunities provided by the project, the park has improved relationships with local communities and succeeded in engaging local support and collaboration to deal with management issues such as poaching, over harvesting of firewood and thatch and management of annual pilgrimages.

Kothari (2003) reported about the poachers turned conservationists in Periyar Tiger Reserve, India, through an eco-development strategy. As part of a Global Environment Facility eco-development project, a community that derived a substantial part of its income through poaching has become engaged in ecotourism and now has a major stake in conservation. The effort is being expanded, and the situation is ripe for a formalized participatory conservation approach for the buffer part of the reserve.

Sharma et al. (2004) evaluated the IEDP in South Asia and found that the project envisaged eco-development as a strategy that 'aims to conserve biodiversity by addressing both the impact of the local people on the protected areas and the impact of the protected areas on local people'. They have also reported that with the exception of the Periyar Tiger Reserve, Kerala, the implementation of the project at the WB Mid Term Review (MTR) stage in 2000 was taking place at a slow to medium pace at most sites. Thus the eco-development strategy at PTR was evaluated as a success.

Kutty and Nair (2005) reported that the IEDP at Periyar Tiger reserve has been acknowledged as one of the best forest management practices in Asia by the FAO.

Gubbi et al. (2008) analysed the legacy of an eco-development project around Periyar Tiger Reserve, India. They have administered Questionnaire surveys to a random sample who participated in and benefited from IEDP, and to 90 respondents from a control group who did not participate in IEDP. Among the treatment group, 71.1 per cent of respondents were aware of IEDP's objectives, but receipt of community benefits did not influence their attitudes to conservation. Instead, their attitudes were best explained by previous experience of human wildlife conflict, their age and their participation in an ecotourism-based profession.

Based on a study in PTR, Pillai (2010) concluded that the strategy of eco-development has become a necessary prop for the participatory management of the Protected Areas, in response to pressures on Protected Areas.

2.2.7. Contingent Valuation Method (CVM)

Rolston (1985) distinguished twelve types of value carried by wild lands viz., economic, life support, recreational, scientific, genetic diversity, aesthetic, cultural symbolization, historical, character building, therapeutic, religious, and intrinsic values. He criticized contingent valuation efforts to price 'these values and proposed an axiological model, which interrelates the multiple levels and types of value, and some principles for wild land management policy.

Cameron and James (1987) developed a new Maximum Likelihood Estimation technique for use with closed ended contingent valuation survey data which solves the problem of truncation bias and readily accommodates explanatory variables. These models are easier to interpret as ordinary least square regression results.

Loomis (1987) used the CVM to quantify non marketed environmental benefits from enhancing natural aquatic conditions. In this case, the problem was to determine the public trust values of Mono Lake in California at alternative lake levels. Loomis found that the economic benefit to California residents of preserving Mono Lake could conservatively be estimated to be USD 1.5 billion annually.

Echeverria *et al.* (1995) attempted to value the non priced amenities provided by the biological resources within the Monteverde Cloud forest preserve, Costa Rica. They have determined the overall expected value per user through contingent valuation survey designed with five experimental designs, compared the two ways of eliciting value, single versus annual lump sum payments.

Abdullah (1995) applied a dichotomous choice contingent valuation method to estimate the benefits of beach recreation in Port Dickson. The Logit and Probit models were used to analyse the data and the willingness-to-pay values were computed from the maximum likelihood estimates. The median willingness to pay value for beach recreation in Port Dickson ranged from RM 55.01 to RM 534.80 for mean income of RM 404.56 to RM 3933.30 respectively.

Kosz (1995) estimated the economic cost and benefits associated with the proposal to establish 'Donau Auen' National Park in Austria using CVM. The wetlands were valued using WTP survey.

Sulter (1995) concluded that development of a research programme for ecosystem evaluation must address both methods for assigning values to ecological properties that have no market values and methods for predicting the changes in the ecological properties that are to be studied.

Keith *et al.* (1996) have undertaken a contingent valuation study to examine the value to Utah residents of the designation of the proposed additional wilderness or retention of that land area in open access multiple use management.

Loomis and White (1996) measured the economic value of rare and endangered species to the citizens of USA using contingent valuation method for 18 species. Annual WTP ranged from a low of USD 6 per household for fish to USD 95 per household for spotted owl. A regression analysis of WTP values showed that over half of the variation in WTP is explained by changes in the size of the population, whether the payment is one time or annual, whether the respondent is a visitor or non user and whether the species is marine, mammal or bird.

Hadker *et al.* (1997) conducted a study to survey the residents of Bombay and elicit their willingness to pay (WTP) for the maintenance and preservation of Borivili National Park using the contingent valuation method. Despite India being a developing country, the evidence suggested that people are willing to pay for preserving environmental amenities. The households were willing to pay exclusively for BNP Rs. 7.5 per month for five years. Extrapolating to whole Mumbai, this amounts to a substantial 20 million per month for five years.

Carson (1998) in his study explored the possibility of using a large scale multi-country contingent valuation study for making decisions concerning global resources in the specific context of valuing a large set of tropical rainforests. This study highlighted the practical difficulties likely to be encountered in actually implementing a large contingent valuation study in multiple countries which seeks to value a common set of tropical rainforests.

Loomis and Caban (1998) used a contingent valuation survey to estimate the economic value to California and New England residents of implementing a fire management plan to reduce acres of old growth forests that burn in California and Oregon. Using a random effect probit, the average willingness to pay to reduce catastrophic fire on 2570 acres was found to be USD 56 per household.

Brown and Gregory (1999) studied the disparity between WTA and WTP approach in valuing environment.

Alpizar *et al.* (2001) discussed valuation of non market goods when using choice experiments. The advantages of choice experiments are that values for each attribute as well as marginal rate of substitution between non- monetary attributes can be obtained. The have recommended a closed-ended CVM survey for valuing a certain environmental change and a choice experiment in other cases.

Turpie (2003) in his study investigated the public interest, experience and knowledge of biodiversity and used contingent valuation methods to estimate its existence value of biodiversity in South Africa. Respondents' interest was correlated with knowledge, and both were positively correlated with willingness to pay (WTP) for biodiversity conservation, though WTP was constrained by income level. WTP for conservation was relatively high (USD 58 million for national biodiversity), and comparable with government conservation budgets. WTP increased dramatically (to up to USD 15 million and USD 263 million per year, respectively) when respondents were faced with the predicted impacts of climate change on biodiversity.

Khan (2004) valued the recreational benefits and estimated the benefits of establishing and managing the Margalla Hills National Park near Islamabad. They examined the WTP of visitors who visited and enjoyed the park. He found that the annual benefits from the Park are considerable—the total

annual consumer surplus or economic benefit obtained from recreation in the Park happened to be approximately USD 0.4 million. Various factors influencing the value of WTP included travel cost, household income, and the quality of the park.

Ninan and Sathyapalan (2005) in their study on economics of biodiversity conservation in coffee growing region in the Western Ghats of India noted that the local community had a positive attitude towards biodiversity conservation and were willing to pay in terms of spending time for participatory biodiversity conservation. Taking elephants, a keystone and threatened species in Asia and the study region, for the contingent valuation survey, the study noted that the respondents were willing to spend 25.8 human days per household annually which works to over Rs. 6003 per household per annum in terms of the income foregone. They also preferred a decentralized government institution for participatory biodiversity conservation.

Alpizar (2006) in his study on the pricing of protected areas in nature based tourism in Costa Rica suggested a theoretical model for the optimal pricing of a system of protected areas used for recreation, by stressing the possibility of third degree price discrimination based on the visitor's nationality, and by stressing the distributional fairness of assigning different welfare weights to the consumer surplus of different groups of visitors.

Amirnejad *et al.* (2006) estimated the existence value and individual WTP for North Forests of Iran (NFI) adjacent to Caspian Sea by using a contingent valuation method and dichotomous choice (DC). The Logit model was used for measuring individuals WTP Estimation parameters of the model were based on the method of Maximum Likelihood (ML). Results showed that 65.8 per cent individuals are willing to pay for the existence of NFI, while about 20 per cent of these individuals have not yet visited, and 41 per cent of them only visited the NFI once or twice. The mean of WTP for existence value of these forests is USD 2.51 per household per month or annual value of USD 30.12 for a household.

Christie *et al.* (2006) applied the choice experiment and contingent valuation methods to value the biological diversity. A choice experiment examined a range of biodiversity attributes including familiarity of species, species rarity, habitat, and ecosystem processes, while a contingent valuation study examined public willingness to pay for biodiversity enhancements associated with agri-environmental and habitat recreation policy. The study concluded that the public has positive valuation preferences for most, but not all, aspects of biodiversity, but that they appeared to be largely indifferent to how biodiversity protection was achieved.

Lee and Mjelde (2007) obtained the estimates of the preservation value of the Korean DMZ and Civilian Control Zone (CCZ) and examined the potential for hypothetic bias in respondents' answers in a

contingent valuation method framework. The parameters were estimated using LOGIT model. Truncated Mean WTP of the respondents was calculated from the estimated Logit model. Findings suggested inclusion of a real payment vehicle may reduce the hypothetical bias in eliciting willingness-to-pay (WTP). The study estimated a mean WTP of USD 16.74 per capita. Aggregate preservation value lies between USD 264 and USD 602 million.

Thuy (2007) estimated the WTP using CVM for a conservation program for the Vietnamese. Five bid levels were used based on the results of a pretest of 120 questionnaires in Ho Chi Minh City. The mean WTP was estimated at USD2.50 per household. The Logit regression analysis showed that socio economic characteristics have no statistically significant effect on WTP, indicating that different groups might have the same preference regarding Rhino conservation.

Baral *et al.* (2008) administered contingent valuation surveys to determine the willingness to pay (WTP) for fixing candidate entry fees to Annapurna Conservation Area, Nepal. The results of logit regression showed that the bid amount, family size, visitors' satisfaction, the use of a guide, and group size were the most significant predictors of WTP. Results suggested that most visitors would be willing to pay an entry fee considerably higher than the current fee of USD 27.00.

Ahmed (2009) estimated the recreational benefits (direct service values) of mangrove forest in Larut Matang, Perak using CVM. The mean willingness to pay (WTP) per recreationist was RM 44.58 per visit while the estimated value was RM 41.18 per visit. The conservation of the mangrove forest of Larut Matang was found to be vital for the livelihood of the local communities.

Amiry *et al.* (2009) in their study investigated the WTP for recreational resources at Kapar Bird Sanctuary (KBS), Kelang Malaysia. The relevant values were estimated by utilizing dichotomous choice form of CVM. The Logit models were used to analyze the data collected. Open-ended elicitation questions were used to induce respondents to state their maximum WTP, and the OLS model was employed to determine the WTP values. The findings of the study showed that the mean willingness to pay ranged from RM12.06 to RM60.94. The results implied that non-use value should be considered in policy making associated with recreational resources.

Buckley *et al.* (2009) measured willingness to pay (WTP) for public access and trail improvements on commonage farmland for recreational walking in upland and lowland areas of Connemara region in the West of Ireland using the CVM.

Leinhoop and Messner (2009) carried out a contingent valuation study to value the economic benefits of a post-mining lake-district in East Germany. They determined the non-market benefits that

would be generated by good water quality in the lake-district in order to re-assess the distribution of water among all water users in the Elbe Catchments. The findings showed that the annual non-market benefits of the lake-district was significant and ranged between 10.4 and 16.2 million Euros. Apart from recreational benefits, people also obtain non-use values for the lake-district.

Yacob *et al.* (2009) applied dichotomous choice survey design-contingent valuation method (CVM) to investigate empirically the willingness to pay (WTP) of the visitors for ecotourism resources in two selected marine parks in Peninsular Malaysia. It used Logit and Probit models to estimate the visitor's WTP responses for conservation the marine parks for ecotourism. The results in Pulau Redang indicated that visitors were willing to pay for conservation, about RM 7.8 and RM 10.6 per year for local and international visitors.

Belkayali *et al.* (2010) undertook a study to determine the recreational and tourism use value of Göreme Historical National Park with the CVM, examining effective factors of users' willingness to pay. The study estimated the annual willingness to pay value for current situation at USD 8672.788.

Lee *et al.* (2010) attempted to analyse public Willingness to Pay (WTP) for preventing climate change by applying a Contingent Valuation Method. The estimated mean WTP per household per month in Seoul, Korea, was about 3326 Korean won.

CHAPTER III

DESIGN OF THE STUDY

In order to achieve the various objectives of the study, an appropriate methodology which describes sampling design, data collection and specification of the empirical model and tools of analysis is necessary. The selection of the different tools of analysis has been made in the light of different methods followed in various studies reviewed in the previous chapter. The study employed both primary and secondary data collected during the period of study. Hence, in this chapter, description of the methodology followed in the present study is detailed under the following headings.

3.1 Selection of Study Area

3.2 Sampling Design

3.3 Sampling Technique

3.4 Collection of Data

3.5 Tools of Analysis

3.1. Selection of Study Area

Kerala is home to 21 wildlife sanctuaries and two biosphere reserves (Government of Kerala, Forest statistics, 2008), of which Periyar Tiger Reserve is the largest and first of its category in the state. Periyar Tiger Reserve, Thekkady, one of the seven sites in the country identified for implementation of the World Bank funded India Eco Development Project (IEDP) and following a participatory management regime was selected for the study.

3.2. Sampling Design

The sample constituted different groups of respondents for different objectives. To determine the impact of India Eco Development Project (IEDP) on the local livelihood and conservation of PTR, the beneficiaries of IEDP constituted the sample space. Thus, the IEDP beneficiaries are the Eco Development Committee members who constitute mainly the fringe area residents of Periyar Tiger Reserve, most of whom were dependant on the reserve for their subsistence.

To estimate the economic value of Periyar Tiger reserve, the sample respondents constituted the tourists visiting PTR for recreational purpose. Both general tourists and ecotourists were made part of the survey. The general visitors are allowed to the Periyar lake area on payment of entrance fee and ecotourists are allowed to the forest with the permission from the authority and along with guards to watch wildlife.

3.3. Sampling Technique

A purposive sampling had been adopted in the selection of study area, as PTR is the only protected area from Kerala selected under IEDP project. Stratified random sampling was followed in the selection of respondents. Among the five different types of Eco Development Committees viz., Neighbourhood based EDCs, Usergroup EDCs, Professional EDCs, Pilgrim management EDCs (SAPP) and Staff EDCs, the first four groups which constitute 78 EDCs were selected as they constitute the major beneficiaries of IEDP. The staff EDCs were excluded as they did not come under the objectives of the present study. In the next stage from each of these four groups, respondents were selected randomly based on proportional allocation making up a sample size of 60.

Table 3.1. Distribution of sample respondents in the EDCs

No.	EDC category	Total Number	Total No.of Households	No.of respondents
1	Professional EDCs	6	150	5
2	User group EDCs	5	214	4
3	Village EDCs	58	4706	47
4	SAPP EDCs	9	390	4
5	Staff EDCs	1	80	0
	Total	79	5540	60

In the selection of tourists random sampling was followed. The total sample size comprised of foreign tourists and domestic tourists numbering 50. Both foreign and domestic tourists were randomly selected in equal number (25 each). The sample size was fixed to be 50 so as to maintain a minimum predictor to observation ratio of 10 to 1 in the LOGIT model estimated.

Table 3.2. Distribution of tourist respondents

No.	Category	No.of respondents
1	Foreign tourists	25
2	Domestic tourists	25
	Total	50

3.4. Collection of Data

The primary data required for the study was collected from the sample respondents using a pre tested interview schedule bearing questions in relation to the objective of the study. Separate interview schedules were used for IEDP beneficiaries and tourists. The questionnaires are furnished in Appendix I. Contingent valuation method (CVM) questionnaire was used to elicit tourist responses. The secondary data pertaining to the study area viz., location, demography, socioeconomic factors, flora and fauna, etc, were collected from published sources and the records of Periyar Foundation. The study was conducted during the months of February and March 2011.

3.5. Tools and Techniques

3.5.1. Observation

The study aimed to examine the effectiveness of participatory institutional mechanisms in operation in the Periyar Tiger Reserve for the sustainable management of forest commons. This would be achieved through personal observation in the field and interaction with the Eco Development Committee members and officials of the Periyar Tiger Reserve. Visits to the fringe area settlements, EDC offices, ecotourism sites and feedback from the stakeholders helped to understand the mechanisms in place for management and the extent of success. Secondary sources were also made use of in the qualitative analysis.

3.5.2. Percentage and Tabular Analysis

3.5.2.1. General Features of the Sample

Simple percentage and tabular analysis was used to assess the general features of the sample viz., age, income, size of holding, education, occupation, forest dependency, and also to assess the general opinion of the forest dependant people with respect to conservation of forests and wildlife and the impact of the IEDP on livelihood and forest conservation.

3.5.2.2. Impact of IEDP on PTR Conservation and Socio Economic Status of Beneficiaries

To assess the impact of IEDP, the study used a comparison of the selected variables in pre IEDP and post IEDP periods. The difference between the pre and post periods is interpreted as the impact of the programme. To study the impact on conservation, primary data collected from the respondents on extraction of forest products and their frequency of visits to forest have been analysed using simple percentage and tabular analysis. The mean value of quantity of forest products extracted by the sample

households and the number of household involved in NTFP collection in the pre and post IEDP periods were compared.

The socio economic impact was studied with the help of variables namely; household income, household assets, improvement in living facilities, saving habit, social attitudes, level of self confidence and conservation attitude.

Following Mian *et al.* (2007), the impact on household income was assessed at the terminal year (2010) constant prices, since it was not possible to collect data on Pre IEDP period because of recall bias of the respondents. The information on the number of sources of income in the pre and post IEDP periods was collected and accounted at terminal year prices for comparison.

The social impact was assessed by the difference in number of 'yes' responses to the statements (given in the questionnaire) relating to their social involvement, attitudinal changes, feel of self confidence, indebtedness, etc, by the participants in the pre and post IEDP periods.

The social empowerment of the IEDP beneficiaries was assessed using a five point rating scale. All the respondents were presented with a set of 10 statements strongly agreeing (SA) to a positive statement was given +2, agreeing (A) +1, neutral (UN) zero, disagree (DA) -1 and strongly disagree (SDA) -2. Based on the total score obtained, they were rated as empowered or not.

Following Gubbi (2006), the conservation attitude of the EDC members was assessed as follows. All respondents were presented with six positive and six negative statements about natural resource or species conservation in PTR. The respondents were asked whether they 'agreed', 'disagreed' or 'do not know'. Agreeing to a positive statement received +1 point; agreeing to a negative statement received -1 point; and, vice versa for disagreeing to these statements. A 'do not know' to either type of statement received zero points. The points from these twelve questions were then totaled into a single additive score termed as 'conservation attitude score'. Thus, the most positive conservation attitude score was +12 points, whereas the most negative conservation attitude was -12points. The difference in number of respondents with positive conservation attitude is compared in the Pre and Post IEDP periods. The statements are given in the questionnaire furnished in Appendix I.

3.5.3. Lorenz Curve of Income Inequality

Lorenz curve is a graphical representation of the cumulative distribution function of the empirical probability distribution of wealth; it is a graph showing the proportion of the distribution assumed by the bottom '*Y'* per cent of the values. It is often used to represent income distribution, where it shows for the bottom 'X' per cent of households, what percentage of the total income they have. The percentage of households is plotted on the *X* axis, the percentage of income on the *Y* axis. Lorenz curve is convex in

shape. The extent of inequality is inferred from the deviation from equidistribution line. A Lorenze Curve closer to the line of equality indicates less inequality in income distribution and vice versa. In the present study, Lorenze curve for the income distribution of the sample EDC members is plotted for the two periods before and after IEDP intervention and the results are interpreted as an impact of IEDP intervention on the economic status of the beneficiaries.

3.5.4. Gini Coefficient of Income Inequality

The Gini coefficient is a measure of the inequality of a distribution, a value of zero expressing total equality and a value of one maximal inequality. It is commonly used as a measure of inequality of income or wealth. The Gini coefficient is usually defined mathematically based on the Lorenz curve, which plots the proportion of the total income of the population (y axis) that is cumulatively earned by the bottom 'X' per cent of the population. The line at 45 degrees thus represents perfect equality of incomes.

The Gini index is defined as a ratio of the areas on the Lorenz curve. If the area between the line of perfect equality and the Lorenz curve is A, and the area under the Lorenz curve is B, then the Gini index is A/(A+B). A decrease in the value of Gini coefficient can be interpreted as an improvement in income distribution of the sample. In the present study, Gini Coefficient for the income distribution of the sample EDC members is estimated for the two periods before and after IEDP intervention and the results are interpreted as an impact of IEDP intervention on the economic status of the beneficiaries.

3.5.5. Multiple Linear Regression Analysis

3.5.5.1. Factors Influencing IEDP Perception

All respondents were presented with five positive and five negative statements about IEDP and conservation initiatives in PTR. The points from these ten questions were then totaled into a single additive score termed as 'IEDP Perception Score'. The respondents were presented with the following statements and based on their response scores were given. Strongly agreeing (SA) to a positive statement was given +2, agreeing (A) +1, neutral (UN) zero, disagree (DA) -1 and strongly disagree (SDA) -2. Similarly, strongly disagreeing (SD) to a negative statement will be given +2, disagree (DA) +1, neutral (UN) zero, agree (A) -1 and strongly disagree (SDA) -2. The score may range within -20 to +20. Respondents were categorized as very positive, positive, neutral or negative based on the score. Respondents with a score above 10 were classified as very positive; sore 1 to 10 positive; score zero as neutral and a score of less than zero indicated negative perception. The statements given to the respondents to calculate their IEDP Perception Score is given in the questionnaire furnished in Appendix I.

The model to estimate the factors influencing IEDP perception Score is given below.

$Y = a + b_1 AGE + b_2 ODPTR + b_3 WLC + b_4 ODEDC + b_5 NBIEDP + b_6 ConEDC$

Where,

Y – IEDP perception score

AGE – Age of the respondent (years)

ODPTR – Occupational dependency on PTR (1/0)

WLC – Experience of wildlife conflicts (1/0)

OBEDC - Whether served as office bearer of EDC (1/0)

NBIEDP – Total number of benefits received under IEDP

ConEDC – Absence of conflicts with EDC (1/0)

3.5.5.2. Willingness to pay (WTP) of EDC members for protecting PTR for future generation (Bequest Value)

To estimate the factors influencing willingness to pay (WTP) of the EDC members for protecting PTR for the benefit of future generation and the factors governing it, Multiple Linear Regression Model was used. The dependant variable in this model is the hypothetical WTP for conserving PTR for future generation obtained from the respondents through open ended Contingent Valuation Method (CVM). This model applied OLS to estimate the coefficients.

The suggested model is:

$WTP = \beta_1 + \beta_2 Gender + \beta_3 Age + \beta_4 Edu + \beta_5 AEM + \beta_6 ODPTR + \beta_7 MI + \beta_8 IEDPScore$

Where,

WTP	–	Willingness to Pay of the respondent (Amount Rs.)
Gender	–	Male /female (1/0)
Age	-	Age of the respondent (years)
Edu	-	Educational status
AEM	-	Actively involved in EDC activities or not (1/0)
ODPTR	-	Occupational dependency or otherwise on PTR (1/0)
MI	-	Monthly income (Rs)

IEDP score – IEDP perception score

The Bequest Value of PTR was estimated by aggregating the mean WTP of the EDC members.

3.5.6. LOGIT Model to estimate the Total Economic Value

Total Economic value includes use value and non use value. Here, the Use value referred to the recreation use value and Non use value (Preservation value) comprised of Option value (retaining the recreation opportunity for possible future use), Existence value (knowledge that natural resources are preserved), and Bequest values (satisfaction derived from endowing future generations with natural resources). Following Lee and Mjelde (2007), the value of the natural ecosystem of the Periyar Tiger Reserve was measured using CVM applying LOGIT model. Logit model was estimated using LIMDEP 7.

The research method employed is contingent valuation method (CVM), which is a standard approach to measuring economic values of non-market goods, such as recreation resources, wildlife, and environmental quality goods. CVM basically ascertains from respondents what they would be willing-to-pay under hypothetical market scenarios. For a given donation amount for the preservation of the PTR, individuals have the choice to either join in the preservation by making the suggested donation or withholding their participation. Individuals know which choice maximizes their utility. The common starting point for analyzing such alternatives is the random utility model. The utility that individual 'i' receives from alternative 'k' is:

$$u_{ik} = v_{ik} + e_{ik} \qquad (1)$$

Where v_{ik} is the indirect, deterministic utility individual 'i' receives on choosing alternative 'k' and 'e_{ik}' is an unobservable or random component of the utility function. The random component is assumed to be identically, independently distributed with zero mean.

Let 'A' be a specific donation amount associated with alternative 'j'. An individual will choose alternative j over alternative k if the utility from j is larger than the utility from k (Hanemann, 1984).

$$u_{ij}(Y-A/x_i) > u_{ik}\ (Y/x_i) \qquad (2)$$

Where, 'Y' is income and 'x_i' represents a vector of given individual socio-economic characteristics of individual 'i'. An individual consents to donation, 'A', if the utility gain from preserving the PTR is larger than the utility from not preserving the reserve, when taking into account the change in income. It is often assumed that u_{ij} takes on a linear form (Haab and McConnell, 2003). Under this assumption, Equation (2) can be written as

$$\Delta Ui = u_{ij} - u_{ik} = \alpha_1 + \beta_1(Y-A)/x_i - \alpha_0 + \beta_0(Y/x_i)$$

$$= \alpha_1 - \alpha_0 + \beta_1 Y - \beta_1 A - \beta_0 Y/x_i > 0 \qquad (3)$$

Where, 'β_m' are the coefficients associated with income. Under the assumption of constant marginal utility of income between the two alternatives, $\beta_1=\beta_0$, income drops from the equation (Haab and McConnell, 2003). Analyses of this type are often known as utility difference models. Socio-economic characteristics are often included in cross sectional empirical analyses to shed light on the importance of particular factors

The dichotomous choice format of the CVM question has a binary choice dependent variable which requires a qualitative choice model. Assuming the error term in Equation (1) is distributed as a logistic function, the Logit model arises. In this framework, the probability (Pi) that the individual will accept an offer (A) can be expressed as the following Logit model (Hanemann, 1989; Pindyck and Rubinfeld, 1981).

Logit regression has been used to model the relationship of the binary dependent variable (WTP) to the independent variables and to estimate the Total Economic Value.

The following equation was estimated:

Probability (WTP) $=a+ b_1$ Bid Amount $+ b_2$ Age $+ b_3$ Education$+ +b_4$ Nationality$+ + b_5$ Number of wildlife sited $+u$

Where, 'a' is the constant and 'b_i' are the coefficients of the explanatory variables. The goodness-of-fit of the model was estimated using the maximum log-likelihood ratio. This did not include respondents' income in the Logit regression model in order to make a statistical model compatible with the economic hypothesis of utility maximization. This uses a utility model as suggested by Hanemann (1984) in which discrete choice probabilities are independent of the individual's income.

The dichotomous choice format of the CVM question has a binary choice dependent variable which requires a qualitative choice model. Assuming the error term in Equation (1) is distributed as a logistic function, the Logit model arises. In this framework, the probability (Pi) that the individual will accept an offer (A) can be expressed as the following logit model (Hanemann, 1989; Pindyck and Rubinfeld, 1981).

The probability that a respondent would be willing to pay a given bid amount was assumed to follow a Standard Logistic Variate:

$$Pi = Fn\,(du) = \frac{1}{1+\exp(du)}$$

$$= \frac{1}{1 + \exp(-(\alpha + \beta A + \gamma Y + \Phi S)}$$

Pi = F_n (Δu) is the cumulative distribution function of a Standard Logistic Variate.

Where, ‘α’ is a constant parameter, ‘β’ is the coefficient of the bid variable A, ‘γ’ is the vector of other explanatory variables influencing the response, and ‘Φ’ is the vector of the corresponding slope parameters.

Truncated Mean WTP was used to calculate the expected value of WTP by numerical integration, with bids ranging from zero to the maximum bid (Amax). This method was preferable because it satisfies consistency with theoretical constraints, statistical efficiency, and ability to be aggregated (Duffield and Patterson, 1991). Expected WTP was calculated by the following equation, with the socio-economic values set to their sample means except the bid amount.

$$E(WTP) = \int_0^{\max A} F_n(\Delta u)\,dA$$

$$= \int_0^{\max A} F_n\left(\frac{1}{1+\exp(-(\alpha^* + \beta A))}\right)dA$$

Where, $\alpha^* = \alpha + \gamma Y + \phi S$

The truncated mean WTP was obtained by integrating the above function using Trapezoidal Rule for definite integrals. This is aggregated to find the Total Economic Value of PTR, Thekkady. The methodology for trapezoidal rule is given in Appendix III.

CHAPTER IV

DESCRIPTION OF THE STUDY AREA

A proper perspective of the study region is absolutely essential to have a better understanding of the results of the study and in turn to draw meaningful conclusions. This chapter provides information on the various dimensions of the Periyar Tiger Reserve (PTR) including geographical features such as location, climate, and socio economic features such as information on local communities, history, and social background, the ecological features such as flora and fauna and threats to PTR. The evolution and features of India Eco Development Project (IEDP) and the various ecotourism activities conducted in the Periyar Tiger Reserve are also furnished in the following section.

4.1. The Periyar Tiger Reserve

Periyar Tiger Reserve, Thekkady, one of the well known protected areas in the world, located in the southern Western Ghats mountain ranges of Peninsular India, (Figure 4.1) is an example of nature's bounty, with great scenic charm, rich bio diversity and providing veritable visitor satisfaction. Sprawled over an area of 925 sq .km. PTR is one of the 39 tiger reserves in India. Zealously guarded and efficiently managed reserve is a repository of rare, endemic and endangered flora and fauna and forms the major watershed of two important rivers of Kerala, the Periyar and Pamba.

4.1.1. Location

PTR is located in the Idukki, Pathanamthitta and Kottayam districts of Kerala state in southern India between 9º 16' to 9º 40' North latitude and 76º 55' to 77º 25' 55 East latitude (Figure 4.2), and forms part of the Western Ghats, which is recognised as a biodiversity hotspot (Myers *et al.,* 2000, Conservation International, 2006). The town of Kumili borders the PTR and its development has been linked to the growth of tourism activities at PTR. Indeed the economy of Kumili is now largely dependent on PTR. Historically the area now encompassed within PTR was under the administrative control of the erstwhile State of Travancore. An area of 600 sq. km. was declared as the Periyar Lake Reserved Forest in 1899. More areas were added in subsequent years and the wildlife sanctuary of 777 sq. km. was established in 1950. The core area of 350 sq. km. within the wildlife sanctuary was declared as a national park in 1982. PTR was designated as one of India's Tiger Reserves in 1978 (GOI 2005) and was declared as an Elephant Reserve in 1991 (KFD 2001). PTR forms part of a contiguous and compact forest block of 3,000 sq. km. in the Southern Western Ghats. The large forest block of PTR and its surrounding area are designated as Tiger Conservation Landscape (TCL) 64 of regional importance (Sanderson *et al.,* 2006). Now the area is extended to 925 sq.km, surrounded by an artificial lake over an area of 25 sq.km.

4.1.2. Zonation and Administration

PTR has a total boundary length of 220 km, and shares an interstate boundary of 90 km bordering the State of Tamilnadu (KFD, 2001). The reserve is divided into core (350 sq km), buffer (427 sq km) and tourism zones (50 sq. km.) (*Ibid*).

PTR and its eco development activities are managed and administered by Periyar Foundation headed by a Field Director and two Deputy Directors. PTR has two divisions (Periyar East division and Periyar West division), each managed by a Deputy Director and has five administrative ranges each managed by a Range Officer. The administrative structure of Periyar Founadtion is given in Figure 4.3.

4.1.3. Elevation

The reserve is spread over a variety of elevations but mostly lies between 750–1500 m above msl. (KFD, 2001). Kottamala is the highest point in PTR at 2019m above msl, and Pamba Valley is the lowest at 100m above msl (*Ibid*).

4.1.4. Climate and rainfall

The area receives both the southwest (June-September) and northeast (October-December) monsoons. Most rain falls during the southwest monsoon with the maximum rainfall in July. The average rainfall within PTR is 2500 mm with average humidity varying between 60-85 per cent. The temperatures vary between 15°C and 31°C (KFD, 2003a)

4.1.5. History of PTR

1895 - Construction of Mullaperiyar Dam

1899 - Formation of Periyar Lake Reserve.

1933 - S.C.H. Robinson made the first game warden

1934 - Formation of Nellikkampatty Game Sanctuary

1950 - Consolidation as Periyar Wildlife Sanctuary.

1978 - Declaration as Periyar Tiger Reserve.

1982 - Preliminary notification of the core area as National Park.

1991 - Brought under Project Elephant.

1996 - India Eco Development Project launched.

2001 - Reorganised as two Divisions, Periyar East and Periyar West

2004- Periyar Foundation was established.

4.2. The India Eco Development project (IEDP)

Ministry of Environment, Government of India had undertaken the India Eco Development Project as a five year pilot project to be implemented from October 1996 to June 2002 to promote local community participation in forest management in seven PAs. Periyar Tiger Reserve was one among them which has become a paragon of participatory biodiversity conservation. The fringe area communities of PTR act as a social fence around the park. The relationship between the park authorities was fostered through the India Eco-Development project (IEDP) which started in PTR on December 29th, 1996 and continued up to June 2004. The major objectives of the IEDP were; to improve capacity of PA management, to conserve biodiversity and to minimize negative impacts of people on PA and vice versa by increasing collaboration of local people in the conservation effort. The major components of IEDP were; improved protected area management, village eco-development, nature education and training, research and monitoring. The India Eco-Development Project around Periyar Tiger Reserve (PTR-IEDP) received USD 6.0 million, of which 43.2 per cent was spent on community-based conservation activities. At the end of the project period, 72 Eco-Development Committees (EDCs) were formed encompassing almost 40,000 people from the forest fringe area; negative dependency of these people on forest was almost reduced, poaching and wildlife crime rate was at its lowest, sandal smuggling and forest fires were controlled through participatory management regimes. In order to sustain the process of participatory management which has grown and evolved many folds beyond the project period, Periyar Foundation took birth on 27th July, 2004.

4.2.1. Village Eco Development

Dependency was the precondition for selecting appropriate sites for EDC formation. An eco development zone, a distance of two km from the boundary of the PA was identified for this. Tribal settlements, SC colonies and other marginal and backward fringe area communities were given maximum priority (KFD,2003b).

4.2.3. Microplanning

In the areas selected for EDC formation, micro planning was initiated through Protected Area Mutual Interaction Assessment (PAMIA) methods. The process of micro planning was completed by September 2000 and 72 micro plans covering 5540 families for respective EDCs were prepared. Central to IEDP had been the participatory planning, which happened to be dynamic, ongoing process that ran concurrent to implementation. By the end of 2010, the number of EDCs has grown to 79. The details of various EDCs functional in PTR are given in Appendix II.

The different types of EDCs formed were as follows.

1. Neighbourhood-based EDCs: these comprised villages, settlements and hamlets around PTR. The number of households in these EDCs ranged between 28 and 148. The Micro plans for these committees mainly aimed at the economic upliftment of the families and provided financial, technical and marketing support to improve their resources- mainly agriculture. The project emphasis was on building community infrastructure and individual benefits to improve local livelihood opportunities.
2. User group-based EDCs: these comprised of members who were dependent on PTR for grazing, fuel wood or thatching grass as a source of livelihood. The focus of these EDCs was to provide community groups with alternative livelihoods to decrease their dependency on PTR. Currently, they are permitted to graze livestock, and to harvest fuel wood, thatching grass and some Non-Timber Forest Produce (NTFP) species within PTR subjected to regulations, as the alternate income generating activity suggested such as ; notebook making, food processing, etc., failed.
3. Professional group based EDCs: these comprised of (i) professionals who were previously involved in illegal activities such as collection of cinnamon bark *(Cinnamomum malabatrum)*, timber smuggling and poaching; and (ii) forest dwelling communities who were relocated from the interiors of PTR (between 1930s and 1984), these people are currently carrying out agriculture and other professions, and are living in the periphery of PTR. These groups were formed as two separate EDCs (currently six groups) consisting of members who were trained to carry out ecotourism and reserve protection activities.
4. Pilgrim management EDCs: these comprised seasonally active members who ran business activities within PTR during the Sabarimala pilgrimage months of November to January. Some members of these EDCs happen to be members of the Neighbourhood EDCs.
5. Staff EDCs: these comprised members of government departments and included staff of forest, irrigation and tourism departments who resided within and around PTR and they happen to be the ex officio members in the executive committee of one of the other EDCs.

Table 4.1. Number of EDCs at PTR

No.	EDC category	Total Number	Total No.of Households
1	Professional EDCs	6	150
2	User group EDCs	5	273
3	Village EDCs	58	4647

4	SAPP EDCs	9	390
5	Staff EDCs	1	80
	Total	79	5540

4.3. Project Area

4.3.1. The Fringe Area

The Fringe Area is defined as the immediate surrounding up to two kilometres along the PTR border for the convenience of the Project. There is an unavoidable overlap about the impact range, which varies from below one km. to even above ten km. At certain strategic points along the fringe natural landmarks like rivers and hills separate habitation sites from the PTR and at others it remains almost a geo-ecological continuum. Roughly the total 'Fringe Area' comes to about 285 sq. km.

4.3.2. Population

According to the official records, the PTR accommodates about 2, 25,000 people. Population density of the peripheral area is 750 persons per sq.km. with about 2.2 per cent Scheduled Tribes (ST), 28.9 per cent Scheduled Castes (SC) and remaining from other castes and communities. Core area of the reserve is free from human habitation (Mishra *et al.*, 2009).

4.3.2.1. Tribal Communities

The PA accommodates six indigenous communities of Kerala, viz., *Mannan*, *Paliya*, *Oorali*, *Ullada*, *Malayaraya* and *Malampandaram*. The last one is still a nomadic tribe. *Mannan* and *Paliya* are considered to be the earliest settlers in the PA. The settlement was formed by made them re-settle on the north-east boundary of the PA, from its interiors, when it was declared as a reserve forest about six decades before. The total number of families belong to *Mannan* tribe are 316 and *Paliya* are 135 (Pillai, 2010). The most populated tribal community is that of the *Mannan* and the least populated *Ullada*. There are 47 *Malapantaram* and 35 *Ullada* families; during 1930's and 40's *Oorali* and *Mannan* were the strongest ones. The relatively most developed among the tribes in the area are the *Malayaraya*.

4.3.2.2. Settlements

There are three major settlements of the tribes in the periphery of the PTR. It was during the turn of the fifties that the tribal communities were transplanted from their habitation sites within the PTR to the following Fringe Area sites:

1 Labbakkandam (near Kumily, situated on the northern edge of the PTR. The settlement occupies in all about 88.4 ha. jointly for two tribes: *Mannan* and *Paliya*; *Mannan* 60 ha. and *Paliya* 28.4 ha.).

2 Vanchivayal (on the western edge within the buffer zone of PTR. There the settlement of the *Oorali* tribe occupies about 39.39 ha.).

3 Muzhikkal (on the western edge within the buffer zone of PTR. This is a *Malayaraya* settlement occupying about 112 ha.).

4 Attathodu (on the south eastern side of PTR and in the Ranni Division. There *Malapantaram* and *Ullada* settlements occupy about 150 ha.).

5 Azhuthakkadavu Kalaketty (on the south western side of PTR in the Kottayam Division. This is a settlement of the *Malayaraya'*s occupying about 50 ha.

4.3.2.3. Scheduled Caste

Among the eleven colonies of the scheduled castes, four are mixed ones either with other castes/communities or with the tribes. The exclusively scheduled caste colonies are; Ceylon Colony, Sathram Colony, Ceylon Mount, Kismum Colony, Gavi, Kochupampa, Minar and Mulakkayam Colony. Those Colonies with other castes/community are Kuttikkayam, Mattuppetty, Mulakkayam, Gandhinagar Colony, Rosapukkantam, and Kuzhimavu. Most of these are colonies purposefully created for settling down the various scheduled caste people (Gurukkal, 2003).

4.3.2.4. Others

The settlements of other castes and communities are evenly distributed along the Fringe Area. There are about thirty settlements in all, mostly created by the government in response to the post-war depression call to 'Grow More Food'. Quite a few of them are indeed, settlements of unauthorized immigrants who infiltrated in the turn of the sixties mostly from Central Travancore. In either case the settlements augmented themselves through encroachments. These include ex-service men lands, staff colonies, grazier's settlements and households of encroaching people (Gurukkal, 2003).

4.4. Biological importance

4.4.1. Vegetation Diversity

PTR harbours an array of vegetation types. Seven types of forest ecosystems have been identified from Periyar Tiger Reserve, of which evergreen and semi evergreen forests form the major chunk. Besides, marshy grasslands and streams form extremely valuable micro ecosystem. Major vegetation

types in PTR are: Tropical evergreen and semi evergreen forests (74.6 per cent), moist deciduous forests (12.7 per cent), grasslands (1.5 per cent) and eucalyptus plantations (7.1 per cent). Periyar Lake forms an important ecosystem which occupies 3.5 per cent of the area.

4.4.2. Forest Types of PTR

1. West coast tropical evergreen forests

2. Southern hilltop tropical evergreen forests

3. West coast semi evergreen forests

4. Southern moist mixed deciduous forests

5. Southern montane wet temperate forests

6. Southern montane wet grasslands.

7. South Indian sub tropical hill savannahs

4.4.3. Flora

PTR is quite unique in floral diversity with the presence of more than 50 per cent of the entire flowering plants of Kerala, which include 149 species listed under various threat categories. A total of 1965 species of flowering plants, from 823 genera and 159 families, have been documented in PTR and 26 per cent of these species are endemic to the Western Ghats (KFD, 2003a).

4.4.4. Fauna

PTR supports a high animal diversity with 63 species of mammals, 323 species of avifauna, 72 species of herpetofauna, 38 species of fishes and 119 species of butterflies. PTR supports some globally threatened wildlife species, including the Tiger *P. tigris* (EN), Asiatic Wild Dog *C. alpinus* (EN), Indian Elephant *E. maximus* (EN), Lion-tailed Macaque *M. silenus* (EN), Nilgiri Tahr *H. hylocrius* (EN), Salim Ali's Fruit Bat *Latidens salimalii* (EN), Slender Loris *Loris tardigradus* (EN), Great Hornbill *B. bicornis* (EN) and King Cobra *Ophiophagus hannah* (EN) (IUCN, 2006).

4.4.5. Ecological value

PTR acts as a catchment for the Mullayar, Periyar, Pamba and Azutha rivers. The Mullayar and Periyar rivers join to become the Mullaperiyar River that has been dammed to form the Periyar Lake. The Periyar Lake irrigates about 680 sq. km. of agricultural land in Theni, Ramanathapuram and Dindigul districts, lying within the neighbouring State of Tamilnadu (KFD, 2003a). Water from the Periyar Lake is also used for hydro-power generation in Tamilnadu.

4.5. Tourism Activities at PTR

People oriented and park centered community based ecotourism is the hallmark of Periyar Tiger Reserve. These programmes are conducted by local people responsible for the surveillance of the vulnerable parts of the reserve. By taking tourists along, they are involved in the conservation of the forests of Periyar and some valuable revenue is generated for community welfare. In addition to the boating along the lake to view the wildlife, ecotourism activities viz., Nature Walk, Clouds Walk, Jungle Patrol, Border Hiking, Babmoo Rafting, Bullock Cart discoveries, Bamboo Grove, Jungle Inn, Periyar Tiger Trail, Tribal Heritage Museum, etc, are also of importance in PTR (Plate 1 and Plate 2). Details of the above programmes are given in Appendix IV.

4.6. Tourist Arrivals at PTR

The number of tourists visited PTR during the last seven years is presented in Table 4.2. The average number of tourists visiting PTR per year was 502374. Domestic tourists account for about 90 per cent of the visitors to PTR every year.

Table 4.2. Tourist Arrivals Statistics of PTR

Financial Year	Number of Tourists		
	Domestic	**Foreigners**	**Total**
2003-04	378830	36543	415373
2004-05	333882	37150	371032
2005-06	400686	40243	440929
2006-07	497567	45874	543441
2007-08	513393	52965	566358
2008-09	590950	53985	644935
2009-10	491623	42940	534553
Average	458133	44242	502374

4.7. Threats to PTR

PTR has a human population of 225,000 living within two kilometres from the radius of the reserve who either partially or completely depend on its natural resources (World Bank 1996; KFD 2003a; Sharma *et al.*, 2004). This high human density has put severe pressures on PTR and

some of the important threats to PTR's natural resources and biodiversity that led to the inception of IEDP are listed below.

4.7.1. Tourism and pilgrimage

Nearly 400,000 tourists visited PTR annually (KFD, 2001; KFD, 2003a) leading to extensive direct and indirect pressures on PTR. The *Ayyappa* temple at Sabarimala situated in the south west part of PTR attracts about five million pilgrims annually (*lbid*). This pilgrimage posed a serious threat on PTR's resources in terms of timber and fuelwood. Fire and litter disposed by pilgrims are serious consequences of this high-volume pilgrimage.

4.7.2. Non-Timber Forest Products (NTFP)

NTFP's harvested across PTR for commercial and subsistence purposes include: black dammar *Canarium strictum,* nutmeg *Myristica* spp., giant honey *Apis dorsata,* Asiatic honey *Apis cerana indica,* cinnamon *Cinnamomum malabatrum,* bamboo reed *Ochlandra travancorica,* thatching grass *Amaranthus spinosus* and *Themida cymbaria*. (Appendix V).

4.7.3. Poaching

Several wildlife species were hunted for both local meat consumption and commercial trade, including; wild boar (*Sus scrofa),* Sambar (*Cervus unicolor),* Gaur (*Bos gaurus),* Mouse Deer (*Moschiola meminna),* Indian giant squirrel (*Ratufa indica indica),* Indian Flying Squirrel (*Petaurista philippensis),* Black-naped Hare (*Lepus nigricollis),* Common Monitor (*Varanus bengalensis)* and Grey Jungle Fowl (*Gallus sonneratii)*. Poaching of herbivores could be a limiting factor for the predator density of PTR. The main hunting methods used were scavenging wild dog kills, guns, snares and hunting dogs.

4.7.4. Timber smuggling

Illegal felling of timber both for local consumption and commercial trade posed a threat to the northern and south-western parts of PTR. Commercially viable, but threatened tree species were illegally felled, including Sandal (*Santalum album),* Indian Rose Wood (*Dalbergia latifolia)*) and Teak (*Tectona grandis)*. Species such as *Allophylus cobbe, Macaranga peltata* were extensively extracted as poles. Large scale felling of timber in the south-western part of PTR increases during the Sabarimala pilgrimage season from November to February.

4.7.5. Livestock grazing

Livestock grazing was observed in all areas of PTR except where the terrain is inaccessible. Disease transmission from domestic animals to wildlife, such as foot-and-mouth disease was recorded and had resulted in the death of wildlife. It was estimated that over 2000 domestic livestock graze in the

tourism zone alone (KFD, 2003a) and grazing competition with livestock could consequently be a limiting factor for wild herbivore densities.

4.7.6. Narcotic Cultivation

Illegal cultivation of cannabis was carried out in some evergreen patches of PTR. Cultivation of cannabis involves forest clearance and these workers were often also involved in wildlife poaching.

4.7.7. Forest Fire

Forest fires in PTR were mainly caused by human disturbances (KFD, 2003a). The fires in natural grasslands had affected PTR's small population of Nilgiri Tahr and had seriously impacted upon ground vegetation. Pilgrims happened to be one of the main causes of fire in PTR.

CHAPTER V

RESULTS AND DISCUSSION

The primary data collected with respect to the stated objectives of the study were analyzed. The results, discussion and inferences are presented in this chapter under the following subheadings.

Section 5.1: gives the general description of the sample respondents from among Eco Development Committee members, the participatory management mechanism for conservation and maintenance of PTR and the impact of IEDP on forest resource use and socio economic status of the forest dependent people.

Section 5.2: explains the general description of the tourist sample respondents and the economic valuation of Periyar Tiger Reserve.

5.1. Results of Analysis of the Sample Respondent EDC Members

5.1.1. General Description of the Sample EDC Member Respondents

5.1.1.1. Age of the respondents

As furnished in table 5.1, age of the sample respondents from Eco Development Committees (EDCs) varied between 23 and 65. Forty per cent belonged to the age group of 40-50 years. Those within the age group of 30- 40 years accounted for 37 per cent, whereas 16.7 per cent of the respondents were of the age group of more than 50 years. The respondents with less 30 years of age were 6.7 per cent.

5.1.1.2. Educational status of the sample respondents

The education level of the respondents (Table 5.1) varied from zero years of schooling up to 12 years of formal education. Ten per cent of the respondents never did any formal school education, whereas 11.7 per cent had primary education, 70 per cent had secondary education and 8.3 per cent had higher secondary education. Among the sample respondents none had any college level education. This indicates the fair amount of educational level of the once forest dependant people living in the fringe area of PTR.

5.1.1.3. Income level of the families of the sample respondents

The results presented in table 5.1 indicate that half of the respondents in the study area (50 per cent) earned an income of Rs. 4000 to Rs. 8000 per month. Thirty five per cent had an income of less

than Rs. 4000 per month. Thirteen per cent of the respondents earned an income of Rs. 8000-16000 per month and only 1.6 per cent had an income more than Rs. 16000 per month. This indicates that the income gap is not wider among the sample respondents.

Table 5.1. Age, Education and Income of the Respondents – EDC Members

Sl.No.	Age		Education		Income	
	Age (years)	**Number of respondents**	**Educational status**	**Number of respondents**	**Income level (Rs/Month)**	**Number of respondents**
1	<30	4(6.7)	Illiterate	6 (10)	<4000	21(35)
2	30-40	22(36.6)	Primary	7(11.7)	4000-8000	30(50)
3	40-50	24(40)	Secondary	42(70)	8000-16000	8(13.4)
4	>50	10(16.7)	Higher secondary	5(8.3)	>16000	1(1.6)
5	Total	60(100)	Total	60 (100)	Total	60(100)
6	Average Age of the Sample Respondents(Years)					43.7
7	Average Monthly Family Income of the Sample Respondents (Rs)					5674

(Numbers in parentheses indicate percentage to total)

5.1.1.4. Primary occupational structure of the sample respondents

The occupational structure of the respondents is presented in Table 5.2. Majority of the respondents (38.3 per cent) were directly dependent on PTR for their livelihood as Ecotourism guides and watchers. The other occupations followed were, agricultural labour (18.3 per cent), agriculture (13.3 per cent) NTFP collection (8.4 per cent) and homemaking (6.6 per cent). Fifteen per cent were involved in other occupations like business, mason, goldsmith, bus conductor etc. It could be thus concluded that PTR serves as a major source of livelihood to the fringe area people.

Table 5.2. Primary Occupational Structure of the EDC Sample Respondents

Sl.No	Occupation	Number	Per cent
1	Agriculture	8	13.3
2	Agricultural labourers	11	18.3
3	Forest Dependants	5	8.4
4	Ecotourism Guides/ watchers	23	38.3
5	Housewife	4	6.6
6	Others	9	15
Total		60	100

5.1.1.5. Land holding pattern

The land holding pattern of the respondents is furnished in Table 5.3. It could be observed that 75 per cent of the respondents owned land. Fifty five per cent owned less than 50 cents, 6.7 per cent owned 51 cents to one acre, 10 per cent had 1.0 to 2.0 acres and three per cent had more than two acres. This indicates that though majority of them owns land, they are nominal land holders. Only 58 per cent is growing crops in their field. Only very few are having a substantial area of land for carrying out agriculture. Among the sample respondents, 25 per cent happened to be landless households. It is observed that the respondents carried out both commercial and subsistence farming. The main commercial crops grown were Pepper (48.3 per cent), Rubber (5), Coffee (35 per cent), Areca nut (6.6 per cent),Cardamom (6.6 per cent), Coconut (3.3 per cent) cocoa (1.6) and Banana (5 per cent). The main subsistence crops grown were Cassava (13.3 per cent, Yam (13.3 per cent) and Vegetables (6.6 per cent). The details are presented in Table 5.4.

Table 5.3. Land Holding Pattern of Respondents

Sl.No	Land Size (cents)	Number of respondents	Mean area (cent)
1	<25	21 (35)	8.3
2	25-50	12(20)	47
3	51-100	4(6.7)	90
4	101-200	6(10)	163.3
5	>200	2(3.3)	350
6	landless	15(25)	0.00
Total		60(100)	
Average land holding size of the sample			46.8

(Numbers in parentheses indicate percentage to total)

Table 5.4. Major crops grown by the Sample Households

Sl.No.	Crop	Number of respondents	Per cent
1	Pepper	29	48.3
2	Coffee	21	35
3	Areca nut	4	6.6
4	Cardamom	4	6.6
5	Rubber	3	5
6	Banana	3	5
7	Coconut	2	3.3
8	Cocoa	1	1.6
9	Cassava	8	13.3
10	Diascorea	8	13.3
11	Vegetables	4	6.6

5.1.1.6. Gender and category of respondents

The details given in table 5.5 revealed that among the total respondents 63.3 per cent were male and 36 per cent were female. Regarding the social category of the respondents, 41.7 per cent belonged to general category, 33.3 per cent were scheduled tribe people and 25 per cent were scheduled caste people. It reveals the involvement of people belonging to all the social strata in the activities of EDC.

Table 5.5. Gender and Category of the Respondents

Particulars	Gender of the respondent		Category of the respondents		
	Male	Female	SC	ST	general
Number	38	22	15	20	25
Per cent	63.3	36.7	25	33.3	41.7

5.1.1.7. Nature of sample EDCs

The Eco Development Committees are classified into five different types based on the nature of members involved. Of the total EDCs, 49.4 per cent were included in the sample of study. The sample covered 43.1 per cent of Village EDCs, 80 per cent of the Usergroup EDCs, 83.3 per cent of the Professional EDCs and 55.5 per cent of SAPP EDCs. The staff EDCs were excluded from the study (Table 5.6).Thus the sample composed of Village EDCs (64.10 per cent), Usergroup EDCs (10.26 per cent), Professional EDCs and SAPP EDCs each 12.82 per cent.

Table 5.6. Nature of Sample EDCs

Sl.No	Type of EDC	Total Number	Number sampled	Percentage sampled
1	Village	58	25(64.10)	43.1
2	Usergroup	5	4(10.26)	80
3	Professional	6	5(12.82)	83.3
4	SAPP	9	5(12.82)	55.5
5	Staff EDCs	1	0(0.00)	0
Total		79	39(100)	49.4

(Numbers in parentheses indicate percentage to total)

5.1.1.8. Distribution of office bearers of EDC in the sample

The results of analysis presented in table 5.7 showed that 48.3 per cent of the respondents served (or serving) as office bearers of EDCs. Of them, 76 per cent were male and 24 per cent were female. The office bearers in the sample comprised of 24.2 per cent in the position as chairmen, 51.2 per cent as EC members among male and 3.4 per cent as chairperson and 20.7 per cent as EC member among female respondents. Participation rate of various communities revealed 38 per cent scheduled from caste, 17.24 per cent from scheduled tribes and 44.82 per cent from general category as office bearers which indicated the involvement of all, particularly the weaker sections.

Table 5.7. Distribution of Office Bearers of EDC in the Sample

Sl.No	Category	Number	Per cent
1	**Office bearers**	29	48.3**
i	Ex office bearers	9	31
ii	Present office bearers	20	69
2	**Gender participation**		
i	**Men**	22	76
a	Chairman	7	24.2
b	EC member	15	51.7
ii	**Women**	7	24
a	Chairperson	1	3.4
b	EC member	6	20.7
3	**Category participation**		
i	SC	11	37.94
ii	ST	5	17.24
iii	General	13	44.82

** Percentage to total sample size

5.1.2. Observations on Participatory Management Mechanisms in PTR for its Conservation and Maintenance.

5.1.2.1. Eco - development committees

The Eco Development Committees (EDCs) constituted as part of the India Eco Development Project (IEDP) during the period 1996 to 2004 initiated the participatory management framework in PTR and still serve as the platform for its conservation and maintenance. In order to sustain the process of participatory management which has grown and evolved many folds beyond the project period, Periyar Foundation took birth on 27th July, 2004. A total of 79 operating EDCs comprise of five different types; viz., Village EDCs, Usergroup EDCs, Professional EDCs , SAPP EDCs and Staff EDCs. They vary in the nature of stakeholders and activities undertaken, but the basic objective remains the same for all, i.e., to reduce forest dependency and conserve the ecosystem of PTR in a mutually beneficial way. The operation of the participatory management is vested with the grass root level EDCs. Based on a study in PTR, Pillai (2010) concluded that the strategy of Eco development has become a necessary prop for the participatory management of the Protected Areas, in response to pressures on Protected Areas.

5.1.2.2.. Structure and composition of EDCS

Around 80 families of an area, who are living in the fringes of the sanctuary, form one EDC. Each family in the EDC is represented by two members, of whom one will be a female. The range officer who is in charge of the area is the Assistant Eco Development Officer and the Forester is the Ex Officio Secretary. One of the forest guards in the area is the Assistant Ex officio Secretary. The General Body of the EDC elects an Executive Committee of seven members, of which one person is the chairperson of the committee. Among the remaining six members, three shall be females and three from SC/ST category. The forester is the Member Secretary. Voting rights are accorded to the families on one family one vote norm. Ex officio secretary does not have any voting rights. The bank account of the EDC is jointly operated by the chairman, ex officio secretary and one nominated female member (Cheque member) of the Executive Committee. Micro plans are prepared by the committee and submitted to the Eco Development Implementation Committee (EDIC) meeting for approval. Every family of the village EDC is eligible for an interest free loan amount of Rs. 12500 as project investment collected back to Community Development Fund (CDF).

The executive committee meets once in a month and the general body meeting is convened once in a year. Important decisions on activities of EDCs, sanctionaing of loans, fund utilization, etc. is taken in the meeting of Executive Committee and is sent for the approval of the Periyar Foundation (PF). The decisions are arrived at on a mutual consensus of the members. For coordinating the activities of EDCs,

PF recruits Non Government Individuals (NGIs), who will be entrusted with the activities of eight to ten EDCs. They also participate in EDC meetings, but do not have voting rights.

The Community Development Fund (CDF) for sustaining the activities of EDCs was formed by the initial amount sponsored by the World Bank to the beneficiaries as interest free loans. The amount was not repaid to the sponsoring agency, but to the EDCs. Also, the income generated by various ecotourism programmes conducted by EDC members are pooled to a common fund, 15 per cent of which goes to the CDF of corresponding EDCs. The remaining amount is utilized to meet the salary expense of ecotourism guides, watchers and management of PTR. The financial expense of PF is mainly met by the surcharge collected from tourists (Rs.10 from domestic and Rs.100 from foreigners).

EDC members coordinate various CBET programmes that help in protection and conservation of PTR from external threat and reduce the manpower requirement of the department. As per the reports of Periyar Foundation, a total of 109314 man hours were generated in 2009 as contribution towards protection and conservation from CBET programmes. The members of EDCs who are not involved in ecotourism programmes also participate in voluntary protection and conservation activities. Moreover, they act as a vigilant social fence around PTR to prevent the entry of offenders.

The activities and achievements of the four different types of EDCs , viz., Village EDCs, Usergroup EDCs, Professional EDCs and SAPP EDCs are given in Appendix V.

5.1.2.3. Eco - Development Committees as participatory management institutions

The acceptance of EDCs among the stakeholders indicated the long lasting legacy of participatory management institutions. Periyar Tiger Reserve was always prone to the encroachers from outside and the negative dependency of local people for a very long time. The bureaucratic institutional set up of the forest department had limitations in controlling the menace. But, once the participatory initiatives emerged, PTR management turned out to be a model to be replicated elsewhere in CPR management.

The participatory management mechanism in PTR emerged on a mutual benefit basis. The situation which harnessed the excessive forest dependency of the people was well studied and micro plans were formulated addressing these issues. The social and economic empowerment of the people resulted from the eco development is the major factor that lead to the sustainability of the participatory management institutions.

PTR follows a cooperative management strategy for biodiversity conservation through EDCs. As the evolutionary theory of management of CPR suggests, tribal level collective institutions are effective for successful management of commons. But, these institutions did not evolve through the self enlightened interest of the local people when PTR was on the verge of “Tragedy of Commons”. The external stimulus required to evolve such collective institutions was provided by the IEDP initiatives.

According to the Cultural theory of management of CPR, institutions of Hierarchical or Egalitarian nature are successful in managing commons. But the comparison of pre and post IEDP governance mechanism of PTR indicated the success of a cooperative (egalitarian) institution rather than a hierarchical one, where the beaurocratic hierarchical mechanism of forest department could not control the depletion of forest resources by the local communities and outsiders. The EDCs enjoy the status of a cooperative institution at the grass root level, with strong vertical linkages with the Hierarchical mechanism of Periyar Foundation.

Forty three years ago, Hardin opined that the 'tragedy of commons' was inevitable in case of CPRs, if not owned by government or privatized. But, the new theoretical paradigms advocated cooperative management and legitimate institutional mechanisms for the management of commons. The successful management of PTR through grass root level EDCs coordinated by Periyar Foundation falls in the new paradigm of CPR management. The IEDP at PTR also highlighted the role of State to organize and motivate local people for collective action.

Dietz, Ostrom and Stern (2003) opined that "locally evolved institutional arrangements governed by stable communities and buffered from outside forces have sustained resources successfully for centuries, although they often fail when rapid change occurs". The EDCs evolved during 1996-2001 period at PTR, still serve as platform for its management. The vigilant social fencing created around the PTR ensures that the rules of resource use are generally followed, which is essential for the effective governance of CPR.

The story of PTR narrates the need for a credible intervention for the initiation of the process. Once established, the participatory institutions are a must to continue the process. A well established, decentralized institutional framework exists for the eco development committees. Entrusting the grass root level institutions at the local level with the protection and conservation of natural resources were effective in preventing the so called 'tragedy of Commons" in the case of PTR ecosystem and wildlife.

5.1.3. Impact of IEDP on Forest Resource Use and Socioeconomic Status of the Forest Dependant People.

5.1.3.1. Magnitude and extent of dependence on PTR by local people before and after IEDP

The magnitude and extent of dependence on the PTR resources and the socio economic profile of the sample respondents before and after the implementation of India Eco development Project (IEDP) and emergence of Eco Development Committees (EDCs) are studied and presented in this section. The changes can be interpreted as the impact of IEDP on forest resource use and the socio economic status of local people.

5.1.3.1.1. Forest produces collection by the respondents

The major forest produce collected by the fringe area people were identified and the number of sample households engaged in the collection of these resources before and after the introduction of EDCs were assessed and presented in Table 5.8. The extraction of firewood was the major purpose for which local people entered the forest. The number of sample households collecting firewood was reduced from 73.3 per cent of the total to 26.67 per cent. The number of thatching grass collectors has come down to 6.7 per cent from 18.3 per cent of the respondents. The complete termination of illegal sandal wood smuggling and cinnamon bark after the project is notable. Only 1.67 per cent of the respondents collect resin from the tree black dammar (*Thelli*), which was a highly destructive practice. About 17 per cent of the respondents especially tribals were engaged in the collection of minor forest produce like ginger, turmeric, cardamom, pepper, etc., which is now reduced to only 3 per cent. The consumption of bamboo reeds and *Channa* leaves for constructing shops during Sabarimala season is also completely stopped after the formation of EDCs. Five per cent of the respondents still go for fishing in Periyar Lake but not to exploitative levels. It can be observed that there is significant reduction in the number of families involved in illegal extraction of forest resources after the formation of Eco Development Committees.

Table 5.8. Number of Respondents Collecting NTFPs before and after IEDP

Sl. No	Forest produce collected	Before IEDP		After IEDP	
		No.of sample households	Per cent	No. of sample households	Per cent
1	Firewood	44	73.3	16	26.67
2	Thatching Grass	11	18.3	4	6.7
3	Sandal	4	6.7	0	0
4	Cinnamon bark(*Vayana*)	7	11.67	0	0
5	Black dammar (*Thelli*)	5	8.33	1	1.67
6	Honey	7	11.67	3	5
7	Ginger	10	16.7	2	3.33
8	Turmeric	10	16.7	2	3.33
9	Cardamom	10	16.7	2	3.33
10	Pepper	10	16.7	2	3.33
11	Bamboo reed	9	15	0	0
12	*Channa* leaves	7	11.67	0	0
13	Fish	15	25	5	8.33

5.1.3.1.2. Frequency of visit to forest by the respondent EDC members

The frequency of visit of the sample respondents to the PTR forest to fetch various needs before and after IEDP is presented in Table 5.9. The percentage of daily visitors has reduced to 8.3 per cent from 41.67. About 17 per cent each visited forest once in three days and once in a week prior to IEDP which has now come down to 1.67 per cent and 6.67 per cent, respectively. The number of people going to forest for NTFP collection once in a month and once in two weeks has increased from three to five per cent. It could also be observed that the number of respondents who never visited PTR for extractive purpose has recorded a tremendous increase from 15 to 73.3 per cent. The average number of days spent for the collection of forest produce by respondents reduced from 150.15 in the pre IEDP period to 33 at present. It can be stated from these observations that there will be a corresponding reduction in the quantum of resources extracted from PTR.

Table 5.9. Frequency of Visit to Forest by EDC Members

Sl.No	Frequency of visit	Before IEDP		After IEDP	
		No.of sample households	Per cent	No. of sample households	Per cent
1	daily	25	41.67	5	8.3
2	once in three days	10	16.67	1	1.67
3	once a week	10	16.67	4	6.67
4	once in two weeks	4	6.67	3	5
5	once a month	2	3.33	3	5
6	never	9	15	44	73.3
Average number of days used for forest produce collection in a year		150.15		33	

5.1.3.1.3. Annual extraction of forest produce by the sample respondents

The average annual quantity of forest produce extracted by the family of sample respondents before and after IEDP intervention is analysed and furnished in Table 5.10. The average quantities extracted in a year by the sample households revealed the following. The amount of firewood collected shows a 73.7 per cent reduction from 5879 to 1548.7 kg per year. One hundred per cent reduction is observed in the extraction of sandal and cinnamon bark (*vayana*). There is 97.4 per cent decrease in quantity of black dammar collected. The reduction recorded in the extraction of honey, ginger, turmeric and cardamom worked out to be 58, 72, 72.4 and 72.7 per cent, respectively. Conversely, there is an increase in the amount of thatching grass collected, i.e., a change of 109 per cent. This is due to a strategic decision taken in one of the EDCs in PTR. An EDC called firewood and thatching grass collectors EDC was formed in 1998. They were asked to collect more thatching grass from border areas and reduce firewood collection which also helped in reducing the forest fire.

Table 5. 10. Annual Extraction of Forest Produce by the Sample Respondents

Sl.No	Produce	Before IEDP	After IEDP	Change(per cent)
		Average (kg)	Average (Kg)	
1	Firewood	5879	1548.47	73.7
2	Cinnamon Bark (Vayana)	1316.67	0	100
3	Black Dammar	65.5	1.67	97.4
4	Sandal	80	0	100
5	Honey	4.17	1.75	58
6	Ginger	4.17	1.17	72
7	Turmeric	4.83	1.3	72.4
8	Cardamom	2.45	0.67	72.7
9	Fish	35.55	5.13	85.7
10	Thatching Grass	228.83	480	109

5.1.3.1.4. Purpose of NTFP collection by the respondents

The purpose of dependency of the sample respondents on PTR resources were assessed and presented in Table 5.11. The people depended on PTR for various reasons. Before the implementation of IEDP, 30 per cent of the sample respondents were dependant on forest resources as the source of livelihood, 28 per cent for additional income and 26 per cent for self use. Of the total, 85 per cent were dependant on the forest resources of the reserve. After the implementation of IEDP, the number of forest dependent people is only 26.67 per cent, of which 8.3 per cent were for livelihood, 3.3 per cent for additional income, and 15 per cent for self use. The current dependency is subject to restricted access rights to the forest dwelling communities and user group EDCs which is termed a positive dependency without exploiting the reserve.

Table 5.11 Purpose of NTFP collection by the respondents

Sl.No	Purpose	Before IEDP		After IEDP	
		No.of respondents	Per cent	No.of respondents	Per cent
1	Livelihood	18	30	5	8.3
2	Additional income	17	28.33	2	3.3
3	Self use	16	26.67	9	15
	Total dependants	51	85	16	26.67

5.1.3.1.5. Hunting of animals

The wild animals of PTR were highly prone to poaching. As indicated in table 5.12, 14 per cent of the respondents admitted that they were engaged in hunting of animals for economic gains before their involvement in EDCs. The animals killed by poachers were mainly elephant, sambar deer, biason, wild ox, wild boar, etc. At present, the threat of poaching is completely eliminated from the PTR with the coordinated efforts of EDC members and forest department.

5.12. Hunting of Animals

Sl.No	Particulars	Number of respondents	
		Before IEDP	After IEDP
1	Poachers	7 (14)	0
2	Non poachers	53(86)	60(100)

(Numbers in parentheses indicate percentage to total)

5.1.3.1.6. Impact on conservation of wildlife

The population density of wildlife in Periyar Tiger Reserve during the Pre IEDP (1997) period and post IEDP period (2002) is given in Table 5.13. It could be observed that the population density of Elephant, Tiger, Bonnet Macaque, Gaur, Nilgiri Langur and Wild boar have increased by 23.82 per cent, 75 per cent, 955 per cent, 26.6 per cent, 159 per cent, and 15.4 per cent, respectively. This could be interpreted as a result of termination of poaching by the fringe area people and the intruders from outside through the coordinated efforts of EDCs and Forest Department.

Table 5.13. Wildlife Statistics in the Pre and Post IEDP Period

Sl.No.	Wildlife Animal	Density(No./Km2)		Change(per cent)
		Pre IEDP(1997)	Post IEDP(2002)	
1	Elephant	0.7214	0.8933*	23.82
2	Tiger	0.028	0.049**	75.00
4	Sambar Deer	.2679	0.2495	-6.8
5	Barking Deer	0.2080	-	
6	Bonnet Macaque	0.1237	1.1815	955
7	Common Langur	-	0.0103	
8	Gaur	0.4246	0.5376	26.6
9	Malabar Giant Squirrel	0.2638	0.2186	-17.1
10	Nilgiri Langur	0.6389	0.6495	159
11	Wild Boar	0.4287	0.4951	15.4

* 2005 data ** 2008 data

Source:Easa *et al*., (1997, 2002) , Sivaram *et al*.,(2006), KFRI and Ramakrishnan (2008).

5.1.3.2. Socio Economic Impact of IEDP

5.1.3.2.1. Current occupational status of the respondents

The current occupational status of the sample respondents is presented in Table 5.14. It can be observed that the consumptive occupational dependency of the people on PTR has given way to non consumptive dependency. A little over 38 per cent of the respondents depended on PTR for their primary occupation as ecotourism guides and watchers. Only 8.3 per cent is involved in firewood and thatching grass collection from PTR as their primary source of income, but subject to the regulations. Agriculture is the primary occupation for 13 per cent and secondary occupation for 41.6 per cent. It can be seen that NTFP collection is not followed as a primary or secondary source of income by any of the respondents. Analysis of the data indicates that PTR still serves as a livelihood option for many but not in an exploitative manner.

Table 5.14. Current Occupational Status of the Respondents

Sl.No	Occupation	Number of respondents		
		Primary	Secondary	Tertiary
1	Ecotourism guide	23(38.3)	0	0
2	Firewood and thatching grass collection	5(8.3)	2(3.3)	0
3	Fishing	0	2(3.3)	0
4	Agriculture	8(13.3)	25(41.6)	0
5	Agricultural labour	9(15)	2(3.3)	0
6	Business	2(3.3)	6(10)	0
7	Others	7(11.6)	0	0
8	Housewife	4(6.6)	0	0
9	Other NTFP collection	0	0	3(5)

(Numbers in parentheses indicate percentage to total)

5.1.3.2.2. Monthly household income of the sample respondents

The monthly household income of the sample respondents before and after IEDP implementation is compared at the terminal year (2010) constant prices. The results are given in Table 5.15. It would be observed that the households were able to increase their monthly income. The agricultural income that primarily came from sale of pepper and coffee increased by about 45 per cent. It could be attributed to the redemption of agricultural land from the moneylenders and the coordinated marketing of pepper under EDC. The income from the sale of forest products recorded a significant reduction by 90 per cent. The income earned from wage labour also increased by 26.2 per cent as more people diverted their livelihood from forest product collection. The highest increase in income resulted from the IEDP occupation as ecotourism guides and watchers. It would be observed from the table that, before the IEDP about 45 per cent of the household income was contributed by the forest products whereas its share is reduced to only 3.1 per cent in the post IEDP period. On the contrary, the major source of household income of the sample respondents at present happened to be the IEDP occupation. It could be interpreted as a diversion from consumptive use of PTR to non consumptive use of forest. The monthly household income of the sample respondents increased by 39.5 per cent, from Rs.4066 to Rs.5674.

A comparison of income received from various PTR dependant activities in the pre and post IEDP period is presented in Table 5.16. The income from consumptive use of PTR is only 3.19 per cent in the post IEDP period compared to 44.53 per cent in the previous period. A 90 reduction is observed in the income from consumptive use of PTR. 49.25 per cent of the income of the sample respondents is contributed by the non consumptive activities related to PTR in the current period. The reduction in consumptive use can also be inferred as an improvement in the forest ecosystem. This was also substantiated by the forest officials and the fringe area people during the survey.

Acquisition of a better livelihood indicates the sustainability of the participatory forest conservation strategy. Zhu *et al.* (2011) based on their study concluded that a bigger livelihood improvement for CBCM project is a more sustainable way for long term forest resource protection. Poverty being the basic reason for forest dependency of local communities, provision of a better livelihood is an effective means to reduce it.

Table 5.15. Monthly Household Income (2010 prices) of the Sample Respondents

Sl. No	Source	Average Monthly Income (Rs)		Change	
		Before IEDP	After IEDP	Amount (Rs)	Per cent
1	Agriculture	674.30(16.5)	977.1(17.21)	302.78	44.8
2	Forest Products	1810.7(44.53)	181.5(3.19)	-1629.2	-90
3	Labour	962.5(23.6)	1215.55(21.42)	253.05	26.2
4	Others	605.5(14.9)	463.89(8.1)	-141.667	-23.3
5	IEDP occupation	0	2794.72(49.25)	2794.72	(**)
6	Average	4066.67(100)	5674.41(100)	1607.75	39.5

*mathematically infinity implying a very large increase

(Numbers in parentheses indicate percentage to total)

Table 5.16. Comparison of Income (2010 prices) from PTR Dependant Activities

Sl.No	Particulars	Pre IEDP	Post IEDP	Change
1	Income from consumptive use of PTR (Rs)	1810.7(44.53)	181.5(3.1)	1629.2(-90)
2	Income from non consumptive use of PTR (Rs)	0	2794.72(49.25)	2794.72(**)
3	Income from other sources (Rs)	2256.00(55.47)	2698.19(47.55)	442.19(19.6)
4	Average monthly household income (Rs)	4066.67(100)	5674.41(100)	1607.74(39.53)

(Figures in parentheses indicate percentage)

5.1.3.2.3. Lorenz Curve for the household income distribution of the sample

The Lorenze curves obtained for the household income distribution of the sample respondents in the two periods before and after IEDP are given in Figure 5.1 and Figure 5.2, respectively. It could be observed from the figure 5.1 that the income inequality was very high among the sample in the period before the IEDP intervention, due to the low income status of the forest dependent people in the poor and marginalized section of the fringe area of PTR. The improvement in income levels and the better distribution of income to all the sections of the fringe area especially the people dependant exclusively on PTR for their livelihood could be observed from the Lorenze curve given in figure 5.2. The redemption from persistent debts and better marketing facilities for their crops resulted from IEDP intervention contributed to the reduction in income inequality.

5.1.3.2.4. Gini Coefficient of income inequality

The Gini Coefficient (GC) of income distribution in the sample for the periods before and after IEDP indicated a significant reduction in the income inequality. The value of gini coefficient was 0.41 in the pre IEDP period, whereas it was 0.29 in the post IEDP period, the reduction was 29.3 per cent.

5.1.3.2.5. Changes in asset position of the sample respondents

Assets are capital items whose possession is an indication of the economic well being and standard of living of the households. The possession of 11 assets in the households of the respondents before and after the implementation of IEDP is presented in Table 5.17. All assets are reported to have increased in the post IEDP period. The highest increase was observed in the case of LPG stove (1025 per cent) followed by telephone (366.7 per cent), mixer grinder (700 per cent), refrigerator and fan (350 per cent each), television (291.6 per cent), cot (59.3 per cent), chair (23.8 per cent), latrine (25 per cent), and dwelling house (12.2 per cent). Seventy per cent of the respondents possess mobile phones. The increase in use of LPG stove has also resulted in a significant reduction in the extraction of firewood from PTR. The increase in asset position of the households indicated the improved economic status of the respondents following IEDP interventions like agricultural produce marketing, freedom from the clutches of moneylenders and better livelihood options generated.

5.17. Changes in Asset Position of the Sample Households

Sl.No.	Asset	Before (no.)	After (no.)	Change
1	Dwelling House	49(81.6)	55(91.6)	6(12.2)
2	Latrine	44 (73.3)	55(91.6)	11(25)
3	Chair	42(70)	52(86.6)	10(23.8)
4	Cot	32(53.3)	51(85)	(59.3)
5	Television	12(20)	47(78.3)	35(291.6)
6	Refrigerator	4(6.6)	18(30)	14(350)
7	Fan	4(6.6)	18(30)	14(350)
8	Mixer grinder	4(6.6)	32(53.3)	28(700)
9	LPG stove	4(6.6)	41(68.3)	37(1025)
10	Telephone	6(10)	28(46.6)	22(366.70)
11	Mobile phone	0(0)	42(70)	Infinity**

(Numbers in parentheses indicate percentage)

** mathematically infinity implying a very large increase

5.1.3.2.6. Social impact of IEDP on the respondents

A major influence of the IEDP on the fringe area people was the social empowerment that resulted from participation in EDC activities. As indicated in table 5.18, the sample respondents' involvement in different social development activities and attitudes witnessed a considerable change in the favourable direction after IEDP.

Table 5.18. Social Impact of IEDP on the Sample EDC Members

Sl. No.	Particulars	Before 'yes'		After 'yes'		Change in No.
		No.of respondents	Per cent	No.of respondents	Per cent	
1	Visit to PTR office	11	18.33	60	100	49(445)
2	Attended trainings/meetings at PTR	5	8.33	58	96.67	53(1060)
3	Had Bank transactions	7	11.67	41	68.33	34(485)
4	Had saving habits	1	1.67	33	55	32(3200)
5	Borrowing from moneylenders	42	70	8	13.33	-34(-80.95)
6	Involvement in Conservation activities	5	8.33	44	73.33	39(780)
7	Social interaction and recognition	19	31.67	49	81.67	30(157.8)
8	Concern about family welfare and Children's education	26	43.33	60	100	40(153.8)
9	Leadership	4	6.67	25	41.67	21(525)
10	Feel of self confidence	16	26.67	49	81.67	33(206)
11	Feel of empowerment	4	6.67	46	76.67	42(1050)
12	Forest dependency	51	85	16	26.67	35(-68.6)
13	Positive Conservation Attitude	10	16.6	60	100	50(500)

(Figures in parentheses indicate percentage)

After the involvement with IEDP, the rate of visiting PTR and attending meetings and training recorded a very high increase. Currently, they undertake bank transactions and have saving habits. Number of respondents having bank account and saving habit increased by 485 and 3200 per cent, respectively, a multifold increase compared to the earlier period. One of the major problems of the area

before the emergence of IEDP, i.e., the borrowing from moneylenders at exorbitant interest rates decreased by 81 per cent. Their perception and attitude towards conservation of forest resources have improved significantly and the respondents directly involved in conservation activities recorded an increase by 780 per cent. There is about 157.8 per cent improvement in social welfare and the social recognition earned, as reported by the respondents as a result of their shift to a legal livelihood. EDC activities brought many to the forefront in the society. EDCs, being apolitical offered chances to the poor and marginalized to acquire new social status as members and office bearers of EDC. The IEDP beneficiaries are better placed in respect of leadership ability, feel of self confidence and empowerment compared to their previous situation by 525, 206 and 1050 per cent respectively. All of them are now concerned about family welfare and children's education compared to the previous 43.33 per cent. There was 500 per cent increase towards the number of respondents with positive conservation attitude. This situation is congenial for sustainable socio economic development and sustainable management of PTR. The forest dependency of the people recorded a reduction by 68.6 per cent in the post IEDP period.

5.1.3.3. Views on India Eco Development Project

The views of the Eco development Committee members on IEDP and PTR were assessed and given in Table 5.19.

5.1.3.3.1. Benefits given to people under IEDP

Among the respondents, 65 per cent of them received household benefit in terms of micro credit for redemption of debt, agricultural development and self enterprise development, etc, and provision of LPG stove. About 67 per cent received community benefits viz., drinking water facility, water harvesting structures, drainage construction, crop protection measures, community hall, nursery school, EDC office building, pepper marketing facilities, cardamom drying unit, etc. Little over 48 per cent gained an alternative livelihood option through ecotourism programmes. Access rights for collection of forest produce were given to 11.6 per cent of them. It included the rights for responsible biomass extraction of firewood and thatching grass through user group and minor NTFP by the tribal people.

Table 5.19. Views on IEDP and PTR

Sl.No	Particulars	Number of Respondents	Per cent
1. Benefits received by the respondents under IEDP			
1	Micro credit	39	65
2	Community benefits	40	66.6
3	Alternative livelihood	29	48.3
4	Access rights	7	11.6
II. Reasons for provision of benefit under IEDP			
1	To reduce forest dependency and conserve PTR	54	90
2	Accepted as KFD gave	6	10
3	Don't know	0	0
III. Problems of people living near PTR			
1	Crop destruction by wild animals	32	53
2	No problem	18	47
IV. Satisfaction level of the current governance activities of EDCs			
1	Satisfactory	55	92
2	Non satisfactory	5	8

5.1.3.3.2. Reasons for provision of benefits under IEDP

The results presented in Table 5.29 revealed that a great majority of respondents (90 per cent) knew that the benefits were given to reduce their negative forest dependency and conserve PTR and 10 per cent replied that they had accepted the benefit as Kerala Forest Department (KFD) gave it. The inference is that most of the people were aware of the objectives of IEDP.

5.1.3.3.3. Problems of people living near PTR

The only problem indicated by the people living near PTR was the crop destruction by wild animals**.** About 53 per cent of the respondents complained about wildlife attack on crops mainly banana, tubers and vegetables. Wild boar was the most destructive primary crop raiding animal followed by monkey, sambar deer and elephant. They had also opined that the crop raiding had increased in the recent years as the animal populations had increased and they never used to fear for human attack. The fearless entry of wild animals to farm gives a clear indication of improvement in people's conservation attitude.

5.1.3.3.4. Satisfaction level of the current governance activities of EDCs

Among the sample respondents, 92 per cent expressed satisfaction with the activities of EDCs. The remaining eight per cent have complained about the unfulfilled promises such as giving works of forest department to local people made during the IEDP period and certain confusions regarding repayment of credit which should be maintained as a Community Development Fund by the EDCs. But, all of them reported that their relation with forest department have improved after the IEDP.

5.1.3.3.5. Overall perception of the respondents towards IEDP

The overall perception of the respondents towards the implementation of IEDP was assessed during primary survey using a perception rating scale. It could be observed from table 5.20 that 65 per cent of the respondents had a very positive perception and 18.3 per cent had a positive perception towards IEDP. Five per cent remained neutral in their perception towards IEDP. But 8.3 per cent expressed their negative perception towards IEDP due to certain misconception about credit repayment and their inability to dominate democratically formed EDCs.

The factors influencing the direction of perception towards IEDP were analyzed using OLS regression and presented in Table 5.21. The estimated coefficient of the intercept constant is 7.12. The factor AGE had a positive relation with IEDP score, but in the present study it was not found to be significant. The occupational dependency on PTR was found to have a significant influence on IEDP perception score i.e., for the people dependant on PTR for livelihood the IEDP perception score was higher by 4.05 units than others. The incidence of wildlife conflicts was also insignificant in influencing their perception towards IEDP. If the respondent served as an office bearer of EDC, it has got a significant positive influence on the score by 3.1 units. The total number of benefits received by the respondents under IEDP had a positive relation with the score, but it was found to be insignificant in the present study. Another very significant factor that had a positive influence on IEDP perception score was absence of any conflicts with the mechanism of EDC. Those members who had no experience of conflicts

with EDCs seemed to have a better perception score. The significance of this factor implied that the present governance mechanism of the EDCs is fair and accepted by the members.

Table 5.20. Overall Perception towards IEDP by the Sample Respondents

Sl.No	IEDP Perception	Number of respondents	Per cent
1	Very positive	39	65
2	Positive	11	18.3
3	Neutral	3	5
4	Negative	5	8.3
Total		60	100

Table 5.21. OLS Estimates of Factors Influencing the IEDP Perception Score

Sl.No.	Variables	Coefficient	t Stat	P value
1	Constant	7.12	1.78	0.0806
2	Age	0.097204	1.36	0.17898
3	Occupational dependency on PTR	4.0527**	2.94	0.00478
4	Wild life conflicts	-1.67427	-1.20	0.233901
5	Office bearer of EDC	3.100506*	2.18	0.033127
6	Total number of benefits received under IEDP-	0.514027	0.82	0.411191
7	Absence of conflicts with EDC	11.7058***	-5.78	4.03E-07
	R^2	0.4973		
	Adjusted R^2	0.4404		
	Standard Error	5.05		
	Observations	60		
	F	8.74***		
	Significance	.000001		

** *Significant at one per cent

** Significant at five per cent

* Significant at ten per cent

5.1.3.4. Willingness to Pay (WTP) of EDC Members for Protecting PTR for Future Generation (Bequest Value)

The fringe area people are the direct beneficiaries of PTR who have developed a great desire to conserve and protect PTR once they were enlightened about the need for CPR management after the IEDP intervention. Most of them are offering their time and energy in protecting PTR. They were asked about their willingness to contribute an amount for the protection and conservation of PTR for the benefit of future generation. The WTP was elicited using an open ended CVM under the hypothetical setting. The payment vehicle used was every year payment to a PTR protection fund, which will be exclusively used for the protection of PTR.

All the sample respondents except 10 expressed their willingness to contribute towards conservation of PTR (83.3 per cent). The WTP amounts ranged between Rs. 50 and Rs. 6000. The modal value of WTP was found to be Rs. 500, offered by 23.3 per cent of the respondents followed by Rs.1000 expressed by 15 per cent. The details are presented in Table 5.22.

The factors that significantly influenced their WTP were analysed using OLS regression and presented in Table 5.23. The mean WTP of the respondents and the bequest value of protecting PTR was estimated.

It could be observed from the results that factors like gender, age, education, involvement in EDC activity and occupational dependency on PTR were not influencing the willingness to pay amount significantly. The factors that had significant influence on WTP were monthly income and IEDP perception score of the respondents. With every unit increase in monthly income of the people, the WTP increased by 0.14 units. As the IEDP perception score increased by one unit, the WTP increased by 42.51 units. A positive IEDP perception score itself indicated the conservation attitude of people towards PTR. So, it could be inferred that the intervention through IEDP has resulted in a positive conservation environment among the local people. The people, who once exploited the forest for their livelihood is now willing to contribute in anticipation of the future benefits.

Table 5.22. Willingness to Pay of EDC members

Sl.No	WTP (Rs)	Number of respondents	Per cent
1	50	2	3.33
2	100	5	8.33

3	200	9	15
4	250	2	3.33
5	500	14	23.33
6	600	1	1.67
7	1000	9	15
8	1200	1	1.67
9	2000	3	5
10	3000	1	1.67
11	5000	2	3.33
12	6000	1	1.67
13	Total	50	83.33
14	Not willing to pay	10	16.67
15	Grand Total	60	100

Table 5.23. OLS Estimates of WTP of EDC Members for Protecting PTR for Future Generation

Sl.No.	Variables	Coefficient	t Stat	P value
1	Constant	1012.34	-1.26116	0.212882
2	Gender	282.4817	1.059129	0.294436
3	Age	-0.41913	-0.02939	0.976662
4	Education	219.0497	1.349772	0.182936
5	Involvement in EDC activity	-290.216	-0.75207	0.455402
6	Occupational Dependency on PTR	302.2766	0.965741	0.338644
7	Monthly Income	0.141468***	2.8199	0.006783
8	IEDP perception score	42.5181**	1.824883	0.073765
	Mean WTP (Rs)	763.63		
	R^2	0.44252		
	Adjusted R^2	0.367475		
	Standard Error	965.9324		
	Observations	60		
	F	5.89***		
	Significance	0.00004		

*** Significant at one per cent

** Significant at five per cent

The mean WTP of the EDC members for protecting and conserving PTR for future generation was estimated to be Rs. 763.3 per year per family.

There are 5540 families in the fringe area of PTR who are members of EDCs. Assuming that about 80 per cent of the families i.e., 4432 families would be willing to pay for protecting PTR, the total Bequest Value was estimated to be Rs. 3.38 million per year.

The fact that the people value PTR for its benefits to the future generation by the amount Rs.3.38 million per year is an indication of the positive impact of IEDP on the conservation attitude of people.

5.2. Results of Analysis of sample Tourist Respondents

5.2.1. Description of the General Characteristics

5.2.1.1. Age of the sample respondents

The age profile of tourists (Table 5.24) who visited PTR varied from 19 years to 66 years. Thirty two per cent of the of the domestic tourists and eight per cent of the foreign tourists were of the age less than 30 years, 16 per cent of the foreign tourist respondents and 44 per cent of the domestic tourist respondents belonged to the age group of 30 to 40 years, 16 per cent each of foreign and domestic tourists accounted for the age group of 40 to 50 years, those respondents falling in the age group of 50-60 years were 36 per cent in the case of foreign tourists and eight per cent in the case of domestic tourists, whereas 24 per cent of the tourist respondents belonged to the age group of more than 60 years and all of them happened to be foreigners. Thus, the results indicated that people from all the age groups visited PTR for recreation.

5.2.1.2. Educational status of the respondents

The education level of the sample respondents who visited PTR was observed to be high as indicated in Table 5.25. Majority of them (94 per cent) had college level education. It consisted of 34 per cent graduates, 44 per cent post graduates and 16 per cent qualified professionally. Among the graduates, 40 per cent were domestic tourists and 28 per cent were foreigners. Post graduate group of tourists consisted of 56 per cent of foreigners and 34 per cent of domestic tourists. The professional group had 16 per cent each of foreign and domestic tourists. Six per cent were educated up to higher secondary level, all of them domestic tourists. None of the respondents were illiterate.

Table 5.24. Age Distribution of the Sample Tourists Respondents

Sl.No	Age (years)	Number of Respondents		
		Domestic	Foreign	Total
1	<30	8(32)	2(8)	10(20)
2	30-40	11(44)	4(16)	15(30)
3	40-50	4(16)	4(16)	8(16)
4	50-60	2(8)	9(36)	11(22)
5	>60	0	6(24)	6(12)
	Total	25(100)	25(100)	50(100)

(Numbers in parentheses indicate percentage to the total)

Table 5.25. Educational Status of the Sample Tourists Respondents

Sl.No	Educational Status	Number of Respondents		
		Domestic	Foreign	Total
1	Illiterate	0	0	0
2	Secondary	3(12)	0	3(6)
3	Graduate	10(40)	7(28)	17(34)
4	Post graduates	8(32)	14(56)	22(44)
5	Professional	4(16)	4(16)	8(16)
	Total	25(100)	25(100)	50(100)

(Numbers in parentheses indicate percentage to the total)

5.2.1.3. Occupational structure

The occupational structure of the respondents is furnished in Table 5.26. People engaged in different types of occupation visited PTR. Majority of the visitors were private employees (44 per cent) followed by government employees, retired persons and businessmen each constituting 12 per cent. Students accounted for 10 per cent while unemployed persons constituted eight per cent. Only two per cent of the sample visitors were agriculturists.

Table 5.26. Occupational structure of the Tourist respondents

Sl. No.	Occupation	Number of respondents		
		Foreign	Domestic	Total
1	Govt. Employee	4(16)	2(8)	6(12)
2	Private Employee	13(52)	9(36)	22(44)
3	Retired	6(24)	0	6(12)
4	Own business	0	6(24)	6(12)
5	Agriculture	0	1(4)	1(2)
6	Student	2(8)	3(12)	5(10)
7	Unemployed	0	4(16)	4(8)
	Total	25(100)	25(100)	50(100)

(Numbers in parentheses indicate percentage to total)

5.2.1.4. Income level of the respondents

The monthly income level of the respondents is given in Table 5.27. The respondents were from various income strata of the society. People with very high income level i.e., more than Rs.1.00 Lakh per month formed the majority with 32 per cent and all of them happened to be foreign tourists. Forty eight per cent of domestic tourists and four per cent of foreign tourists belonged to the income group of Rs. 15001 to Rs. 50000 who constituted 26 per cent. Twenty eight per cent of the foreign tourists were in the monthly income group of Rs.50001 to Rs.1 lakh. People with an income of Rs. 5001 to Rs. 15000 per month constituted 14 per cent comprising of 24 per cent of domestic tourists and 4 per cent of foreign tourists. The lowest income group i.e. less than Rs. 5000 per month who accounted 14 per cent of the respondents consisted of 28 per cent of the domestic tourists. Overall, the average income level of domestic and foreign tourist respondents was Rs.--------- and Rs._____ per month respectively.

Table 5.27. Monthly Income of the Sample Tourists Respondents

Sl.No	Income level (Rs/Month)	Number of Respondents		
		Domestic	Foreign	Total
1	<5000	7(28)	0	7(14)
2	5000-15000	6(24)	1(4)	7(14)
3	15001-50000	12(48)	1(4)	13(26)
4	50001-100000	0(0)	7(28)	7(14)
5	> 1 La	0(0)	16(64)	16(32)
	Total	25(100)	25(100)	50(100)

(Numbers in parentheses indicate percentage to total)

5.2.1.6. Membership in environmental organizations

Among the sample respondents 34 per cent happened to be members in environmental oraganisations like Green Peace and others. Majority of them belonged to the foreign nations. Even while, 52 per cent of the foreign tourists were members of environmental conservation organizations, only 16 per cent of the domestic tourists were so engaged (Table 5.28).

Table 5.28. Membership in Environmental Organizations

Particulars	Number of respondents who are members	Per cent
Foreign Tourists	13	52
Domestic tourists	4	16
Total	17	34

5.1.2.6. Frequency of visits to tourist spots

It could be observed from table 5.29 that majority of the respondents were frequent travelers to tourist spots, with 42 per cent of them visiting tourist spots once in a year (majority of them foreigners). Twelve per cent of them made trips twice a year and six per cent traveled very frequently to picnic spots in a year. People who visited aesthetic sites once in two years constituted 14 per cent and those who visited once in four years were two per cent. Among the respondents 24 per cent visited occasionally any tourist spots.

Table 5.29. Frequency of Visit to Tourist Spots by the Respondents

Sl.No	Frequency	Number(foreign tourists)	Number (Domestic)	Total	Per cent
1	Once a year	15	6	21	42
2	Twice a year	3	3	6	12
3	More than twice a year	1	2	3	6
4	Once in two years	3	4	7	14
5	Once in four years	1	0	1	2
6	Not often	3	9	12	24
	Total	25	25	50	100

5.2.1.7. Number of visits to PTR by the respondents

Results presented in table 5.30, showed that most of the respondents (80 per cent) happened to be first time visitors to PTR, whereas 16 per cent of them visiting for the second time and four per cent were on their third visit. Ninety six per cent of the foreign tourists and 64 per cent of domestic tourists were visiting PTR for the first time and four per cent of the foreign tourists and 28 per cent of the domestic tourists were second time visitors. Eight per cent of the domestic tourists were on their third visit to PTR. None of them visited more than thrice. But all the 100 per cent expressed their willingness to visit PTR again.

Table 5.30. Number of Visits to PTR by the Respondents

Sl.No	Number of times	No.of respondents		
		Domestic	Foreign	Total
1	Once	16(64)	24(96)	40(80)
2	Twice	7(28)	1(4)	8(16)
3	Thrice	2(8)	0	2(4)
4	More than three	0(0)	0	0
5	Intents to visit PTR again	25(100)	25(100)	50(100)

5.2.1.8. Reasons to visit PTR by the respondents

The respondents had different reasons behind their visit to PTR, and the results are presented in Table 5.31. The major attraction of the site is the scope of viewing wildlife in close proximity. PTR has diverse wildlife population including tigers, elephants, gaur, sambar deer, wild boar, monkeys and various species of birds and butterflies. Majority of them (70 per cent) chose to travel to PTR to watch the wildlife, while 36 per cent were fascinated by the aesthetic beauty of the site. The surrounding forest and Periyar Lake adds to the aesthetic beauty of the site. Six per cent decided to travel either due to easy access or friend's suggestion who visited PTR previously. Besides, two per cent visited PTR to experience Kerala culture.

Table 5.31. Reasons to Visit PTR by the Respondents

Sl.No	Reason	Number of respondents	Per cent
1	To watch wildlife	35	70
2	Aesthetic beauty	18	36
3	Peaceful place	0	0
4	Easy access	3	6
5	To experience the Kerala culture	1	2
6	Friends' suggestion	3	6

5.2.1.9. Tourism activities undertaken by sample respondents

The various recreational activities enjoyed by the sample respondents at PTR are given in Table 5.32. It could be seen that 98 per cent of the respondents chose boating in Periyar Lake, of which 42 per cent opted only for boating and 56 per cent enjoyed both boating and other ecotourism programmes. Fifty eight per cent of the sample respondents participated in ecotourism programmes like Bamboo rafting (4 per cent), Border hiking (14 per cent), Bullock cart ride (6 per cent), Clouds walk (18 per cent), and Nature walk (18 per cent). It could be observed that foreign tourists were more interested in ecotourism programmes with 84 per cent of them opting for various activities, whereas only 32 per cent of the domestic tourists chose ecotourism programmes.

Table 5.32. Tourism Activities Undertaken by the Sample Respondents

Sl.No	Activity	Number of respondents		
		Domestic	Foreign	Total
1	Boating	25(100)	24(96)	49(98)
a	Boating Only	17(68)	4(16)	21(42)
b	Both Boating and Ecotourism programmes	8(32)	20(80)	28(56)
II	Ecotourism programmes	8(32)	21(84)	29(58)
a	Bamboo Rafting	0	2(8)	2(4)
b	Border Hiking	2(8)	5(20)	7(14)
c	Bullock Cart Ride	1(4)	2(8)	3(6)
d	Clouds walk	4(16)	5(20)	9(18)
e	Nature walk	1(4)	8(32)	9(18)
f	Periyar Tiger Trail	0	0	0
g	Jungle Patrol	0	0	0

(Numbers in parenthesis indicate percentage)

5.2.1.10. Willingness to Pay (WTP) of tourists to visit PTR

The tourists' WTP for visiting Periyar Tiger Reserve was elicited using the bidding game technique. As indicated in table 5.33, eighty per cent of the respondents were willing to pay a higher amount than the existing entrance fee (Rs.25 for domestic and Rs.300 for foreigners) towards the conservation of PTR. The amount ranged between Rs. 50 and Rs. 7000. The bid accepted by maximum number of domestic respondents (28 per cent) was Rs. 100 followed by Rs.150 and Rs.50 (16 per cent each), Rs.200 (12 per cent) and Rs.1000 (four per cent). The bid amount accepted by maximum number of foreign tourist respondents was Rs.500 (24 per cent). The amounts such as Rs. 400, Rs.600 and Rs.1000 were agreed by 12 per cent each. Eight per cent each accepted Rs. 3000 and Rs.7000. The lowest and highest bid accepted were Rs. 50 and Rs. 1000, respectively for domestic tourists and. Rs.400 and Rs.7000, respectively for foreign tourists. The average willingness to pay of the respondents worked out to be Rs.550.00.

Table 5.33 Willingness to Pay of Tourists

Sl.No	WTP Bid amount (Rs)	Number of respondents		
		Foreign	**Domestic**	**Total**
1	50	0	4(16)	4(8)
2	100	0	7(28)	7(14)
3	150	0	4(16)	4(8)
4	200	0	3(12)	3(6)
5	250	0	0	0
6	300	0	0	0
7	400	3(12)	0	3(6)
8	500	6(24)	0	6(12)
9	600	3(12)	0	3(6)
10	700	2(8)	0	2(4)
11	1000	3(12)	1(4)	4(8)
12	2000	2(8)	0	2(4)
13	3000	1(4)	0	1(2)
14	4000	0	0	0
15	5000	0	0	0
16	6000	0	0	0
17	7000	1(4)	0	1(2)
18	Willing to Pay	21(84)	19(76)	40(80)
19	Not Willing to Pay more than the current rate(Rs.25 for domestic, Rs.300 for foreigners)	4(16)	6(24)	10(20)
20	Total	25(100)	25(100)	50(100)
21	Mean WTP (Rs)	976	124	550

(Numbers in parentheses indicate percentage to total)

5.2.2. Economic Valuation of PTR

The economic value of the forest consists of use value and non use values. The TEV comprising recreational use value and preservation value is estimated using LOGIT model from the WTP obtained through contingent valuation method. To elicit the WTP of the tourists, the payment vehicle used was the Entrance Fee to the PTR.

The tourist respondents were asked to consent to or reject a donation amount in the hypothetical setting, ranging from Rs. 50 to 10000. The bid amounts were fixed based on an open ended CVM during pre testing of the questionnaire. As the payment vehicle opted was the entrance fee and since it was different for domestic and foreign tourists, the bids were given accordingly. The highest and lowest bids accepted were 7000 and 50, respectively.

5.2.2.1. Estimated LOGIT models

In addition to the donation amount, socio-economic variables included in the Logit models were age, education level, nationality of the tourist (Foreign/ domestic) and number of wildlife species viewed at the site. The estimated LOGIT models are presented in Table 5.34.

The dependant variable in the LOGIT model happened to be the probability of accepting WTP bid amount. The education level of the respondents was found to have a positive and significant influence on accepting a bid. The estimated coefficient is 0.1311. Another factor that very significantly influenced the probability of accepting a bid was the number of wildlife species sited. It had a positive influence on P (WTP) as the main reason for which people travel to PTR is to watch and enjoy the wildlife. The estimated model is:

P(WTP)=-0.2547-0.81(Bid)+0.1768(Age)+0.1311(Edn)-0.93(F/D)+0.1637(NWL)-----(1)

5.2.2.2. Truncated Mean WTP of the tourists

The truncated mean WTP was calculated from the above equation (1), with the socio-economic values set to their sample means except the bid amount (A). The model obtained is

P (WTP) = - 0.81(A) +7.86 ----- (2)

$$= \int_{0}^{7000} \left(\frac{1}{1+\exp(-(0.81A-7.86))} \right) dA \quad \text{----- (3)}$$

Applying Trapezoidal Rule for definite integrals to the above equation (3)

WTP = 35/2 [1.003+ 2(33)] (h=7000-0/200)

= 1330.

The truncated mean WTP is estimated to be Rs. 1330 per person.

Table 5. 34. Estimates of LOGIT Model for WTP of Tourists

Sl.No.	Variables	Coefficient	P value	t Stat	Mean of Variable
1	**Constant**	-.2547	.2799	-1.08	
2	Bid amount	-.8100	.1146	-1.57	584.00
3	Age	.1768	.6481	0.456	42.62
4	Education	.1311**	.0589	1.889	2.66
5	Foreign/ Domestic Tourist	.9302	.4053	0.832	0.50
6	Number of wildlife species viewed	.1637***	.0000	4.594	4.30
Multinomial LOGIT model Maximum Likelihood Estimates					
8	Dependant Variable			P(WTP)	
9	Number of observations			50	
10	Observation to Predictor ratio			10:1	
11	Log likelihood Function			-4.07	
12	Chi squared			44.53	
13	Degrees of freedom			5	
14	Significance			.0000000	

*** Significant at one per cent level

** Significant at five per cent level

5.2.2.3. Total Economic Value of PTR

According to the reports of Periyar Foundation (2010), the average number of tourists visiting PTR per year is 502374. Assuming that 80 per cent of the tourists i.e., 401899 persons will be willing to pay, the aggregated mean WTP was found to be Rs.534.52 million per year. Thus, the total economic value of PTR was estimated to be Rs.534.52 million per year.

5.2.3. Forest Function Ranking by the Tourists

A set of important functions performed by the forests was presented with a brief description about each function and the tourists were asked to rank these functions based on the importance of each function from the individual's point of view. The rankings are presented in Table 5.35.

It could be observed that the function of maintaining the ecological balance was the first among most ranked 'rank 1' function of the forest by the respondents (66 per cent). The aesthetic value and future use value are in the second and third position followed by existence value and rarity. The least valued function by the tourists was consumption function with the Rank 8 given by all the sample respondents. The ranking of the forest function indicated that the tourists want the forest to be protected for its non consumptive benefits.

Table 5.35 Forest Function Ranking by the Tourists

Sl. No	Forest Function	Number of ranks assigned							
		Rank1	Rank2	Rank3	Rank4	Rank5	Rank6	Rank7	Rank8
1	Ecological function	33	10	3	3	1	0	0	0
2	Aesthetic Function	11	23	7	5	3	1	0	0
3	Rarity	0	1	0	10	7	27	4	0
4	Existence	0	2	6	24	14	4	0	0
5	Future use	0	21	18	4	5	2	0	0
6	Livelihood	0	1	0	0	2	4	43	0
7	Ecosystem services	6	10	1	4	20	8	1	0
8	Consumption	0	0	0	0	0	0	0	50

CHAPTER VI

SUMMARY AND CONCLUSION

In this chapter, a brief report of work undertaken and the results obtained are summarized along with the conclusions and policy options.

Periyar Tiger Reserve, Thekkady, the sole tiger reserve of Kerala is one of the seven sites identified under World Bank sponsored India Eco Development Project (IEDP) in the year 1996. The Eco Development Committees constituted as part of the project with the aim to reduce the negative forest dependency of the local communities and to provide them a better livelihood turned out to be a model approach for participatory management of forest commons. In view of this, a study was undertaken with an overall objective of assessing the impact of IEDP and the effectiveness of the participatory management framework in PTR. The specific objectives were:

5. To examine the effectiveness of the participatory institutional mechanisms in the Periyar Tiger Reserve for the sustainable management of forest commons.
6. To analyse the impact of India Eco Development Project (IEDP) and Ecotourism initiatives towards ecosystem conservation and local livelihood.
7. To measure the Willingness to Pay of tourists for conservation of Periyar Tiger Reserve and to assess its economic value.
8. To investigate the possibility of the extension of the management mechanism in the study area to similar areas.

The hypothesis were:

1. Community based participatory approaches are not the effective means of managing free rider problems associated with common property resources.
2. Provision of an alternate income generating activity cannot always contribute to poverty reduction and ensure cooperation of the dependant communities in the sustainable management of commons.
3. People acknowledge the economic and ecological value of PTR but are not willing to contribute towards its conservation.

6.1. Sampling

The EDC members and the tourists visiting PTR constituted the sample space. To analyse the socio economic impact of IEDP, 60 respondents were selected from the four EDCs viz., Neighbourhood based EDCs, Usergroup EDCs, Professional EDCs and Pilgrim management EDCs (SAPP). To estimate

the economic value of PTR, WTP was elicited from 50 tourists selected randomly comprising 25 domestic and 25 foreign tourists.

Two separate interview schedules were used, one for the EDC members and the other for the tourists. The survey was conducted during the months of February and March, 2011. The data collected were tabulated, processed and subjected to economic and statistical analysis.

The sample covered 43.1 per cent of Village EDCs, 80 per cent of the User group EDCs, 83.3 per cent of the Professional EDCs and 55.5 per cent of SAPP EDCs.

6.2. General Characteristics of Sample EDC Members

Among the total respondents 63.3 per cent were male and 36.7 per cent were female. Regarding the social category of the respondents, 42 per cent belonged to general category, 33 per cent were scheduled tribe people and 25 per cent were scheduled caste people. It revealed the involvement of people belonging to all the social strata in the activities of EDC.

Age of the sample respondents of the EDCs varied between 23 and 65. Majority of the respondents (40 per cent) belonged to the age group of 40-50 years followed by the respondents of the age group of 30- 40 years (37 per cent). Only 6.7 per cent of the respondents were less than 30 years of age.

The education level of the respondents varied from zero years of schooling up to 12 years of formal education. Ten per cent of the respondents were illiterates, 11.7 per cent had primary education, 70 per cent had secondary education and 8.3 per cent had higher secondary education. Among the sample respondents none had any college level education.

The analysis of household monthly income of the respondents revealed that 50 per cent earned an income of Rs. 4000 to Rs. 8000 per month, followed by 35 per cent having an income of less than Rs. 4000 per month and 13 per cent having an income of Rs.8000 to 16000 per month. Only 1.6 per cent had an income more than Rs. 16000 per month.

The analysis of primary occupation of the respondents indicated that 38.3 per cent were directly dependent on PTR for their livelihood as ecotourism guides and watchers. The other occupations followed were agriculture (13.3 per cent), agricultural labour (18.3 per cent), NTFP collection (8.4 per cent) and home making (6.6 per cent). It would be seen that PTR serves as a major source of livelihood to the fringe area people through non consumptive activities.

The land holding pattern of the farmers revealed that 75 per cent of the respondents owned land. Among them, 55 per cent owned less than 50 cents, seven per cent owned 51 cents to one acre, 10 per

cent owned one to two acres and three per cent owned more than two acres of land. This indicated that even while majority of them owned land, they are marginal and small land holders. Only 58 per cent were growing crops in their field.

Among the sample respondents, 48.3 per cent of the respondents served (or serving) as office bearers of EDCs (Chairman or EC member). Of them, 76 per cent were male and 24 per cent were female. The office bearers in the sample comprised of 24.2 per cent chairmen, 51.2 per cent male EC members, 3.4 per cent chairperson and 20.7 per cent female EC member. Participation rate of various communities viz., 38 per cent scheduled caste, 17 per cent scheduled tribes and 41 per cent general category as office bearers indicated the involvement of all, particularly the weaker section.

The hypothetical willingness to pay of the EDC members elicited using open ended CVM ranged between Rs.50 and Rs. 6000, the modal value being Rs.500 accepted by 23 per cent of the respondents.

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6.3. Participatory Management Mechanisms in PTR for its Conservation and Maintenance

6.3.1. Structure and composition of EDCS

The Eco Development Committees (EDCs) constituted as part of the India Eco Development Project (IEDP) during 1996 to 2001 period initiated the participatory management framework in PTR and still serve as the platform for its conservation and maintenance. The total 79 operating EDCs comprise of five different types viz., village EDCs, Usergroup EDCs, Professional EDCs, SAPP EDCs and Staff EDCs. Around 80 families of an area, who are living in the fringes of the sanctuary, form one EDC. Each family in the EDC is represented by two members, of whom one will be a female. Voting rights are accorded to the families, on one family one vote norm. The executive committee meets once in a month and general body meeting is convened once in a year. Important decisions on activities of EDCs, sanctionaing of loans, fund utilization, etc., are taken in the executive committee and are sent for the approval of the Periyar Foundation, the administrative authority in charge of Eco Development in PTR. The decisions are arrived at on a mutual consensus of the members.

6.3.2. EDCs as Participatory Management Institutions

The story of PTR narrates the need for a credible intervention for the initiation of the process. Once established, the participatory institutions are a must to continue the process. A well established, decentralized institutional framework exists for the eco development committees. Entrusting the grass root level institutions at the local level with the protection and conservation of natural resources were effective in preventing the so called ‘Tragedy of Commons’ in the case of PTR ecosystem and wildlife.

The establishment of a harmonious relationship with the local communities was the core of IEDP in the participatory common resource management. The fringe area people were socially and economically empowered by the involvement in EDCs. The mutual benefit principle succeeded in reducing the negative forest dependency and gaining the local people's cooperation in protecting PTR. The incentives provided during the initiation of the project still keep them committed towards protecting PTR.

6.4. Impact of IEDP on Forest Resource Use

The changes in magnitude and extent of dependence on the PTR resources and the socio economic profile of the sample respondents before and after the implementation of India Eco Development Project (IEDP) and emergence of Eco Development Committees (EDCs) were analysed.

The number of sample households collecting firewood declined from 73.3 per cent of the total to 26.7 per cent. The number of thatching grass collectors has come down to 6.7 per cent from 18.3 per cent of the respondents. The complete termination of illegal sandal wood smuggling and cinnamon bark after the project is notable. Only 1.67 per cent of the respondents collect resin from the tree black dammar, which was a highly destructive practice. About 17 per cent of the respondents especially tribes were engaged in the collection of minor forest produce like ginger, turmeric, cardamom, pepper, etc., which had declined to three per cent.

The families venturing into the forest daily to collect forest produce had come down to 8.3 per cent from 41.67 per cent. Those who visited forest once in three days and once in a week (17 per cent each) before IEDP had come down to 1.67 per cent and 6.67 per cent, respectively. It could also be observed that the number of respondents who never visit PTR for extractive purpose has recorded a tremendous increase from 15 per cent to 73.3 per cent. The average numbers of days of visiting PTR for fetching their needs reduced to 33 per year compared to the previous 150.15 per year.These are all strong indications of corresponding reduction in the quantum of resources extracted from PTR.

The average quantities of forest produce extracted in a year by the sample households were assessed. The amount of firewood collected showed a 73.7 per cent reduction. One hundred per cent reduction was observed in the extraction of sandal and cinnamon bark (*vayana*).The reduction recorded in the extraction of black dammer, honey, ginger, turmeric and cardamom happened to be 97.4, 58, 72, 72.4 and 72.7 per cent, respectively.

After the implementation of IEDP, the number of forest dependent people among the sample respondents is only 26 per cent (compared to the previous 85 per cent), of which 8.3 per cent were for livelihood, 3.3 per cent for additional income, and 15 per cent for self use. The current dependency is subject to restricted access rights to the forest dwelling communities and user group EDCs which is termed a positive dependency without exploiting the reserve. All these indicated a reduction in the consumptive dependency of people on PTR resources.

The threat of poaching is completely eliminated from the PTR with the coordinated efforts of EDC members and forest department.

6.5. Socio Economic Impact of IEDP on EDC members

The socio economic impact of IEDP was assessed in terms of changes in occupational pattern, house hold income, asset position, empowerment of the people and social involvement in the pre and post IEDP period.

The analysis of the current occupational status of the sample respondents indicated that the consumptive occupational dependency of the people on PTR has given way to non consumptive dependency. About 38 per cent of the respondents currently depended on PTR for their primary occupation as ecotourism guides and watchers. Only 13 per cent is involved in firewood and thatching grass collection from PTR as their primary source of income, but subject to the regulations.

The average monthly household income of the sample respondents before and after IEDP compared at the terminal year (2010) constant prices indicated that the households were able to increase their monthly income by 39.5 per cent. It is Rs. 5674 per family during the current period compared to Rs.4066 in the previous period. The agricultural income that mainly came from sale of pepper and coffee increased by 45 per cent. It can be attributed to the redemption of agricultural land from the moneylenders and the coordinated marketing of pepper under EDC. The income from the sale of forest products recorded a significant reduction by 90 per cent. The income earned from wage labour also increased by 26.2 per cent as more people diverted their livelihood from forest product collection. The highest increase in income resulted from the IEDP occupation as ecotourism guides and watchers. It could be found that before the implementation of IEDP about 45 per cent of the household income was contributed by the forest products whereas its share is only 3.19 per cent in the post IEDP period. On the contrary, the major source of household income at present is the IEDP occupation (Ecotourism). Thus, the share of income from consumptive activities had come down to 3.1 per cent from 45.3 per cent in the pre IEDP period and the share of non consumptive use of PTR in the current income of the respondents is

49.3 per cent. It could be interpreted as a diversion from consumptive use of PTR to non consumptive use of forest.

The Lorenze Curve analysis of household income of the sample EDC respondents in the pre and post IEDP period indicated a significant reduction in income inequality after IEDP intervention. The Gini coefficient was estimated to be 0.41 in the pre IEDP period and 0.29 in the post IEDP period.

Asset position of the sample respondents were analysed as an indication of the economic well being and standard of living of the households. All the 11 assets considered are reported to have increased in the post IEDP period. The highest increase was observed in the case of use of LPG stove (1025 per cent) followed by telephone (366.7 per cent), mixer grinder (700 per cent), refrigerator and fan (350 per cent each), television (291.6 per cent), cot (59.3 per cent), chair (23.8 per cent), latrine (25 per cent), and dwelling house (12.2 per cent). The increase in asset position of the households would indicate the improved economic status of the respondents following IEDP interventions like agricultural produce marketing, freedom from the clutches of moneylenders and better livelihood options generated.

A major influence of the IEDP on the fringe area people was the social empowerment that resulted from participation in EDC activities. After involvement with IEDP, the rate of visiting PTR office and attending meetings and training recorded a very high increase (445 per cent). Number of respondents having bank account and saving habit increased by 485 per cent and 3200 per cent, respectively, a multifold increase than the earlier period. One of the major problems of the area before the emergence of IEDP, i.e., the borrowing from moneylenders at exorbitant interest rates decreased by 81 per cent. Their perception and attitude towards conservation of forest resources had improved significantly and the respondents directly involved in conservation activities recorded an increase by 780 per cent. The number of respondents concerned about family welfare and children's education increased from 43 per cent in the previous period to 100 per cent at present. There is a 157.8 per cent improvement in social welfare and the social recognition earned as reported by the respondents as a result of their shift to a legal livelihood. EDC activities brought many to the forefront of society. The IEDP beneficiaries are better placed in respect of leadership ability, feel of self confidence and empowerment compared to their previous situation by 525, 206 and 1050 per cent respectively. This situation is congenial to sustainable socio economic development of the PTR dependant people and sustainable management of PTR. The forest dependency of the people recorded a reduction by 68.6 per cent in the post IEDP period.

6.6. Views of the EDC Members on IEDP and PTR

The views of the Eco Development Committee members on IEDP and PTR were assessed.

The benefits received by the sample EDC members through IEDP included micro credit (65 per cent), Community benefits (66.6 per cent), alternate livelihood (48.3 per cent) and access rights (11.6 per cent).

Majority of the respondents (90 per cent) were aware that the benefits under IEDP were given to reduce their negative forest dependency on PTR. The remaining opined that they accepted the benefits as KFD gave it.

Fifty three per cent of respondents reported crop raid by the wildlife as a problem in living near PTR and the menace had increased in the recent years following IEDP.

The current governance mechanism of EDC was rated satisfactory by 92 per cent of the respondents and eight per cent had a difference of opinion.

6.7. Overall Perception of the Respondents towards IEDP

It could be observed that 65 per cent of the respondents had a very positive perception and 18.3 per cent had a positive perception towards IEDP. Five per cent remained neutral in their perception towards IEDP. Only 8.3 per cent expressed their negative perception towards IEDP. The OLS regression analysis of the factors affecting IEDP perception score indicated that the factors significantly influencing the positive perception were occupation dependency on PTR, their status as office bearers of EDCs and absence of or minimum conflicts within EDCs.

6.8. Willingness to Pay (WTP) of EDC Members for Protecting PTR for Future Generation (Bequest Value)

The EDC members were asked their hypothetical willingness to contribute an amount for the protection and conservation of PTR for the benefit of future generation. A majority of the respondents (83 per cent) were ready to contribute an amount every year. The factors significantly influencing their WTP were found to be the monthly income and IEDP perception score. The mean WTP of the EDC members for protecting and conserving PTR for future generation was estimated to be Rs.763.3 per year and the total bequest value was estimated to be Rs. 3.38 million per year. The bequest value accorded to PTR by the EDC members could be considered as an indication of their CPR enlightenment towards PTR.

6.9. Economic Valuation of PTR

6.9.1. General Characteristics of the Tourist Sample Respondents

The sample consisted of 54 per cent female and 46 per cent male. The age of the sample tourists who visited PTR varied from 19 years to 66 years. Thirty two per cent of the of the domestic tourists and eight per cent of the foreign tourists were of the age less than 30 years, 16 per cent of the foreign

respondents and 44 per cent of the domestic respondents belonged to the age group of 30 to 40 years and 16 per cent each of foreign and domestic tourists accounted for the age group of 40 to 50 years. Those respondents falling in the age group of 50-60 years were 36 per cent of foreign tourists and eight per cent of domestic tourists, whereas 24 per cent of the tourist respondents belonged to the age group of more than 60 years, all of them foreigners.

Educational status of the tourists was quite impressive. Majority of them (94 per cent) had college level education. It consisted of 34 per cent graduates, 44 per cent post graduates and 16 per cent qualified professionally. Among the graduates, 40 per cent were domestic tourists and 28 per cent were foreigners. Post graduate group of tourists consisted of 56 per cent of foreigners and 34 per cent of domestic tourists. The professional group had 16 per cent each of foreign and domestic tourists. Six per cent were educated up to higher secondary level, all of them domestic tourists. None of the respondents were illiterate.

The respondents were from various income strata of the society. People with very high income level i.e., more than Rs.1 Lakh per month formed the majority with 32 per cent, all of them being foreign tourists. 48 per cent of domestic tourists and 4 per cent of foreign tourists belonged to the income group of Rs. 15001 to Rs. 50000 who constituted 26 per cent. Twenty eight per cent of the foreign tourists were in the income group of Rs.50001 to Rs.1 lakh. People with an income of Rs. 5001 to Rs. 15000 per month constituted 14 per cent comprising of 24 per cent of domestic tourists and 4 per cent of foreign tourists. The lowest income group i.e., less than Rs. 5000 per month who accounted 14 per cent of the respondents consisted of 28 per cent of the domestic tourists.

People engaged in different types of occupation visited PTR. Majority of the visitors were private employees (44 per cent) followed by government employees, retired persons and businessmen each constituting 12 per cent. Students accounted for 10 per cent while unemployed persons constituted eight per cent. Only two per cent of the sample visitors were agriculturists.

Among the sample respondents, 34 per cent were members of environmental oraganisations like Green Peace and others. Majority of the respondents were frequent travelers to tourist spots. Forty two per cent of them visited tourist spots once in a year, 12 per cent of them made visits twice a year and six per cent traveled very frequently to picnic spots in a year. People who visited aesthetic sites once in two years were 14 per cent and once in four years were two per cent.

The respondents had different reasons behind their visit to PTR. Majority of them (70 per cent) chose to travel to PTR to watch the wildlife while 36 per cent were fascinated by the aesthetic beauty of the site. Six per cent of them decided to travel on friend’s suggestion who visited PTR previously. Besides, two per cent visited to experience Kerala culture.

Most of the respondents (80 per cent) happened to be first time visitors to PTR, whereas 16 per cent of them visiting for the second time and four per cent were on their third visit.

Regarding the recreational activities at PTR, 98 per cent of the respondents chose boating in Periyar Lake, of which 42 per cent opted only for boating and 56 per cent enjoyed both boating and other ecotourism programmes. Fifty eight per cent of the sample respondents participated in ecotourism programmes like Bamboo rafting (4 per cent), Border hiking (14 per cent), Bullock cart ride (6 per cent), Clouds walk (18 per cent), and Nature walk (18 per cent).

The tourists' WTP for Periyar Tiger Reserve was elicited using bidding game technique. Eighty per cent of the respondents were willing to pay a higher amount than the existing entrance fee (Rs.25 for domestic and Rs.300 for foreigners) towards conservation of PTR. The bid amount ranged between Rs. 50 and Rs. 7000. The mean WTP for domestic tourists and foreign tourists were Rs.124 and Rs. 976, respectively

6.9.2. Total Economic Value of PTR

The total economic value of PTR comprising recreation use value and preservation value was estimated by eliciting WTP of the tourists visiting PTR. The factors that significantly influenced their WTP were education level and number of wildlife species sited. The truncated mean WTP of the tourists estimated using LOGIT model was Rs. 1330 per person. The aggregate value of PTR is found to be Rs.534.52 million per year.

The free rider problem refers to a situation where some individuals in a population either consume more than their fair share of a common resource, or pay less than their fair share of the cost of a common resource. The results revealed that the free rider problem associated with PTR in the pre IEDP period, the over exploitation of natural resources resulted from their persistent dependence on it for their livelihood was effectively controlled following a participatory management approach. Thus the hypothesis that participatory management mechanisms are not effective means to prevent free rider problems is disproved.

Also the alternate income generating activities diverted the forest dwelling people's dependence on PTR for their livelihood and the results showed that 49.25 per cent of the average monthly household income is contributed by the alternate income generating activities based on the non consumptive use of PTR like ecotourism. Subsequently, the results showed a corresponding reduction in the consumptive use of PTR resources by the local people. So, the second hypothesis is also rejected based on the results.

The analysis of willingness to pay of both EDC members and tourists revealed that they acknowledge various ecological functions of the PTR and are willing to contribute towards its conservation. The total economic value estimated from their WTP, 534.52 million which clearly disproved the hypothesis that people are not willing to pay for the conservation of natural resources.

Thus, all the hypotheses proposed in the present study have been rejected based on the results obtained from the analysis.

6.10. Conclusions

The conclusions of the study are summarized below:

- The members of EDCs functioning in PTR and the tourists visiting PTR formed the sample space for the present study.

6.10.1. EDC member respondents

- The sample of EDC members covered 43.1 per cent of Village EDCs, 80 per cent of the User group EDCs, 83.3 per cent of the Professional EDCs and 55.5 per cent of SAPP EDCs.
- The sample of EDC members consisted of 63.3 per cent male and 36.7 per cent female respondents.
- Forty two per cent of the sample belonged to general category, 33 per cent were scheduled tribes and 25 per cent were scheduled caste people.
- Majority of the respondents (40 per cent) were in the age group of 40 to 50 years and 70 per cent of the respondents had secondary level education.
- Fifty per cent of the respondents earned a monthly income of Rs. 4000 to Rs.8000.
- 51.6 per cent of the respondents were dependant on PTR for their livelihood through Ecotourism (38.3) and NTFP collection (13.3).
- Seventy five per cent of the respondents owned land and the major crops cultivated were pepper and coffee.
- Among the sample respondents, 48.3 per cent of the respondents served (or serving) as office bearers of EDCs (Chairman or EC member). Among these 76 per cent were male and 24 per cent female.

- The hypothetical willingness to pay of the EDC members ranged between Rs.50 and Rs. 6000, the modal value being Rs.500 accepted by 23 per cent of the respondents.

6.10.2. Participatory management mechanism in PTR

- The IEDP at Periyar Tiger Reserve could lay a foundation for the participatory management of the forest resources of PTR. The Eco Development Committees and the Community based Ecotourism (CBET) initiatives are contributing to the conservation and maintenance of PTR.
- The establishment of a harmonious relationship with the local communities was the core of IEDP in the participatory common resource management. The fringe area people were socially and economically empowered through their involvement in EDCs. The mutual benefit principle succeeded in reducing the negative forest dependency and gaining the local people's cooperation in protecting PTR. The incentives provided during the initiation of the project still keep them committed towards protecting PTR.
- IEDP has paved way to cooperative collective action for the management of PTR from the command and control management mechanism of Forest Department.

6.10.3. Impact of IEDP

- There is considerable reduction in the consumptive extraction of forest resources like sandal wood, timber, firewood, black dammer, cinnamon bark, other NTFPs and hunting of wild animals. Sandal wood smuggling and poaching was completely terminated. The biomass and wildlife of PTR were highly conserved following IEDP.
- The families venturing into the forest daily to collect forest produce had come down to 8.3 per cent from 41.67 per cent.
- The average numbers of days of visiting PTR for fetching their needs reduced to 33 per year compared to the previous 150.15 per year.
- The number of sample households collecting firewood declined from 73.3 per cent of the total to 26.7 per cent. The number of thatching grass collectors has come down to 6.7 per cent from 18.3 per cent of the respondents.
- Illegal sandal wood smuggling and cinnamon bark collection was completely terminated in the post IEDP period. Only 1.67 per cent of the respondents collect resin from the tree black dammar, which was a highly destructive practice.
- There was 73.7 per cent reduction in the amount of firewood collected by the sample respondents. One hundred per cent reduction was observed in the extraction of sandal and cinnmon bark

(vayana).The reduction recorded in the extraction of black dammer, honey, ginger, turmeric and cardamom happened to be 97.4, 58, 72, 72.4 and 72.7 per cent, respectively.

- After the implementation of IEDP, the number of forest dependent people among the sample respondents is only 26 per cent, compared to the previous 85 per cent.
- None of the sample respondents were engaged in poaching wildlife at present, whereas 14 per cent of them were poachers in the pre IEDP period.
- The forest dependant people were given an alternate livelihood option through ecotourism and the mortgaged agricultural lands were brought back to their possession under IEDP assistance.
- The average monthly household income of the sample respondents increased by 39.5 per cent.
- The share of income from consumptive activities within forest had come down to 3.2 per cent from 45.3 per cent in the pre IEDP period and the share of income from non consumptive use of PTR in the current income of the respondents is 49.3 per cent.
- Lorenze Curve analysis of income distribution indicated a significant reduction in income inequality in the post IEDP period. Gini coefficient estimated in the pre and post IEDP period was 0.41 and 0.29, respectively.
- The changes in asset position of the sample respondents were considered as an indication of the economic well being and standard of living of the households. All the 11 assets considered are reported to have increased in the post IEDP period. The highest increase was observed in the case of use of LPG stove (1025 per cent).
- A major influence of the IEDP on the fringe area people was the social empowerment that resulted from participation in EDC activities.
- Number of respondents having bank account and saving habit increased by 485 per cent and 3200 per cent, respectively.
- One of the major reasons for the local people's persistent poverty and forest dependence was the borrowing from moneylenders at exorbitant interest rates which decreased by 81 per cent due to IEDP intervention.
- The number of respondents concerned about family welfare and children's education increased from 43 per cent in the previous period to 100 per cent at present.
- There is a 157.8 per cent improvement in social welfare and the social recognition earned as reported by the respondents as a result of their shift to a legal livelihood activities.

- The IEDP beneficiaries are better placed in respect of leadership ability, feel of self confidence and empowerment compared to their previous situation and the increase was by 525, 206 and 1050 per cent, respectively.
- The benefits received by the sample EDC members through IEDP included micro credit (65 per cent), Community benefits (66.6 per cent), alternate livelihood (48.3 per cent) and access rights (11.6 per cent).
- Majority of the respondents (90 per cent) were aware that the benefits under IEDP were given to reduce their negative forest dependency on PTR.
- Fifty three per cent of respondents reported crop raid by the wildlife as a problem in living near PTR and the menace had increased in the recent years following IEDP.
- Sixty five per cent of the respondents had a very positive perception and 18.3 per cent had a positive perception towards IEDP. Five per cent remained neutral in their perception towards IEDP. Only 8.3 per cent expressed their negative perception towards IEDP.
- The factors significantly influencing the positive perception were occupation dependency on PTR, their status as office bearers of EDCs and absence of or minimum conflicts within EDCs.
- The mean WTP of the EDC members for protecting and conserving PTR for future generation was estimated to be Rs.763.3 per year and the total bequest value was estimated to be Rs. 3.38 million per year.

6.10.4. Tourist sample respondents

- The tourist sample consisted of 50 per cent foreign and 50 per cent domestic tourists.
- Fifty four per cent of the tourist respondents were male and 46 per cent were female.
- The domestic tourists mostly belonged to the age group of 30-40 years (44 per cent) and foreign tourists were mostly in the age group of 50-60 years (36 per cent).
- A great majority of the tourist respondents were graduates (94 per cent).
- Sixty four per cent of the foreign tourists had a monthly income greater than Rs.1 La and 48 per cent of the domestic tourists were in the income group of Rs.15001 to Rs.50000.
- Eighty two per cent of them were employed, eight per cent were unemployed and 10 per cent were students.
- Thirty four per cent of the tourist respondents were members in environmental organisations.

- Frequent travelers to tourist spots formed the majority of respondents (60 per cent).
- Most of the respondents (70 per cent) visited PTR to watch wildlife.
- Almost all of the respondents (98 per cent) opted for boating in the periyar Lake and 56 per cent enjoyed both boating and other ecotourism programmes.
- Eighty per cent of the respondents were willing to pay a higher amount than the existing entrance fee towards conservation of PTR and the mean WTP for domestic tourists and foreign tourists were Rs.124 and Rs. 976, respectively.

6.10.5. Economic Valuation of PTR

- The total economic value of PTR comprising recreation use value and preservation value estimated using LOGIT model was found to be Rs.534.52 million per year. It fairly justified the cost sponsored by World Bank towards IEDP in PTR for conserving it.
- The forest function ranking by the tourists revealed that the tourists want the forest to be protected for its non consumptive benefits.

6.11. Policy Implications

- The participatory management mechanism in PTR through the grass root level EDCs and coordination by the Periyar Foundation (a Quasi Government body) was found to be a success in managing forest commons and ensuring local people a better livelihood. It also narrates the role of authorities to organize people for collective action for the management of CPR in case of absence of a self enlightenment. The community participation in conservation of PTR reduced the burden of Forest Department and the man power requirement for protecting PTR. While trying to conserve CPR, the dependant people's interests had been taken care of through setting of debts initially and by setting up ecotourism activities subsequently, for its sustainability. This can be replicated to other protected areas where similar situation exists.
- The community-based ecotourism (CBET) programmes created some local employment and generated revenues that enhanced local incomes of the people and helped to support conservation activities and extent the EDC activities beyond the project period. The ecotourism activities however should be selected carefully and allowed based on the carrying capacity of the natural areas without altering it. The ecotourism programmes should be sustainable in the long run and care must be taken to avoid any negative impacts on the ecosystem.

- The estimation of WTP of tourists indicated that they are willing to pay higher amount as the entrance fee compared to the present rates. The willingness of the tourists can effectively be harnessed to mobilize money for conservation and maintenance of PTR ecosystem and create social infrastructure in the fringes of the PTR to help the dependent people without affecting the ecosystem.
- People living in the fringe area of PTR reported the increasing number of incidences of wildlife attack on crop fields. Effective protection measures need to be taken to prevent the menace. Also, the increasing incidences of wildlife straying into human habitation need a detailed study.
- The analysis of socioeconomic impact of IEDP on the forest dependant people indicated an empowerment and a positive conservation attitude resulted from their participation in the project. The results obtained were however based on the qualitative analysis and in depth study using methods like experimental economics will help to quantify the impact and there is scope for future research on this

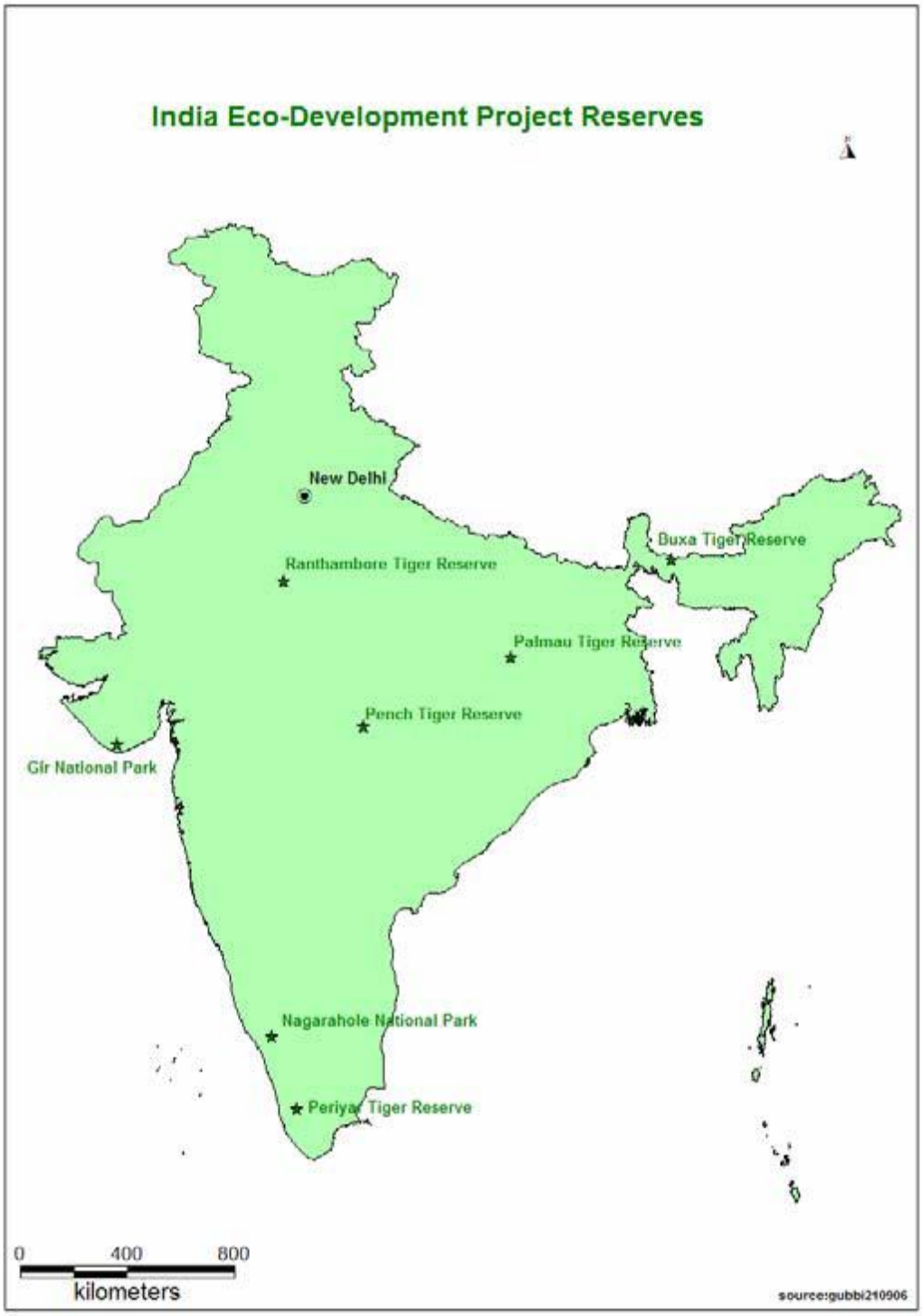

Figure 1.1: The seven India Eco-Development Project sites

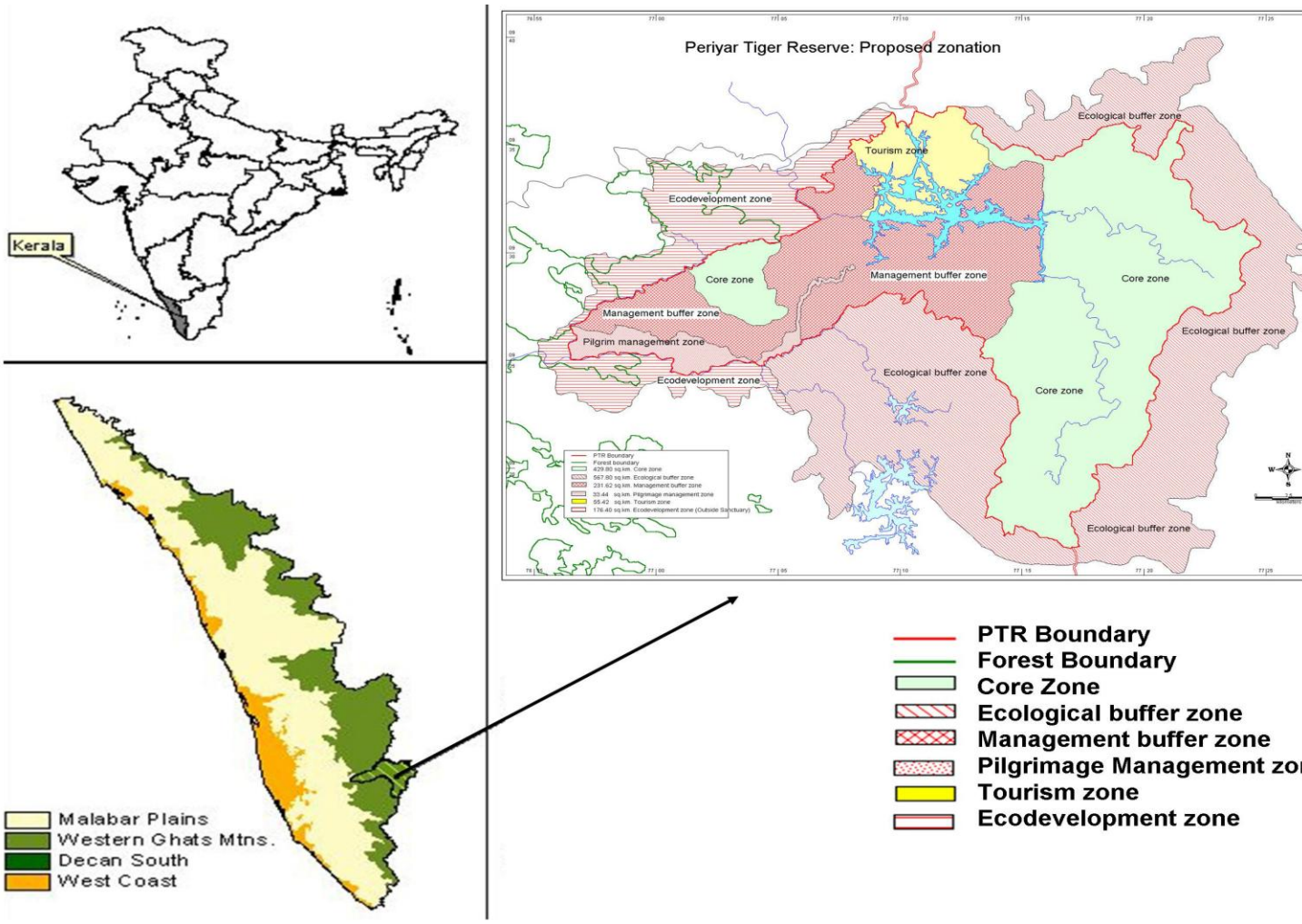

Figure 4.1: Periyar Tiger Reserve and its Location within India

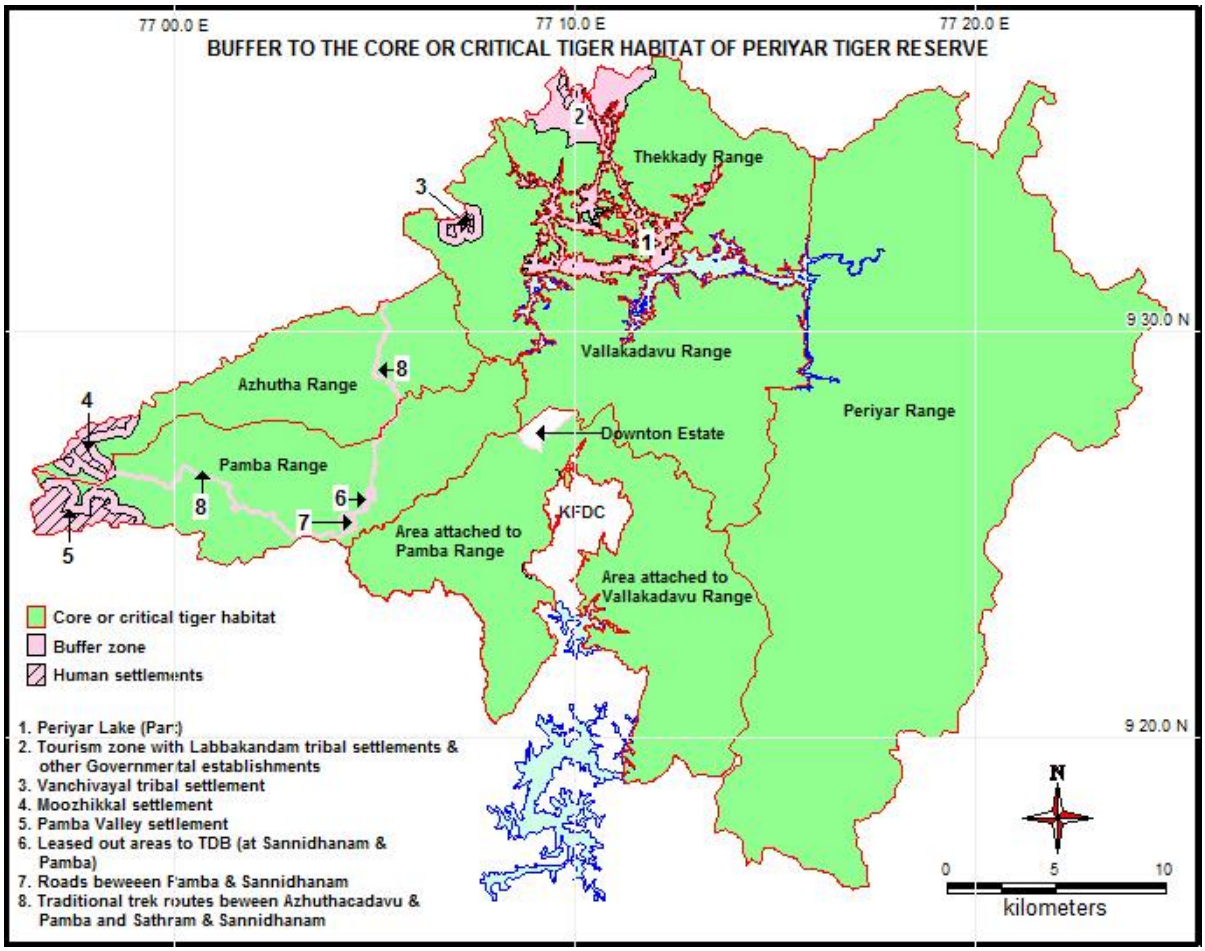

Figure 4.2 Zonation of Periyar Tiger Reserve

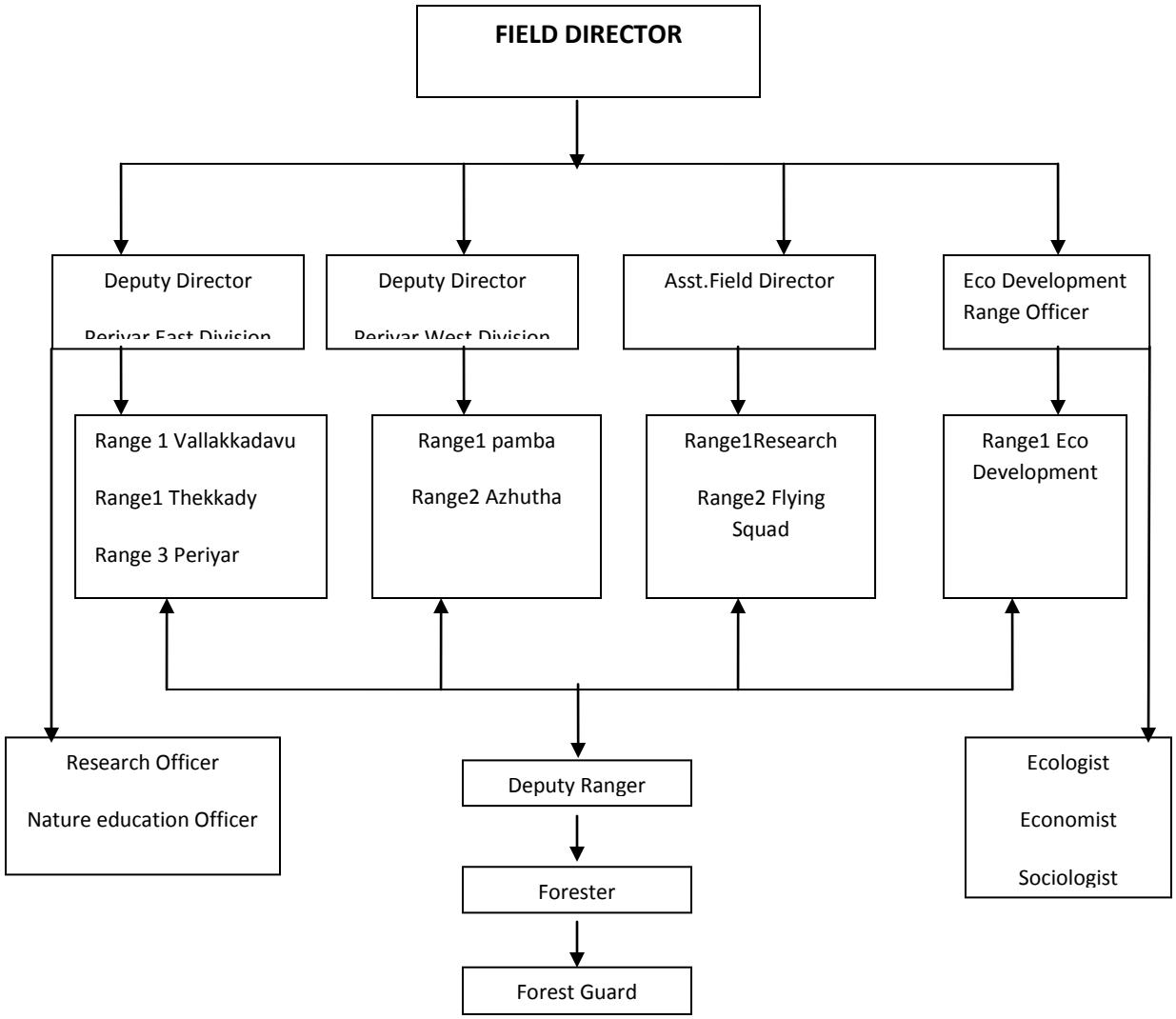

Fig. 4.3. Administrative Structure of Periyar Foundation

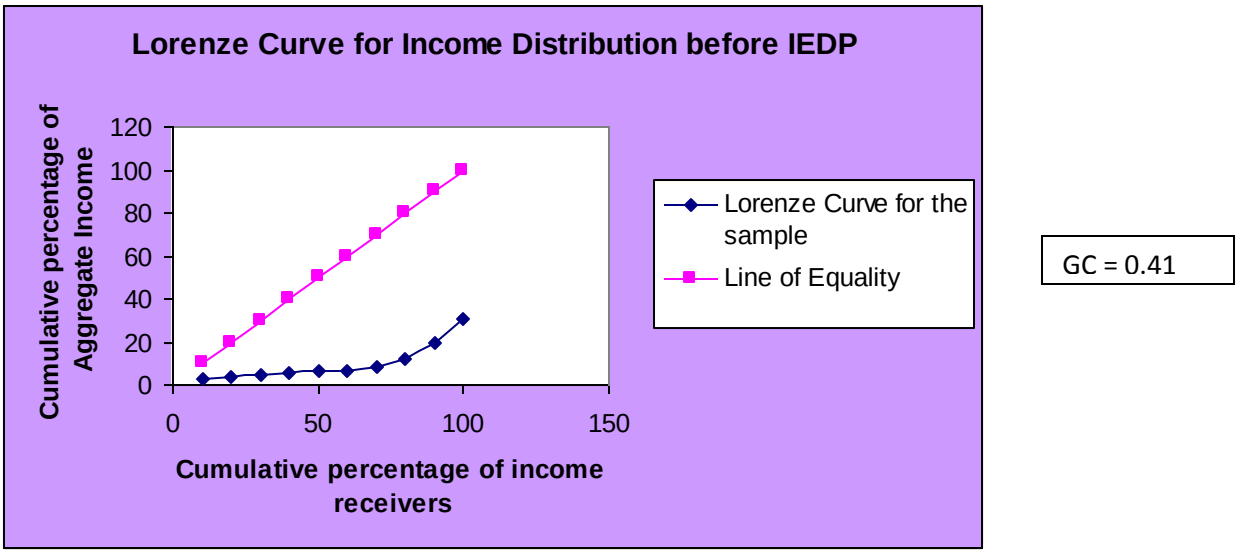

Fig. 5.1 Lorenze Curve for Income Distribution before IEDP

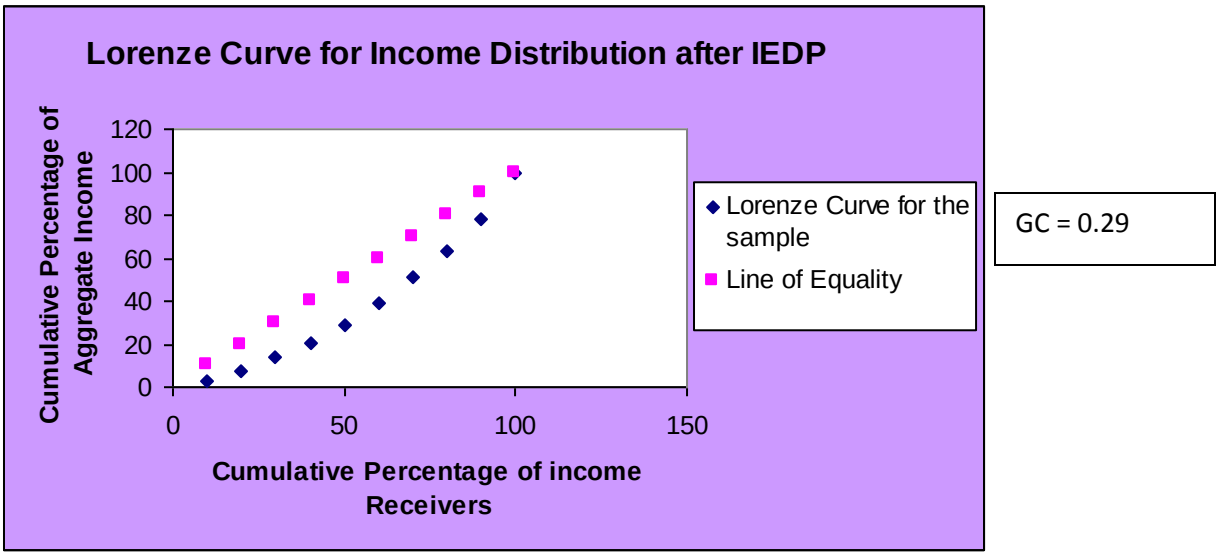

Fig. 5.2 Lorenze Curve for Income Distribution after IEDP

Plate.1 Periyar Lake

Jungle Patrol

Nature Walk

Bamboo Rafting

Bamboo Grove

Bullock Cart Discoveries

Jungle Inn

Plate.2 Various Ecotourism Programmes in Periyar Tiger Reserve

ABBREVIATIONS AND ACRONYMS

CBCM	:	Community Based Co- Management
CBET	:	Community Based Eco Tourism
CDF	:	Community Development Fund
CPR	:	Common Property Resources
CBST	:	Community Based Sustainable Tourism
CEP	:	Continuing Education Programme
CVM	:	Contingent Valuation Method
EC	:	Executive Committee
EDC	:	Eco -Development Committee
GC	:	Gini Coefficient
IEDP	:	India Eco - Development Project
IFRI	:	International Forestry Resources and Institutions
KFD	:	Kerala Forest Department
KFRI	:	Kerala Forest Research Institute
NGI	:	Non Government Individuals
NTA, Lao PDR	:	National Tourism Authority, Lao Peoples Democratic Republic
NTFP	:	Non Timber Forest Produce
PF	:	Periyar Foundation
PA	:	Protected Area

PFM	:	Participatory Forest Management
PTR	:	Periyar Tiger Reserve
REST	:	Responsible Ecological Social Tours Project (Thailand)
RM	:	Malaysian Ringgit (MYR)
Rs	:	Rupees
SAPP EDC	:	Sabarimala Ayyappa Poonkavana Punarudharana EDC
sq.km.	:	Square Kilometre
TEV	:	Total Economic Value
TIES	:	The International Ecotourism Society
USD	:	US Dollar
WTP	:	Willingness to Pay

APPENDIX VI

Activities and Achievements of Various EDCs

1. Village EDCs

These are village level EDCs comprising of all the families that falls in a particular geographical or administrative area of the PTR. The Micro plans for these committees mainly aimed at the economic upliftment of the families and provided financial, technical and marketing support to improve their resources- mainly agriculture. Most of the beneficiaries of the village EDCs belong to weaker sections of the society including tribals.

The main objectives of the activities were to ensure people's involvement in protecting the identified forest areas within the PA, bring down the extractive dependency on forest and reduction of dependency for fuel wood, black dammar, cinnamon bark etc. The idea has been to realise these goals by improving the financial / economic status of the people. Hence the improvement of agriculture, reduction of indebtedness, opening up of alternative avenues of income generation and improvement of health status etc. came within the purview of village eco development initiatives. The benefits from being part of IEDP included household benefits like LPG, micro credit , community benefits like drinking water projects, community hall, crop protection measures, access rights to forest produce and alternative livelihood options.

To reduce the persistent indebtedness of the people, they were provided with interest free loans to repay their debts as part of the project. The amount was recollected from the beneficiaries in due course of time and constituted the Community Development Fund (CDF) for the sustenance of the activities of the EDCs beyond the project period. Now, the activity of the village EDCs have confined to CDF revolving. People pursue this as a source of credit in the hour of need.

The centralized marketing system of pepper was an innovative step towards enhancing the economic well being of the villagers. Under the scheme, green pepper is procured and marketed through forward auction in centralized manner. An ad hoc marketing committee will be formed and the committee, in consultation with EDCs, facilitates the centralized marketing of green pepper. Just before every harvest season (normally October to February), the committee invites public tenders from pepper traders to participate in the auction. The upset-price (floor price) is determined by negotiation between the traders and the committee members, in the presence of forest officials. Those traders who conform to the upset-price, has to remit the stipulated EMD (earnest money deposit) as set by the committees and the amount will be repaid only after the harvest season.

Every day, except Sunday, at 10 am, the auction is taken place at the EDC office for setting the price of the pepper that is going to be sold in the very next day. Then the price is published in the notice board of the EDC to inform the prospective pepper sellers in the settlement. This mechanism provides latitude and privilege to the farmers that they can abstain from harvesting and selling the pepper, if the price fixed for a particular day does not conform to their expectation. The sellers will get a premium over the market price under this mechanism. Since the pepper from the settlement is unique and much demanding in the market, the buyers compete among themselves. The committee collects the sale proceeds from the buyers and remits the amount in the bank accounts of the respective EDCs depending on their supply. The farmers will collect only the advance amounts to meet ways and means expenditures and the accounts are normally settled after the harvest season. And it is also ensured that the pepper is not sold in other channels by engaging the 'pepper squads'. The pepper squad is a voluntary vigilant group of men and women, who watch and forestall illegal transport of pepper from the settlement. They do it on turn basis and they can also seek the help of forest personnel in this regard.

The social and economic impact of the scheme was beyond imagination. When the scheme was introduced during 1998-99, the total debt obligation of the people in the settlement to the money lenders was approximate USD. 17,000. But the sale proceeds of that year were more than USD. 200,000. It implies that the money lenders would have collected pepper by advancing a comparatively meager amount to the hapless people. During the year, there was more than 12 fold rise in their pepper income. From the year 2003 onwards, in addition to the auction sale, they could network with an organic pepper exporter and sold their produce still at higher premium price. To be eligible for this, a German firm conducted soil tests for three consecutive years preceding to 2003-04 pertain to organic certification. All farm lands in the settlement have now got organic certification. This offered them a 25 per cent price premium over the auction.

Majority of the fringe area people have a positive perception towards the emergence of EDCs. They personally feel that they would have ended up as forest dwellers if IEDP was not in place. The eco development committees played a key role in the creation of a social capital in the area. The eco development initiatives resulted in providing a new status and social ranking to the poor and marginalized as the office bearers and leaders of EDCs. Also it has resulted in Common Property Resource (CPR) enlightenment and conservation awareness. The people admit that they were never concerned about the conservation of PTR before the formation of EDCs, the sole aim being their subsistence and the source was PTR. As the social and economic framework improved, the mindset of people has changed to conservationists. It formed a vigilant group of protectors in and around PTR, which resulted in reducing

the watch and ward burden of the forest department. Members of various village EDCs participate in forest patrolling and fire protection activities.

The EDC activities have lead to the empowerment of local people which forms the basis of the sustainability of the eco development activities initiated during the project period. The moneylenders who were evicted from the area were hopeful of coming back once the project is withdrawn. But their expectations went in vain as the EDCs resulted in building up of a strong social capital.

The voluntary involvement of people especially women in conservation and protection activities without receipt of any incentives illustrates the sustainability and everlasting legacy of the Eco development committees. Their willingness to participate in protection of PTR is attributed to the mutual benefit principle. They feel that it is their responsibility to help the PTR management who once rendered a helping hand in their predicament. The vanitha squad called "Vasanthasena" engaged in sandal patrolling is a voluntary initiative, the financial implication of which is a great relief to the forest department.

About eight percent of the sample respondents expressed their negative perception towards the activities of EDCs owing to various reasons. The reasons are found to be their unwillingness to repay the loans received, internal conflicts among EDC members, conflicts with officials and non involvement in EDC activities. Persons who are actively involved in the activities of EDCs expressed a very positive attitude towards IEDP.

2. Professional EDCs

Professional EDCs are a group of members who were previously involved in illegal activities such as collection of cinnamon bark *(Cinnamomum malabatrum)*, timber smuggling and poaching and youth of forest dwelling communities. The member-ship is fixed based on the level of interaction and knowledge about the PA in the past. The professional EDCs include Ex vayana bark collectors EDC who were once dependant on collection of cinnamon bark, Vidiyal EDC, the group of ex poachers and smugglers, Thelli EDC who collected black dammar, Tribal Trackers EDC and Tribal Heritage EDC, the group of tribal youth and PETS EDC.

The professional EDCs are involved in ecotourism and protection activities of PTR. The ecotourism programmes are focused towards protection, rehabilitation and revenue generation. These programmes offered a livelihood to the persons who were ready to forego their illegal past in the forest. Their familiarity with the forest adds to the conservation efforts which mainly focus on the protection from poaching, illicit felling, and entry illegal guides with tourist groups to the forest and tribal settlements.

The presence of people in the forest (day and night) keeps the intruders away from it. The revenue generated from tourism activities is pooled to the park welfare fund to meet the salary expense of ecotourism guides and watchers. They also participate in any conservation efforts of Forest Department like extinguishing the wild fire, Protection oriented patrolling (day in and day out), plastic eradication campaign, Traffic regulation in the park, Wildlife Week Celebration and so on.

The ecological benefits achieved through the CBET Programmes include Strengthened protection (against sandalwood smuggling, animal poaching, illegal tree felling, forest fire), increased man-power for protection , reduced burden of wage to the protection watchers , reduced pressure on forest , improved detection of illegal activities, improved conservation awareness among visitors, more documentation of wildlife sightings and improved cleanliness of the Reserve.

The government support only with 12 days wages of the PETS EDC comprising of 83 members. The other five professional group EDCs *viz.*, Tribal Trekkers, Tribal Heritage, Vidiyal, Ex-vayana bark collectors and Clouds' Walk EDC members generate their own wages from the ecotourism programmes. Moreover, around 250 families of fringe area communities including tribals are being supported by the ecotourism programmes. A total of 109314 man hours (Table 1) were generated in 2009 as contribution towards protection and conservation from CBET programmes

Table 1: Additional man hours generated through CBET programmes

Programme	**Additional Patrolling (man-hours/year)**			
	Guest	**Guides**	**Staff**	**Total**
Tiger Trail	9960	22200	4440	36600
Bamboo Rafting	22563	12645	2529	37737
Jungle Patrol	7557	1662	831	10050
Border Hiking	7965	5544	1386	14895
Nature Walk	7746	1014	0	8760
Jungle Inn	636	636	0	1272
Total	**56427**	**43701**	**9186**	**109314**

Source: Periyar Foundation

The social transformation resulted from the activities of professional EDCs are worth mentioning. The sharp shooters turned protectors of wildlife is a noteworthy achievement of IEDP. The social acceptance and recognition gained is more valued by them than the bumper economic gains foregone from illegal activities. It has resulted in reducing the negative forest dependency of the tribal youth and developed their self esteem. Also, many interstate smugglers and poachers were trapped with the help of these professionals. The coordinated efforts of forest department EDCs members could terminate the poaching and smuggling in the PTR which has improved the flora and fauna of the reserve.

3. User group EDCs

Groups of individuals who depended on a particular resource of the park, e.g. graziers, firewood and thatching grass collectors, black dammar collectors, fishermen, etc, were taken as EDC members aiming at reducing the negative forest dependency of the fringe area people.

There are a total of 98 families in the Firewood and Thatching grass Eco development Committee, in which 29 families collect only firewood and 19 families collect only thatching grass. Rest of them collects both. These people utilize approximately 12 sq. km forest area for collecting both the items at the time of the formation of the EDC. Their area of collection is mainly moist deciduous and semi evergreen forests interspersed with *vayals,* a habitat crucial for herbivores. It was estimated from the PRA (Participatory Rural Appraisal) that a total of 30,000 bundles (50 kg/bundle) of firewood and 15,000 bundles (40 kg/bundle) of thatching grass were collected annually by these 98 families from the area. Of the 30,000 bundles of firewood, 25000 bundles are collected solely for selling purpose and the rest for own use at the time of the inception of the EDC. The ever increasing demand for firewood and thatching grass led to severe threat to the bio-resources of the park.

The EDC was formed to reduce their negative dependency on the resources. They were given access rights when the EDCs are formed with certain rules and regulations to be followed in the mode of collection and quantum of collection. It aimed to promote the collection of thatching grass instead of firewood collection and to introduce other income generating activities to discourage collection of firewood for selling purpose. But unfortunately, alternate livelihood options failed due to technical reasons. The selling of firewood and thatching grass was made through a centralized place under the control of EDC and eliminated middle men to realize more income for the items.

The mode of collection earlier was cutting the entire tree and leaving it for few days for drying and subsequently collect firewood from them. Now this practice has changed. The EDC members have adopted responsible biomass extraction subject to stipulated rules and regulations and reduced the

negative pressure. Massive regeneration of tree species is an evidence of reduction of pressure in this area.

Reports from PTR indicates a 75.8 per cent and 68.9 per cent reduction in firewood exraction over a period of ten years for sale and own use, respectively (Table 2). Similarly the figures in the following table indicates the success of EDC involvement in reducing the negative dependancy of forest dependant people. There is increase in the collection of thatching grass as people diverted from collection of fuelwood to thatching grass. This was also encourgaed since it helps in preventing forest fire in summer.

Table 2. Changes in Resource Extraction from PTR

Sl.No.	Type of resource	Quantity collected		Reduction / increase in Collection	Per cent of Reduction / increase
		1997	2007		
1	Firewood (Own use)	8601768	2672520	5929248	68.9
	Firewood (Sale)	2648480	641990	2006490	75.8
2	Fish (Own use)	53020	15300	37720	71.1
	Fish (Sale)	135220	78400	56820	42.0
3	Black Dammar	57068	3047	54021	94.6
4	Thatching Grass	345892	633472	287580	83.1 (+)
5	Fodder Grass	415398	51757	363641	87.5
6	Pole	76164	3395	72769	95.5
7	Bamboo	247353	21352	226001	91.3
8	Honey	10295	410	9885	96.0

Source: Periyar Foundation

4. Sabarimala Ayyappa Poonkavana Punarudharana (SAPP) EDCs

SAPP (Swamy Ayyappa Poonkavana Punarudharana) EDCs, are pilgrim management EDCs active during Sabarimala Pilgrimage Season. They operate along the traditional pilgrimage routes to Sabarimala Shrine and provide basic amenities to pilgrims in an eco-friendly way. Nine such EDCs are functional along the pilgrimage route at different *thavalams* providing service to the devotees and ensuring the protection of resources in the forest.

Before the formation of EDCs, the business along the traditional route was allotted on contract basis by the Devaswam Board which was run by people from different parts. The large number of shops exerted tremendous negative pressure on the resources of forest as they extracted the raw materials for construction from the forest. But, the situation has changed since the EDCs took charge of Eco Friendly service centers to the pilgrims. The comparative statement of number of shops during the year 1998-99

and number of members and shops during 2008-09 in the nine thavalams are given in the table 3 below. As per the reports of Periyar Foundation, number of shops has also been reduced by 38 per cent thereby reducing the dependencies also.

Table 3. Number of Shops in the pilgrim route before and after IEDP

Sl. No	Name of Thavalam	No. of shops during 1998-99	No. of shops during 2008-09
1	Azhuthakadavu	64	16
2	Kallidamkunnu		60
3	Vallithodu	40	32
4	Vellaramchetta	30	30
5	Puthussery	59	51
6	Karimala	107	21
7	Valianavattam	37	20
8	Cherianavattam	14	6
9	Uppupara	44	10
Total		**395**	**246**

Source: Periyar Foundation

The perusal of the reports of Periyar Foundation indicates the following facts regarding the achievements of SAPP EDCs in conserving the forest resources. The materials such as bamboo (collected from outside forests), eucalyptus (from forest plantations), iron rods, plastic sheets, coconut leaves and ropes are commonly used for construction after formation of EDCs. It is calculated that a minimum of about 14730 poles and 29460 rafters were saved during this year through the formation of EDCs.

Fire was found to be regular phenomenon in the grasslands of Uppupara region during mandala-makaravilakku season. However, the fire was effectively prevented during 2007-08 by taking appropriate control measures like fire lines and pre-controlled burning in and around the grasslands along the traditional routes. The EDCs have been taking care in checking forest fires in the areas adjoining the *thavalams* and there have been no fires during this season in the forest areas along the traditional routes. With the total prevention of cutting/lopping of trees for constructing the sheds and reduction in collection of firewood, reduction in fire incidents and improvement in the management of the areas along the traditional routes, the health of the ecosystem is improving and there is better regeneration of natural

seedling. In order to control the cutting of poles and canes for using as walking sticks by the pilgrims, tapioca poles were supplied by the EDC people in Azhuthakadavu Thavalam.

It was observed that all the shops used dried and wind fallen firewood collected from the forests in addition to the LPG and rubber wood. Thus a total of 140 tones of firewood from the forest has been saved and thereby prevented the biomass removal and reduced the damage on vegetation (Periyar Foundation, 2009).

APPENDIX II

Details of Different Eco Development Committees (EDCs) in PTR

Sl.No.	Name	Type	Year of formation	No.of families	Community Status
Periyar East Division					
1	PETS EDC	professional	2000	74	General
2	Tribal Trackers EDC	professional	2000	20	ST
3	Tribal Heritage EDC	professional	2003	21	ST
4	Ex.V.B.EDC	professional	1998	13	SC and Others
5	Vidiyal EDC	professional	2004	22	General
6	Graiziers EDC	User group	1998	100	General
7	Thelli EDC	User group	2010		ST and others
8	FW&TG EDC	User group	1998	77	SC and others
9	Vanitha EDC	User group	1999	19	General
10	Vasanthasena	User group	2008	77	General
11	Thekkady EDC	village	1999	64	General
12	Periyar colony	Village	1998	29	SC and Others
13	Gandhinagar Colony	Village		28	SC and others
14	staff EDC	Village	2000	80	General
15	Kurisumala -1	Village	2000	93	General
16	Kurisumala -2	Village	2000	58	General
17	Spring valley	Village	2000	88	General
18	Mullayar	Village	2000	109	General

19	Chottupara	Village	2000	143	General
20	Kollampattada -I	Village	2008	82	General
21	Kollampattada -II	village	2001	118	General
22	Kollampattada III	village	2001	76	General
23	Kollampattada IV	Village	2001	53	General
24	Paliyakudy	Village	1998	109	ST
25	Mannakudy I EDC	Village	1998	88	ST
26	Mannakudy I l EDC	Village	1998	96	ST
27	Mannakudy I l l EDC	Village	1998	104	ST
28	Mattuppetty Estate	Village	2000	98	SC and Others
29	Mattuppetty Puthuval	Village	2000	68	SC and others
30	Ceylon ponnagar colony	Village	1999	50	SC
31	Vanchivayal colony	Village	1999	67	ST
32	Vallakkadavu I EDC	Village	1999	82	General
33	Vallakkadavu II EDC	Village	1999	105	General
34	Vallakkadavu III EDC	village	1999	74	General
35	Vallakkadavu IV EDC	village	2000	70	General
36	Vallakkadavu V EDC	Village	2000	74	General
37	Gavi	Village			SC and Others

38	Meenar	Villlage			SC and Others
39	Kochupampa	Village			SC and Others
Periyar West Division					
40	PETS	professional	1998		General
41	Valiyanavattam Thavalam	SAPP	1998		General
42	Cheriyanavattam Thavalam	SAPP	1998		General
43	Karimala Thavalam	SAPP	1998		General
44	Puthuserry Thavalam	SAPP	1998		General
45	Vellaramchetta Thavalam	SAPP	1998		General
46	Vallithodu Thavalam	SAPP	1998		General
47	Kallidamkunnu	SAPP	1998		General
48	Azhuthakkadavu Thavalam	SAPP	1998		General
49	Uppupara Thavalam	SAPP	1998		General
50	Thadithodu	village	1998	43	ST
51	Kuzhimavu I	village	2000		General
52	Kuzhimavu II	Village	2000	126	General
53	Nampupara	Village	1998	81	ST
54	Mozhikkal	Village	1998	79	ST
55	Kandamkayam	Village	2000	125	General
56	Anakkallu	Village	2000	49	ST and Others
57	Koruthodu	Village	2000	148	General

58	Kuttikkayam	Village	1998	68	SC and others
59	Sathram	Village	1998	138	SC
60	Ceylon Mount	Village	1998	50	SC
61	Angel Valley I	Village	1998	66	General
62	Angel Valley II	Village	1999	67	General
6	Angel Valley III	Village	1998	105	General
64	Arattukayam I	Village	1999	69	General
65	Arattukayam II	Village	1999	64	General
66	Kalaketty I	Village	2001	106	ST and others
67	Kalaketty II	village	2001	78	ST and Others
68	Kisumum I	Village	1998	63	SC and Others
69	Kisumam II	Village	1998	47	SC and Others
70	Moolakkayam I	Village	1998	63	SC
71	MoolakkayamII	Village	1998	73	SC
72	Azhuthamunni	Village	1998	105	SC and others
73	MookenpettyI	Village	2000	96	SC and others
74	Mokenpetty II	Village	2000	89	SC and Others
75	Ezhukumannu I	Village	1999	67	General
76	Ezhukumannu II	village	1999	69	General
77	Attathodu I	Village	1998	73	ST
78	Attathou II	Village	1998	73	ST
79	Attathodu III	village	1998	64	SC and Others

Source: (KFD 2003a, Periyar Foundation)

APPENDIX IV

Ecotourism Programmes at PTR

1. Nature Walk and Green Walk

It is an interpretive sandal protection trekking programme offering excellent opportunity of watching birds, butterflies and other wildlife through a range of habitats during the 4-5 km, three hours walk. A maximum of five persons can go for trekking at a time along each trail accompanied by a trained tribal guide.

2. Clouds Walk

The programme is a guided trek for approximately 3-4 hours. From the vantage point, the tourist can have a look at grasslands, evergreen, deciduous and riverine forests and the expanses of irrigated arid land across the border where the nectar from Periyar provides the breath of life. Visitors can see the exuberance of Cumbam Valley, the dizzying heights of Mangaladevi, Kumarikulam and other escarpments of the Fort of Periyar and glory of Palani hills farther away from the view point. The Programme has two slots each day; one in the forenoon and another in the afternoon. The forenoon slots starts between 7.30 am and 8.30 am and end before 12.30 pm and afternoon slot start between 1pm and 2 pm and end before 6 pm. A maximum of five persons are taken trekking in a group accompanied by a trained guide.

3. Jungle Patrol

This is a regular night patrolling programme in the fringes of the eco development zone of the Tiger Reserve in the company of armed guards between 7 pm and 4 am. This programme injects excitement into the experience while keeping smugglers at bay.

4. Border Hiking

It is a day long range hiking programme along the borders of Periyar Tiger Reserve. The route passes through undulating terrains and altitudinal ranges of 900 m to 1300m where the trekkers have a glimpse the lofty escarpments bordering the park, watersheds and the vast stretches of Cumbam Valley below. Gaur, sloth bear, elephants are often sighted apart from birds and butterflies. A maximum of 10 tourists can take part in the programme in two different groups. The trekkers along with two guides and an armed forest guard participate in the programme which starts at 8 am and ends in the evening.

5. Bamboo Rafting

This is the dawn to dusk hiking and rafting programme through some of the richest forest tracts of Periyar Tiger Reserve. It starts at 8 am through a mosaic of habitats and forest rich in bird life, arboreal animals like Giant Squirrel, Nilgiri langur, herds of elephants and gaurs. The rafting is of about three hours duration where one gets a panoramic view of the forest clad hills reflected on the lake. Five tourists accompanied by two guides and an armed guard par taking the programme. This programme caters to a maximum of 10 tourists per day.

6. Bamboo Grove

It is an eco-lodge and centre for experiential learning where 15 bamboo huts are clustered in an ecofriendly ambience along with a traditionally modern kitchen and a well equipped board room (Kalari). Experiential learning and nature sensitization camps are conducted for discerning aspirants and visitors who dwell in the bamboo grove. Lectures, group discussions, audio-visual programmes, field visits are the attractions of this eco-lodge. Each hut can house two inmates and the traditional Kerala food is an added attraction.

7. Periyar Tiger Trail

In the Tiger Trail, nature lovers are in the hands of a team of guides hardy and dependable who know the forest and its ways intimately. They were once poachers who have been transformed into the protectors of the forest and now part of the protection force of PTR. This is an adventurous camping and trekking programme of one-night – two-days and two-nights – three-day duration. The team consists of a maximum of five visitors, five guides and one forest official. Normally a distance of 20 to 35 km is covered during the trail.

8. Jungle Camp

The programme provides tented accommodations for 30 persons at a time with a board room facility for projection, film shows, trekking in the forest (Windy Walks) and a chance to experience the traditional tribal food prepared by the *Oorali* tribe. The site is located at the river view point in the banks of Periyar River at Vallakadavu, the sylvan surroundings of the forest in Periyar Tiger Reserve.

9. Bullock Cart Discoveries

This programme takes the visitor in a unique experience through farm lands, vine orchards, jasmine garden, a typical tamil temple, coconut groves, a meandering river side trail and the sleepy village of Gudalur, on a bullock cart ride guided by people who were once poachers from Tamilnadu. This is a transboundary tourism initiative of the Periyar Tiger Reserve. The programme starts at 6 am in the morning and ends at 2.30 pm in the afternoon. It is a three hours package.

10. Tribal Heritage Museum

A tribal heritage museum built inside the *Mannan* settlement featuring various types of artifacts related to their ancient agricultural practices, marriage ceremonies, cultural events, dress code, rituals and death ceremonies is the hub of this ecotourism programme. Display of fishing gear, hunting weaponry, indigenous medicine and vessels, cereals, medicinal herbs, bamboo furnitures, etc. are other attractions providing a peep into their original culture.

APPENDIX V

Non Timber Forest Products (NTFPs) collected from PTR

No.	Local name (Malayalam)	English common name	Scientific name	Use
1	Inja	?	*Acacia caesia*	Alternative to soap
2	Kodam puli	Malabar tamarind	*Garcini gummi-gutta*	Spice
3	Kundarikum, Telli	Black damar	*Canarium strictum*	Used in varnish industry
4	Pathri poo	Nutmeg flower	*Myristica* spp.	Used as natural dye
5	Poon karandi	?	*Abutilon* spp.	Medicinal herb
6	Paal madaki	?	*Phaseolus* spp?	Medicinal plant
7	Anali vegam	?	*Alstonia venenata*	Medicinal plant
8	Kalluru vanji Kalvanjika	?	*Nigella sativa*	Medicinal plant
9	Ada puriyal	?	?	Medicinal plant
10	Then	Giant honey bee	*Apis dorsata*	Medicinal properties
11	Cheru then	Asiatic honey bee	*Apis cerana indica*	Medicinal properties, bee hive as medicine
12	Patta	Cinnamon bark	*Cinnamomum malabatrum*	Used in paint, soap, incense stick industries

				Spice
13	Kaatu Inji	Wild ginger	*Zingiber officinalis*	Medicinal properties Spice
14	Manjal	Wild turmeric	*Curcuma aromatica*	*?* Spice Medicinal properties
15	Aratha Mala Inji	?	?	?
16	Mootil puli	?	*Buccaria courtalensis*	Spice used in fish curry
17	Pulanji kaayi Cheve kaayi	Soapnut	*Acacia sinuata*	Shampoo
18	Nelligaayi	Indian goose berry	*Emblica officinalis*	Pickle, medicine
19	Channa ila	?	*Amaranthus spinosus*	Thatching grass
20	Meichal pullu	?	*Themida cymbaria*	Thatching grass
21	Channa ila	?	*Amaranthus spinosus*	Thatching grass
22	Meichal pullu	?	*Themida cymbaria*	Thatching grass
23	Paav koonu	Mushroom	?	Delicacy
24	Eelakai	Wild cardamom	*Elettaria cardamom*	Spice
25	Kaatu Kurumulagu	Wild pepper	*Pipper nigrum*	Spice
26	Pana	Toddy	*Caryota urens*	Alcoholic drink
27	Kaitha	?	*Pandanus* spp	?
28	Mullam	choral Cane	*Calamus thwaltessi*	Handicrafts
29	Eeta	Reed bamboo	*Ochlandra travancorica*	Handicrafts

30	Badraksha kaayi Rudraksha	Olive nut?	*Elaeocarpus tuberculatus*	Prayer beads
31	Yedambiri valambiri	East Indian screw tree	*Helecteris isora*	Medicinal property, rope from bark
32	Fish species			
33	Kuyil	Mahsheer	*Tor khudree*	Food
34	Kooral	Curmuca barb	*Puntius curmuca*	Food
35	Gold fish	European carp	*Cyprinus carpio communis*	Food
36	Tilapia	Tilapia	*Oreochromis mossambicus*	Food

Source: Sanjay Gubbi (2006)

APPENDIX I

Interview Schedule for Data Collection

I. Interview schedule for IEDP Beneficiaries

Name of the EDC: _____ Type:_____

Name of the Settlement: _____ Date: _____

1 .Name of the respondent: _____

2 .Family details

Name and relationship to the Head of the family	Gender	Age	Education	Primary Occupation		Secondary Occupation	
				Before	After	Before	After

3. Religion/caste: _____

4. Was he/she born here: Yes (1)/ No (2)

5. If not, length of residence in this village: _____

6. Where did your family come from: _____

7. Any migrants in your family?

Particulars	**Number**	**From when?**	**Why?**

In migrants			
Out migrants			

8. Distance of your home from PTR?

9. Do you own land: Yes (1)/ No (2)

10.If yes, how much land do you own:_____

11. The land has: title /encroached without title / forest land / revenue land / private lease

12. Crops Grown:

SlNo.	**Crop**	**Area(acre)**	**Date/Year of planting**	**Irrigated/RF**	**Source of Irrigation**

13. Annual income?

Source	**Income(Rs)**	
	Before	**After**

14. Any instances of human wildlife conflict? Y/N If Yes, Briefly explain animal , nature of damage and loss occurred.

15. Have you claimed compensation? Y/N If yes, Amount?_____

16. Time lag in payment of money?

Questions on IEDP

1. When did you join EDC? _____

2. Why did you opt to join EDC?

3. Did your household receive any benefit under IEDP: Yes (1) /No (2) / don't know 4. If yes, (Specify) _____

5. What is your involvement in IEDP?

6. Why were the benefits from IEDP given: (To reduce use of PTR resources (1) /accepted as KFD gave it (2)/came free(3)don't know(4))

7. If to reduce dependency of resources, which one?

grazing (1)/ NTFP(2)/ poaching(3)/pilgrimage pressure(4)/fishing(5)/ others(6)

8. Why do you think PTR was established? (If multiple answer, then rank)

Wildlife preservation (1) to support local people (2) for forest department (3) for tourism (4) others (5) (specify)_____

9. What is your perception about IEDP?

Very positive (1) positive (2) neutral (3) negative (4) very negative (5)

10. Did you receive any alternative livelihood benefits under IEDP? Y/N , if yes,

What alternative livelihood did you/your family receives under IEDP:

shop(1) / self enterprises(2) / tourism related(3) / loans(4) / others(5)

11. When did you start your alternative livelihood provided under IEDP: ____

12. Do you still continue your previous occupation: Yes (1) /No(2)

13. Do you solely depend on the IEDP occupation: Yes (1)/ No (2)

14. Do you have any other side occupation: Yes (1)/No (2)

15. If yes, what: _____

16. How much do you earn/month from the IEDP occupation (in Rs):_____

17. Is this income enough to support you and your family: Yes(1)/ No(2)

18. What's your income/month from your side occupation/s(in Rs):_____

19. What other benefits did your household receive under IEDP: _____

20. Did your village/hamlet has received any community/village benefit/s under IEDP? Y/N; If yes,

What benefit did your community/village receive under IEDP: community hall(1) support to school(2) solar fence(3) community farms(4) EDC office building(5) community electricity(6) farm produce marketing(7) Crop protection from wildlife (8) None (9)

21. Do you think it is/was a useful benefit for the community/village: Yes/No/dont Know

22. Does the community use the asset provided under IEDP:

Yes, often (1) /occasionally (2) /rarely (3)/ No (4) /can't say (5)

Perception towards IEDP (5 point rating scale)

No.	Statement	Rating				
		SA	A	UN	DA	SDA
1	IEDP have alienated us from forest resource base and reduced our incentives from them.(-)					
2	Wildlife and Ecosystem conservation is at the expense of our subsistence.(-)					
3	IEDP resulted in breakdown of our traditional practice, erosion of tradition knowledge etc.(-)					
4	We have lost the desire to protect forest resource from deterioration.(-)					
5	Forest resources belong to us and We should be allowed to collect them as we wish.(-)					
6	IEDP has provided us a better livelihood option and social recognition.(+)					
7	Our attitude changed towards forest conservation and we happy to be involved in that.(+)					
8.	Conservation of ecosystem and wildlife is important for the sustainable existence of humans.(+)					
9.	If IEDP had not been in place, we would have lived in our earlier predicament forever.(+)					
10.	The forest ecosystem has improved after the implementation of IEDP. (+)					

Questions on Forest Dependency

1**.** Were you dependent on PTR before IEDP: Yes (1)/ No (2)

If Yes,

Product Collected	Before IEDP		After IEDP	
	Quantity (kg)	Amount(Rs)	Quantity(Kg)	Amount(Rs)

2. How many trips you make in a month to collect forest produce? Before_____After___

3.Do you use the natural resources from PTR for (1) livelihood(2) additional income(3) 4) self use (5) (explain others)_____

4. Where did you sell the products?

5. Do you or have you hunted in the past Yes (1) /No (2)

6. What have you hunted: birds (1) /animals (2)/ other (3)

If yes, species: _____

7. Purpose?

8. What did you use to hunt: gun (1) /traps (2) /others (3)

9. How often do you go into PTR for fetching your needs?

Past (before IEDP)

daily(1) /once in 3 days(2)/ once a week(3) /once in 2 weeks(4) /once a month(5)

Present (after IEDP)

10. Do you think pressures on the PTR by the people have been reduced since the past ten years ? Yes (1)/ No (2)/ don't know (3)

If yes, why_____

11**.** Please list any major problems that you experience living near PTR (list in rank order only the top three MAJOR PROBLEMS.)

1.

2.

3.

Questions on EDCs

1. Are you an office-bearer of any EDC? Yes/ No

2. Do you regularly attend the meetings of EDC ? Y/N

No.of Meetings conducted in 2010	No.of meetings attended

3. What are the activities of your EDC?

4a. State how the EDC decisions are made? Consensus/ majority decision/ decision by EC/ GB. Indicate the process:

4b.What is your role in decision?

4c.How is the decisions operationalised?

4d.Who implements decision?

4e.What authority the EDC has?

4f.On whom the final authority vests?

5. How many days you participate in EDC activities per year?

6. Alternative income forgone for EDC activity?

7. Do you think that the relationship with the forest department have improved through EDCs? Y/N

8. If Yes, in what ways?

If No, Why?

9. Is there any impact on traditional / local systems after the introduction of EDCs? Y/N

If yes, state what are they?

10. What are the benefits you gain from being a part of EDC?

11. Do you think that the working of EDCs should continue for sustained maintenance of PTR?

12. Do you feel any reduction in the tempo of activities of EDC since inception? Y/N

13. Time devoted for EDC activities? 5years before _____ Present_____

14. Are you satisfied with current governance arrangement for EDC? Y/N

If No, what is your suggestion?

15. In your opinion, what is the contribution of Ecotourism to conservation of PTR?

16. Do you feel any negative impact of Ecotourism on PTR?

Questions on conservation attitude

Statement	**yes**	**no**	**Don't know**
It is important to protect wildlife inside PTR (+)			
It is important to maintain the vegetative cover in the PTR			
It is important to preserve the flora in the PTR			
PTR is important for my children(+)			
People should be allowed to graze livestock inside PTR(-)			
PTR should be abolished (-)			
People should not be allowed to hunt wild animals for food inside PTR (+) Wild animals from PTR that cause crop-damage should be exterminated (-)			
Wild animals from PTR are important as a source of tourism revenue. (+)			
People should be allowed to carry out agriculture inside PTR. (-)			
Conservation of forest vegetation and ecosystem is essential for our sustainability. (+)			
The Ecotourism activities should be allowed without any restriction to earn higher income. (-)			

Socio Economic Impact of IEDP

1. Annual Income

Source	Income (Rs)

	Before	After
Agriculture		
Tourism activities		
others		

2**. Livestock and Poultry**

Source	**No.**	**Income**	**No.**	**income**
	Before		**After**	
Dairy Cow				
Goat				
Hen				
Duck				
Others				

3. Asset position

No.	**Particulars**	**Before**	**After**
1	Dwelling House		
2	Latrine		
3	Chair (plastic)		
4	Cot		
5	Radio		

6	Television		
7	Refrigerator		
8	Fan		
9	Wet grinder		
10	Gas stove		
11	HH vessels		
12	Cycle		
13	Telephone		
14	Mobile phone		
15	Others (specify)		

4. **Social Impact: Change in social attitudes (Tick mark the response)**

Particulars	**Before (yes)**	**After (yes)**	**No**
Attend meetings /trainings at PTR			
Visit panchayat / PTR office			
Bank transactions			
Membership in SHGs			
Saving Habits (if yes, amount?)			
Borrowing from money lenders (if yes, amount?)			
Involved in conservation activities			
Social interaction and attend social functions			
Concern about family welfare and children's education			
Leadership			
Self enterprises(if yes, specify)			
Feel of self confidence and empowerment			
Social recognition			

5. Empowerment (5point rating scale)

No.	Statement	SA	A	UN	DA	SDA
1	I am a part of forest management activities activities of Kerala Forest Department.					
2	I contribute to PTR revenue and conservation by participating in ecotourism .					
3	I am prepared to meet any adversities while taking the tourists along and guide them efficiently.					

No.	Statement	SA	A	UN	DA	SDA
4	Now I earn livelihood through a legal occupation and contribute to the well being of family.					
5	I receive social recognition and acceptance and attend public functions.					
6	I am interested in educating my children and interact with their teachers often.					
7	I am involved in community activities and people approach me for conflict resolution and advice.					
8.	I go to various institutions and interact with officials.					
9.	My livelihood has been improved in terms of amenities, nutrition, education and family welfare.					
10.	I am able to take initiatives in the activities of EDCs.					

50. If you are asked to contribute an amount towards the conservation of PTR for the benefit of future generation, how much would you be willing to pay (WTP) per year?

Thank You

II. CVM: Interview Schedule for Tourists

A. Socio economic details

1. Name
2. Age 3. Male / Female
3. Marital status : Single/ married
4. Occupation

Govt employee / Private employee / Retired /Farmer / Labourer /Non working /Own business / Student /Others.

5. No. of members in the household

No.	Male	female	Earning members	Dependants

6. Education of the head of the household
7. Monthly income

a) <5000 b) 5001-7500 c) 7501-10000 d)10001-15000 e) 15001-20000 f) 20001-25000 g) 25001-50000 h) 50000-1La i) > 1La

8. Are you member of any environmental organization or group: Y/N

If Yes, Name them:

9. Location :

Country: state: District: Village/ Town:

10. How often you travel to tourist spots/ forest recreation areas in a year?

B: Details of Travel

1. Is Thekkady the only place you are visiting during this trip? Y/N

If No. which are the other places?

2. Why did you choose to Travel to Thekkady?

a) To watch wildlife b) aesthetic beauty c) peaceful place d) friends' suggestion e) easy access f) others

3) Have you visited PTR any time before? Y/ N

4) If yes,

a) No.of times visited PTR? _____

b) When was the last visit?

c) Do you find any changes in the place? (Better / worse)

d) If better, what?

e) If worse, what are they?

5) What are the activities you enjoy here?

Activity	**Tick ()**	**Cost per person**
boating		
Tiger trail		
Bamboo rafting		
Border hiking		
Bullock cart		
Jungle patrol		
Clouds walk		
Nature walk		
Jungle inn		
Bamboo grove		
Tribal Heritage Museum		

6) What is the time spent at the site?

7) No.of wildlife species viewed here?

8) Do you stay here? Y/N

If Yes,

a) How many days?
b) What is the cost of stay?

9) Do you find conditions of entry: restrictive/ OK/ liberal?

10) What do you suggest? Continue / be restrictive/ be liberal

Why?

11). How do you rate the facilities at PTR? Good/ satisfactory/ non satisfactory

12) Frequency of visits to PTR per year?

13) Do you wish to visit again?

14) Would you be suggesting this place to others?

15) Have you visited similar places? If Yes, Name them.

16) What are the improvements needed at PTR for tourists?

17) No.of visits you would make if facilities are improved?

18) Which is your next best choice place?

19) Distance from your place? _____Km

20) How much would you like to spend then?

C: Environmental Conservation Attitude (Tick mark the response)

No.	Statement	Rating

		SA	A	UN	DA	SDA
1	We should not pursue development programmes that damage the environment. (+)					
2	We should not invest in environment conservation for the benefit of future generation sacrificing our life style and utility .(+)					
3	The value of forests remains the same with or without wildlife. Wildlife is of no use to us.(-)					
4	No matter if entire PTR is lost due to encroachment (-)					
5	Govt. and Forest dept is entrusted with conservation and management, then why should we bother? (-)					
6	Ecosystem conservation is inevitable for the existence of humans (+)					
7	Every individual has the responsibility to conserve and protect nature and natural resources. (+)					
8.	Development must be given preference, not environment. (-)					
9	Animals have the right to exist even if they are not beneficial to us(+)					
10.	People should be given open access to forest resources. (-)					

2. Rank the following uses of Forests

Uses	**Rank**
Ecological functions	
Consumption	
Livelihood	
Rarity	
Aesthetic value	
Future use	
Existence	
Services	
Others (specify)	

D. Willingness to Pay (WTP) of Tourists for protecting PTR

PTR is a biodiversity hotspot. It is home to a variety of flora and fauna including many endangered species. Illegal human interventions in the forest for forest produce collection, poaching, smuggling, grazing, illegal cultivation etc are posing threat to the existence of this forest and wildlife. Environmental pollution due to inaccurate waste disposal mechanism is another major problem. The protection of PTR is possible only through the cooperative action of forest department and people and PTR has a story of success in this regard . In order to sustain these activities and enforce laws, village communities, forest department, the media, and the courts are crucial. All these involve higher expenditure to be more vigilant through enhanced social fencing capabilities, the forest department has to increase their administrative capacities by increasing the number of Forest guards, rangers, vehicles, weapons, communication systems etc.

1. Suppose the above enhanced regulation and enforcement cost you and your family an extra amount, which will be a one time payment collected as entrance fee from you, the purpose of this is largely to protect the forests from various threats mentioned above. Would you pay this amount out of your income?

a) Yes b) No c) Not willing to respond

(The amount M in the above question is to be randomly selected from Rs. 50, Rs.100, Rs.150, Rs.200……Rs.10000. For each respondent, pick any figure randomly (say X) from this list.)

If the answer to the question 1 is Yes, ask the following questions.

2. Would you be willing to pay Rs .X or more?

a)Yes b) No c)Don’t Know

If Yes, Amount?

If answer to 2 is NO,

3. Would you be willing to pay Rs. (less than X)

a)Yes b) No c)Don’t Know

If Yes, Amount?

4. What is the most important reason why you would be willing to pay?

1. For the benefit of future generation
2. for existence of PTR
3. Social benefit
4. To sustain the Recreational benefits from PTR
5. To protect forest from threats
6. To conserve the forest and wildlife
7. Tourism generates revenue, so we need to protect
8. For the sake of Tourism dependant local people
9. Other reasons _____

If No,

5. What is the reason that you are not willing to pay?

1. I cannot afford to pay
2. Forest Dept has to take care of it
3. Tourists are paying for their visit
4. These are hypothetical options that never work
5. I don’t receive any direct benefits from PTR
6. Don’t know

7. There is no such problem

8. Other reasons

6. Do you have any suggestions for improvement of Ecotourism in PTR?

7. Do you have any suggestion for conservation of flora and fauna in PTR?

Thank You

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Appendix III

Trapezoidal Rule

The trapezoidal rule is a numerical method that approximates the value of a definite integral. We consider the definite integral

$$\int_a^b (Fx)dx$$

We assume that f(x) is continuous on [a, b] and we divide [a, b] into n subintervals of equal length.

$$\Delta x = b\text{-}a/n$$

Using the n + 1 points,

$$x0 = a,\ x1 = a + _x,\ x2 = a + 2_x,\ .\ .\ .\ ,\ xn = a + n_x = b.$$

We can compute the value of f(x) at these points.

$$y0 = f(x0),\ y1 = f(x1),\ y2 = f(x2),\ .\ .\ .\ ,\ yn = f(xn)$$

We approximate the integral by using n trapezoids formed by using straight line segments between the points (xi−1, yi−1) and (xi, yi) for 1<i <n.

By adding the area of the n trapezoids, the value of definite integral is obtained.

The simplified trapezoidal rule is:

$$\int_a^b (Fx)dx = \Delta x/2\ [\text{Sum of first and last ordinates} + 2(\text{sum of remaining ordinates})];$$

$$\int_a^b (Fx)dx = \Delta x/2(y0 + 2y1 + 2y2 + \cdot\cdot\cdot + 2yn{-}1 + yn)$$

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