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# **Heterogeneity, management effectiveness and resource sustainability: Evidence from the study of common property forest resources in the sample villages of the Indian state Odisha**

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## **ABSTRACT**

The seminal contributions of Common Property Resources (CPRs) such as forests and mangroves, common pastures and grazing lands, village ponds and tanks and streams and rivers to sustainable rural livelihood systems have been widely established in the literature on development economics. Despite high dependence of the people at the lower echelons; unequal benefit sharing, efficient management by adoption of the most appropriate institutional arrangements and sustainable use and extraction of these ecological resources has become a cause of concern across the globe. The efficacy of the CPR management institutions depends on the prevailing state laws, conventional practices and customs, user groups' characteristics and also on the composition of the management committee governing the use of such resource systems. In this backdrop the contours of the research work has been drawn along the inter-related lines such as dependence, heterogeneity and collective action, vis-à-vis institutional sustainability and common property forest resource sustainability in the context of the villages in Odisha. The field survey results obtained from the six sample villages of the three districts of the state reveal that social and economic heterogeneity critically affects the stability of the forest management institutions as well as sustainability of the resource system.

## **1. Introduction**

The nature, scale and scope of environmental and ecological problems have expanded considerably over the past few decades of human history and have ranged from pollution related issues to depletion and degradation of natural resources, and to global concerns on climatic changes and ozone layer. Mounting pressures on environment and ecosystems whether at local, regional, national or global levels are concomitant of high population pressure, unprecedented growth of human activities and highly mechanized and technical interventions in the human niche appropriation process. Renewable natural resources such as forests, land and water are in fact declining at rates that threaten the basis of already fragile economies (Schramm and Warford 1989). The poor countries of the world which depend heavily on natural resources encompassing the common property resource (CPR) systems are the most vulnerable to their damage and depletion. It is reasonably argued that poor capital base and limited ability of the rural population of these

countries to switch over to other gain full off forest and off CPR income generating activities only intensify the threat. In this realm, efficient management and sustainable use and extraction of the existing natural resources including CPRs are imperative from the standpoint of ecological balance, livelihood securities, intergenerational resource allocation and environmental basis of sustainable economic development.

It is a well established fact that there exists a strong direct linkage between effective management practices and resource sustainability. In this backdrop, the paper has attempted to disseminate the empirical results of a micro level primary research which brings out the links among the three interconnected issues; heterogeneity, management sustainability and resource sustainability. The remainder of the paper has been sequenced as follows. Section 2 defines common property forest resources in line with the National Sample Survey Organization (NSSO) of India. Section 3 incorporates a brief review of some of the literature on CPR management and resource sustainability. The research problem has been discussed in Section 4. The objectives, database and methodology of the study have been outlined in Section 5. Profile of the survey villages and household level dependency on common property forest resources has been discussed in section-6. The forest management practices in the state and in the study villages are described in Section 7. Analysis of heterogeneity, management sustainability and resource sustainability has been conducted in Section 8. Finally conclusion and policy implications are discussed in Section 9.

## **2. Formalization of common property resources**

In India, the National Sample Survey Organization (NSSO, 1999) has defined common property resources (CPRs) as those resources which are accessible to and collectively owned/held/managed by an identifiable community or group and on which no individual claims exclusive property rights. Rigidly speaking, common property resources have well-defined user groups having the right to their collective uses, and the rules and the institutional arrangements governing their uses by them are clear and followed universally. Such resources are different from “free rider” or “free” or “open access” resources characterized by the absence of any rules and institutional mechanisms for their use and management.

CPRs in India have the following three configurations. The first one is common village land or commons which lie within the boundary of the village and are formally held by the village panchayat or village community. It consists of village panchayat grazing land/pasture land, village forest and woodlot (not under Forest/Revenue Department) and van panchayat and village sites and threshing floor. The second is the government forest comprising reserved forests, protected forests and unclassed forests. Common water resources are another category of CPRs. The water sources are either constructed by or lie within the jurisdiction of a government department and are held by a community or group.

In the present study, forest resources which are within the boundary of a village and are formally held by the village community/panchayat are considered for analysis. For the purposes of analysing uses, the coverage of CPRs has been broadened to include forest land, revenue land not assigned to village community/panchayat and even private land in use of the community by convention.

### 3. Literature review

Ever since the appearance of World Commission on Environment and Development's (WCED's) 'Our Common Future', a vast literature on sustainability has developed in respect of both sustainable use and sustainable management of common resources. A brief review of some of these literatures is presented here.

As an illustrative starting point, reference may be made to Babu (1998), Raj (2006) and Samal (2009). Babu (1998), in his study on common lands in the Haryana state of India has argued that resource base has undergone substantial degradation due to unsustainable management practices. Raj (2006), in his study in the Indian Central Himalayas, found that overexploitation of CPRs poses a serious threat to the longevity of such resource system. The findings of the study focus on the need of appropriate management practices to conserve the common property land, forest and water resources. A people-centered approach to management has been advocated by him for realizing sustainable, balanced and equitable sharing of CPR benefits and their development in the area. Samal (2009) observes that more time is required and more distance needs to be covered than before to get the same quantity of forest produce indicating that the forest has depleted and sustainability is jeopardized. The role of traditional environmental knowledge and community tenure systems in promoting sustainable CPR management and inter-generational equity is well established.

Wade (1988, 1994), Ostrom (1990), and Baland and Platteau (1996) postulate that members of small local groups can design institutional arrangements to help manage resources sustainably. However, if agents are not fully aware of ecological processes or are unable to protect the common resource against intruders or are inclined to overharvest it due to their poverty, state intervention may be needed (Baland and Platteau, 1996). They have also raised doubts about the ability of user groups to manage resources efficiently and lay down four conditions for successful group management. These include a) characteristics of the resource, b) nature of users' group that depends on the resource, c) features of the institutional regime for management and d) the nature of the relationship between a group, and the external forces (markets and technology) and authorities (state and government).

Kellert *et al.* (2000) suggest community based natural resource management systems for increasing the participation of marginalized groups and ensuring both resource-and- management sustainability. Ojha (2006), while focusing on the positive aspects of community ownership and management of common property forest resources, advocates a well-defined benefit sharing mechanism within the broad contours of collective action to ensure equity and resource sustainability.

Sonak *et al.* (2006), from their study of Khazan ecosystem of Goa, lament the ecological unsustainability of Khazans due to disruption of the self-regulating coastal tribal peasant communities.

Turkelboom *et al.* (2001) argue the case for locally agreed arrangements and strong local leadership for promoting CPR sustainability albeit with a caveat. When the CPR is scarce, households think it irrelevant to agree upon sustainable management practices. They use the resource base by hit-and-run and cause degradation to the common resource system.

Adhikari (2001) emphasizes the need of an appropriate property rights regime as a vital determinant of the economic and environmental sustainability of CPRs, and the social sustainability of the people dependent on them.

Some researchers have linked sustainability to group heterogeneity. They have found that resource sustainability and management sustainability are difficult to achieve in the face of inequality in benefit sharing, social heterogeneity in group composition and disparities in asset position among them (Bardhan, 2000; Dayton-Johanson, 2000; Balasubramanian and Selvaraj, 2003). Olson (1965) visualizes greater possibilities of enforcing CPR conservation when the user group is homogeneous than when it is heterogeneous.

Adhikari's (2001) concept paper highlights considerable disagreement among researchers on the issue of the relationship between poverty and resource management sustainability. At the one extreme scholars like Baland and Platteau (1996) are observed to have argued that absolute poverty threatens the survival of the poor and with future holding no hope for them, they are inclined and rather forced to make unsustainable use of CPRs through a hit-and-run process of exploitation. At the other extreme, scholars like Jodha (1986), Reddy (1999) and others have observed that poor people being critically dependent on CPRs view their degradation as survival risk and attach significant attention to their conservation through adoption of sustainable CPR management practices. It is no gainsaying, therefore, that poverty does influence the quantity and quality of CPR base.

Sarker (2009) found that co-management of common forest resources would sustain rural livelihoods and that the poor and very poor categories of households who are most dependent on these resources manage the resource base sustainably. He laments that illegal collection of timber products from forest have an adverse effect on the sustainability of forest resources. On the other hand Sapkota and Oden (2008) observed overexploitation of community forest resources by poor households and urged upon the authorities to provide alternative livelihood options for transforming group of over extracting poor people into a conservation group. Contrary to this Mahanty et al. (2006) found a tradeoff between equitable access right to CPRs and sustainable management.

Sarvanan's (2002) study of community-based watershed management in Himachal Pradesh, Madhya Pradesh and Uttaranchal States in India focuses on participatory local institutions for managing CPRs in contrast to delivery-based functioning of government programs. Ability to address community needs, accountability and transparency in management have been cited as the key factors in ensuring sustainability of local institutions and arresting resource degradation. The important role of Non Government Organizations (NGOs) in promoting resource sustainability has also been highlighted in the study. For improving environmental quality and sustainability of CPRs, Mohanty (2006) suggests decentralized participatory governance, and a strong political will and commitment. He also emphasizes protection of CPRs for ensuring their sustainable regeneration.

Tábara and Pahl-Wostl (2007), emphasize the need to overcome dualism between the individual and collective, between human and natural systems, and between human agency and natural conditions through a holistic understanding of human-natural interactions, mutual self-organization and resilience. In their opinion resource and management sustainability calls for the construction of a self-aware society that transcends the existing dualisms to create a self-sustaining humanity on a life supporting planet.

Nagendra (2011) in his study on forest management observed that heterogeneity whether in the form of economic, social or other dimensions pose a challenge for collective action in respect of natural resources management. Further, he observed that the costs of collective action were disproportionately higher for the poor who were dependent on the forest products. He also argued that high level of heterogeneity could be dangerous for collective action and sustainable forest management practices.

Nagendra and Ostrom (2012) have made important theoretical contribution towards the role of diverse institutions at multiple scales for encouraging reforestation across the world. Their theory emphasizes polycentric governance to be a better approach for improving forest policies than reliance on any single approach. Single-level governance mechanism, whether international, national, regional or local, cannot provide complete solutions for the overarching challenges of forest governance.

Maryudi and Krott (2012) in their study of a forest village in Java found the community forest management programmes to be less effective. The limited success of such programmes in the village stemmed from the reluctance of the state agencies to provide better access to the local people. Restricted access encouraged the locals to continue illegal activities, and the goals of sustainable forestry remained hanging in the balance.

Haque et al. (2012) on their study on shrimp farming in Bangladesh revealed that successful management of common pool resource is largely associated with resource scarcity, distance of the market to the resource and community characteristics such as leadership structure, group size, status of heterogeneity in the community and involvement of other institutions.

Community ownership and local systems of CPR management are crucial. Local management and group ownership offer, checks and balances to prevent overharvesting by stealing and other illegal means, provide incentives and motivations to protect CPRs, ensure effective management and have positive effects on resource productivity, equity and sustainability. There is need of identification, recognition and patronization of local area community management agencies for the purpose.

#### **4. The research problem**

Over the years, significant economic growth has been accomplished in India and the same has percolated at least partially, into the countryside in terms of proliferation of alternative livelihood systems. Along with this development, the man-environment relationship might have changed considerably particularly in the rural hinterlands in Odisha, as elsewhere in the world, impacting on people's dependence on common resource systems, adoption of resource management practices and sustainability of the resource base to cater to the needs of future generations. In this backdrop the contours of our research problem has been drawn along the

inter-related lines such as dependence, heterogeneity and collective action, vis-à-vis the management and sustainability of common property forest resources in the context of the villages in Odisha.

## 5. Objectives database and methodology

This section outlines the objectives and provides a brief description of the database and methodology employed to address the research problem.

The objectives are as follows;

1. To examine whether presence of heterogeneity in the management group in terms of economic and social dimensions affects the stability and sustainability of the local level common property forest management institutions.
2. To study sustainability of common property forest resources in the survey villages using both quantitative and qualitative indicators.
3. To establish links among heterogeneity, management sustainability and common property forest resource sustainability in the study villages.

The research work is based on primary data collected through a micro-level sample survey conducted in 210 households in six villages of three blocks in three districts of the state Odisha in India. A four-stage simple random sampling technique has been used, where the sampling units are the districts, the blocks, the villages and the households at each stage. The NSSO (54th Round Survey- 1998) has classified India into 15 major agro climatic zones, and the state Odisha comes under two zones viz. East Coast Plains and Hills (EG) and Eastern Plateau Hills (EHg); 19 of the total 30 districts in Odisha come under EHg and the reminder 11 districts fall in EG; the ratio of the districts falling under EG and EHg being roughly 1:2. We have purposively limited our study to three districts selecting one district from EG, that is, Keonjhar, and two districts from EHg that is, Balasore and Mayurbhanj, using the ratio and random approaches.

The blocks have been selected on the basis of common property forest area. A complete list of blocks having high forest coverage has been prepared for each of the three selected districts on the basis of information obtained from the forest department, and one block has been picked up at random from the list for each district. Accordingly, Patna, Nilagiri and Jashipur blocks have been selected from Keonjhar, Balasore and Mayurbhanj districts, respectively.

From each block, two villages have been randomly selected considering the information on common property forest coverage provided by the Revenue Inspectors of the respective blocks. In all, six villages have been selected for the study with two villages from each block. The villages so selected are Ghatabalijodi and Tanda from Patna block of Keonjhar district, Banthiapada and Tenda from Nilagiri block of Balasore district, and Mandam and Ramasahi from Jashipur block of Mayurbhanj district.

A total of 210 households have been selected at random from the six villages with equal representation (35 from each village) for intensive investigation. This size can be accepted as reasonably good for a standard primary survey, and the sampling method adopted in the survey is considered appropriate to minimize bias and obtain more representative results. The primary data have been collected by the survey

method. Under the survey method, a household has been taken as the unit of investigation. The relevant information and data have been collected with the help of a pre-tested specially designed schedule canvassed in person among the sample households.

A pilot field survey was conducted in the month of March 2010 for six selected households in Banthiapada village of Nilagiri block in Balasore district. Thereafter, the schedule was redrafted in the light of the experience gained. The major field survey was conducted between April and June 2010.

The study emphasizes on the economic status and social composition of the members of the management committee to ascertain the effectiveness of the existing mechanisms in ensuring equity in participation and sustainability of the management regime. Presence of heterogeneity among the members of the management committees has been examined both from economic and social considerations. Economic heterogeneity has been captured by the coefficient of variation (CV) of the annual household incomes of all the committee members. A high value of CV indicates high economic disparity and vice versa. Similarly, the presence of social homogeneity/heterogeneity has been ensured by the caste status (upper and lower caste) of the committee members.

The formula for calculating CV is as follows.

$$\text{Coefficient of Variation (CV)} = \frac{[(\text{Standard deviation of income}) / (\text{Average income})] \times 100}{}$$

Again to strengthen our analysis, sustainability of the local-level management institutions has further been examined from the view points of the user group's (sample households using the common property forest resource) perception about their functioning over the years. All the 210 sample households in the survey villages were asked to provide their response on seven selected indicators and on a five point scale (1 to 5), with one indicating the lowest value and five the highest. The seven indicators used in the present analysis are as follows: (1) user groups' assessment of the management system, (2) behaviour of the management committee towards the users, (3) equity consideration, (4) practical measures taken on forest resource conservation/regulation, (5) promptness of the management committee in major decision-making process, (6) strict adherence to the rules and regulations regarding resource use and their extraction and (7) provision to check illegal logging/intrusion. The index for each of the indicators has been estimated following the dimension index used for constructing the human development index (HDI). The dimension index is specified as follows.

$$\text{Dimension Index (DI)} = \frac{(\text{Average value of the indicator} - \text{Minimum value})}{(\text{Maximum value of the indicator} - \text{Minimum value})}$$

The values of the DI varies between "0" and "1", where "0" indicates the least satisfied and "1" indicates the most satisfied on a given indicator. Finally, for each district, a composite index has been constructed taking the arithmetic mean of the DI's for the seven indicators stated above. The composite index with a value exceeding 0.60 is accepted to suggest high institutional sustainability. A value within the range 0.50–0.59 is assumed to indicate medium sustainability. Low sustainability is indicated by a value of <0.50.



In order to address sustainability of the common property forest resources in the study areas, the survey schedule was designed with some indicators for obtaining information from the sample respondents as questions on resource sustainability. The sample households were asked to give a comparative picture of the current state of CPR forests both in quantitative and qualitative terms as compared to their status 10 years ago. The quantitative indicators employed are (i) the distance covered by a household for collection of non timber forest products (NTFPs) and fuel wood, (ii) the number of days in a month the household goes to the forest for collecting materials, (iii) income from sale of NTFPs collected per year, (iv) quantity of fuel wood collection per month, (v) average age of plants cut and (vi) average number of hours required to collect a bundle of fuel wood. Similarly the selected qualitative indicators are (i) total area of the CPR forest, (ii) density of the CPR forest, (iii) collection quantity from CPR forest and (iv) the Quality of the produce.

## 6. Village profiles and common property forest resource dependency at the household level

The profile of the sample villages is presented in this section for a better understanding of the survey areas. **Table-1** given below records village level statistics on population, number of households, agricultural land, village forest, forest land used by the villagers, grazing land, homestead land, other lands and the total land area. The table has also captured per household availability of land under different category viz; agricultural land, common property forest land, grazing land, homestead land and others. A comparison across villages of the three districts reveals that per household availability of common property forest land is found to be the highest in the sample villages of Mayurbhanj (2.75 acres) followed by Keonjhar (2.05 acres) and Balasore (0.73 acres). At the household level the figures appear to be quite appealing.

Table-1									
Village statistics									
Village profile	Mayurbhanj			Keonjhar			Balasore		
	Ramasahi	Mandam	Total	Ghatabalijodi	Tanda	Total	Tenda	Banthiapada	Total
1. Population	503.00	471.00	974.00	450.00	522.00	972.00	1275.00	451.00	1726.00
2. Number of households	64.00	60.00	124.00	75.00	87.00	162.00	276.00	73.00	349.00
3. Agricultural land (Acres)	243.98	195.99	439.97	343.99	601.77	945.76	295.25	361.50	656.75
4. Village forest (Acres)	35.87	17.98	53.85	0.00	0.00	0.00	0.00	0.00	0.00
5. Forest land used by the villagers (Acres)	192.25	95.06	287.31	191.49	140.23	331.72	170.49	84.34	254.83
6. Grazing land (Acres)	32.06	15.52	47.58	28.60	67.60	96.20	29.77	31.01	60.78
7. Homestead land (Acres)	12.29	8.88	21.17	29.29	24.65	53.94	45.46	41.19	86.65
8. Other lands (Acres)	40.63	26.39	67.02	48.45	76.34	124.79	536.43	87.22	623.65
9. Total land (Acres)	557.08	359.82	916.90	641.82	910.59	1552.41	1077.40	605.26	1682.66

Availability of land under different category at household level									
1. Agricultural land (Acres)	3.81	3.27	3.55	4.59	6.92	5.84	1.06	4.95	1.88
<b>2. Common property forest resource* (Acres)</b>	<b>3.56</b>	<b>1.88</b>	<b>2.75</b>	<b>2.55</b>	<b>1.61</b>	<b>2.05</b>	<b>0.62</b>	<b>1.16</b>	<b>0.73</b>
3. Grazing land (Acres)	0.50	0.25	0.38	0.38	0.78	0.59	0.10	0.42	0.17
4. Homestead land (Acres)	0.19	0.14	0.17	0.39	0.28	0.33	0.16	0.56	0.25
5. Other lands (Acres)	1.57	2.27	0.54	0.65	0.88	0.77	1.94	1.19	1.79

Source: Data collected from the revenue inspector's office of the respective blocks of the villages (2010).

\* Common property forest resource includes both village forests and forest land used by the villagers.

In India, common property forest resources are vital to the life and economy of a vast majority of its rural population. In the rural Orissa, 57 percent of villages are located on forest fringe areas. More than 15 million people residing in and around forest areas, most of them being poor and tribals derive their livelihood from collection and /or marketing of forest produce. They collect and use roots and fruits as food; fuel wood and dry leaves for cooking and lighting; timber, bamboo and cane for house construction, fencing and stacking; medicinal plants and creepers as drugs against illness; green leaves and grass as fodder ; streams for irrigating farm lands and vegetable fields; some dry leaves for smoking; and some flowers for brewing liquor and drinking. Besides, a good number of non-timber forest produce and some of the aforementioned collections are sold by them in the market to obtain other household necessities with the help of the sales proceeds. Population pressure, lack of alternative gainful employment opportunities, poverty and distress are some of the compelling forces which make them critically dependent on common property forest resources. Forest dependency substantially reduces the expenses of households on items such as fuel wood, timber, fencing materials, house construction, crude agricultural implements, food and oil.

The field survey results reveal that the households in the sample villages derive their income from two sources- non forest and forest sources. The share of the forest component gives a summary picture of the forest dependency of households in the study area. Decomposition of income from forest sources shows reasonable insights into such dependency. For analytical purposes we have divided income from forest sources into two broad groups on the basis of information collected during field survey. They are income from sales and imputed income. Income from sales are further subdivided into income from sales of Non Timber Forest Products (NTFPs) and products of Forest Based Activities (FBAs) while imputed income is decomposed into value of fuel wood, timber and bamboo collected from forests and used in the household. **Table-2** shows sample households' forest dependency at a disaggregate level.

Table-2

## Common property forest dependency of sample households

DISTRICT	Non forest source (INR)	Common property forest source							Total forest	Grand total (INR)
		Income from sales (INR)			Imputed income (INR)					
		NTFP sales	Products of forest based activities	Total	Fuel wood	Timber	Bamboo	Total		
BALASORE	<b>43206.10</b> (73.99)	1628.01 (2.79) [10.72]	3427.71 (5.87) [22.57]	<b>5055.72</b> (8.66) [33.29]	7785.26 (13.33) [51.27]	1772.55 (3.04) [11.67]	572.53 (0.98) [3.77]	<b>10130.34</b> (17.35) [66.71]	<b>15186.06</b> (26.01) [100.00]	<b>58392.16</b> (100.00)
MAYURBHANJ	<b>21897.84</b> 61.41)	3467.81 (9.72) [25.20]	128.45 (0.36) [0.93]	<b>3596.26</b> (10.08) [26.13]	7603.71 (21.32) [55.25]	2183.68 (6.12) [15.87]	378.62 (1.06) [2.75]	<b>10166.01</b> (28.51) [73.87]	<b>13762.27</b> (38.59) [100.00]	<b>35660.11</b> (100.00)
KEONJHAR	<b>27331.60</b> (68.58)	1984.07 (4.98) [15.85]	880.50 (2.21) [7.03]	<b>2864.57</b> (7.19) [22.88]	8418.29 (21.12) [67.23]	1115.88 (2.80) [8.91]	122.88 (0.31) [0.98]	<b>9657.05</b> (24.23) [77.12]	<b>12521.62</b> (31.42) [100.00]	<b>39853.22</b> (100.00)
ALL	<b>30811.85</b> (69.03)	2360.00 (5.29) [17.07]	1478.90 (3.31) [10.70]	<b>3838.90</b> (8.60) [27.77]	7935.75 (17.78) [57.41]	1690.70 (3.79) [12.23]	358.00 (0.80) [2.59]	<b>9984.45</b> (22.37) [72.23]	<b>13823.35</b> (30.97) [100.00]	<b>44635.20</b> (100.00)

Source: Field survey data

Note: Figures in ( ) indicate percentages in grand total.

Figures in [ ] indicate percentages in total forest income

The table provides information on the average annual forest income and non-forest income dependency at the household level in the sample villages of the three study districts. For all the sample households, the share of non-forest income is 69.03 per cent and that of forest income is 30.97 per cent of the household annual income. Forest income from sales proceeds has a share of 8.60 per cent with NTFPs accounting for 5.29 per cent and FBAs, 3.31 per cent while that from imputed value of forest produce collected by and used in a household has a 22.37 per cent share comprising contributions from fuel wood (17.78 per cent), timber (3.79 per cent) and bamboo (0.80 per cent). Sales proceeds account for 27.77 per cent of total forest income with NTFPs constituting 17.07 per cent and FBAs 10.70 per cent but imputed income constitutes 72.23 per cent of forest income with fuel wood having the largest share (57.41 per cent) followed by timber (12.23 per cent) and bamboo (2.59 per cent).

It is thus clear that the share of forest sources in household annual income is very high (around 31 per cent) of which imputed value of forest produce used in a household has a lion's share and direct sales are much less. Fuel wood is seen to be the single largest contributor to imputed income, all forest income and household income as a whole. They earn direct income by sales of NTFPs, products of FBAs and livelihood by collecting fuel wood, timber and bamboo from the forests. This suggests that in the study area the households are critically dependent on common property forests.

## 7. Forest management institutions in the state of Odisha and in the study villages.

The primacy of an appropriate institutional framework for effective management of CPR forests is well established. A cursory look at the institutional arrangements for the promotion and development of forests in Odisha reveals a twofold system of management institutions operating in the state. They are Community Forest Management (CFM) and Joint Forest Management (JFM). A brief description of these institutions and their functioning in respect of forest resources of the state in general and the study areas in particular is presented here.

### 7.1 Community forest management (CFM) in Odisha

Keeping in mind the importance of forests in the livelihood and economic conditions of the rural poor, a large number of rural and tribal communities have evolved their own forest management mechanism to deal with the forest degradation situation in Odisha. The first ever recorded instance of voluntary forest protection committees or community forest management (CFM) was formed in the year 1936 in the Lapanga village of Sambalpur district of Odisha. In subsequent periods, the CFM institutions were formed in many villages of the Western and Central Odisha. At present, the CFM institutions are operating in Nayagarh, Mayurbhanj, Keonjhar, Dhenkanal, Sambalpur, Balangir and Phulbani districts of the state. Presently, around 8,000 CFM institutions are engaged in protection and conservation of two million hectares of the state's forest. The CFM institutions are protecting different types of forests such as bushy forest, degraded forest, open forest as well as forests which are not degraded. These institutions are engaged in controlling and managing forests irrespective of their legal status. The management practices followed by CFM institutions strike a balance between forest conservation and livelihood needs of the local communities.

### 7.2 Joint forest management (JFM) in Odisha

In the year 1988, the state government came out with a resolution to involve the forest dwelling community in government efforts for the protection and conservation of reserved forests of the state. In addition to this, the resolution also tried to meet certain bonafide needs of the local communities. The forest department with the help of the villagers formed Village Forest Protection Committee (VFPC) in response to the resolution. The VFPCs were assigned the responsibilities of protecting the forests from fire, grazing, illegal felling of trees, theft, etc. However, in the year 1993, a comprehensive resolution was adopted by the state government for the involvement of local communities in the protection and management of state forests. The government coined a new term which is popularly known as Joint Forest Management (JFM) and the effort led to the constitution of Vana Sanrakhyana Samiti (VSS) around the degraded forests of the state. After the formulation of VSS, the VFPCs were declared null and void. The scope of the JFM was further extended to social forestry plantation, and the VSS were given 100 per cent share over the forest products as well as the final harvest on the trees planted under the social forestry project. The two major objectives of JFM framework were involvement of local community in forest planning and management and equitable distribution of forest produces between the state and local stakeholders. Through the government resolution in 1993, the OFD delineated the guidelines on JFM as follows.

- JFM institutions to operate in degraded reserved and protected forests.

- It is to be operated only in the forest areas where the local people of the adjacent village or cluster of villages are willing to offer active cooperation in regeneration and protection of the forest tract.
- The scheme allows a single village to manage and develop up to about 200 hector of degraded forests.

The forest officials of the state make due evaluation of the responses of the local community in relation to protecting and managing the forest areas and recommend the Grama Panchayat to constitute a Van Sanrakshyan Samiti (VSS) in the village. Then, the VSS forms the executive committee (EC) for a term of 2 years with Naib Sarpanch of Gram Panchayat as the head. Subsequently, the VSS enters into a MoU with the concerned DFO for active participation in the programme designed by the JFM plan. The concerned forester of the Forest Department acts as the member secretary of the EC of VSS without voting power. The minimum participation of women in the general body and EC has been kept at 50 and 33 per cents, respectively. The JFM has also been extended to less degraded forests. Both the forest department and the user group jointly participate in micro-plans in JFM areas. Over the years, the JFM system has made rapid inroads into the management arena and is doing a good job for promoting the use and growth of forests in the state.

### **7.3 Management of CPR forests in the study villages**

Natural resource systems including CPR forests have been managed for centuries by communities across the globe (McKean and Ostrom 1995). Although management of common property resources under community ownership has offered a stable form of resource management in many traditional societies, several studies have revealed that factors like population growth, user group characteristics in terms of economic condition and social status, motivational factors, cooperative efforts and political affiliations have considerably influenced their efficacy. In some cases, political forces and socio-economic heterogeneity of members in the management have destabilized many of the existing viable local-level institutions. In India, traditional village-based institutions regulate user's access to common property resources. These institutions enforce user groups' obligations relating to conservation, protection and development of village-level common property resources such as land water and forests. The villagers make contribution both in terms of labour and funds to the upkeep of such resources, and violation of restrictions is usually met with severe penalties. In the study villages, similar practices were found in respect of common property forest resource extraction, their use and management. The major functions of the management committees in all the six study villages are outlined as follows.

- Protection and conservation of the common forests.
- Preventing the forests from outsiders and illegal intruders by the "Thengapali" approach. In the "Thengapali" system, the management committee appoints a group of individuals to vigil the common property forest. It functions on daily basis, and all the households of the village are involved in the process by contributing manpower.
- Bush cutting and cleaning activities in the common forests to protect trees from fire and help them grow properly.
- To prevent illegal hunting from the common forests.
- To clear trees that decay naturally.

- To put control on logging activities.
- To review households' needs and accordingly allot quota for harvesting timber from the forest.

However, with regard to fuel wood collection by individual households, no such restriction was imposed.

## 8. Heterogeneity, management sustainability and resource sustainability

The field survey results have indicated that there is critical dependence of the rural households' on common forests for fulfilling their livelihood requirements and economic needs. However, empirical findings reveal that in these villages the common property forest resources are becoming unsustainable over time. A temporal analysis brings out the fact that in the three study areas, forest resources are undergoing both quantity and quality deterioration but at varying degrees. Further it has been found that there exists a strong link among socio-economic heterogeneity of the members of the management committee, institutional stability and common property forest resource sustainability. The subsequent discussions delve into the inter-linkages among the afore-said dimensions by investigating into the status of heterogeneity (social and economic) in the management group, households' / user groups' perception of the management institutions about their functioning and sustainability of the forest resources in the survey villages.

### 8.1 Socio-economic heterogeneity and sustainability of the local level management institutions

**Table-3** given below provides a brief description of the socio-economic composition of the members of the management committees in each of the six sample villages from the three study districts viz., Mayurbhanj, Keonjhar and Balasore.

The two sample villages selected from the Maurbhanj district are Ramasahi and Mandam and the respective village level management institutions are Ramasahi jangal surakshya committee and Mandam jangal surakshya committee. The Ramasahi jangal surakshya committee consists of a total of 12 members and all of them belong to the Scheduled Tribes (ST) category. Further it is found that the average annual household income of the committee members ranges between INR 48,300.00 and INR 40,000.00 with a coefficient of variation (CV) of income of 5.81. A similar observation was made in the case of Mandam jangal surakshya committee. Here also all the 7 members of the management committee belong to the ST category and at the household level, the average annual incomes for all the members were found to vary between INR 42,000.00 and INR 36,000.00 with a CV of 6.56. The very low CVs in the income (5.81 and 6.56) are suggestive of the existence of economic homogeneity among the members of the management committees in both the villages. Hence, composition wise the management committees in these two villages were found to be fairly *homogeneous* in respect of both *social* and *economic* considerations. During interaction with the villagers and some of the members of the management committee, it was observed that in respect of functioning of the management institutions, the local community is quite satisfied in both the villages. In major decision making situations, all the members were given fair chance to participate and free expression of their views. There have been no serious conflicts in both the management committees for the last several years, and the committees have been functioning smoothly. It was also observed that among the members, the level of social capital, such as trust and mutual affection is quite high. The user group's attitude towards the members of the

committee was found to be quite respectful. The households contributed their labour for conservation and protection of common property forests in both the villages. However, the local community feels that there is a greater need of funding from the state government for more effective management of common forests. On the whole, the management committees in the two villages are functioning *pretty well* as perceived by the user groups.

Name of the district	Mayurbhanj		Keonjhar		Balasore	
Name of the village	Ramasahi	Mandam	Ghatabalijodi	Tanda	Tenda	Banthiapada
<b>Name of the management committee</b>	Ramasahi jangal surakshya committee	Mandam jangal surakshya committee	Ghatabalijodi jangal surakshya committee	Tanda jangal surakshya committee	Sinduragaura jangal surakshya committee	Banthiapada jangal surakshya committee
<b>Total members</b>	12	7	15	15	16	7
<b>Maximum annual income in the group (INR)</b>	48,300	42,000	48,000	56,000	1,00,000	90,000
<b>Minimum annual income in the group (INR)</b>	40,000	36,000	42,000	46,100	35,000	32,000
<b>Coefficient of variation of income</b>	5.81	6.56	4.06	6.1	37.79	38.84
<b>Number of Schedule caste members</b>	0	0	0	0	0	0
<b>Number of Schedule tribe members</b>	12	7	10	9	16	7
<b>Others</b>	0	0	5	6	0	0
<b>Status of heterogeneity in the management committee</b>	Economic and social homogeneity		Economic homogeneity but social heterogeneity		Economic heterogeneity but social homogeneity	
<b>Institutional stability</b>	High		Medium		Low	

Source: Field survey data

The management institutions in the villages of Ghatabalijodi and Tanda in the Keonjhar district are named after the respective villages as Ghatabalijodi jangal surakshya committee and Tanda jangal surakshya committee, respectively. The roles and responsibilities of the two institutions with respect to CPR forests are the same as discussed in the case of the villages in the Mayurbhanj district. The Ghatabalijodi jangal surakshya committee has a total of 15 members out of which 10 members belong to the STs and the remaining belong to households other than STs. It can be noticed from the table that the maximum and minimum average annual household incomes of the members in the committee are INR 48, 000.00 and INR 42,000.00 with a CV of 4.06. Similarly, The Tanda jangal surakshya committee has 15 members and the STs and non-ST members are 9 and 6 respectively. In this committee, the maximum and minimum average annual household incomes of the members were found to be INR 56, 000.00 and INR 46, 100.00 respectively with a CV of 6.10. An investigation into the group characteristics of both the villages reveals that the management committees are

*heterogeneous* in terms of *social stratification* but *homogeneous* with respect to *economic consideration* (CVs of income are 4.06 and 6.10 respectively). With regard to their functioning, it was noticed that members belonging to higher social strata play a dominant role in major managerial decision making. The socially lower sections were not given adequate opportunity to participate in the decision-making process. Their participation is limited and they feel that they should have been given a more equitable treatment. Such unequal treatment led to conflicts among the members on several occasions in the past leading to poor outcomes in CPR forest management. The user group's perception about the functioning of the committee is not very satisfactory. Greater institutionalization, enforcement of equity in participation of the lower strata of the society and more public funding have been demanded for ensuring effectiveness and sustainability in CPR management. The management of the common forests in these villages was also found to be *less effective* compared to the management in the study villages of Mayurbhanj.

The forest management institutions in the sample villages Tenda and Banthiapada of the Balasore district are Sinduragaura jangal surakshya committee and Banthiapada jangal surakshya committee respectively. The Sinduragaura jangal surakshya committee of the village Tenda has a total of 16 members and all of them belong to the ST category. The maximum and minimum average annual incomes for the member households were found to be INR 1,00,000.00 and INR 35,000.00 respectively, with a CV of 37.79. Evidently, the 16 member committee is homogeneous with respect to social stratification but quite heterogeneous by the income variable. The CV of income which is with a value of 37.79 indicates wide economic disparity among the committee members. Members having higher household income were found to be dominating in the decision making process, indicating concentration of power in the hands of the economically better off. In the management group, economically weaker members were found to be passive in participation and in the decision making as well.

The seven-member Banthiapada jangal surakshya committee consists of members belonging to the ST category. The households' average annual income was found to vary between INR 90,000.00 and INR 32,000.00 with a CV of 38.84. This management committee has also similar group characteristics as that of the management committee in the village Tenda. The group is homogeneous with respect to social status but highly heterogeneous by economic consideration. The high CV (38.84) is indicative of presence of high disparity in the average annual income of the member households. In both the villages, the functioning of the committee was found to be poor in terms of regularity in meetings, improving the condition of the forests, benefit sharing among the users and their contribution to the quality of management practices followed. The forest management institutions these villages were found to be the *least effective* compared to those in the villages of Mayurbhanj and Keonjhar.

### **8.1.1 Participatory management in the study areas: A comparative analysis**

The field survey results obtained from the analysis of the functioning of participatory management are quite revealing. Management institutions have been most effective in the villages of Mayurbhanj district, followed by those in Keonjhar and Balasore. The effectiveness of the management institutions in respect of the common property forests were observed to be determined largely by two conditions viz, *social*



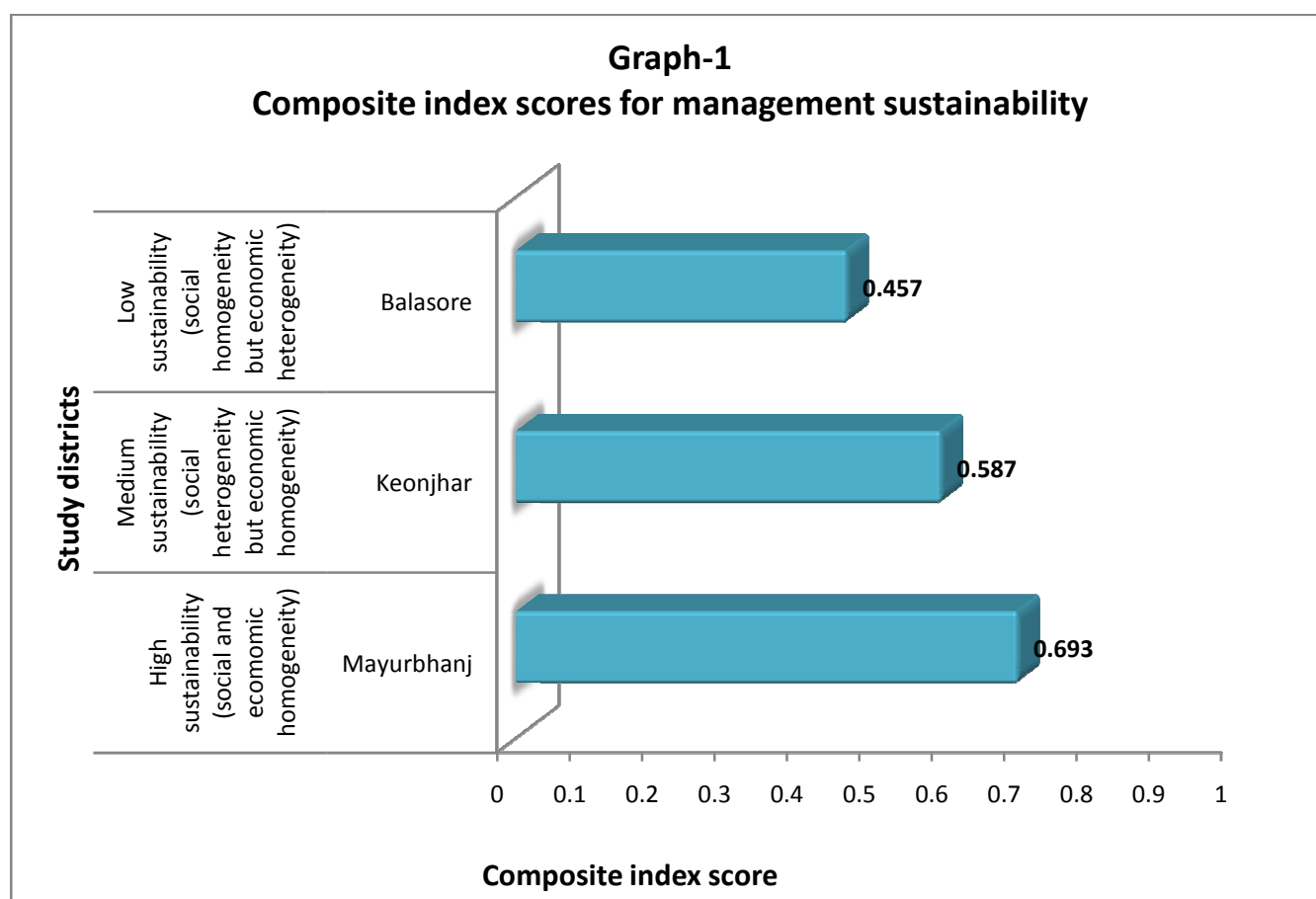
*composition* and *economic status* of the members of the management committee. The management institutions are *highly effective* in the sample villages of Mayurbhanj which are characterized by both social and economic homogeneity, *moderately effective* in the villages of Keonjhar which are socially heterogeneous but economically homogeneous and *least effective* in the villages of Balasore district which are socially homogeneous but economically heterogeneous.

A further attempt has been made to examine the sustainability of the common forest management institutions on the basis of the user group's perception about their functioning. For this purpose, seven selected indicators have been considered and the formula for their estimation has been discussed in details in the data and methodology section. **Table-4** has recorded the average scores of the seven selected indicators and the composite index scores for the three survey districts.

Indicators	Districts		
	Mayurbhanj	Keonjhar	Balasore
1. User groups' assessment of management system	0.785	0.570	0.392
2. Behavior towards users	0.820	0.470	0.392
3. Equity consideration	0.730	0.600	0.427
4. Resource conservation/regulation	0.700	0.505	0.412
5. Promptness in decision making	0.470	0.655	0.305
6. Strict adherence to rules	0.520	0.612	0.495
7. Provision to check illegal logging/intrusion	0.827	0.702	0.780
<b>Composite index score</b>	<b>0.693</b>	<b>0.587</b>	<b>0.457</b>
<b>Institutional sustainability</b>	<b>High</b>	<b>Medium</b>	<b>Low</b>

Source: Field survey data

A comparative analysis of the composite index scores on management sustainability for the three districts also suggests that community management is highly sustainable (Index value = 0.693) in Mayurbhanj district followed by Keonjhar with medium sustainability (Index value = 0.587) and Balasore where sustainability is low (Index value = 0.457). The afore-mentioned composite index scores re-affirm our subjective findings on the relationship between the socio-economic status of the members of the management committee and institutional sustainability. The same has been depicted in the **Graph-1**.



Source: Field survey data

## 8.2 Common property forest resource sustainability in the sample villages.

The need for sustainable forest resource systems in poor and developing states is well established. They are the primary producers with large subsistence sectors depending heavily on their natural resources like forests, land and water. High population growth, acute poverty, widespread unemployment and unskilled nature of human resources make people critically dependent on CPR forests for their livelihood. Overexploitation of CPR forest resources and their depletive uses causes a collapse of the resource system and will cease their main livelihood support opportunities as well as the environmental basis of economic growth leading to poverty and overexploitation and hence perpetuation of the vicious circle. All of us must, therefore, be sensitive to forests, especially with the rapid degradation of forest cover and forest resources. We must no longer sacrifice the forests for the sake of economic growth and shift focus from growth per se to the sources and quality of growth.

In our study on common property forest dependency of the rural households it was found that the sample households are heavily dependent on CPR forests for making their livelihoods, household enterprises and incomes. Irrespective of the district characteristics, the degree and extent of dependency was found to be very high across all the six sample villages. Colossal poverty, widespread unemployment and lack of adequate gain full employment opportunities were the important determining factors for such high dependency.

During the survey it was revealed that almost all the sample households were dependent on CPR forest some way or the other way round throughout the year. Heavy dependency in terms of resource use and extraction may pose serious threat to the long-run sustainability of the CPR forest resources in these areas. The per household availability of common property forest resources for the sample villages in the study districts Balasore, Mayurbhanj and Keonjhar were estimated at 0.73, 2.75 and 2.04 acres respectively. CPR forest area per household was found to be the highest in the sample villages of Mayurbhanj (2.75), followed by those of Keonjhar (2.04) and Balasore (0.73) in that order. This indicates that among the sample villages there is remarkable variation in per household availability of the CPR forests. The village profiles suggest that such variation exists owing to two important factors i.e., the amount of total CPR forest area at village level and the number of households in the sample villages. However, at the aggregate household level the average CPR forest area of 1.32 acres may be considered to be quite substantial. For the 210 samples the percentage share of households' forest income in the annual average income was found to be 30.97 per cent. The highest contribution of the forest income in total household income has been observed for the Mayurbhanj district (38.59 per cent), followed by Keonjhar (31.42 per cent) and Balasore (26.01 per cent). However, such a high degree of dependency on CPR forest resources may put a big question mark on intergenerational resource allocation and resource sustainability in the state. An attempt has been made here to study the sustainability aspects of common property forest resources in the study areas.

### **8.2.1 Analysis of resource sustainability by quantitative indicators - Current status preceding 10 years.**

In order to examine the sustainability aspect of the common property forest resources in the study areas, the sample households were asked to give a comparative picture of the current status of CPR forests in quantitative terms in respect of 6 selected indicators (discussed in the data and methodology section). The responses were collected from the sample households for two points of time i.e., as on the date of survey and 10 years preceding the survey year and the average response values of each of the indicators have been recorded in **Table-5**. To make the data compatible, distance was measured in kms, value of NTFPs were estimated at the current prices (INR), fuel wood collection was measured in kgs and life of plants cut was taken in years. The percentage changes (increase/decrease) have been provided in the parenthesis.

Table-5

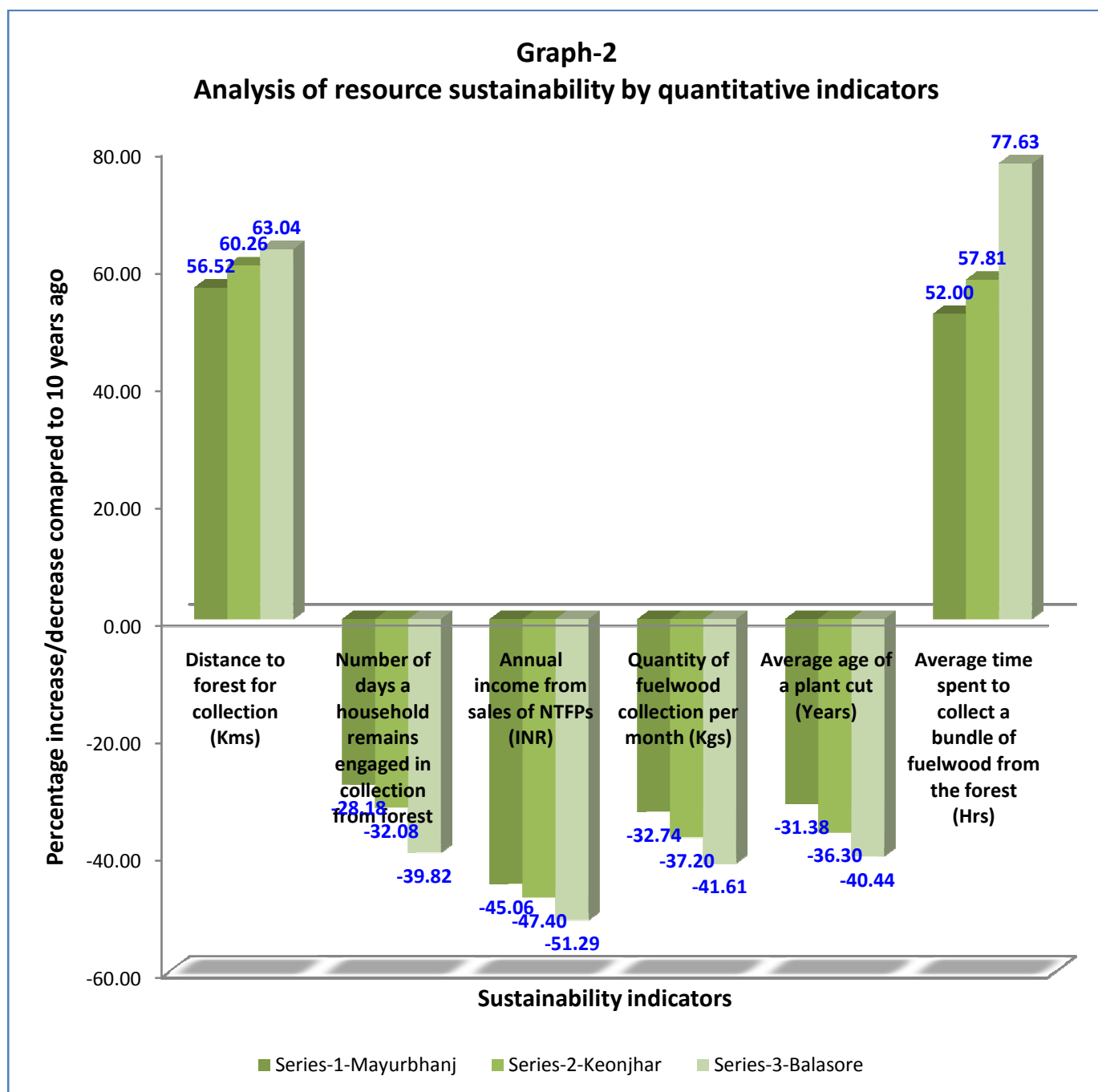
Changes in the values of the indicators compared to their status 10 years preceding the survey year

Districts	Mayurbhanj		Keonjhar		Balasore	
	10 years ago	Now	10 years ago	Now	10 years ago	Now
1. Distance to forest for collection of material and firewood (Kms)	0.69	1.08 (56.52%)	0.78	1.25 (60.26%)	0.46	0.75 (63.04%)
2. Average time spent to collect a bundle of fuel wood from the forest (Hrs)	1.00	1.52 (52.00%)	1.92	3.03 (57.81%)	1.52	2.70 (77.63%)
3. Number of days a household remains engaged in collection from the common forest	28.96	20.80 (-28.18%)	25.00	16.98 (-32.08%)	22.10	13.30 (-39.82%)
4. Annual income from sales of NTFPs (INR)	6312.50	3467.81 (-45.06%)	3772.00	1984.07 (-47.40%)	3342.29	1628.01 (-51.29%)
5. Quantity of fuel wood collection per month (Kgs)	473.07	318.21 (-32.74%)	404.40	253.96 (-37.20%)	362.71	211.80 (-41.61%)
6. Average age of a plant cut (Years)	29.45	20.21 (-31.38%)	38.84	24.74 (-36.30%)	14.12	8.41 (-40.44%)

Source: Field survey data

Note: The figures in ( ) records percentage changes

It is clearly revealed from the table that irrespective of the survey districts, the status of common forests has undergone serious deterioration over time. However, the degrees of deterioration have varied across the sample villages in the respective districts. A comparative analysis at the two time points suggests that “Distance to forest for collection of material and firewood” have increased remarkably. The highest increase in distance (in Kms) was recorded in the villages of the Balasore (63.04%) followed by Keonjhar (60.26%) and Mayurbhanj (56.52%). Similarly the “Average time spent to collect a bundle of fuel wood from the forest (in Hrs)” has increased and the percentage increases are 77.63%, 57.81% and 52.00% in the sample villages of Balasore, Keonjhar and Mayurbhanj respectively. This is suggestive of the fact that the common forests have deteriorated in terms of availability of material and firewood as a result of which there has been a substantial increase in distances and collection times. For collecting materials from the common forests, the “Number of days a household remains engaged” was found to have declined across the districts. The percentage declines are 39.82%, 32.08% and 28.18% in the respective districts. With regard to the indicator, “Annual income from sales of NTFPs (INR)”, similar observation was made. The respective percentage decline figures are 51.29%, 47.40% and 45.06%. Such significant declines in the frequencies of access to forest by the households and the reduction in the collection values of NTFPs may be attributed to quality deterioration and less availability of material from the common forests. The quantity of fuel wood collection per month by the households have also declined during the period and the highest percentage decrease has been recorded for the district Balasore (41.61%), followed by Keonjhar (37.20%) and Mayurbhanj (32.74%). The average age of a plant cut (Years) from the forests has also declined in all the sample villages and the percentage decline for Balasore, Keonjhar and Mayurbhanj are 40.44%, 36.30% and 31.38% respectively.



Source: Field survey data

The field survey results obtained against the quantitative indicators for the three districts have been presented in the **Graph-2**.

### 8.2.2 Analysis of resource sustainability by qualitative indicators - Current status preceding 10 years.

As a useful supplement to our analysis on sustainability of common property forest resources discussed above, further investigation has been made to obtain information from the sample respondents on four qualitative indicators. The statistics has been given in **Table-6**. The sample households were asked to provide a comparative picture of the current state of CPR forest following a subjective approach. Here also the

responses were collected for two points of time i.e., as on day of survey and 10 years preceding the survey. The results have been discussed here.

It may be noted from the table that none of the respondents in the selected villages of Balasore district reported no-change in 'forest area' during the last ten years. 85.71 per cent of the households indicated that the area has reduced moderately and 14.29 per cent viewed the decline as substantial.

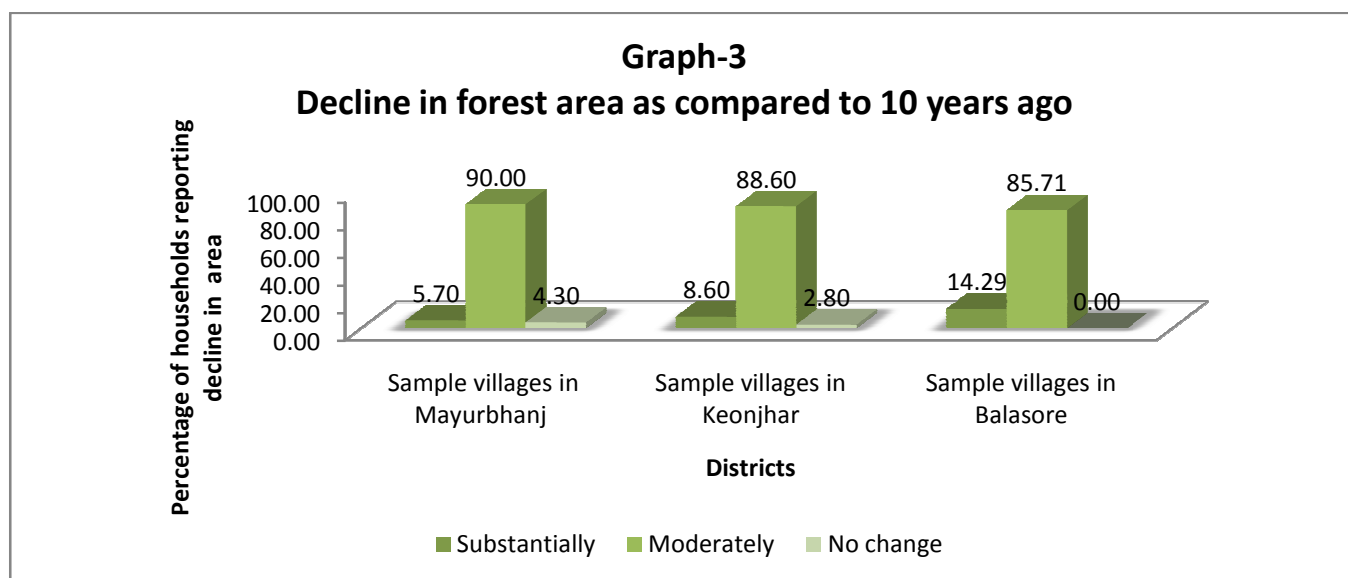
<b>Table-6</b>			
<b>Percentage of the sample households response</b>			
	<b>Sample villages in Mayurbhanj</b>	<b>Sample villages in Keonjhar</b>	<b>Sample villages in Balasore</b>
<b>Decline in area (%)</b>			
Substantially	5.70	8.60	14.29
Moderately	90.00	88.60	85.71
No change	4.30	2.80	0.00
<b>Loss of density (%)</b>			
Substantially	40.00	61.50	84.29
Moderately	57.15	35.70	15.71
No change	2.85	2.80	0.00
<b>Decline in collection (%)</b>			
Substantially	18.60	25.70	31.43
Moderately	75.70	72.90	68.57
No change	5.70	1.40	0.00
<b>Deterioration of quality (%)</b>			
Substantially	11.40	31.40	40.00
Moderately	84.30	67.20	60.00
No change	4.30	1.40	0.00

Source: Field survey data

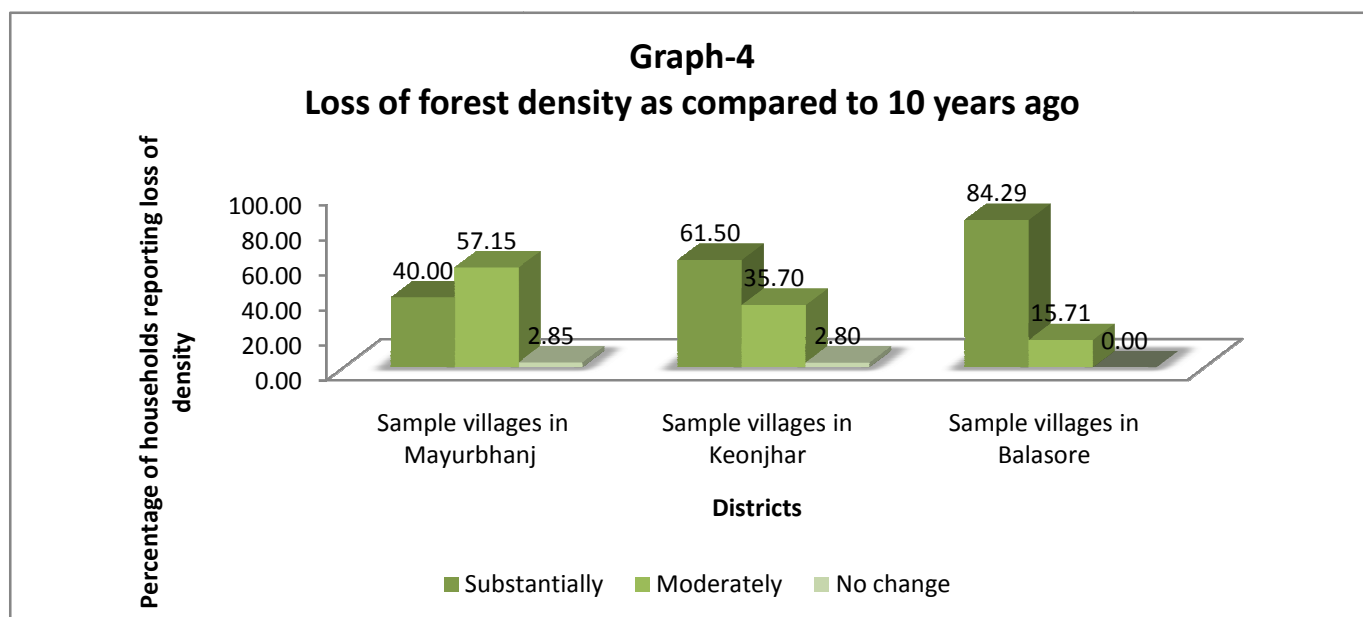
Thus the majority view ran in terms of a moderate decline in forest area over the last ten year period. For the sustainability indicator 'density' of the CPR forest, 15.71 per cent of the households have reported it to be moderately decreased and 84.29 per cent of sample households reported that it has decreased substantially. Thus, majority of the sample households were alarmed at the substantial decline in the density of forest area. This seems to be quite grave situation for sustainability of CPR forests. When the sample households were asked about their experience on collection of produces of any kind from CPR forests, 68.57 per cent of households responded that the collection has gone down moderately and 31.43 per cent reported that it has decreased substantially. For this sustainability indicator the majority view ran in terms of moderate reduction of collection of materials from CPR forests per person and per annum. Similar responses were obtained in regard to the quality of produce collected from forests, with 60 per cent of households reporting moderately and the balance 40 per cent indicating substantial quality deterioration.

A summary picture of the responses of sample households on the indicators of sustainability of CPR forests for Keonjhar district has been discussed here. With regard to the 'forest area' indicator, 2.80 per cent of households indicated no change, 88.60 per cent of households reported moderate decline and 8.60 per cent of households have shown it to have declined substantially. Thus the majority of households have reported a moderate decline in forest area during the last ten years. As regards the 'density' parameter only 2.80 per cent of households have reported no change, 35.70 per cent of households indicated a moderate decline and 61.50 per cent of households have reported the density of CPR forest land to have declined substantially. In respect of sustainability of CPR forest land the situation is very grave in the sample villages of Keonjhar. The sample households' response on 'collection of produces' from CPR forests shows that only 1.40 per cent of households reported no change while 72.90 per cent of households indicated that the collection has gone down moderately and 25.70 per cent of households reported it to have decreased substantially. For this sustainability indicator the majority response indicated a substantial decline. On the issue of 'quality of produce' only 1.40 per cent of households indicated no change as against 67.20 per cent of households reporting moderate decline in quality of product and 31.40 per cent of households pointing to substantial quality deterioration.

In the case of Mayurbhanj district the situation is comparatively better. For the indicator 'forest area' only 4.30 per cent of households indicated no change in area during the last ten years, 90.00 per cent of households indicated the area to have decreased moderately and 5.70 per cent of households reported that the area has decreased substantially. Thus a vast majority of the households' response was in terms of a moderate decline in forest area. With respect to 'density' indicator only 2.85 per cent reported no change in density of forests while 57.15 per cent indicated a moderately decline and 40.00 per cent have reported that the density of CPR forests has decreased substantially. It paints a grave situation for the future sustainability of CPR forests in the sample villages of Mayurbhanj. The sample households were also asked about their experience on collection of produces from CPR forests. On this issue 5.70 per cent indicated no change, 75.70 per cent responded the collection to have gone down moderately and the balance 18.60 per cent reported the collection to have reduced substantially. For this sustainability indicator majority of the sample households indicated a moderate decline in collection. In respect of the indicator 'quality of produce' 4.30 per cent reported no change in quality of collection from forests, 84.30 per cent indicated a moderate deterioration and 11.40 per cent viewed the quality deteriorated as substantially. On this score also, the major response has been in terms of a moderate deterioration. Graph-3, graph-4, graph-5 and graph-6 have summarized the findings of the households' responses on the selected qualitative indicators.

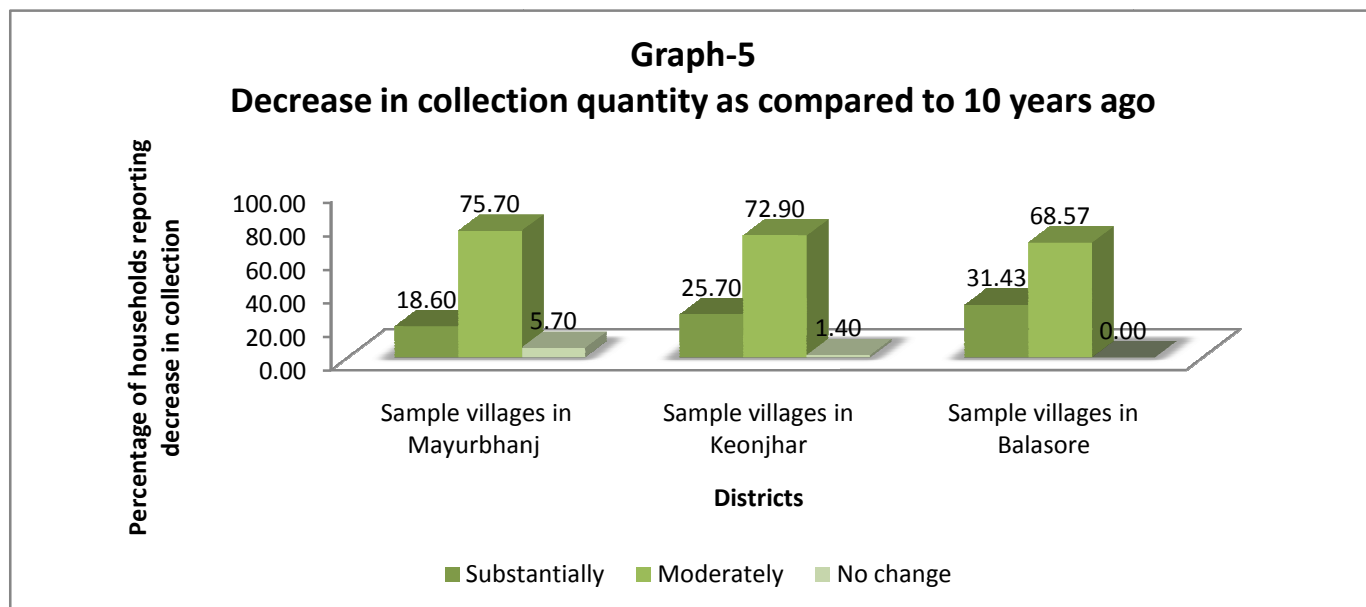


Source: Field survey data

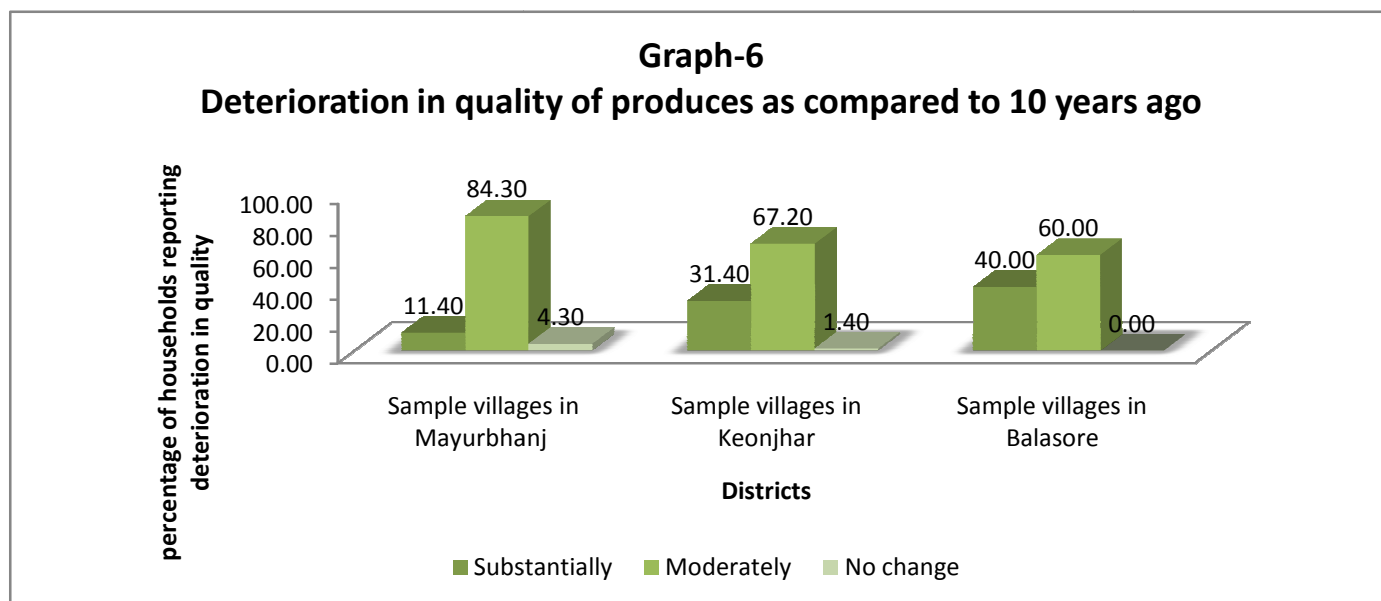


Source: Field survey data





Source: Field survey data



Source: Field survey data

## 9. Conclusion and policy implications

The results obtained from the responses of the sample households on the issue of sustainability of common property forests are quite revealing. They show a substantial reduction in status relating to forest area, density of forest, collections and quality of forest produce over time. This means that sustainability of common forest resources has been affected negatively in the process of extraction of materials from common forests and implementation of development projects which use forest materials one way or the other. However, the reduction in status of area, density, collections and quality are not uniform across space. The

decline is reported to be the lowest or alternatively, the threat to resource sustainability is the least in the villages of Mayurbhanj followed by Keonjhar and with Balasore at the end of the ladder. The findings based on quantitative indicators also indicate increase in the distance to be travelled to collect materials and time required to collect a given amount of produce from forests, and decline in the number of days per month a person is engaged in collecting materials, income from sales of NTFPs, fuel wood collection per month and average age of plant cut. These results show that sustainability of common property forest resources has reduced phenomenally over the years. Unsurprisingly, the impact has been non-uniform across the study areas. Among the three selected districts, the situation is the best in Mayurbhanj, worst in Balasore with Keonjhar in the moderate path on the sustainability scale.

Our study on management of CPR forests and their relationship with socio-economic heterogeneity yields interesting results. It reveals that presence of social and economic homogeneity/heterogeneity among the members of the forest management committee exerts considerable influence on the effectiveness and sustainability of these institutions. Management has happened to be more effective and sustainable where social and economic homogeneity is ensured among the committee members, but has become less effective and less sustainable where social and economic heterogeneity had made its presence.

Spatial variations in resource sustainability also bear a close link with the variations in effectiveness of management mechanisms operating in the respective areas. It is observed that the districts where management is more sustainable are the districts where resources are less unsustainable and vice versa. This suggests that socio-economic heterogeneity among the members of the management institutions has a negative bearing on its effectiveness in managing common property forests.

It has been observed that dependence and pressure on the existing common property forest resource system is higher than the acceptable level. The extraction of materials from forest is too high and management is too inadequate to pose serious threats to the future sustainability of existing management mechanisms and resource systems. In the interests of providing livelihood support to the forest dwellers, indigenous tribal communities and households living close to the forest areas as also of ensuring sustainability of forest resources, conservation and promotion of common forests assumes priority significance. It is imperative to take initiatives at local, sub-national and national levels by indigenous people, government administration, non-governmental organizations and the civil society at large to conserve, protect and facilitate regeneration and growth of the forest resource system. The findings of the study and observations made above have significant implications for corrective and promotive policy.

Lack of off-forest income earning opportunities tends to put heavy pressure on common property forest resources leading to their unsustainable use, degradation and quality deterioration. Appropriate measures need to be taken to provide off-forest employment opportunities in the village areas. Expansions of educational avenues have a vital role in this respect. Education can be a deterrent to manual labour for exploiting forests; it can also make them aware of the dangers of overexploitation and the need of planting trees and creating social forestry.

The existing legal system in the state is prohibitive rather than promotive. It tries to prevent the entry of people into protected and reserved forests, let alone extracting materials from them. History teaches us that restrictionism is a new form of the Raj and it promotes piracy, pilferage and corruption. Our experience with the forest laws and their implementation only reaffirms this. What is needed is to allow people to collect low priced regenerative fuel wood and other NTFP kind of requirements by the people but prohibitive restrictions on over-extraction of less regenerative high priced forest products by the privileged minority. Controlled harvesting of these resources through government outlets will address both equity and resource sustainability.

The indigenous people have an undeclared and unwritten right over common forests. They have a tendency for controlled harvesting of the common forests and motivation for facilitating their regeneration. The JFM form of participatory management system in the state, though devised to ensure broad based participation in the management decision making process, has not proved successful. It achieved neither joint management nor participatory management. The officials of the forest department still hold the key and operate the management system to their own advantage through a handful of village level power elite with others being passive actors in the process. Most importantly, while forming village level institutions, due care need to be taken to include members from all social strata, economic background, gender and ages. The official functionaries of the state should provide funds and act as facilitators for the forest promotion activities.

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