Achieving Conservation and Livelihood : A Case Study from Orissa, India

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ABSTRACT

The forest policies are primarily reviewed from time to time on the assessment of function of formal/state institutions responsible for conservation and management of forest. However, a variety of informal institutions embedded with social and human capitals, operating at grassroots level, do not get recognized for their conservation potential by the policy makers as these institutions are legally not recognized. Besides, there is lack of scientific methodology to empirically measure the effectiveness of these institutions. Consequently, there exists a knowledge gap between the appreciation of issues between the policy establishment and that of the stakeholders at the local level. Through an interdisciplinary approach, we provide empirical evidences in favour of local institutions regulating community based forest management (CFM) in the state of Orissa, India and present model for sustainable development.

The integrated approach of remotes sensing, GIS and field inventory developed in the study is an important scientific contribution to monitoring of the forest cover and livelihood studies at a village level, where majority of CFM operates. By virtue of statistical soundness of the methodology, the study has provided convincing and easily understandable results in favour of community based forest management in Orissa as a viable option towards forest protection and management. The comparative analysis on the livelihood patterns in the three districts of the state revealed that CFM has contributed towards forest protection and regeneration; however, the potential of forest towards livelihood enhancement is not yet fully realized. The study further discusses a model to achieve ecological sustainability on one hand and enhancing incomes of the forest-dependent communities on the other hand.

Key words: Community based forest management, Integrated Natural Resource Management, Ecological sustainability, Livelihood enhancement

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INTRODUCTION

The majority of 'forest management units' are designated either on the basis of forest characteristics or to suit administrative objectives. However, the most elementary unit that manifests interactions between forests and forest-dependent communities, and at which social and natural processes operate together, is the village (or hamlet). As a result, these existing management units do not provide a proper basis for assessing the community-forest relationship, or for policy initiatives to enhance community livelihoods while achieving effective conservation. In the absence of such a comprehensive approach, the real impact of the shift in natural resource management (late 1980s and 1990s) towards a more decentralized governance with active community involvement in management decisions (Goodland 1987; Ostrom 1990; Wondolleck and Yafee 2000; Schweik et al. 2003; Pretty, 2003; Wollenberg et al. 2007; Agrawal et al. 2008) has not been adequately realized. This underlines the need for an interdisciplinary approach to assess the interaction between natural and social processes at a village level that could contribute in the process of planning interventions for sustainable management of natural resources (Kremen et al. 1994; Bellarmy et al. 2001; Nagendra et al. 2005).

Community Forest Management

Community forest management is generally active towards protection of a forest patch and its regulation for resource use. This management regime is found to be operational in area irrespective of its ownership, which could be either in community owned or government owned land. Further, it is recognized that the effectiveness of forest governance is independent of formal ownership (Agrawal et al. 2008) but positively correlated to social capital and the collective management of resources (Pretty 2003). Among developing countries like Nepal (Agrawal and Ostrom 2001) and Mexico (Bray and Klepeis 2005), community forestry is promoted/initiated by the State and therefore it is recorded and can be periodically assessed. However, in India, on the other hand, with a large forest-dependant population, many communities have evolved their own local institutions for sustainable management of forest resources (Kant et al. 1991; Pal 2000; Nayak and Berkes 2008). These institutions are born out of a self-realization by the local communities for forest protection, rather than as a result of extraneous considerations like the availability of external financial/technical aid, and operate at the level of a village or a cluster of villages. The rules and regulation pertaining to resource use from the forests are collectively decided by the village communities and monitored by elected representatives. Such institutions are, hereafter referred to as "CFM" and are assessed for their impact and potential towards forest protection and livelihoods enhancement.

Recognizing the need for people's participation, Government of India has also introduced Joint Forest Management (JFM) in 1990, mandating the state and resource users to work in partnership for rehabilitation of degraded land through formation of village level committee. Though JFM has been implemented, their functioning is a cause for concern. Lack of community participation, ineffective leadership, lack of statutory institutional support, bureaucratic and political factors (lack of will), external

factors (insecure flow of fund) and tenurial security are the major concerns that need to be addressed to make JFM effective (Andersen 1995; Kumar et al. 2000; Saigal 2000; Murali et al. 2003; Singh et al. 2005; Matta and Kerr 2007; Nayak and Berkes 2008). However, in the process of the implementation of JFM, some of the already existing CFMs were replaced by JFM. Such replacement impacted the functioning of CFM adversely; nevertheless many CFM did not join the JFM and continued to exist independently (Singh et al. 2005; Nayak and Berkes 2008).

The potential of these institutions (CFM) for protection of forest resources and enhancing livelihoods has not been scientifically and quantitatively analyzed till date. The reasons for this are lack of a scientific methodology to ascertain the spread and impact size of CFM villages and assess the interplay of natural and social processes at the village level (Bawa et al. 2004) and also Forest Department's reluctance for its recognition. As a result, the potential contribution of these CFM institutions to resource management is not made use of by the policy makers (Singh et al. 2005).

We present our study and findings of CFM institutions in the Indian state of Orissa. Our main objectives here are threefolds: 1. to develop an approach to estimate the spread and quantify the impact of CFM on forest protection; 2. to assess forest's contribution to people's livelihoods; and 3. to recommend a model for sustainable forest management. The results have significant implications for forest policy, and will critically inform the debate on community-based forest management for government officials, policy makers, communities and national and international non-governmental organizations working on these issues.

METHODS

The methodology for locating CFM villages and assessing the impact of CFM on forest protection makes use of multi-date high resolution satellite remote sensing techniques combined with ground truth. On account of financial reasons, this part of the study was carried out in Kandhamal only; whereas studies on contribution of forests to overall livelihoods of the forest-dependent communities, were conducted in three districts of Orissa, viz., Kandhamal, Mayurbhanj and Koraput. Districts were chosen to represent the range of population distribution, forest cover, stages of economic development and degrees of awareness towards community based forest management occurring in the state.

To achieve our first objective, we first prepared a comprehensive list of CFM villages. CFMs are not legally recognized, therefore, there was no formal/reliable list of these villages. This was done through collating the names of CFM villages from the literature survey, intensive interviews with knowledgeable people and grassroots non-governmental organizations (NGOs) working on CFM. We wanted the list to correspond to revenue villages so that locations of villages are reliable and we could produce the comparable change map at the village level. A revenue village is the lowest mapped entity and other socio-economic data collected by National Census Organization are also available at this scale. In a typical setting of forest dependent villages, a revenue

village may consist of a single hamlet/multiple hamlets/no hamlet; hamlet is not legally recognized or mapped entities. Therefore, the task was made especially difficult because the prepared list of CFM villages included both revenue villages and tiny hamlets.

The above database on villages practicing CFM was matched with the directory of village names prepared by the National Census Organization. This enabled us to classify all revenue villages into two groups, CFM and Non-CFM. The former group contained 426 villages. We randomly selected 26 villages from the first group for an in-depth evaluation, especially for field verification of the CFM status and assessing forest area change, livelihood analysis and also to understand the structure and function of CFM institutions. During the field work, we found that the occurrence of many more villages practicing CFM, many times the number reported by NGOs or listed in literature. This prompted us to look for an integrated method using remote sensing and GIS, combined with field survey.

Use of Remote Sensing and GIS Method

We produced geo-referenced maps of all census villages in six administrative regions ("blocks") of Kandhamal district. We then conducted an assessment of forest cover change using two-date high resolution satellite data (1990 and 2000) and overlaid on village maps. Images used in this study were US Landsat Thematic Mapper (TM) of November 11, 1990 and November 8, 2000. After super-imposing the change map on the Census Maps, we produced information on forest area change by census villages maps made in 2001 census (Fig. 1).

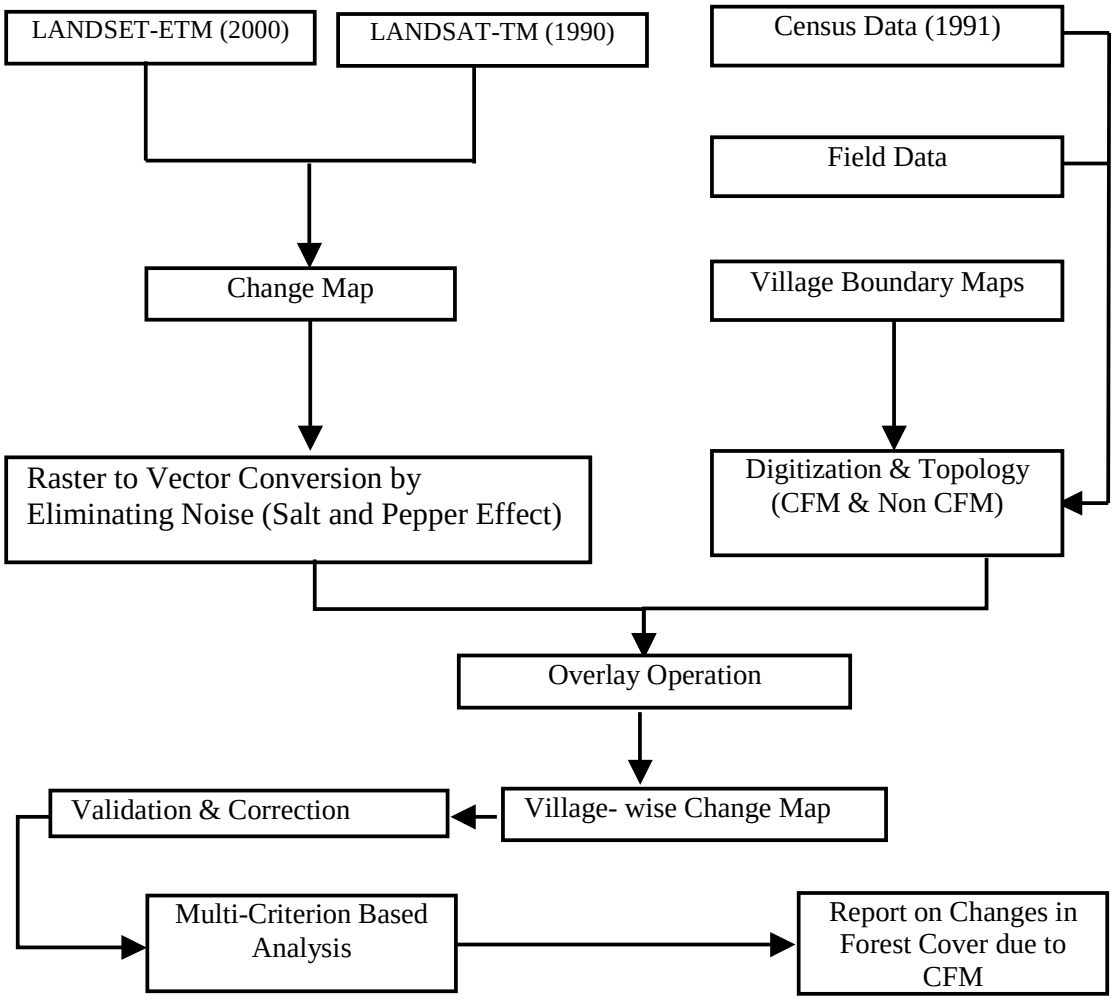

Fig. 1 A schematic presentation of the methodology on application of remote sensing and GIS

Ground Validation of CFM list and Satellite Data Interpretation

It is important to mention here that we first began with one-stage sampling for validation of remote sensing results in 26 villages spread in 19 Gram Panchayats (GP) and 6 Blocks. All the changes observed on the ground were reincorporated to produce the final change map based on remote sensing and GIS.

While validation, we found that 4 villages listed as CFM in our final list, were not found to be practicing CFM on ground. This entailed us to develop a two stage sampling approach for validating remote sensing change assessment and classification of villages as practicing or not practicing CFM. The first stage of sampling was formed by

Gram-Panchyats (GP) and the second stage was formed by individual villages. GP consists of a group of villages, officially belonging to three-tier administration, (GP-Block-District), as prevalent in India.

Livelihood Analysis

As mentioned earlier, livelihood analysis was done in all the three districts using one- stage in Kandhamal of 26 villages and two-stage sampling approach in Mayurbhanj (20 villages) and Koraput (17 villages) districts. Participatory rural appraisal techniques were followed. Meetings were convened in each selected village and three major source of livelihood were identified that include forest, agriculture and daily wages. After this, people were requested to indicate the contribution under each source.

RESULTS AND DISCUSSION

Findings of Remote Sensing and Field Survey

The forest change matrix (1990 and 2000) showed that community managed systems were very wide spread in the district, significantly much more than commonly believed and covered almost all of the forests of the district. The forest change pattern, in terms of reforestation and deforestation (Table 1), was practically comparable all over. This gave an indication that villages listed as Non-CFM by NGOs seemed to practice CFM. This was confirmed during the field survey.

Table 1. Land use change assessment (%) based on 1990 and 2000 remote sensing images

Land Use	Sample villages (26 villages)	CFM Group (426 villages)	Non-CFM Group (949 villages)
Pixels (%) with no change in remote sensed attributes			
Forest Cover	24	30	40
Non-forest Cover	62	54	44
Total	86	84	84
Pixels (%) with change in remote sensed attributes			
Reforestation	11	12	12
Deforestation	03	04	04
Total	14	16	16

One possible reason for above could be that many reported CFM-practicing hamlets had escaped the notice of non-governmental organizations (NGOs), when they compiled the list. This could have happened because villages in non-CFM stratum are on an average located in more remote forested regions. This is evident from the result of remote sensing that the probability of no change of forest area is higher for non-CFM stratum as compared to CFM Stratum.

Another plausible reason could be that the process of finalizing the list of CFM villages by comparing Census Village Directory and NGO list, might have resulted in systematic exclusion of many CFM villages from the stratum as some CFM village names were only recorded by their specific hamlet names, which are not mentioned in the Revenue Village Directory (villages often comprise multiple hamlets). In addition, CFM has strong demonstration effect in this particular district, as observed during the field survey, leading to its continuous spread in other adjoining villages. CFM started in more accessible villages where natural resources have become scarce, after self-realization of the communities for the need of forest protection. The up-gradation of CFM list by NGOs is not as spontaneous as its spread due to its own organizational and financial constraint and therefore the incomplete information on the exact count of CFM villages. This also highlights that there is need for robust filed survey coupled with remote sensing and GIS in order to ascertain/assess the impact of these informal institutions.

The field survey made use of two-stage sampling in 19 village clusters (called as Gram Panchayats) distributed in 6 blocks revealed that number of CFM villages was 2.15 times more than appearing in the NGO list. The number of CFM villages was 1.33 in Mayurbhanj and only 0.60 times in Koraput district. This is very important and innovative approach to assess the spread of informal institutions, which are not documented due to its non-legal entity. These findings highlight the great divide of knowledge and information, and lack of existing assessment methods to capture ground realities in the hinterland.

The results provided scientific evidence for an integrated scientific approach to assess community's efforts towards protection as well as the regeneration of degraded lands. This had not been so far appreciated by the Forest Department because these initiatives did not form a part of government sponsored program and lack of continuing monitoring system. In generic terms, such ecological changes are attributed to the resource use decisions made by households and local communities in pursuit of immediate survival and livelihood security, which are influenced by the policies, institutions and technologies that impact on their lives. Such decisions are the main determinants of links between poverty elimination, improved land care and sustainable livelihoods (Jones 1999). However, in the present context, the increasing trend of forest cover in post-90 of Kandhamal district could partly be attributed to origin and spread of CFMs, which are operating at the village level.

Kandhamal district recorded a continuous decline in forest cover (from 81% to 53.7%) between 1960 and 1990 (Sahu and Das 1997) with no commensurate enhancement of livelihoods indicating that the external investments and government interventions did not seem to have a trickle down effect. The awareness among the communities towards conservation dawned around 1990 when the communities realized that they had to assume responsibility and avoid threats to their livelihood themselves. The field survey also revealed that the origin of CFM as a movement started around 30-40 years back, however, 73% of the villages adopted CFM only in the

last 10-15 years (Fig. 2), which assumed the form of a mass movement. The trend indicates a strong demonstration effect of CFM, which could be attributed to reversal of the historic trends of deforestation in the study area (53.7% in 1990 to 67.2% in 2001). It may be noted that Government of India also launched a nation-wide programme in the same year towards rehabilitation of degraded land under Joint Forest Management (JFM), involving people's participation. We also assessed the awareness and responses of the communities towards JFM, which revealed that only 30% of villages joined JFM, that too at a much later stage, mainly to get symbolic rights over the patch of forests to overcome inter-village conflicts. This reiterate that the origin and spread of the CFM is autogenous as it is borne out of people's self-realization towards need of forest for meeting their critical livelihood and is free from any external financial input. On the contrary, JFM is project driven and requires financial support for its implementation. The shift from state to co-management (JFM) is an appropriate step given the realities encountered in India. However, the insecure, incomplete and often incoherent transfer of specific rights from the state to local communities, information asymmetries and lack of accountability, all together, question the efficiency of JFM (Behera and Engel 2006).

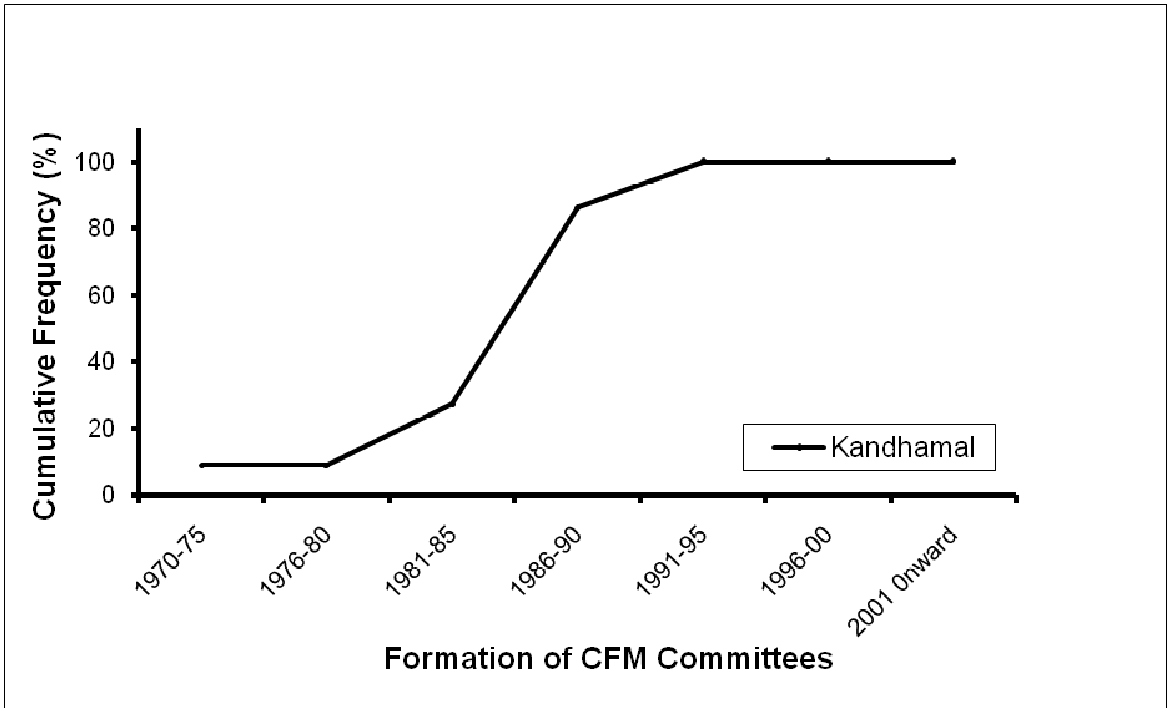

Fig. 2 Formation of CFM committees over the last three decades in Kandhamal district

Planning and control of CFM are steered by a village committee, either selected, or elected, following local customs and traditions. These traditional institutions are responsible for organizing meetings where rules and regulations towards management and monitoring of forest resources contained in CFM are collectively decided. In addition, these committees also decide the benefit sharing from the resources and set punitive measures (social and monetary) for offenders. The entire gamut of the issues

mentioned above are discussed and decided in the context of the village concerned and societal needs of that community. This makes them one of the most decentralized systems operating at a village level.

Livelihood Opportunities and Social Capital

Our next objective was to assess the current and potential livelihood contribution of forests. An earlier study conducted on villages living close to forests in different states of India (Madhya Pradesh, Orissa and Gujrat) showed that their dependence on forests varied from 37% to 76% (Bahuguna 2000). We sampled three districts representing different trends in depletion of forests and different levels of CFM in terms of 'social capital'. Social capital here refers to the ability of the local communities to work together for mutual benefits through protection of forests. Amongst the three districts, Mayurbhanj has a historical background of CFM. Here the CFM villages have organized themselves in to federation of villages that has enabled them to have a more effective protection regime from the bigger mafias and smugglers. This has also resulted in raising the awareness amongst communities regarding the benefits of CFM and in getting informal support and patronage from Forest Department officials and political leaders. Koraput has undergone maximum industrialization amongst the three districts and the number of CFM villages is on decline as observed during the survey. The contribution of forests to livelihood varied from 8% to 41% (Table 2). Using this information of livelihood pattern, we estimated the current and potential future contributions of forests to the economic development with special reference to the contribution from non-timber forest products (Table 3). The current contribution of forest to livelihoods (per ha) in Mayurbhanj and Koraput is almost 6 times and 1.5 times higher, respectively, than that of Kandhamal, despite the fact that Kandhamal has the maximum forest cover. These differences can be attributed to the inadequate utilization of potential non-timber forest products (NTFPs) in Kandhamal, which, in turn, is a function of social capital. The inadequate utilization here mainly refers to processes of value addition and opportunities for marketing of the NTFPs. Thus, in overall development scenario of Kandhamal, NTFPs hold a huge untapped potential to contribute to livelihoods, provided the new policies enabling the communities for optimum harvest and adequate marketing is in the place. Experiences and knowledge of Mayurbhanj (where CFM operates at village federations) can serve as an example for communities of the level of Kandhamal. Further, federations at Mayurbhanj need to be strengthened by integrating with other government and non-governmental organizations as per the forest-based development model recommended, later in this paper. The strategies for Koraput have to be different. In Koraput, the focus needs to be on reversing the trend of decline in forest cover by promoting agroforestry and initiating afforestation programmes under community ownership.

Table 2. Livelihood contribution (%) along with standard deviation from different sources including the forest of the three districts (study area)

District	Kandhamal (n=26)	Koraput (n=17)	Mayurbhanj (n=20)

Agriculture	47 ± 11.2	66 ± 26.4	48 ± 20.5
Forest	30 ± 11.8	8 ± 23.3	41 ± 22
Daily wages	23 ± 12.5	26 ± 20.9	11 ± 6.8

Table 3. Potential of forest contribution to livelihood in the three districts (study area)

Variable	Kandhamal	Koraput	Mayurbhanj
Forest share to total livelihood (%)	30	08	41
Rural Population in 2001 (‘000)	604	982	2067
Forest share to livelihood (in ‘000)	181	79	847
Forest area in 2001 (000 ha)	539	148	413
Number of people meeting livelihood from per ha of forest	34	53	205

From the above analysis it can be inferred that the complete potential of CFM towards poverty alleviation (and human development) has yet to be realized by the Government and the communities themselves. In addition to its contribution to forest regeneration, and livelihood enhancement, CFM has contributed to enriching social capital, which is important for successful implementation of any development program in the long-term. This is also reflected in our study where the difference in social capital found in the three districts led to three different livelihood opportunities. In Mexico too, the substantial degree of social capital amongst rural communities has contributed to around 290-479 successful community forest enterprises that have subsequently led to enhancement in their livelihoods and employment opportunities (Bray et al. 2003).

Most of the schemes/programs aimed towards development fail in achieving their target because the development packages are not appropriate to the available social capital. Such constraints in integration of conservation and development goals between sets of stakeholders are also observed elsewhere (Brown 2003). Innovative institutions based on adaptive management, as well as more equitable and inclusionary decision-making, need to be created. We suggest a conceptual model (Fig. 3) to overcome bottlenecks in integrating different stakeholders and communities.

FOREST BASED MODEL FOR SUSTAINABLE DEVELOPMENT

In the proposed model, the central large rectangle represents local empowerment and institution building. Here, community assumes the central role in steering all of the development process and the government assumes a role as the provider of extension and support services including:

1. Development of local institutional and organizational capacity to undertake development planning and mobilizing local and external resources for provision of health care, drinking water and education;

2. Establishment of councils/cooperatives for protection and management of existing forests, creation of new (community owned) forests in deforested and degraded lands to meet their current and future needs;

3. Decentralization of the decision making structure to local level, setting mechanism for inter-departmental cooperation and promoting participation of NGOs and local people in the decision making process, recognition of the value of local production systems and cultural diversity; and

4. Promotion of local processing of forest-products and their marketing through village cooperatives, development of partnership with private sector and NGOs.

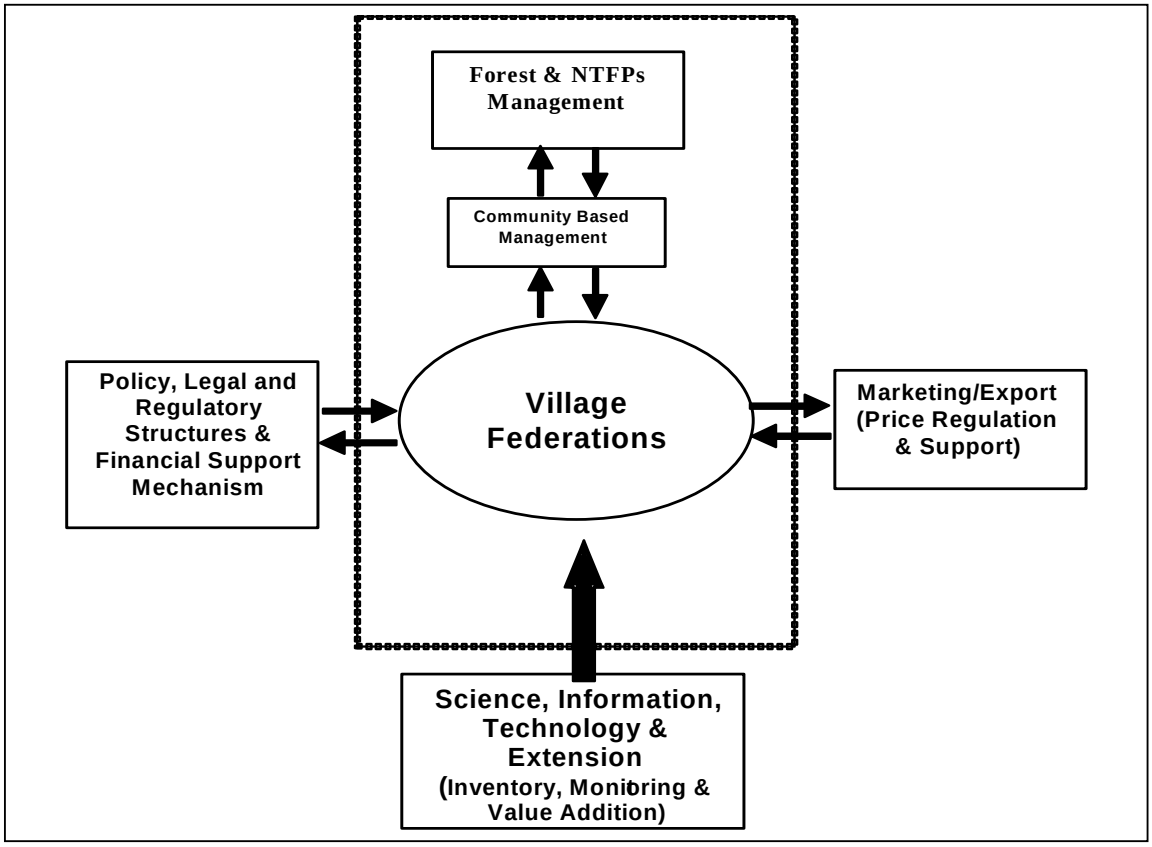

Fig. 3 A conceptual model for management of NTFPs and forest for sustaining livelihood and long-term conservation

The three smaller rectangles indicate the different supporting roles of the government and they are:

1. Establishment of legal, regulatory, conflict resolution and enforcement structures for the management of forest and common land resources; mechanism to redirect a part of revenue to the local community from the management of forests and to compensate them for the loss of revenue due to closure of area for regeneration or other technical reasons

2. Organization of science, information, technology and extension (SITE) services to support planning, monitoring and evaluation of forestry development and poverty alleviation programs and periodic reporting on the state of poverty, progress achieved and constraints in the way

3. In case of NTFPs, there is market failure as well as institutional failure. There are possibilities for private-public-partnership (PPP) in cultivation, processing, value addition and marketing of timber as well as non-timber forest products

CONCLUSIONS

The findings of our survey, structured enquiry, and analysis of remote sensing data, all reinforce each other to establish that communities are making significant contribution towards regeneration and protection of forests. However, their contribution to conservation and sustainable forest management is not adequately known or appreciated by the policy makers and outside world, because existing systems of assessment and monitoring are mainly designed for official reporting purposes. Communities also lack capacity to adequately realize the potential of forest for enhancing their livelihoods on account of communication gap arising from physical and cultural divide between them and the policy maker. Building social capital is also critical in this regard, as reflected in the comparative livelihood analysis that Mayurbhanj district with lesser resources contribute more towards livelihood.

The study provides scientific method for studying quantitative and qualitative aspects of changes in cause and effect relationship between the society and nature at the most elementary level. Further, we present a conceptual and integrated model to meet the goals of conservation and livelihoods. As a result, the study contributes towards enlarging the scope of policy making and planning in promoting conservation and livelihoods.

Acknowledgements: This work was supported by World bank/WWF Alliance Project. We also acknowledge the support of Forest Survey of India and SCIENCE (NGO) at Dehradun for the remote sensing and GIS work.

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