



## Land use planning issues in management of common property resources in a backward tribal area

Arun Chaturvedi<sup>a</sup>, T.N. Hajare<sup>a</sup>, N.G. Patil<sup>a,\*</sup>, Alka Chaturvedi<sup>b</sup>, Arvind Mungole<sup>b</sup>, Rahul Kamble<sup>b</sup>

<sup>a</sup> National Bureau of Soil Survey and Land Use Planning, Amravati Road, PO Shanakarnagar, Nagpur 440010, India

<sup>b</sup> Dept of Botany, RTM Nagpur University, Nagpur 440010, India

### ARTICLE INFO

#### Article history:

Received 14 July 2011

Received in revised form 6 December 2012

Accepted 8 December 2012

#### Keywords:

Common property resources

Resource management

Tribal

Land use planning

Sustainable livelihood

### ABSTRACT

Shrinking natural resources and high population growth over last 60 years have been a matter of concern for the Indian planners. The situation is getting especially critical for communities solely dependent on common property resources (CPRs) associated with marginal lands, leading to major problems of impoverishment. The present study was carried out in a cluster of three villages in Deori taluka (administrative unit) of Gondia district of Maharashtra state, India, listed as a backward district by Planning Commission of India. Livelihood in these villages is characterized by their dependence on declining non-timber forest produce (NTFP), shrinking CPRs, low agricultural productivity, lack of soil and water conservation measures, low productivity of livestock, high rate of migration, and lack of infrastructure and credit institutions. Based on information obtained through a baseline survey, participatory land use plan (PLUP) aimed at improved management of available resources for sustainable tribal livelihood and conserve forests was formulated and implemented. Interventions like optimal rainwater management thorough community action, pisciculture, and diversified cropping were introduced. Quantitative and qualitative evaluation of NTFP was done. As a result of scientific interventions, significant improvement in land productivity and consequently economic development was noted. Two years of implementation of the plan has indicated that sustainable land use plan could not be implemented effectively without mobilization of a proactive community. The ideal way to ensure a proactive participation is to create an impact by starting with interventions where economic benefits are quickly realized and their potentials could be easily perceptible.

© 2012 Elsevier Ltd. All rights reserved.

### Introduction

The term *common property resource* (CPR) is used in many fields like anthropology, behavioural psychology, geography, economics, political science, rural sociology and natural resources management. In traditional economic terms, as a class these resources are characterized by rivalry (one's use detracts from another's) and non-exclusivity (difficult to exclude additional users) (Randall, 1987). Common property resources constitute all such resources which are meant for common use of the communities. In the pre-British India, a very large part of the country's natural resources was freely available to the rural population. These resources were largely under the control of the rural communities. Gradually, with the extension of state control over these resources, resulting in decay of the community management system, CPRs available to the villagers declined substantially over the years. The latest [National Sample Survey Organization study \(1999\)](#) on the role of land, water

and forest commons in the life and economy of rural Indians has revealed that CPRs provide as much as 58% of fuelwood requirements and up to 25% of fodder requirements. It also provides evidence of large-scale depletion of CPRs, with CPR lands in rural India declining by almost 2% every 5 years (Goswami, 2011). Deterioration of common property resources increases the incidence of poverty level because poor people depend on forest resources. Earnings of rural people are mostly the combination of income from private property and common property resources. Reduction in common property resources reduces earnings of rural people leading them to migrate to nearby urban areas in search of livelihood. Thus, there is a link between common property resource degradation, poverty and migration (Mahanta and Das, 2012; Suresh et al., 2010). In India, the greatest decline in terms of absolute area (forest and grazing land) has been in the Central Plateau and Hills, the Eastern Plateau and Hills, the Southern Plateau and Hills and the Middle Gangetic Plains (Menon and Vadivelu, 2006). The study area (Gondia) thus represents the declining region.

In the context of Indian villages, the resources falling under CPR category include community pastures, community forests and wastelands, common dumping and threshing grounds, watershed

\* Corresponding author. Tel.: +91 712 2240881; fax: +91 712 2500534.  
E-mail address: [nitpat03@yahoo.co.uk](mailto:nitpat03@yahoo.co.uk) (N.G. Patil).

drainages, village ponds, rivers/rivulets as well as their banks and beds (Gowda and Savadatti, 2004). Unlike open access resources where people's use is on a "free rider" basis with no recognized property rights, in CPRs accessibility is exclusive with only the identified community having access to it and not others. In this sense, the resources share two broad characteristics. First, they are so large that any attempt to exclude potential beneficiaries from using them would be costly. Second, the supply of such resources is limited and consumption by one user reduces their availability to others. It is these two characteristics that necessitate collective efforts on the part of the beneficiaries for managing the resource. A large majority of over 75 billion rural population of India are dependent on CPRs for their livelihood (Pradhan and Patra, 2011) and yet the issue of land use planning in CPRs has remained neglected mainly due to the protected nature of these resources, where no change of land use is possible (as in case of forest), or the possibility of no modifications in its characteristic (as in case of village ponds, common grazing land). In practice every society has its own local level systems of resource management, which are based on the knowledge and experience of the resource users themselves (Adhikari, 2004). Land use planning issues are, however, very relevant for improved utilization of the CPR's for livelihood security. As a matter of fact, some of these CPR's play a very important role in land use decisions for their beneficiaries. Systematic evaluation of CPR's and their scientific utilization can help in significantly improving the livelihood of the inhabitants, especially in backward areas.

The planning commission of India has identified 150 most disadvantaged (backward) districts of the country on the basis of prevalence of poverty indicated by scheduled caste and scheduled tribes (SC/ST) population, agricultural productivity per worker and agricultural wage rate. An overlay of the map of these districts over the soil and land degradation map of India brings out that most of selected districts are geographically concentrated in the regions with either inhospitable terrain and/or degraded land. Many of these are regions where forest has been denuded for cultivation purpose and is inhabited mostly by tribal. The land quality being poor, there is more emphasis on the CPRs for livelihood security and tribal are often accused of illegal trading of forest produce to make a living. Gondia is one of these districts. In this paper an attempt has been made to evaluate the land use based issues in management of CPR's for their effective sustainable management to ensure livelihood security for the people living in these backward areas. The district is affected by *naxalism* movement (radical group professing communism and demanding control of forests). Among the economic issues that have been taken up by the naxal movement include land rights (for agriculture and housing), minimum wages and common property resources. Land ceiling act in India defines the quantum of land that can be held by an individual farmer. However, the federal states of India have implemented it with variable extent. The landlords invariably belonging to upper castes (upper influential section in social hierarchy) in many states continue to exercise control over excess lands well above the ceiling limits. Often they usurp village common land meant for grazing or other common purpose. Landlords have tenancy relations with marginal or landless farmers who work in the fields with share cropping arrangements. Many of them are absentee landlords. Many villagers work on their farms for wages. The arrangement over the years has created a system of exploitation and deep rooted class wars. Stated objective of the naxal movement is to restore the balance by taking over the excess lands from the landlords, distribute it to the landless/weaker people, and fight for better sharecropping or tenancy rights, housing rights especially for the tenant farmers who live at the pleasure of landlord in homesteads. Fishing rights in village ponds are also contested. The naxalites argue that local landlord always gets the fishing rights in a state held auction because other villagers are forced to allow it going unchallenged or prevented

from bidding higher. The state holds exclusive rights over forest and forest produce. Many forest dwellers practice agriculture inside forest resulting in conflict between basic livelihood rights and forest protection laws. The mining of metals and minerals and related activities inside forest are opposed by the naxalites. The disruptions stall development work frequently and thus uncertainty prevails affecting the poverty alleviation schemes and thus the vicious cycle continues. In this study, common water and forest resources have been taken into consideration mainly because of their importance in the overall livelihood of the inhabitants.

#### Location and other details of study area

The present study was carried out in a cluster of three villages in Deori taluka (administrative unit) of Gondia district in Maharashtra state. The villages, Salegaon, Zunzaritola and Khamtalao are part of the six villages selected for the sub-project "Efficient Land Use Based Integrated Farming System for Rural Livelihood Security in Aurangabad, Dhule and Gondia Districts of Maharashtra" in Gondia district approved by Indian Council of Agricultural Research under component 3: Sustainable Rural Livelihood Security (SRLS) of the National Agricultural Innovation Project (NAIP).

Gondia district is situated on North-Eastern side of Maharashtra state. The total population of this district is 1,200,151. The male and female population is 598,447 and 601,704 respectively. The SC and ST population in the district is 355,484 and 309,822. The literacy rate of district is 67.67% (Fig. 1).

Large part of the district is covered by forest. Paddy is the main *khari* (monsoon) crop. The other agriculture crops are sorghum (in patches), linseed, wheat, and pigeon-pea (grown on bunds). The main profession of people is collection of non timber forest produce (NTFP), farming, and farm labour. There is no large scale industry in the district except rice mills. The district is divided in two sub-divisions namely Gondia and Deori. Each sub-division has 4 talukas, 556 Grampanchayats, and 954 revenue villages. Gondia experiences hot summers and cold winters and an average relative humidity of 62%. It receives rainfall from south-western winds mainly in the months of June, July, August and September. July and August are the months during which the maximum rainfall occurs (mean annual rainfall 1200 mm). The villages fall under Agro-Ecological Region 10.4 described as "Satpura range and Wain-ganga Valley, hot moist sub-humid climate and shallow to deep soils with loamy to clayey mixed, Red and Black soils having low to medium available water capacity and length of growing period 180–210 days" (Velayutham et al., 1999).

The selected villages (Salegaon, Zunzaritola and Khamtalao) are contiguous and located in the North Western part of the Deori taluka. The native population depends mainly on collection of non-timber forest produce (NTFP) for living. The productivity of paddy in these villages is affected by intermittent dry spells during monsoon, low fertility of soils, and lack of soil and water conservation measures, etc. Declining forest cover, shrinking grazing lands and conflicting interests in utilizing water in community tanks (CPRs) are other features. Productivity of livestock is poor. The villagers routinely migrate for seasonal employment.

#### Soils and land use

The cluster landform consists of lower piedmont plain and narrow valleys surrounded by low hills. Soils are in general developed from mixed alluvium and/or granite/gneiss, micaceous phyllites. Four soils were identified in the village namely, *Typic Hapluster*s, *Typic Apisquerts*, *Typic Hapluster*s and *Vertic Hapluster*s based on variation in topography. The soils in hilly region under forest are shallow to deep, excessively drained to well drained, acidic and have relatively higher organic carbon. These soils are classified

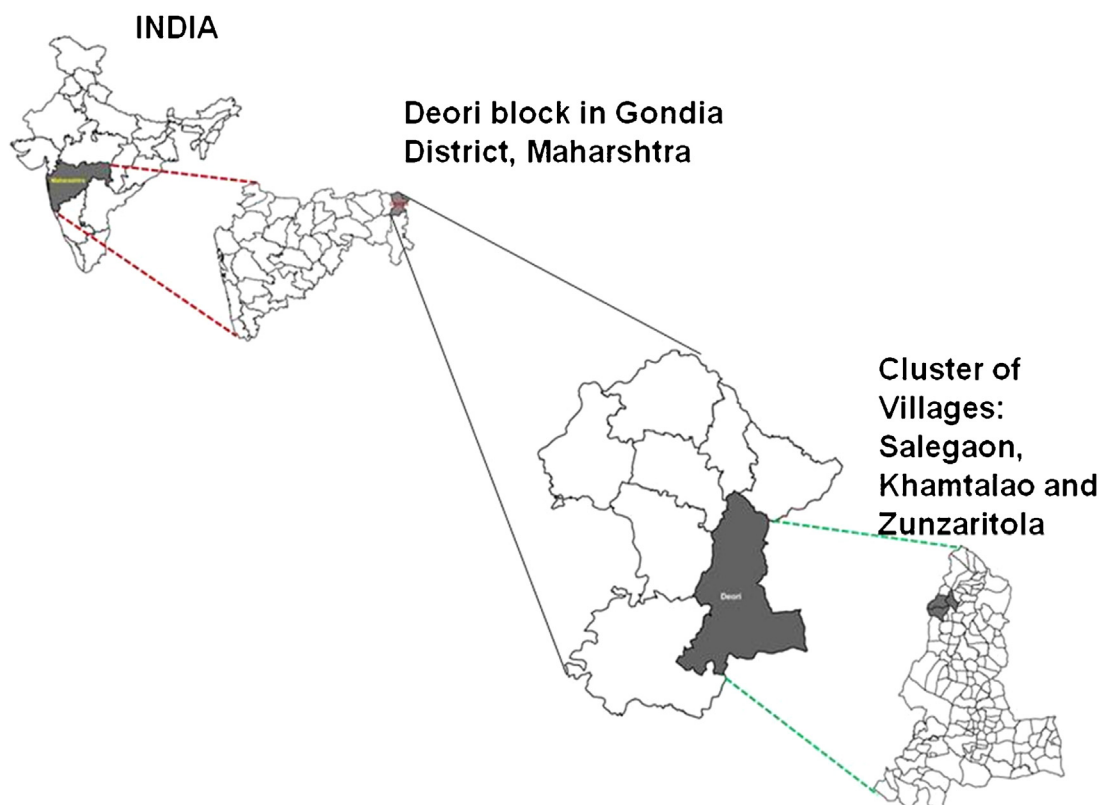


Fig. 1. Location of the study area.

**Table 1**  
Current land use in the selected cluster.

Village	Total geog. area (ha)	Area under forest (ha)	Irrigated area (ha)	Unirrigated area (ha)	Culturable waste (ha)	Area not available for cultivation (ha)
Salegaon	551.00	408.00	42.00	50.98	29.00	23.00
Khamtalao	866.60	841.00	8.00	13.60	2.00	2.00
Zunzaritola	796.69	716.00	40.00	29.69	5.00	6.00

as Loamy-skeletal, *Typic Ustorthents*, *Lithic Ustorthents* and coarse loamy *Typic Haplustepts*. The CPRs of the area are located on these soils. Land use analysis of the cluster villages indicate that forests dominate the landscape in the area. Village 'Khamtalao' has nearly 97% of its land under forest (Table 1), followed by Zunzaritola (89.8%) and Salegaon (74%). Interestingly, 'Salegaon' has higher percentage of tribal population (91%) as compared to Zunzaritola (51.3%), while 'Khamtalao' is one of the five villages in the taluka which has 100% tribal population. The population and economic indices of these villages (Table 2) reflect the realm of inadequacies that villagers have to operate within and the constraints in development. There are no learning centres of any kind and they have to travel long way in search of these centres and/or for jobs.

## Material and methods

### Resource management approach

The crucial aspect of any land use planning exercise is to handle complex problems of resource allocations and decision-making. It is an accepted fact that low socio-economic variables make diffusion of new ideas extremely difficult and thus require tactful handling (Prasad and Chary, 2001). Working in a participatory mode, the scientists from National Bureau of Soil Survey and Land Use Planning (NBSS and LUP) and villagers dwelt upon the possible

land use plan (LUP) and identified potential area of scientific interventions. It was agreed that the plan would necessarily aim at benefiting poorest of the poor and reduce dependence on forest for living. It was also recognized that forest resources would always be threatened until alternative source of living/earning was made available. The beneficiaries of incentives to adopt interventions were identified in a transparent and participatory way. Existing legal framework in India does not provide any mechanism for

**Table 2**  
Population and economic indices.

	Khamtalao	Salegaon	Zunzaritola
Number of households	20	90	27
Total population (P)	98	680	115
Total population (M)	46	349	52
Total population (F)	52	331	63
Tribal population	98	625	59
Primary schools (N)	0	2	0
Middle schools (N)	0	0	0
Secondary schools (N)	0	0	0
Adult literacy centres (N)	0	0	0
Other schools (N)	0	0	0
Well (with electricity)	1	2	0
Tank	7	40	40
Distance from the nearest town (in km)	67	67	51

Source: Census of India (2001).

institutionalizing LUP be it mutually agreed or otherwise. The state ownership of forest land empowers or bestows hardly any role to the stakeholders living in rural countryside. Thus, land use plan produced by scientific institution has little state sanctity and its implementation is purely voluntary. The National Agriculture Innovation Project (component 3) currently being implemented in India is aimed at developing sustainable livelihood systems. The PLUP work reported here is essentially a part of this project to evaluate different livelihood options with LUP as a base. To overcome the constraints of lack of mechanism for LUP and ensure project implementation, one NGO representative and one research fellow visited villages daily especially during agricultural season.

Following broad steps were followed to collect information.

1. Initially tools such as transect walk, night meetings, and village resource mapping were employed to create awareness about the project and facilitate primary data collection especially baseline survey.
2. Baseline survey of the village including information on current agricultural practices, crop yields, livestock, implements, equipments, credit availability, agriculture inputs used, animals, fodder needs, sources of income, literacy, consumption pattern, infrastructure was carried out. Each household of the three villages was personally visited by a team of scientist, social worker, technical expert and NGO representative to collect the data.
3. Identification and mapping of all the village's natural resources and profiling of the village history including; population, ethnicity, demography, cultures, communications, infrastructure, resource usage. Facilitation of village/gramsabha discussions about the natural resources management issues and how best to plan for their management. Prioritizing and ranking problems and solutions.
4. Primary, secondary and key stakeholders were identified and SWOT (strengths, weaknesses, opportunities, threats) analysis was done in consultation with them.
5. Discussion amongst the expert group to identify technical interventions necessary to tackle prioritized issues. Involving state departments engaged in various related activities such as livestock health, fisheries development, agriculture extension, revenue department, local government. Iterations of discussion with villagers in general/night meetings and consideration of alternatives/objectives, consultative finalization of priorities/plan.
6. Appropriating/earmarking available funds for activities to be taken up. Initial concentration on activities which will show quick results to gain the confidence of the villagers. Groups were formed to monitor progress, consultations and decision making.
7. Implementation of community action plans/village – participatory land use plan (PLUP), appraisal of results, and modification if any in response to community reaction in the successive years. Formulation of exit plan after 3 years that includes creation of sustainability fund and land care group in each village.

### Common property resources

#### Village tank

Gondia is called the district of water tanks and according to the district statistics there are 7000 water bodies in the district. Unfortunately each village has at least one tank rendered useless due to simple reasons like leakage through gates/lack of maintenance, seepage. The geographical location of ponds and existing system of drainage is such that water is drained through agriculture fields. Thus during monsoon, the fields are often inundated. After cessation of rains these ponds provide supplementary irrigation and

little volume is left for growing another crop. The remaining water is normally used by livestock (drinking). Some of the ponds are owned by state forest department and conflict of interest arises in a below normal monsoon year as drinking water for wildlife also becomes critical.

The participatory research initiative recognized that improved management of CPRs/natural resources would strengthen tribal livelihood and make it sustainable. The initiative was based on baseline survey which revealed that if rain water is managed properly, the paddy yields would lead to stabilized income. Stakeholders had opined that water shortage was the most significant factor that prevented rice farmers from early nursery preparation to utilize rainwater optimally. They knew of fellow farmers in nearby villages or relations owning irrigation wells, benefitting from timely transplanting. Since opening of new irrigation wells was ruled out due to (1) benefit to individual (rather than the community) alone, (2) lack of financial resources and (3) electrical power connection problems, the stakeholders opted for a community nursery. It was also mutually agreed by all the development partners that dependence on sole crop constrained by vagaries of monsoon must be minimized by increasing income from sources other than agriculture. Limitations of agriculture as a source of living were in fact very well recognized by the farming and non farming community. Non farming villagers felt that they had a stake in betterment of agriculture as they were indirect beneficiaries. With many water tanks around, fisheries could also be one of the major livelihood providers but it was seen that the water bodies were not utilized for fish farming because the villagers lacked required skills. During the SWOT analysis, villagers initially showed hesitance in taking up pisciculture as an enterprise mostly due to the social structures and beliefs that pisciculture must be practiced by a certain caste alone. However, the social differences quickly dissolved once they were informed of the possible acquisition of skills through training. Prior to the interventions, fishing was carried out in the villages by a select group of people in a traditional way using throw nets (without modern nets, boats, fishing gears).

Interventions based on baseline study started with optimum use of rainwater through timely seeding and transplanting. Though the monsoon commences every year in the month of June, farmers usually wait for adequate onset of monsoon which is generally in the month of July for seeding. The crop is too young to benefit from the rainy months (July and August) and often suffer due to water shortage in the month of September when it is maturing coinciding with cessation of rainfall. Therefore, establishment of paddy nursery in the month of June was the major intervention for optimum rainwater utilization. Individual farmers could not grow nursery due to lack of irrigation water availability. The entire village however acted in unison to prepare the nursery at a point where water was available. In each village one source of water was identified for this purpose. The water resource (tube-well) owner consented to provide water without cost/charges. Timely preparation of nursery allowed farmers to do transplanting at appropriate time (early July). Preparation of nursery bed, watering it, and other operations were done through voluntary/community action. Because of the interventions following changes took place in paddy cultivation practices.

- Seedlings were ready for transplanting at the on-set of monsoon.
- Protection from early recession of rains/moisture shortage.
- Early *kharif* harvest and availability of soil moisture for *rabi* crop.

### Common forest resources

Non-timber forest products (NTFPs) are an integral part of development and survival of people living in and around forests. A

**Table 3**  
Rice yields obtained by tribal farmers after scientific interventions.

Variety	Ave. yield (q/ha) (last 20 years)	Variety	2009–2010		2010–2011	
			No. of farmers	Ave. yield (q/ha)	No. of farmers	Ave. yield (q/ha)
Local	16.2	Khamang	36	34.4	46	32.6
		Sindewahi-1	22	25.3	11	24.8
		HMT	36	29.1	102	25.5
		Jaisriram	–	–	35	25.5
		IR-64	–	–	69	30.7
		Mean	–	29.6	–	27.8

random sample area of 30 ft. × 30 ft. (83.61 m<sup>2</sup>) was selected near each village for observation on vegetation, number of trees, and species. Relative score of the three villages indicated information on abundance or otherwise of a particular NTFP provider tree/species.

## Discussions

### Results

Baseline survey of the villages indicated that after paddy (monsoon rained crop) the farmers leave the fields fallow in the *rabi* (winter) season, mainly due to limitations of soil moisture availability to grow a second/*rabi* crop. Only 18 households have accessibility to irrigation water and use it for growing gram (broadcasting method), intermittently in a year of better rains and water availability. Others work as contract or casual labour in the forests and under Employment Guarantee Schemes of the Government. It was observed from income and expenditure matrix that agriculture is a tertiary source of income for the tribal. Forest-based income directly contributed to 40% of the income, while 46% income was generated through employment like collection of tendu leaves (used in making Indian cigar) and miscellaneous work for the contractor contributed 46%. The net returns from agriculture were abysmally low (\$220 per ha). In general, farmers seek enough rice to feed the family for 1 year through agriculture. Moreover, no other source of income is available during the monsoon season. It was apparent that any plan to reduce dependence on forest must supplement the income from other sources while incorporating legitimate collection of NTFP.

The results of agricultural interventions indicated that paddy yields had gone up substantially (Table 3). The yield advantage ranging from 56 to 112% indicated ample scope for improving agriculture and potential that needs to be unlocked. Though underpinning ingredients for collective action (community nursery) were many such as low agricultural productivity, lack of alternatives, water shortage, etc., it was apparent that the appraisal of resource base of each village including land, livestock, forest (NTFP) facilitated grouping for a common cause. Ray (2008) sums up that resource base of village plays an incredible role in creating material conditions for collective actions. If these results could be replicated in rest of the district, even a conservative 25% increase in yields would be enough to cause a change in perspective of the tribal farmers and the strong linkage/dependence on forest could be lessened.

The next challenge was to convince the tribal that water conserved in *kharif* could be of use to grow second crop in winter. Though few farmers reportedly utilized the tank beds, there was no systematic mechanism and scattered cultivation of crops in the bed was mainly dictated by the needs of individual family especially in a poor agricultural year. The participatory LUP favoured greater participation and community action. The intervention also indirectly implied that there would be less migration in search of work, less illegal sell of forest produce other than NTFP. Areas around

the water ponds provided an opportunity when the water receded. These are common property resources and are used for excavation of soil by the contractors on license fee imposed by the revenue department. A group of 30 farmers decided to grow crops like water melon, muskmelon, sweet potato, and cucumber through a community approach. Since the tanks were located in the middle of the forest, the crop required protection from wild animals. Two to three men on rotation basis performed the duty of protection. Irrigation was provided by carrying water from the ponds, filling it in large drums placed at a height of seven feet and using indigenous drip technology.

In pisciculture intervention group of 18 farmers in each village was trained at a fisheries institute and fingerlings were provided. The cost of the input (fishlings) was \$555 and by the end of first year 2.32 tonnes of fish was harvested giving an income of \$2957. The group could not sell the entire fish crop in the tank due to lack of fishing equipments. Introduction of fast growing fishes namely Catla (*Catla catla*), Rohu (*Labeo rohita*), and Mrigal (*Cirrhinus mrigala*) under the supervision of fishery experts brought sea change in economic condition and nutrition of villagers. Thus the impact was significant. Proper utilization of water as a CPR thus served as a major source of auxiliary income/sustainable livelihood.

The potential economic value of NTFPs either in terms of utilization or their market value is often underestimated or unknown (Wickens, 1994). The challenge is therefore to assess and quantify the value of these products and to transform the use of many of them as are socially and ecologically viable for subsistence and development (Sauled and Aruga, 1994). In the two villages, Khamtalao and Zunzaritola, more than 80% of the households are involved in some or other activity associated with the forests. The figure is lower in Salegaon village (45%) and highest in Zunzaritola (85%). Most of these activities comprise of collection of NTFP from the forest, collection of mushrooms and other useful products. Quantitative and qualitative analysis of NTFP was carried out and it was observed that 24 minor products were exploited by the dwellers and were self consumed at home in addition to selling for monetary gains. Of these 24, two NTFP were only for selling and included tendu leaves (*Diospyros melanoxylon*) which are abundantly available during April–May and is used for Beedi (indigenous cigar) making. In addition, local bamboo (*Dendrocalamus strictus*) (available throughout the year) is used for making baskets and selling in the local market. *Madhuca indica* (Mahua) is the most economically productive tree whose flowers and seeds are used for extracting oil and making liquor. Its nutritional value being very high, the flowers are also mixed in the dough for making bread. Some important NTFP and their uses are enlisted in Table 4. The data indicates warning signs that the NTFP base in Salegaon (most populated of the three) village is dwindling and a quick action is necessary not only to sustain the livelihood but also to protect forest. While discussing LUP with the stakeholders, it was emphasized that the period of two months (April and May) may not provide adequate employment in near future and mechanism for maintaining the forests must be adhered to. The most frequent use of NTFPs collected by the tribal households (Table 4) are for edible purpose in different forms such

**Table 4**  
Quantification of available NTFPs and their use.

S. no.	Botanical name/local name/season of availability	Parts collected	Khamtalao	Salegaon	Zunzaritola	Use of NTFP
1	<i>Terminalia chebula</i> (Hirda) April–May	Fruits	+++	+	+++	Medicinal, edible
2	<i>Terminalia bellerica</i> (Behada) March–April	Fruits	+++	+	++	Medicinal, edible
3	<i>Madhuca indica</i> (Mahua) April–May	Flowers, seeds	++	+++	++	Edible liquor and food
4	<i>Aegle marmelos</i> (Bel) September–March	Fruits	+	+	+	Edible, medicinal, industrial use
5	<i>Emblica officinalis</i> (Aonla) October–January	Fruits	++	+	++	Edible, medicine, pickle making
6	<i>Diospyros melanoxylon</i> (Tendu leaves) April–May	Leaves	++	++	++	Beedi (cigar) making
7	<i>Dendrocalamus strictus</i> (Bamboo) Perennial	Stem	++	+	++	Basket making
8	<i>Apis dorsata</i> (Honey) Perennial	Honey	–	+	–	Edible, medicinal
9	<i>Agaricus biospyrus</i> (Mushroom) June–August	–	+++	+++	+++	Edible

(+) present, (–) absent, (+) sparse availability, (++) moderate availability, (+++) abundantly available.

as fruits, pickle making, liquor, etc. A few NTFPs were collected by the villagers as medicinal plants for curing different diseases. Other use of NTFPs are for plate making and industrial use. Tendu leaves are used on large scale for beedi (indigenous cigar) making. After rain fed crop season, villagers are mainly dependent on NTFP collection for livelihood. The contribution of NTFP to the total income across varied land holding categories was observed to be higher than the agriculture except for the land holding of more than 2 ha. Interestingly collection of NTFP is mostly done by female workers while male workers migrate to find jobs outside village or forests. In India, there are about 15,000 plant species out of which nearly 3000 species (20%) yield NTFP's. However, only about 126 species (0.8%) have been commercially developed. Thus this narrow base needs to be utilized in a sustainable way.

The villagers do not follow stall feeding of livestock and adjoining forests are seen as readily available and easily accessible source of fodder. During the survey for quantification of NTFP it was observed that there is forest land available around village tanks and near settlements where fodder grass plantation can be carried out. With the consent of forest department, fodder grass variety of Sorghum namely M.P. Chari (*Sorghum bicolor* (L.) Moench) and *Stylo hamata* were sown in the CPR in the villages, covering an area of 20 ha. The villagers decided to restrain from wild grazing of their livestock.

## Discussion

The appraisal of common property resources and participatory land use planning (PLUP) for their utilization has thrown up some interesting issues and land use planning lessons. The study area though richly endowed with assured and high rainfall coupled with significant surface water storage and NTFP, optimal utilization for economic progress is singularly lacking. Limitations of increasing productivity of single agricultural crop were prominent and it was the integrated approach that helped in planning for sustainable livelihood. Lack of skills was the most crucial link that differentiated between possible usage of resources and apathy towards usage. For instance, pisciculture introduced in the village altered the lives of fish farmers. Stealth of fish in water bodies in the reserved forests is a common occurrence that risks tribal lives. Forest department also struggles to keep watch on its resources. Large scale introduction of pisciculture has thus forest and wild life conservation connotations

apart from well being of tribal people living on the fringes. Marketing of large scale produce from pisciculture are also a constraint despite the fact that the returns on small scale were significant. The PLUP must assess the production potentials of such agro-ecologies at sustainable levels and match them with the market forces.

It was apparent that the strength of PLUP lies in prioritizing possible land use based on its capability coupled with the management and utilization of renewable water resources. The concept of one nursery for village was adopted in 2009 enthusiastically but in 2010, the farmers decided to establish more nurseries and preferred transportation of water than the cumbersome logistics (due to narrow slippery footpaths in monsoon season) of carrying plants from single point nursery to the fields. A bottom-up planning process where the decisions (viz. community nursery) were left to the stakeholders indicated that it is an iterative and continuous process. The planning also focussed on the fact that the tribal are gainfully engaged only for a few weeks during summer collecting NTFP. The monsoon mostly prevented any intrusion in the forest partly due to pre-occupation with *khari* crop and partly due to inhospitable climate. Thus it is the rest eight month period that has to be enterprising either from forest conservation point of view or earning livelihood which are often mutually exclusive. Decision to grow *rabi* crop was taken by the community after collective agreement to restrain wild grazing by livestock. The stakeholders were encouraged for *utera* farming (a sort of relay cropping) where seeds of lentil, lathyrus, and local pea (small coloured seeds) are broadcasted in standing crop of paddy (25–30 days before harvesting). The seeds get germinated in residual moisture available in the field. At the time of harvesting, the upper part of germinated plant gets cut (topping of shoots) and it results in prolific branching and higher yield. The highlight of the decision making process was the community response when encouraged to take guided decision. Asides lack of skills, lack of credit and ignorance about possible usage of residual soil moisture prevented tribal from *rabi* season activities. Landless tribal provided with livestock (goat) and access to drying beds of water tanks (CPR) for *rabi*/summer cultivation kept the manpower engaged in gainful work. Interestingly, irrigation to watermelon (summer crop) had to be planned in the afternoons as the people preferred to go for NTFP collection in morning hours.

A lot of committees, groups, teams and other entities were formed to facilitate planning process, understanding concerns of the stakeholders. Contribution to sustainability fund was made

mandatory for each household. The amount of contribution varied according to the gains and decision of the Gramsabha (apex village body). But there were conflicts as soon as money was accrued through better fish farming. The decision making was impaired promptly after realizing the potential of just one water tank. It is likely that similar occurrences will prevail more often than not. Therefore hierarchy of power needs to be clearly outlined from the start in order to avoid conflicts and perhaps an external intervention is also necessary though it could be just periodic. Ray (2008) also argues in favour of external interventions in managing such local institutions. It is advisable to form as few new entities as necessary as, apart from conflicts due to unclear roles, it costs peoples' time, energy and money to maintain active institutions. Formation of entities which are not legally recognized is useful for specific tasks, but such teams or groups should be disbanded when their work is done. Another evident fact about LUP was that the LUP for one village may not be appreciated by neighbouring villages. Most of the villagers have scattered land parcels around the village or in nearby villages. Therefore use of village commons and water tanks became a contested issue. Villagers with multi-locational land holdings served as interlocutors in such cases.

The above facts clearly imply that the agricultural development in these areas is a complex phenomenon and that a system approach is essential for development focusing on sustainability. Perhaps fresh evaluations of the potentials and pitfalls of the agricultural resources base be it land or water is need of the hour while identifying impediments to the flow of technology and building micro-level infrastructure. The existing land use policy does not involve in decision making process especially when natural resources wealth (forest produce, water, metals, minerals) is utilized. The local communities feel alienated as they perceive that their resources are being taken away making them mute spectators. The remedial measures should aim at critical review of existing land use policy and the laws governing it. Conservation of forest ecosystem need not come at the expense of agricultural ecosystem and as the work showed, a synergistic development is possible. The most

important lesson of PLUP in these villages centred around building of proactive community before implementing any LUP activity. Limiting scope of various development departments like agriculture, forest, animal husbandry, fisheries, etc. to their respective domain will not be able to adequately solve the problems of these poor people living in marginal lands. The involvement of stakeholders is perhaps the most crucial link.

## References

- Adhikari, B., 2004. Social Inequality and Collective Action: An Empirical Study of Forest Commons. IFRI Working Paper W08I-5 (accessed at [http://sitemaker.umich.edu/ifri/files/w08i5\\_adhikari\\_falco.pdf](http://sitemaker.umich.edu/ifri/files/w08i5_adhikari_falco.pdf)).
- Census of India, 2001. Available at <http://censusindia.gov.in/>
- Goswami, B., 2011. Dependence of the poor on commons (Common Property Resources—CPR). Infochange at <http://infochangeindia.org/agenda/enclosure-of-the-commons/dependence-of-the-poor-on-commons.html>
- Gowda Manohara, N., Savadatti, P.M., 2004. CPRs and rural poor study in North Karnataka. *Economic and Political Weekly* 39 (33), 3752–3757.
- Mahanta, R., Das, D., 2012. Common property resources degradation and migration: a case study of Assam. *Journal Human and Ecology* 38 (3), 223–230.
- Menon, A., Vadivelu Ananda, G., 2006. Common property resources in different agro-climatic landscapes in India. *Conservation and Society* 4 (1), 132–154.
- NSSO, 1999. Common Property Resources in India Report No. 452(54/31/4). National Sample Survey Organisation. Department of Statistics and Programme Implementation Government of India.
- Pradhan, A.K., Patra, R., 2011. Common property resources in rural India: dependence, depletion and current status. *The IUP Journal of Managerial Economics* 9 (1), 6–20.
- Prasad, J., Chary, G.R., 2001. It needs persuasion. *Agricultural Extension Review* 13 (6), 21–22.
- Randall, A., 1987. *Resource Economics*, 2nd ed. John Wiley and Son, New York.
- Ray, S., 2008. *Management of Natural Resources – Institutions for Sustainable Livelihoods: The Case of Rajasthan*. Academic Foundation, New Delhi.
- Saulei, S.M., Aruga, J.A., 1994. The status and prospects of non-timber forest products development in papua new guinea. *Commonwealth Forestry Review* 73 (2), 97–105.
- Suresh, A., Gupta, D.C., Mann, J.S., 2010. Study on production and utilisation of wool and wool products in India. *Agricultural Economics Research Review* 23, 47–56.
- Velayutham, M., Mandal, D.K., Mandal, C., Sehgal, J., 1999. *Agro-Ecological Subregions of India for Planning and Development*. NBSS and LUP, Publ. No. 35, 372 p.
- Wickens, G.E., 1994. Sustainable management for non-wood forest products in the tropics and subtropics. In: *Readings in Sustainable Forest Management*. FAO, Rome, pp. 55–65.