Community Biodiversity Management in Central Western Ghats, India

Manohar Sunagar [1]
Vasudeva Ramesh[1]
Narasimha Hegde[2]
Bhuwon Stapit[3]

[1]Department of Forest Biology
College of Forestry
[2]Life Trust
SIRSI 581 401

[3]Bioversity International
ICAR, complex
NEW DELHI
INDIA

2010

ACKNOWLEDGEMENTS

We feel privileged to express our deep sense of gratitude and heartfelt thanks to all the members of the community for their full cooperation through out the study period. The financial assistance provided by the Bioversity International, Rome to conduct this study is gratefully acknowledged. The authors profusely thank and acknowledge the support extended by the GEF and UNEP in the form of the multi-country project "Conservation and Sustainable Use of Cultivated and Wild Tropical Fruit Diversity: Promoting Sustainable Livelihoods, Food Security and Ecosystem Services". The basic training and exposure to the concept of CBM to the first three authors was provided during the Global CBM Study training at Chennai, Barzil and at Nepal. RV and MS are indebted to the Wageningen University and Research Centre / Centre for Development Innovation, for this opportunity. We specially thank Dr Marja Thijssen and Dr Walter de Boef for all the help. The support of ICAR, New Delhi and the National Project Coordinator Dr B.M.C. Reddy is highly appreciated. We also appreciate and thank Dr. B.S. Janagoudar, Dean, College of Forstry, Sirsi for his constant encouragement. We have been fortunate in getting kind co-operation, valuable help during the field work from Shrikanth Gunaga, Santosh joshi, Vijaykumar P, Girish Sankri, Niranjan, Amrut, Toshan, Asif.

Content

Executive summary

The study described in this report was undertaken to characterize CBM activities in a forested landscape of the Central Western Ghats in India and in the process to analyze the level of empowerment existing in the community regarding social/cultural, legal, and economic aspects. The study was conducted near Sirsi in the Central Western Ghats, Karnataka state, southern India, which is recognized as one of the hotspots of biological diversity in the world. Standard questioners, meetings and workshops with the communities and different stakeholders such as development agency, conservation stakeholder, members of local governance were adopted to identify the elements of CBM in the forested landscapes of central Western Ghats, to gain understanding of the socio-economic characteristics of the farm households dependent on cultivated / wild resources, to assess the institutional and non-institutional factors that influence the maintenance of diversity and to assess the level of empowerment in social/cultural, economic, and legal aspects.

Betelnut (arecanut) and rice are the major crops in the region maintained large home gardens in which multi-storied cropping is practiced, however number of tropical fruits are also grown. In this study the main focus on two important tropical fruits viz., Wild mango and Garcinia was given in line with the objectives of the a UNEP/ GEF funded project titled "Conservation and Sustainable Use of Cultivated and Wild Tropical Fruit Diversity: Promoting Sustainable Livelihoods, Food Security and Ecosystem Services" undertaken with technical guidance from Bioversity – International.

The basic drivers for the CBM processes included traditional sense of ownership of the forests around the communities and internalized motive to protest against the deforestation taking place in the due to tree-felling. Significantly during 1983 communities had organized and protested against the felling of trees which is popularly known as "Appiko movement" which formed a platform for community actions. There are many community organizations present such as Village Forest Committee (VFC), Co-operatives, and Self Help Groups (SHG), Youth Club, Farmers Group, Local panchayat etc., which are actively working for the livelihood improvement of the community. One the guardians of diversity has maintained a large number of Mango and *Garcinia* varieties and has been an inspiration to other community members.

Today because of the Joint Forest Planning and Management (JFPM), there is relatively higher level of social learning among the communities and a scaling up of the collective action has taken place. The awareness and conscience over traditional knowledge is a good indication of the social empowerment. The level of legal empowerment of the focal communities is rather not strong. Often the exchange of seeds / progagules of local varieties is done informally among the farmers although a few progressive farmers produce and sell to a limited extent the grafts of the local fruit varieties mainly of Mango. There were no formal record / registry of local varieties by the farmers. Central to the sustainability of the CBM activities is the level of economic empowerment obtained by the community. However, because of the shear complexity of the economic empowerment and long-gestation period required for the actual empowerment (because of the long gestation period of that fruit crops) it is not always easy to assess the same. Today we are witnessing only the initial signs of the same. The Exchange programme with the Global CBM sites in other countries has provided good insights regarding the possible CBM activities to be taken in Sirsi site.

Community Biodiversity Management in Central Western Ghats, India

Manohar Sunagar, Vasudeva Ramesh, Narasimha Hegde, Bhuwon Stapit

Introduction

Community Biodiversity Management (CBM) is a community-driven participatory approach towards the conservation/utilization of local genetic diversity aimed at community development. This participatory approach envisages empowering farmers and local institutions such that local wealth of biological diversity is capitalized in order to benefit their communities. CBM recognizes the farmers' own customs, traditions and livelihood needs in conserving, utilizing and in generating newer forms of diversity. Under CBM, the community takes more control of their resources with an increased sense of ownership of these resources and generally CBM results in sustainable livelihood options. Recently CBM has been recognized, world over, as a tool to a) alleviate poverty, b) strengthen farmers' seed systems c) improve access to diversity, d) reinforce the farmers' role as plant breeders, and e) facilitate social processes that contribute to the conservation and utilization of biodiversity. CBM has also been viewed as an important activity that contributes towards conserving ecosystem services.

Since CBM is a result of time tested wisdom evolved within communities to manage a set of resources around them, it is not often surprising that elements of CBM could be recognized in informal systems of common wealth management practiced in different countries. Hence some of the customs and traditions with respect to diversity management followed in ancient village settings of India qualify to be CBM activities. A few formal systems of Forest Management in India too possess the elements of CBM. However there are scanty reports that document the nature and effectiveness of these activities and identify different drivers of CBM practices in India. This study was thus undertaken to fill this gap in a cluster of villages in the central Western Ghats of India basically to document the CBM activities. The

immediate aim of the study was to gain better understanding of the nature of CBM practices and CBM processes in this forested landscape.

Research Objectives

The main objective of the study was to examine the role of the local community in conserving agriculture and forest biodiversity and improving livelihood. It also aimed at determining the present collective practices and strategies for the effective management of the natural resources and level of empowerment that the community attained.

The Specific objectives of the study were:

1. To identify the elements of CBM in the forested landscapes of central Western Ghats
2. To gain understanding of the socio-economic characteristics of the farm households dependent on cultivated / wild resources in general and on wild mango and Garcinia genetic resources in particular
3. To assess the institutional and non-institutional factors that influence the maintenance of diversity
4. To assess the level of empowerment in social/cultural, economic, and legal aspects

The Setting

Uttara Kannada district is one of the biggest districts of Karnataka state, endowed with rich natural resources. The district has varied geographical features with thick forest, perennial rivers and abundant flora/fauna and a long coastal line of about 140 KM length. In its 10.25 lakh ha of geographical area, large chunk is under (8.28 lakh ha) of forest land, and only about 1.2 lakh ha (roughly about 12%) is under agriculture.

The district is surrounded by Belgaum District and State of Goa in the North, by Dharwad District in the East, by Shimoga and Udupi Districts in the South. Arabian Sea forms the West border. The district is divided into 11 administrative units (taluks) namely Karwar, Ankola, Kumta, Honnavar, Bhatkal, Sirsi, Siddapur, Yellapur, Mundgod, Haliyal, and Joida.

According to 2001 census, of the total population of 13.5 lakhs, about 9.66 lakhs live in rural areas. Kannada and Konkani is the major regional language spoken.

Climate

The tropical climate of this region is strongly influenced by the monsoons, and moderated by proximity to the sea. During the monsoons, the region receives one of the heaviest rainfalls in the world. As a result, the region also has a large variety of wildlife. Average rainfall in the district is 2835 mm, however the western coastal and crest-line regions of the district receives heavy rain fall exceeding 4000 mm annually. Bhatkal taluk records highest average rainfall of 4015 mm where as Mundgod averages lowest at 1296 mm. Average climate is 33 Centigrade during the summer and 20 Centigrade during the winter at the sea level. The vegetation in the region is mainly moist deciduous wherein valuable timber wood is found. Evergreen and semi-evergreen formations are fragmented in the crest-line of the Ghats. Deforestation and poaching have been causes for concern in recent years. Arecanut and Rice are the main crops of the irrigated region.

The main rivers flowing in this district

1. Kali : Karwar, Joida Taluk
2. Bedti / Gangavali : Ankola, Yellapura Taluk
3. Aghanashini: Kumta,Siddapur, Sirsi Taluk
4. Sharavati: Honnavar Taluk
5. Venkatapur: Bhatkal Taluk
6. Varada: Sirsi Taluk

Tribes

The main tribes of the district are *Sidhi, Kunabi, Halakki Vokkaliga, Gonda* and *Gouli*. *Sidhis* are said to have been brought by the Portuguese from Africa as farm workers some four hundred years ago. Their population is around ten thousand and is generally found in Haliyal,

Yellapur and Ankola taluks. Now their culture is completely Indian and have adopted mainly Hindu religion. A small population of them are Muslims and Christians. They are extremely poor and backward and work mainly as agriculture labourers in the fields of Havyak Brahmins. *Halakki Vokkaligas* living in the foot of Western Ghats are known as the "Aboriginals of Uttara Kannada". Their distinctiveness and backwardness are too obvious. *Goulis* is a nomadic tribe migrated from neighboring Maharashtra state. They rear mainly cows and goats. They stay on the fringes of forest. Some have taken up agriculture. *Kunabis* are said to be the most backward of the tribe of Uttara Kannada District. They live in small groups deep inside forests in bamboo huts built in a row sharing common walls. Not having access to the medical facilities due to seclusion, mortality rate among them is very high. *Gonds* live mainly in the forests of Bhatkal taluk. They live off forest products. They have rich folk culture of tribal dance.

Culture

Folk Arts like Suggikunitha, Holi Dance, Hulivesha, Siddi Dance are famous and traditional. Yakshagana is also famous in the district. The major population lives in rural area undertaking agriculture as their main occupation. The main traditional occupations are Agriculture, Fisheries, Animal Husbandry, Sericulture, Horticulture, Beekeeping and Leather Works *etc*.

Sirsi town

Sirsi is a town in the Uttara Kannada district in the Indian state of Karnataka. It is located at 14°37′N 74°51′E14.62°N 74.85°E. It has an average elevation of 590 metres (1936 feet), and is situated in the heart of the Western Ghats. It is a mountain town with a population of around 90,000 people. The town is surrounded by lush green forest and the region is popular for a large number of waterfalls. Areca nut or Betel nut is the primary crop grown in the villages that surround the town, making it one of the major trading centres for Arecanut. The nuts grown here are transported all over India, and also exported abroad. The region is also popular for many other spices like cardamom, pepper, betel leaves and vanilla. The major food crop is rice which is a staple food of the people. The majority of the people in

Sirsi speak dialects of Kannada, most notably the Havyaka dialect. The official language is also Kannada, although English is increasingly gaining popularity. A sizeable part of the population, both Hindus and Christians, also speaks Konkani. Also notable amount of believing Muslim community is resident here. Mostly they speak Urdu. Most of them are into local business. Sirsi has an awesome climate especially from October till February. It is a very beautiful place which everyone should visit.

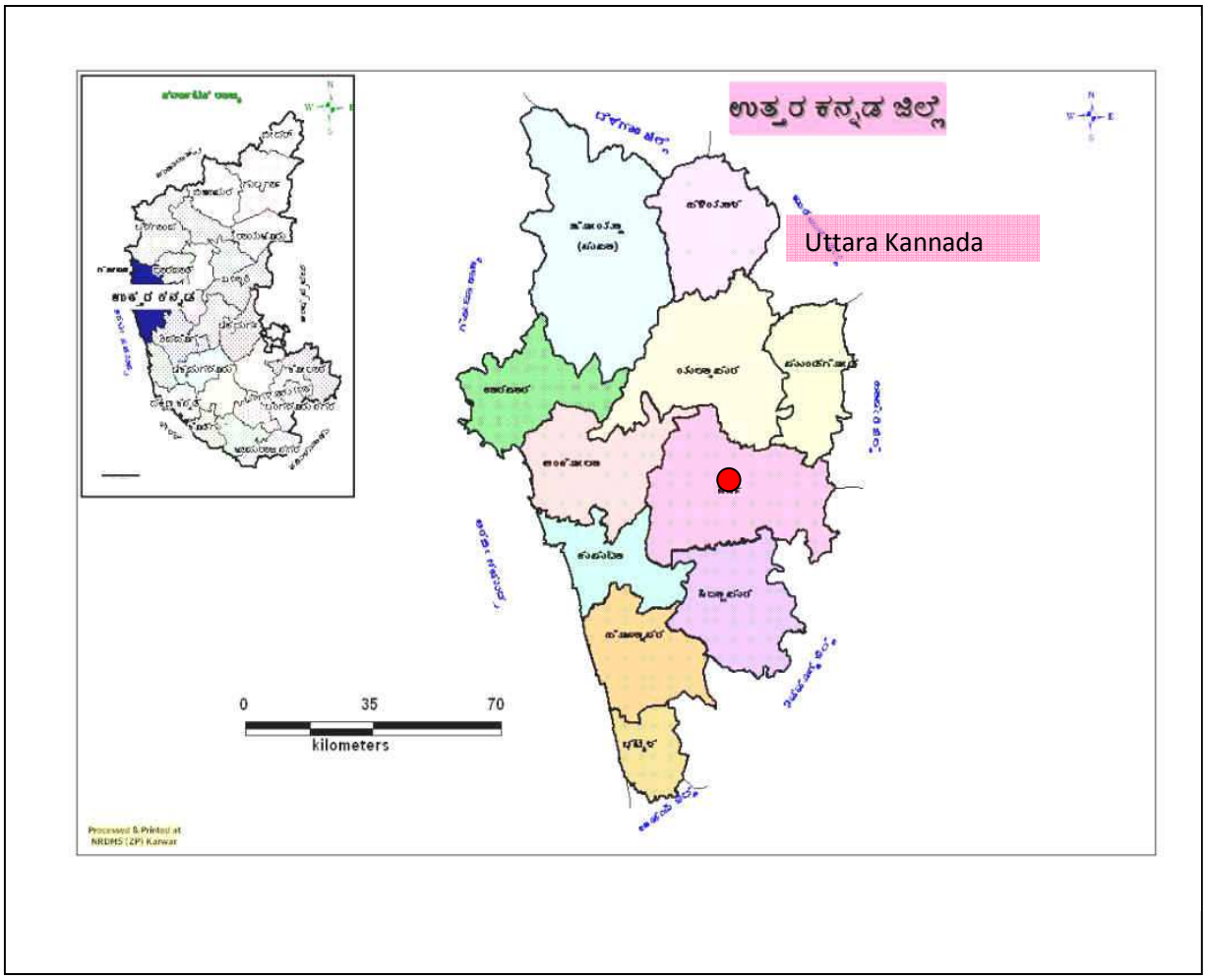


Fig. 1. Map showing the Study Site Sirsi (shown as Red dot)

Methodology

Site Characterization and methods adopted

The data were collected in four locations in the Sirsi region which situated in the southern part of India, and the regions falls in the Western Ghats one of the hottest of the world biodiversity hotspots. The study sites were located about 15 km around Sirsi town under the Salkani panchayat jurisdiction. The hamlets of the Uttara kannada are very small and scattered far away from each other hence for the CBM study four hamlets namely Salkani, Melin Onikere, Kadbal, Manadur were selected which comprised of 120 households with 900 population. The interesting fact about this village is that the people's movement to conserve the natural resources popularly known as '*Appiko movement*' was started by in this cluster during the year 1983. The site falls under the high rainfall region surrounded by the thick forest and the culture of the people are closely associated with the forest, Agriculture/horticulture is the main land use system in the region, major crop in the region are Arecanut, Paddy, Cardamom, Vanilla, Cocoa, and the communities are also involved in the collection of non timber forest products (NTFP's) such as wild mango, Garcinia fruits, gums, resins, leaves *etc*.

The average land holding of the farmers are very low which ranges from 0.5 to 2 ha, majority of the households maintain their own home gardens in which they practice vertical farming system the plants of different heights are planted which occupies different stories, eg.: Arecanut, Banana, Papaya, Pepper, Cardamom, Turmeric vegetables this is their traditional practice they followed from the very long years, farmers with very small land holdings are involved in wage laboring and petty business. The communities are supported by the institutions like Co-operatives, Government departments, NGO's, these help the communities in managing their natural resources, In the year 1993 as per the recommendation of the forest policy forest department initiated the process of formation of the Village Forest Committees, each and every individual of the villages will be the member of it for which a fee of Rs 2 is collected from each individual, and the committee is headed by 10 representatives from the villages in which there will be a reservations for the women and other backward classes and the

forester belonging to the range also be a member of it, this helped in participatory management of the forest resources and sharing of benefits between forest department and the local communities.

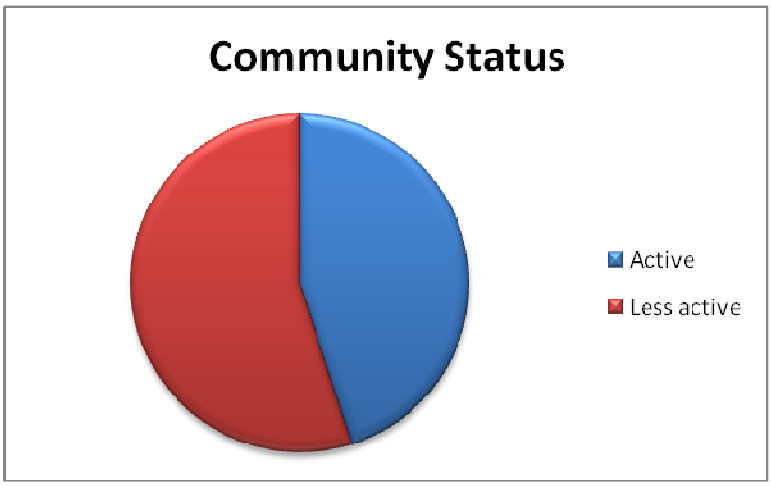
Data collection

The preliminary survey is done to identify the villages and the households for the data collection. A stratified sample of 40 households was randomly selected and interviewed adopting standard questionnaire. The sample included 'less active' and 'active group' based on their level of participation in the CBM activities. The questionnaires consisted of several components including different sections on general information, socio-economic status, dependency on diversity, and level of empowerment. The different stakeholders interviewed included were development stakeholder such as NGO, conservation stakeholder such as Forest department staff, local government such as co-operative decision making body members. A local guardian who maintains a diversity block of Mango and *Garcinia* was also interviewed. Rapid Rural Appraisal (RRA) was conducted in focus-group discussions. The exercises include a) a Venn-diagram to indentify the key institutions influencing the forest resource utilization, b) a time-line of the target and other forest species over the years to determine trends in diversity, c) a diversity four cell analysis to identify the farmer-named varieties and their use as well as the present status. **In this study the main focus on two important tropical fruits viz., Wild mango and Garcinia was given in line with the objectives of the a UNEP/ GEF funded project titled "Conservation and Sustainable Use of Cultivated and Wild Tropical Fruit Diversity: Promoting Sustainable Livelihoods, Food Security and Ecosystem Services" undertaken by the Bioversity – International.**

Major Outputs of the study

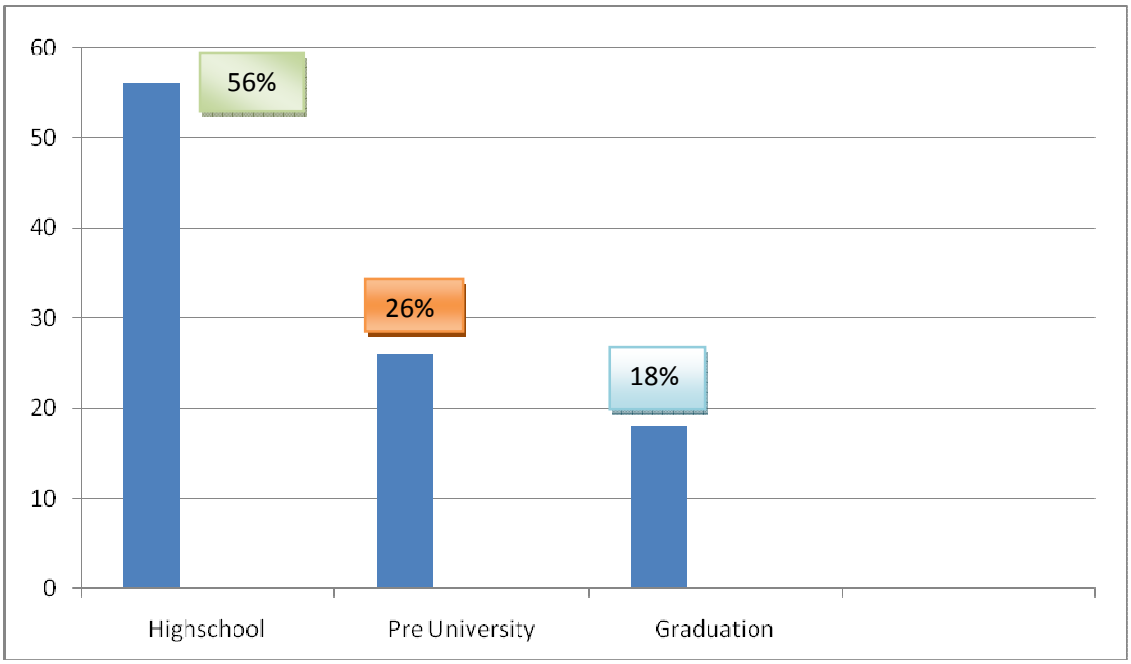
The Farm Households, level of education and production systems

The features of households of the communities have important influences on level of participation in and their relation with the CBM activities. We examined some of these features. Of the 40 house-holds considered, 45% were in the 'active' group while 55% were in 'less active' group. Overall the average age of the house-hold members was on a higher side at 52 years indicating that young people have left the communities seeking job opportunities elsewhere or not actively involved in farming activities. This aspect was also corroborated during the discussions with the communities. This might have an influence on the sustainability of the farming activities of the communities on a long run and on the CBM activities as well. The families with relatively younger members were more often in the "active group" (average age of active households is 46 years); while the "less active" group had a higher average age at 57 years.



Most of the members had only had metric-level education in the community (56%). Roughly a quarter of these had college-level education (26%) and about 18% of them had

completed their graduation. English speaking / understanding community members were all graduates.



The average land holding of the farmers is very less which ranges from 0.5 to 2 ha. Hence large scale hording of genetic diversity within a house hold is not possible. Only farmers with large holdings could act like guardians. Indeed the only guardian identified in the study possessed relatively larger land holding. Majority of the households maintain their own home gardens in which they practice traditional multi-story farming system wherein the main commercial crop Arecanut occupies the top layer followed by Banana, Papaya, cocoa. Crops such as cardamom, and Turmeric are in the last layer. Pickling mango and fruit mango are maintained as hedge crop. Garcinias are largely collected from the wild populations as well as from the 'betta lands' (see Box 1 for details). The communities are supported by the institutions like Co-operatives, Government departments, NGO's, these help the communities in managing their natural resources.

BOX 1

Soppina betta lands: unique privileged usufruct forestlands of Uttara Kannada District used as production system for _Garcinia_ and Wild Mango

Soppina betta (or *betta* in short) literally means "hill slopes managed for green biomass". These are the strips or patches of treed landscapes on the hill slopes adjoining the betelnut (arecanut) orchards that are traditionally used by the cultivators for the collection of leaf litter, mulch, manure and fuel wood *etc*. Legally, it refers to the specific piece of forestland attached or assigned to specific orchard plots, conferring exclusive privileges to the owner of that orchard plot. These privileges of utilization of forestland are given to orchard owners of Uttara Kannada district in Karnataka. However, this doesn't carry with it any rights on the trees to the farers. Till 1897 for every one ha of betel nut orchard owned by a cultivator 8 ha of adjacent forest area on a hill slop was provided, which is now in the ratio of 1:9. The extent of *betta land* in Uttara Kannada is quite substantial at 504.33 Sq. km or about 10,000 ha (*i.e*. about 5 % of the total forested area of Uttara Kannada district).

These treed landscapes consist of evergreen to moist deciduous species such as *Artocarpus integrifolia, Hopea parviflora, Calophyllum apetalum, Cryptocaria woightiana,* ***Garcinia gummi-gutta, Garcinia indica****, Lopopetalum wightianum, Olea dioica, Syzigium cumini, Careya arborea, Dillenia pentagyna, Apporosa lindoleyana, Terminalia alata, T. bellarica, T. chebula, T. paniculata, Sapindus sp. etc*. The biomass from these species would be utilized basically by lopping of young shoots during the months of December to February. The green leaves and tender shoots are applied directly to betelnut garden so that the top soil is protected from the rain. According to an estimate, about 1.5 tons of green biomass is used for every ha of betelnut every year.

However, currently no specific species components of this horti-silvi-pastoral system are followed in these lands. Hence it is essential to address recommendations for a sound management of *betta* lands. We propose that *G. gummi-gutta* and G. indica as well as wild mango genetic resources could be grown as main crop in *betta* land. This also helps in tapping the environmental services offered by NTFP species (such as mitigating deforestation and soil conservation) and ensuring cash-income to the farmers.

CBM Process

Before the British rule, local communities had an age-old relationship with the forests and managed them under a set of traditional rules and regulations. This suggests that the communities had a higher level of understanding of local biodiversity and a sense of belongingness. During 1980's co-operatives were formed by the Government of India in order to help the farmers to get easy access to the seeds, fertilizers and other agricultural inputs and also to give them a financial support by providing loans at low interests and link them to the good markets to fetch better price for their goods. This perhaps provided a platform for the community co-operative processes. Significantly during the year 1983 the local people of the village organized and protested against the felling of trees which is popularly known as "Appiko movement" that shows the concern and sentiments of the local communities towards their natural resources. The basic drivers for the CBM processes thus include time-tested traditional sense of ownership of the forests around the communities and internalized motive to protest against the deforestation taking place in the due to tree-felling.

In the early 1990s, the State government of Karnataka implemented the Joint Forest Planning and Management project with a larger vision to encourage people's participation in conservation and sustainable utilization of biological wealth of the Western Ghats. The principle of this participatory forest management is based on 'co-management' and a 'give and take' relationship between the two major stakeholders viz. village communities and the Forest Department, mediated in most cases by a non-governmental organization. As per this system, the Karnataka Forest Department (KFD) and local communities shared the responsibility to jointly plan, manage areas of forests as well as the benefits arising from forest protection. Over 500 Village Forest Committees (VFCs), a community-based grass-root level organization, were formed in Uttara Kannada district to facilitate the implementation of JFPM. In fact the Uttara Kannada is one of the leading districts in the state to implement JFPM. Any adult individual of a community can enrol as a member of VFC by paying a nominal fee of Rs 2. Generally the VFC is headed by 10 elected representatives from the villages with reservation for the women and other backward classes. The forester of the specific forest range will also be a member of VFC.

This helped in participatory management of the forest resources and sharing of benefits between forest department and the local communities. In order to facilitate the JFPM activities, the general auctioning of NTFPs to the forest contractors was excluded from VFC area such that the communities could harvest as well as sell these products. VFCs take up planting of prioritized plant species in the degraded area in consultation with the KFD, the benefit derived out of such plantations could be shared between the KFD and VFC. Every VFC has a revolving fund jointly raised by the government source and of the communities which is utilized for different activities. Today because of the JFPM, there is relatively higher level of social learning among the communities and a scaling up of the collective action has taken place.

Many NGO's like Life trust are helping the community to improve their livelihood status through encouraging them to prepare the products from their local varieties, and to go for organic farming which is in high demand in the present market scenario, they are also involved in training the communities regarding processing of the Garcinia fruits in the process many community dryers are constructed in the villages, and they are also given awareness regarding improved cultivation practices, for they are taken to the fields of progressive farmers to demonstrate the activities. Education institutions like College of forestry, Sirsi. University of Agricultural Sciences Dharwad, Indian Institute of Horticultural Research Bangalore (IIHR), Krishi Vidnyan Kendra (KVK's) taking active role in addressing the farmers problem and also giving them the guidance to increase their production level, many problem based research activities are carried out in the farmers field.

CBM Practices

The following are the CBM practices followed in the Sirsi site:

Enhancing community awareness

State-sponsored deforestation activities undertaken during 1980's led the communities towards conservation. Driven by their strong conservation-oriented culture, communities became well aware of the ill-effects of deforestation. Some of the local NGOs also contributed

to the motivation of the people to stage a strong activism against forest clearance and this movement was popularized as the 'Appiko movement' ('appiko' literary means to 'hug'- a tree) In the year 1993 Government of India initiated the process of formation of Village Forest Committees (VFC's) which emphasis on the participatory management of the Forest and benefit sharing between forest department and the local community. Other awareness raising CBM tools like community workshops, field visits, diversity blocks, seed fairs and many were practiced in the site for enhancing the awareness of the community at present the local farmers are having more concern for the natural resources and are motivated towards conservation and sustainable use.

Capacity building of community institutions

In Sirsi site there were different grass-root organizations such as Village Forest Commiittee (VFCs), Co-operatives, Non-Governmental Organizations that are actively taking part in building the capacity of the community. Training on Processing and value addition of Garcinia products have been imparted. Community Processing Dryers have been constructed. The co-operative societies are supporting with low interest loans. Study tour for the farmers have been organized in order to exchange of new ideas.

Setting up of institutional working modalities

CBM activities like diversity block establishment, CBM fund mobilization, Division of labors, Community collection, processing and marketing of NTFPs, Grading of the products, value addition etc., has been implementing in field level through the VFC's, Co-operative society and also in the linkage and coordination with other stakeholders.

Box 2

Diversity Block of Mango and *Garcinia* maintained by a Guardian

One of the progressive farmers of the site Mr Dattatreya Hegde has maintained diversity plot of Mango and Garcinia in the CBM Site. This specific farmer has been inspired by an earlier attempt by a fellow farmer. On the diversity plot, spread over 6 ha, mango and *Garcinia* trees have been planted with one row dedicated to a unique variety. This also facilitates the individual treatment and observation. About 54 mango varieties are maintained in the diversity plot of which about 12 are used as pickling types and 42 are fruit types. The speciality is that about 22 of these varieties are local and endemic to the district. All mango trees in the diversity plot are derived through grafting of the original parent recognized in wild. Several *Garcinia gummi-gutta* and *Garcinia indica* are included in the diversity block. The farmer has recognized three different varieties of *Garcinia indica* (Bright red, Red-Big and pale yellow). The farmer has trained several interested farmers on these issues for the last 10 years. His motive to establish this diversity plot was to obtained better mango types over a longer season as Mango varieties mature in different dates within the mango season. This also ensures a longer flow of money to the farmers. Further, fairly large number of wild picking mango types (which are highly aromatic and harvested when they are just unripe stage to make pickle) are also collected and maintained by the farmers as it is highly priced and has traditional acclaimed house-hold use. According to Mr. Hegde, non-transparency of marketing channels is a big hurdle in maintaining the diversity. He feels that the developing local demand is the key to marketing the diverse varieties since in the local market people are aware of 'specific taste' and reliable cash returns. There are many farmers like Mr Hedge who can be identified, recognized as custodians of community diversity and supported to capitalize on their genetic diversity as a source of income and livelihood options

Consolidating community roles in planning and implementation

A number of good practices like biodiversity fair, peoples biodiversity register (PBR), diversity block, are increasingly being internalized in the community action plan in study site. VFC is mainly responsible for conservation related activities especially maintenance of degraded forest, here the community is actively involved in the micro planning like selection of the species, area to be planted etc. the local peoples are members in the VFCs and Co-operatives they have the monthly meetings and annual meetings in which they discuss about the past progress and the future plans and also the allotment of the funds and distribution of loans. These could be treated as surrogates of CBM Trust Funds and hence encouraged.

Community monitoring and evaluation

With the objective of monitoring and evaluation, VFCs hold monthly meeting to plan and review the progress, discuss on problems and constraints. They mentioned an annual meeting for major issues as planning for the whole year or setting the goals and strategic directions for the year. Everyone participate but the main decisions are taking by the members of Co-operative society, VFC and local leaders.

Social learning and scaling up for community collective action

Several institutions from India like IIHR and abroad have visited this site, interacted with the farming communities and observed the grassroots level activities. During the general meeting everyone participate and they had realized that is easier to work as a group. When they work in a collective way there will be sharing of the responsibilities and also they have more opportunities and access to the resources.

List of Specific CBM practices Observed in the Site:

- Village Forest Committees
- Biodiversity and seed fairs
- Diversity blocks
- Biodiversity and management documentation:
- Custodians

CBM and Empowerment of Communities

Indicators of Social and cultural empowerment

In general, the communities have fairly good idea about the traditional knowledge on resource use. Peoples Biodiversity Registers (PBRs) are being documented in a few cases. Further, the communities collect and use the plant species around them on a day to day basis to prepare traditional dishes. The rights to collect Non Timber Forest Produce (NTFPs) from the wild and right to maintain legally provided usufruct forest patches (Betta lands) are known by the communities to a large extent. The awareness and conscience over traditional knowledge is a good indication of the social empowerment.

As a result of the formation of Village Forest Committees, (VFCs), the communities have now become more organized. About 72% of respondents were willing to participate in collective actions often, suggesting their increased inclusiveness. Interestingly the difference between 'active' and 'less active' group were more pronounced in this aspect. About 71 % of 'active group' took part in the collective actions always and about only 5% of them never participated. However in the 'less active' group, about 50% of the respondents participated always and a higher proportion of them (about 36 %) never participated. As an indication of inclusiveness, about 80% of respondents felt that they were 'some what benefited' with their participation in the CBO. They were all benefited as they obtained the loans from the organization which helped them to improve their livelihood. The time line analysis also indicated that after 1990's there has been an increase in the group meetings and exchange of ideas for CBOs. The co-operative societies have played a significant role in the increasing the collaborations with external agencies such as Government Departments and paved way for increasing market channels. Reservation for women, backward classes in the VFCs is another factor that has increased the inclusiveness of the communities' participation. Hence on account of the awareness, the communities are fairly empowered.

Indicators of Legal empowerment

Under the Legal empowerment, the knowledge of the community regarding the registration, market of products and exchange of seeds of their local land races were assessed. Existing mechanisms to access the *ex situ* collections, to document local Genetic Resources and associated Traditional knowledge, policies relating "custodian rights", accession benefit sharing (ABS), Community Biodiversity Register (CBR), Geographical indication (GI) were understood through house-hold surveys as well as through the focus group study. We are of the opinion that the legal empowerment of the focal communities is rather not strong because of the following aspects:

- Often the exchange of seeds / progagules of local varieties is done informally among the farmers although a few progressive farmers produce and sell to a limited extent the grafts of the local fruit varieties mainly of Mango.
- Farmers are not aware of their rights and related policies and till date, there were no formal record / registry of local varieties by the farmers. However some NGOs and government agencies are now making efforts to impart awareness about the policy issues to the communities.
- The farmers are aware of improved / commercial varieties and access to the improved varieties through regular marketing channels
- The community has no awareness or access to information to exercise their rights to benefit sharing. The community knows little about the GI system, actually do not know how to do it.

Indicators of Economic empowerment

Traditionally the communities resort to conserve the agro biodiversity because of the socio- cultural, biological and economic values attached to it. Central to the sustainability of the CBM activities is the level of economic empowerment obtained by the community. However, because of the shear complexity of the economic empowerment and long-gestation period required for the actual empowerment (because of the long gestation period of that fruit crops) it is not always easy to assess the same. In this study, economic empowerment was

assessed through the ownership of land, durable goods, collective assets, genetic resources and household income as influenced by the CBM activities. With regard to the material assets, assessment was restricted to current scenario only. In our opinion the economic empowerment of communities because of CBM activities is still not achieved. Today we are witnessing only the initial signs of the same. The following points suggest both the limitations and those initial indicators:

- The majority of the communities own land to traditionally grow betelnut and rice; many cases of conversion of forest land into agriculture and Areca plantation was also witnessed. The latter issue weakens the association between the CBM and the economic empowerment.

- Formation of the VFCs has empowered communities to participate in the collection and selling of NTFPs in a more organized way. Perhaps this is one of the strong indicators of initial signs of economic empowerment through CBM. There were also a feeling among the community that their household goods / materials improved because of this.

- Some progressive farmers are involved in the maintaining large number of varieties of fruit trees such as Mango, Garcinia, from which they acknowledge the some benefits, although they feel that there is no much profit from the sale of agricultural products.

- Interestingly the 'active group' reported higher returns through sale of agricultural products than those in the 'less active' group. This indirectly supports that CBM is atleast slowly moving towards the economic empowerment.

- There are still no good examples of ABS system in these communities. However in the recent days there are some organizations that are encouraging the farmers to cultivate the local varieties and popularize the same.

Four cell analysis of Mango and Rice Diversity

The four cells analysis (FCA) was adopted to understand the key genetic assets that are a part of the culture and those augmenting the livelihoods of the peoples. FCA is a tool that allows the identification of common, rare, and endangered genetic resources that need to be conserved. Based on the position of a mango variety in a specific cell, the conservation concern to be given could be determined. FCA . Among the rice genetic resources, good-old varieties such as Shethki, Mullare, Halaga, Parimala Sanna, Ratna Chuda, that are scented rice and bold type were preferred to be conserved. Among the manog varieties most of the aromatic 'appe' varieties were observed to be under threat and required to be conserved. The 'appe' is a wild mango or semi domesticated mango varieties that are used for pickling purposes. They are harvested when they are very raw and much before full growth. Roughly about 5- 6 cm length fruits are harvested and processed to prepare pickles. Some varieties are also used as a souring agent in combination with the vegetable. All these pickling and vegetable varieties are identified from the wild directly by the people and hence has a great ethnic value. The FCA has identified the following varieties for the conservation purposes: Anantha bhattana appe, Jeerige appe (4 varieties), Kocha gai (for the souring purposes), Vate makki appe, Gidugana mane appe and malanji appe, Tuduguni Appe, Haladhota, Malangi, Nandagara, Hosagaddi appe, Kengre Appe, Kalagar Appe, Go-mau mango. Apart from the 'appe' varieties, one fruit type called "Vorate giduga" has been identified to be the top quality fruit type used for table purpose and it fetches good price in the market.

This kind of assessment is being carried out as part of the GEF-UNEP Project **"Conservation and Sustainable Use of Cultivated and Wild Tropical Fruit Diversity: Promoting Sustainable Livelihood, Food Security and Ecosystem Services"** which is being implemented at the CBM site as well as in 18 communities of India along with Indonesia, Malaysia and Thailand. The project is funded by GEF-UNEP with the technical support of Bioversity International in partnership with ICAR. Local institutions such as College of Forestry, Sirsi, Life Trust NGO and EcoWatch are working together to document such traditional knowledge and build capacities of farmers and local communities to assess, evaluate and

implement good practices that will increase the value of tropical fruit tree genetic resources. Bioversity International with its technical support has pioneered the cause of conservation and sustainable utilization of such locally important genetic resource. The project works with local and national research and extension organizations to build their capacity to assess diversity and its value and to evaluate certification options. The aim of this nationally important project is to set up a CBM Trust Fund to support the community initiatives that aim at improving the livelihood of the people through the community actions on genetic resource conservation and utilization. With a bottom-up approach, action plans formulated at the village level are being envisaged at the National Level and incorporated as National Action Plans.

Time line analysis

Time line analysis was done to understand how the changes have occurred in the forest landscape, community structure and its impact on the livelihood of the people in the community. We considered 1947, the year of India's Independence, as the base line year. We found the following results. Soon after the independence the community got the electricity and the farmers relate this period with thick forest cover and lot of wild animals in them. The human population was very thin (around 300) with about 40 households in the community. The cultivation practice was such that the farmers were growing only rice and arecanut in the proportion of 70:30. During 1960's there was formation of the co-operatives which led to availability of so-called improved varieties in rice; during this time the old varieties were on decline. During the year 1980 logging of forests for valuable timber trees by the forest department led to the much devastation. The original forest was replaced by planting exotic species like Acacia species, this was strongly opposed by the local peoples. Perhaps the seeds of organized community management started during this period.

Box 3

Appe midi: a unique Genetic Resource of Uttara Kannada district

Appe midi, as it is known in Kannada, literally means the raw, un-ripened mango. It is a special type of pickling mango that is collected extensively from the wild, processed as a pickle, used as a commodity of commerce and relished in every meal by every citizen in Uttara Kannada on every single day. No meal is complete without the extraordinary aroma of the *appe* mango pickle in this part of the country. Because of this attachment, people have developed a special mental faculty to recognize, typify, cultivate and conserve dozens of varieties of *appe* mango in the district. These varieties are recognized by their aroma and taste in addition to their colour, shape, size, pulp content, shelf life, consistency and season of harvest. One can obtain an *appe* with an array of aromas ranging from that of Jeera (Cumin seeds) to that of camphor. As a matter of fact, the aroma of many of the varieties cannot be described verbally. It can only be relished with a wholesome meal. Ananthabhatta's *appe* is perhaps the oldest variety of *appe* mango identified and popularized a century ago in this district. The history dates back to the early 1900s, when a cultivator from Balur village by the name Anantha Bhat on the banks of Aghanashini river, identified and popularized a variety which became very famous quickly. It is named after him as he died while collecting scions of this material. Even today it is one of the leading varieties, much sought after by the farmers and the pickling industry. Unfortunately this clone does not flower in many locations, making it difficult to popularize. Other varieties include *Malanji appe, Haladota appe,* and *Karpura appe*. A range of culinary dishes are prepared and relished every summer with appe midi. Pickling mango species are highly restricted to river banks and other swampy areas. It has evolved as a specialist to these unique habitats. It requires very high soil moisture conditions for its flowering and fruit set. Commercially, the pickling mango is also an important Non-Timber Forest Product (NTFP). It is estimated that a mature *Appe* Mango tree on a river bank can yield 5,000 to 10,000 fruits which can potentially fetch up to Rupees 20,000 ($435) every year for a

local collector. Hence this resource also relates to the livelihood of the local people. Unfortunately, there are no strict guidelines for the collection and marketing of this important NTFP. The confusion basically arises due to the fact that products arising from fruits that are harvested from forest lands and private lands can not be distinguished while marketing. Further, because of the high stake, pickling industries encourage large scale collection of the fruits. Consequently, indiscriminate and unscientific harvesting have set in, leading to depletion of the populations.

Over a period the number of households and population also increased to 90 and population grew to 700. The cultivation practice slightly changed wherein Arecanut became dominant commercial crop. Many hybrid varieties of rice as well as grafted mango varieties became available. The use of synthetic fertilizer application reached its peak. In year 1993 the government policy to form the Village Forest Committees had came into force that aims for the participatory management of the forest by the local communities. Due to this policy the Communities were more organized and an institutional shape to the community engagement in protection of forests was achieved. During the recent past i.e. 2005-2010, the community is facing problems such as shortage of labour, loss of yield due to pest and disease problems, hence the more focus on conservation of the local varieties was given. Several farmers are shifting back to the cultivation of the local verities of rice, organic farming etc.

Experiences of CBM Exchange Program

As a part of the Global CBM study, partners from different countries visited different sites around the globe. From Sirsi site, visits were made to Brazil and Nepal. The experiences of these visits have provided several insights. Here we try to document them.

Brazil

CBM as a means of empowering communities in the conservation of plant genetic resources is slowly gaining importance in Brazil. CBM activities in Brazil are inspired by achievements in Nepal, but because of the dissimilar situations, CBM as methodology has to develop its own pathway in Brazil. The basic drivers for CBM activities, and the empowerment

process include Land issues, the ill effects of modern / intensive production systems, food insecurity, the undermining of ethnic rights, and social inequality. Globally recognized issues such as 'farmers' rights' are complex and influence the CBM processes. Brazilians are open to innovations, independent of their origin, and as such any new ideas that could be used in the empowerment process, from any part of the globe, will be accepted by the Brazilian community as long as they address local issues. This openness was exemplified by the diversity kit, which was adapted to the local context in Guaraciaba, and this version of the diversity kit is now again ready for its return journey, to be re-introduced in Nepal.

Newer insights

Seed bank: The idea of having a seed bank inside the community is a very good way of ensuring food security. This idea was shared with all the Brazilian study sites.

Diversity kit with flyers: The idea for the kit started in Nepal and was well accepted in Brazil (Guaraciaba). Now, more varieties and flyers have been added to the kit, and it has been linked to the issue of sovereignty over food and genetic resources. Community members learn to cultivate those species, and some knowledge about them, as means to enhance their sovereignty. This experience now can be started in other countries.

Biodiversity register: The experiences of CBM in Nepal, in setting up a biodiversity register, can be easily replicated in Brazil, and we should start to think about how to document the knowledge of the guardians and other farmers.

Food fair: The food fair was implemented in Tavares and the farmers adopted the practice really well.

Nepal

CBM processes are very mature, internalized and successful in Nepal. There are several aspects of CBM that could be emulated under Indian conditions.

- Conservation of landraces through formation of Community Seed Bank. This simplest and grass-root level activity would be very ideal to start in many places.
- Formation of Community Biodiversity Registers to document the diversity as well as to raise the awareness on local biological diversity
- Diversity Blocks and Participatory Plant Breeding is one of the sophisticated techniques successfully followed in Nepal. This needs a higher level of technical skill to adopt it.
- Cyber Plant Conservation Programme is a novel idea which could be adopted among communities wherein the literacy levels are higher. School children could be effectively engaged in this programme.
- The establishment of CBM fund is the panacea of all CBM activities which could be followed to sustain the activities.

As a part of the GEF/ UNEP programme, the decisions of the local communities have been integrated into the national plan. Some of the grass-root level decisions made in one of the communities is provided below as an example:

1. Promote the unique types of Pickling and Fruit Mango types
2. Characterize and make efforts to register '*varate giduga*' variety of Mango which is very unique to this part of the region.
3. Undertake training to self help groups for various processing / nursery methods
4. Educate and encourage people to follow good collection practices for Mango and Garcinia
5. Implement the rules that buyers should only buy matured fruits of *Garcinia gummi-gutta*
6. Promoting the importance of *Garcinia* products
7. Research and upscale new technologies regarding processing / alternative processing of *Garcinia* rind for the extraction of Hydroxy Citric acid.

8. Provide driers to stakeholders on subsidy basis or common large scale drier should be set up at hamlet or village level.
9. Facilitate marketing of the Garcinia / Mango products.
10. Set up and operate Garcinia Butter extraction unit at hamlet/village level.
11. Establish and promote community nurseries for the Garcinias and mango.

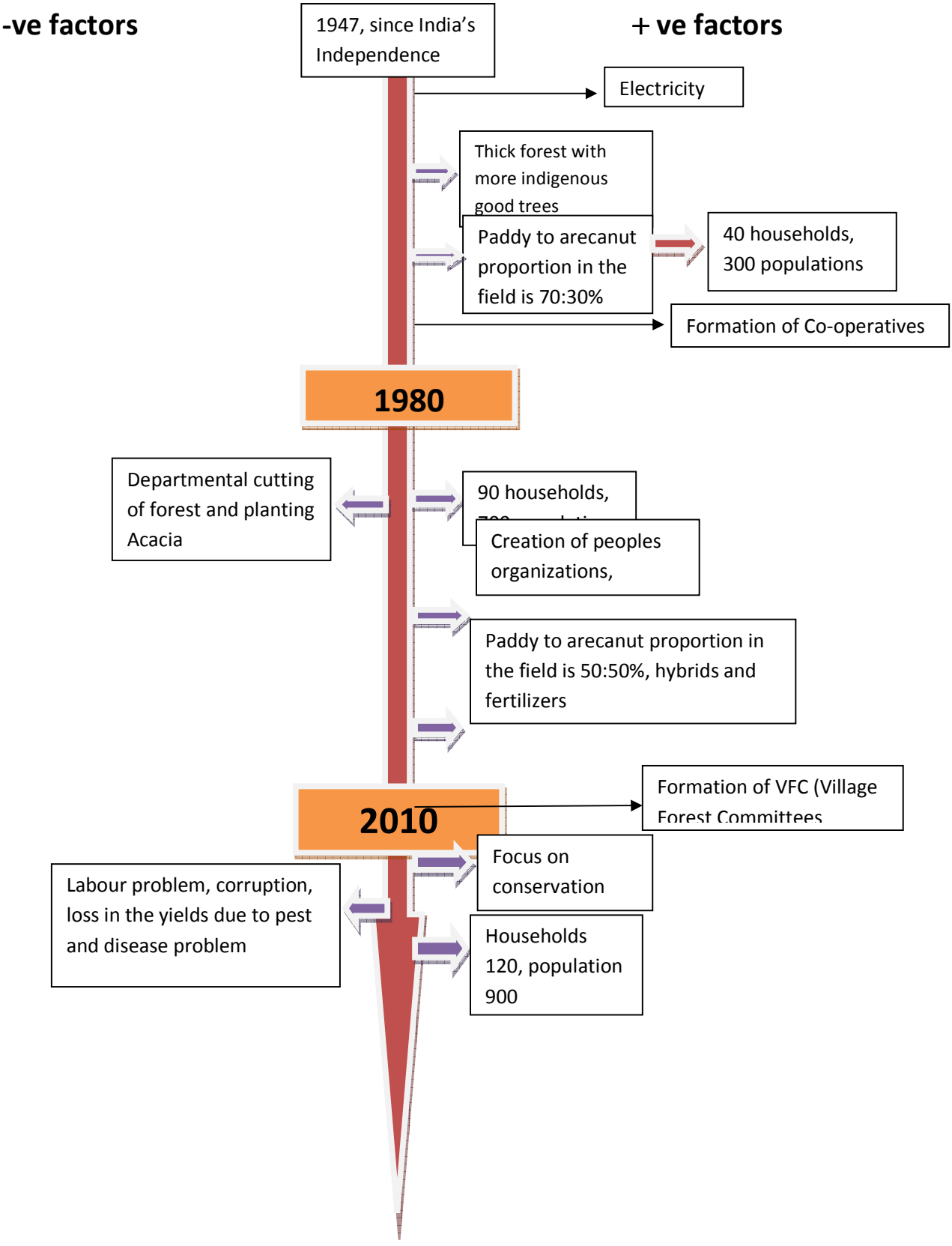
Annex

Country	INDIA
Site	UTTARA KANNADA
Organisation	University of Agricultural Sciences Dharwad, College of Forestry Sirsi.
Lead researchers	Manohar Sunagar, Dr. R Vasudeva, Dr. Bhuwon Sthapit.

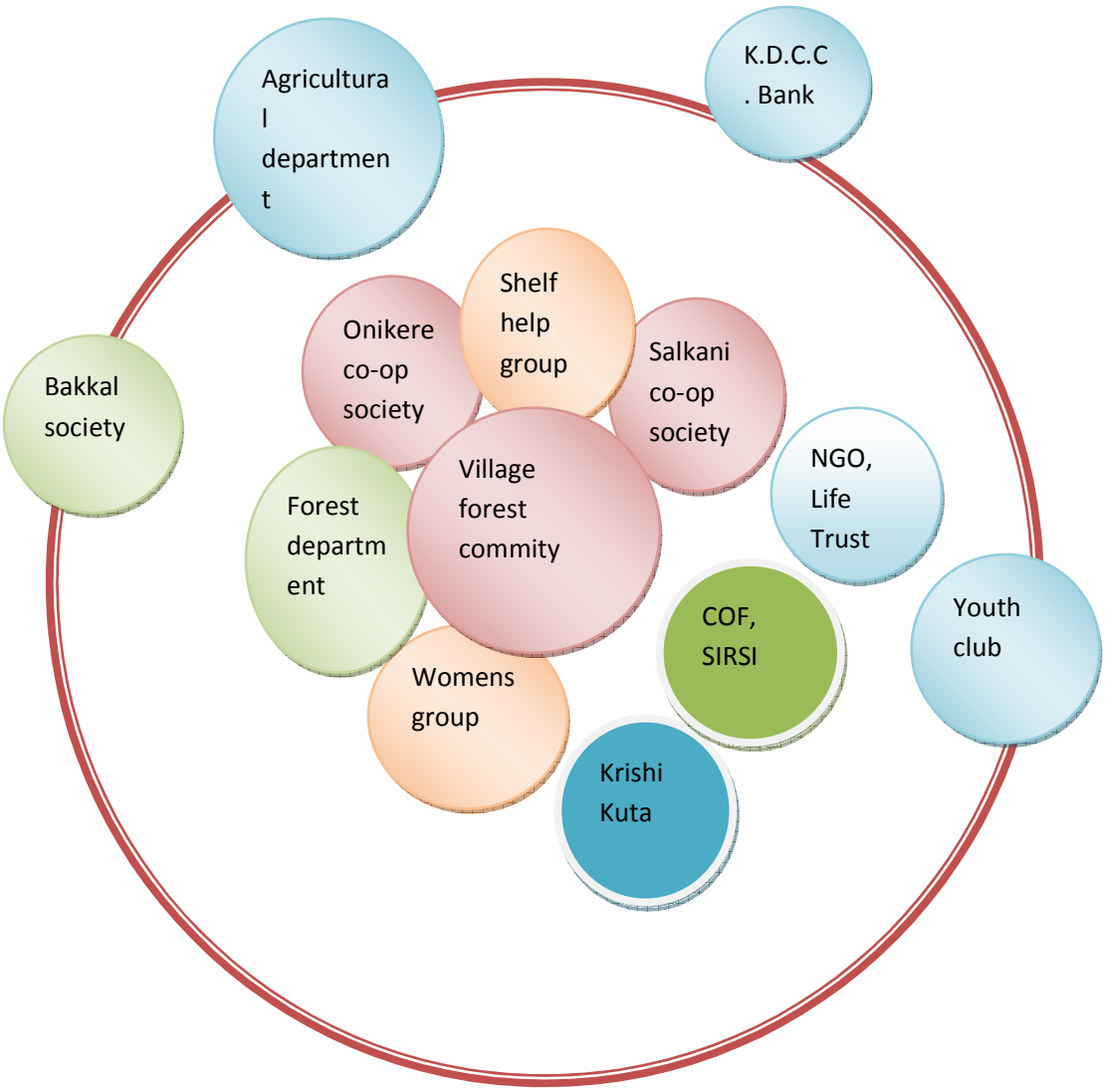
Household Interview:

	Households		
	Total	more active	less active
total number of HHs	40	18	22
Average age yrs	52	46	57
interviewee's gender	37 male; 3 female	16 male; 2 female	21 male; 1 female
HH average size	6 persons	6 persons	6 persons
Specific characteristics	37 HHs Hindu Brahmin, 3 HHs Hindu Namdhari	18 HHs Hindu Brahmin,	19 HHs Hindu Brahmin, 3 HHs Hindu Namdhari
Formal education	High school completed(56%), College(26%), Graduation education(18%)		
Observations	Both more active and less active HHs present in the villages, proportionally More active HHs are very few compared to Less active HHs		

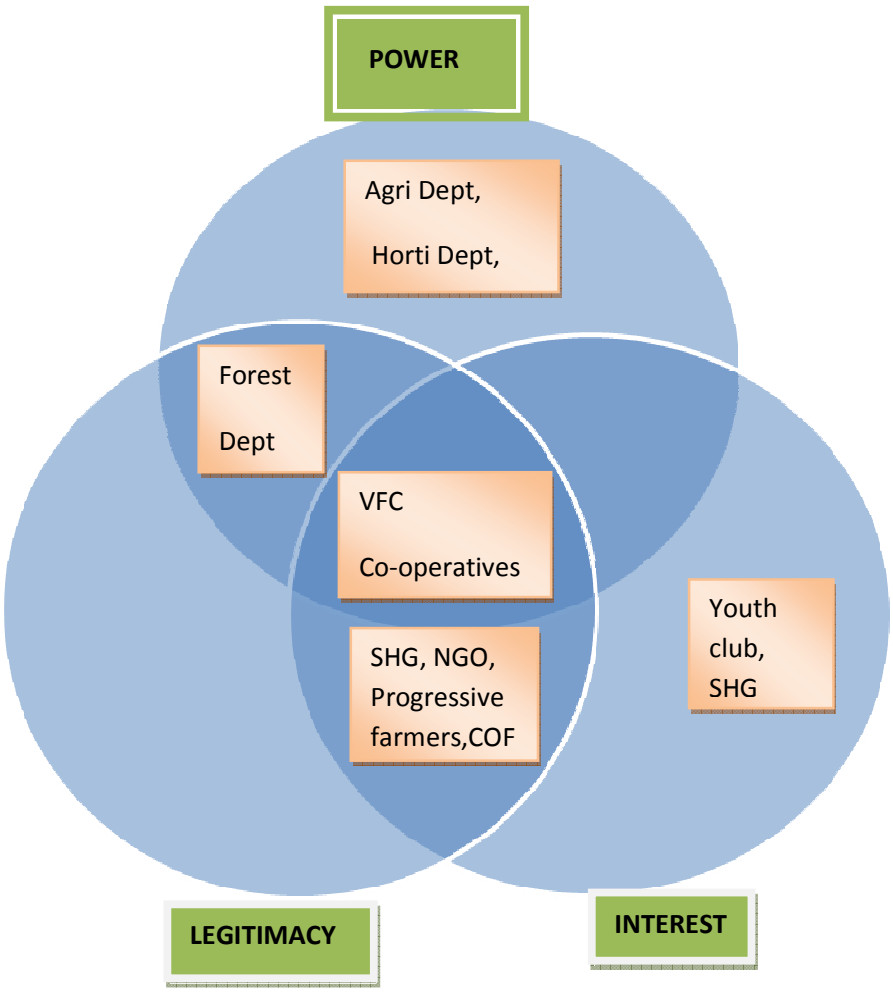
TIME LINE


-ve factors
+ ve factors
1947, since India's Independence
Electricity
Thick forest with more indigenous good trees
Paddy to arecanut proportion in the field is 70:30%
40 households, 300 populations
Formation of Co-operatives
1980
Departmental cutting of forest and planting Acacia
90 households,
Creation of peoples organizations,
Paddy to arecanut proportion in the field is 50:50%, hybrids and fertilizers
2010
Formation of VFC (Village Forest Committees
Focus on conservation
Labour problem, corruption, loss in the yields due to pest and disease problem
Households 120, population 900

VENN DIAGRAM



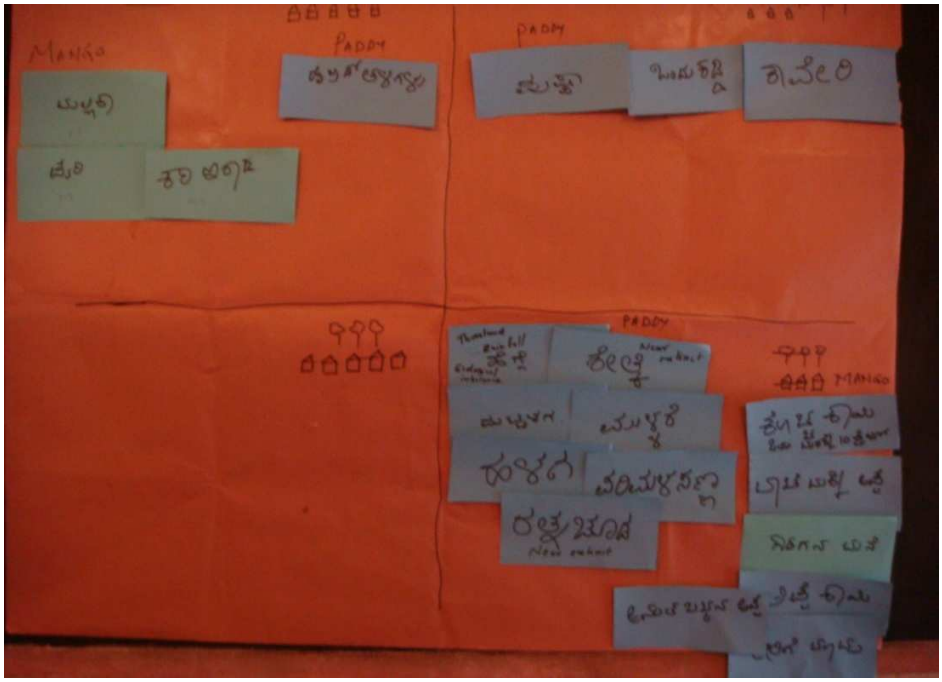
CLIP


POWER
Agri Dept,
Horti Dept,
Forest
Dept
VFC
Co-operatives
SHG, NGO,
Progressive
farmers,COF
Youth
club,
SHG
LEGITIMACY
INTEREST

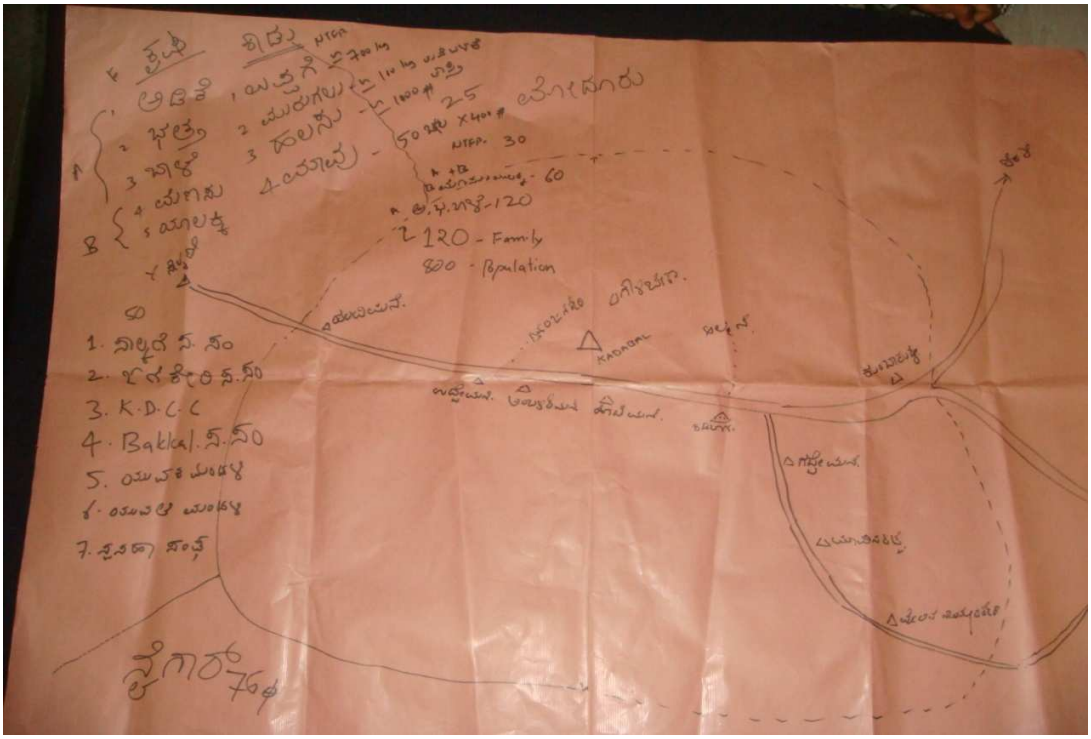
Pictures

Community meeting

Four Cell Analysis



Route Map



Interview with diversity guardians:

Stakeholders Interview:

Local Government

Conservation Stakeholder

List of Farmers & house hold details

Name of the Farmer	Hamlets	Household code	Income (Annualy)
1. Gopal Ram Pujari	Salkani	Very active	Rs 90,000
2. Ramchandra	Salkani	Very active	Rs 1 lakh
3. Hariyamogar	Salkani	Less active	Rs 40000
4. Venkappa Hegde	Salkani	Less active	Rs 55,000
5. Vidya hegde	Salkani	Very Active	Rs 80,000
6. Kamal Venkata raman Hegde	Salkani	Very Active	Rs 1.5 lakh
7. Sathyanarayana kadabal	Salkani	Less active	Rs 40000
8. Nagagouda	Salkani	Less active	Rs 55,000
9. Narashimmurthy Hegde	Salkani	Less active	Rs 1 lakh
10. Manju hegde	Salkani	Very active	Rs 80,000
11. Thirumashiva ganapathi hegde	Melina oni kere	Very active	1.2 lakh
12. Sudarshan manjunath hegde	Melina oni kere	Very active	Rs 90,000
13. Manjula Hegde	Kadabal	Less active	Rs 90,000
14. R V Hegde	Kadabal	Very active	Rs 1 lakh
15. Narashim Bhat	Kadabal	Very active	Rs 1.5 lakh
16. Dattatraya Hegde	Kadabal	Less active	Rs 40000
17. Shridhar Hegde	Kadabal	Less active	Rs 55,000
18. Ramesh Hegde	Melina oni kere	Very active	Rs 1 lakh
19. Ramakrishna Hegde	Melina oni kere	Very active	Rs 80,000
20. Shetharam Hegde	Melina oni kere	Very active	Rs 1.5 lakh
21. Narashim Hegde	Melina oni kere	Very active	Rs 90,000
22. Venkatram Hegde	Melina oni kere	Less active	Rs 55,000
23. Padmanabha Mahabaleshwara Hegde	Melina oni kere	Less active	1.2 lakh
24. Vinayak Satyanarayana Bhat	Manadooru	Very active	Rs 1.5 lakh
25. Madhukeshwara Seetharama Hegde	Manadooru	Very active	Rs 1.8 Lakh
26. Ganapathi H.Moger	Manadooru)	Less active	Rs 40000
27. Shivaram Venkappa Hegde	Kadabal	Less active	Rs 45,000
28. Bhaskar S. Hegde	Kadabal	Less active	1.2 lakh
29. Venktraman Sannu Naik	Kadabal	Less active	Rs 50,000
30. Venku Rama Naik	Kadabal	Less active	Rs 45,000
31. Ramachandra Sannu Naik	Kadabal	Less active	Rs 35,000
32. Ramakrishna K.Hegde	Kadabal	Less active	1.2 lakh
33. Manjunath P Hegde	Kadabal	Less active	Rs 55,000
34. Prabakar T Hegde	Kadabal	Less active	Rs 60,000
35. M. S. Hegde	Kadabal	Less active	Rs 55,000
36. Keshava Ramachandra Hegde	Kadabal	Less active	Rs 40000
37. R.J.Hegde	Kadabal	Very active	1.2 lakh
38. Venkataraman Hegde	Kadabal	Less active	Rs 55,000
39. Ramakanth k Hegde	Kadabal	Very active	1.2 lakh
40. Savithri Hegde	Kadabal	Very active	Rs 90,000