BIODIVERSITY

People's Ecological Planning (PEP) Network and Agricultural Revitalization in South India

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Introduction

Ongoing globalization with its attendant impacts such as commercialization, mechanization, monopolization, economic inequity etc. are questioned or condemned in academic and sociopolitical forum (Shiva, 1993). However, such debates are often reactive and only promote conflict, rather than a balance between the extreme positions so as to integrate the traditions with the modern, sacred with the secular, social interests with the private interests. Interestingly, notable ecological initiatives have recently sprung in India that embody such synergistic approach. These include registration of environmental knowledge and management priorities of various social sectors to foster sustainable natural resource management (Achar *et al*, 2000). The focus on biological diversity and related traditional knowledge in such registration has opened up opportunities to protect the local interests against the global interests through synthesis rather than antagonism (Gadgil *et al*, 2000). This is particularly true of the knowledge dimension as demonstrated by emerging proposals for alternative systems of intellectual property rights (Gupta, 1993). However, role of such registration in participatory planning of natural resources is explored a little (Kothari *et al*, 2000).

Penning Wisdom and Plans

People's Ecological Planning (PEP) network is an emerging initiative by several Indian non-governmental organisations (NGO) trying to build upon folk ecological knowledge, decentralised governance and information revolution. It is a logical extension of an informal network of NGOs linked with the biodiversity register (PBR) programme. PBR is an initiative by voluntary agencies (VA) from India for promoting sustainable use and equitable benefit sharing while conserving the biological diversity. A loosely knit nationwide movement, it aims to generate village level biodiversity management plans eventually to occupy legislative and political spaces for decentralise governance. Besides protection of immediate natural resource rights of villagers, broader objectives of the initiative also include protection of their intellectual property rights (IPRs), by creating documentary evidences useful in litigation. Motivation partly comes from the examples like Neem and Turmeric related patents revoked by European Union and USA respectively due to legal

challenges based on prior Indian publications. The objectives of the programme include:

a) Documentation of people's knowledge, moreover, practices of sustainable use and conservation of bioresources, both wild and domesticated; to help in protecting their IPRs in future.
b) Participatory planning for its sustainable and equitable use, besides conservation.
c) Resolution approving this document as a village resource, in a gramsabha (village meet) or panchayat (village council), to help in its institutionalisation.
d) Wide publicity to this process and products in popular as well as scientific media.

Trade Barriers

Challenges before agriculture have skyrocketed recently due to adverse techno-legal compulsions Intellectual Property Rights (IPR) over new crop and livestock breeds, facilitating foreign monopolies over the agricultural backbone and enslavement of the farmers. More frightening are concerns over food security, due to reduction of import controls of foreign agro-products, including the Genetically Modified Organisms GMOs. Domestic erosion of indigenous agricultural diversity and related practices magnifies these threats. Some fresh legislations provide breathing spaces. But concrete hopes stem from the pre-emptive grassroots efforts for sustainability described here. World Trade Organisation (WTO) is the new global power center, established by the international convention General Agreement on Trade and Tariff, 1994 (GATT). Greatest concern stems from Trade Related Intellectual Property Rights (TRIPS) agreement which compels member nations to provide strong IPR protection to new plant varieties, domestic and foreign alike. The infamous Basmati case only provides a glimpse of the future biological wars within legal tangles. Rice Tec, a multinational agro-corporation patented a new rice variety grown in USA by name Basmati, infuriating traditional Basmati farmers and exporters from the Indian subcontinent no end. For, this unfair non-tariff barrier would first oust them from the US markets and eventually even from the prime European markets, European Union (EU) countries being committed to TRIPS. Today the consumer pressure has compelled the European traders to prefer marketing the traditionally grown Basmati from the subcontinent. However, EU may eventually respect the Rice Tec Basmati, dooming the Indian and Pakistani farmers and exporters, just as EU bowed down to permit imports of US traded banana and beef under the WTO mandate, to the loss of its commonwealth producers. Greater threat to farmer comes not only from loss of foreign markets but even likely loss of Indian markets in future, emulating the EU. This is evident from the Plant Variety Protection and Farmer's Rights (PVPFR) bill due for enactment by Parliament soon, facilitating industries to obtain seed monopolies. PVPFR emulates laws in the industrial countries that favour breeders over farmers. However, unlike those lows, PVPFR does not avail compensation to farmers from the seed companies over unmet promises. Two provisions of PVPFR resemble farmer's rights, however cosmetic. Firstly PVPFR facilitates farmers to challenge seed monopolies for appropriating and manipulating farmer's breeds, as successfully done with frivolous patents on Neem and Turmeric. Secondly, the PVP applicants must disclose original breeds employed to evolve new varieties, depending on which they must contribute to a Community Gene Fund (CGF) to provide incentives to farmers for on farm conservation of agro-diversity.

Community Intellectual Rights?

Four growth phases of the PBR movement are described in Table 1. The programme originated with the concept of Community Register (CR) launched

by the Foundation for Revitalisation of Local Health Traditions (FRLHT) in a meeting of southern Indian NGOs during 1994. The idea then was to systematically document the traditional knowledge and skills (TKS) of the villagers recognise them including as `prior art' to contest the related, fraudulent IPR claims. This beginning marked an important deviation from the classical ethnobotanical publications that recognise and benefit only the modern botanical reporters, besides medicinal or crops industry.

Table 1. **Defining characteristics of each phase of biodiversity registration.**

STEP	LEAD	LOCAL	COST Rs./BR	SITES	SCALE	FOCUS	IMPACT
CR	FRLHT	NGOs	2000/-	10	Region	TKS	NGOs
CBR	IISc	Colleges	25,000 /-	5	Region	Landscape	Methods
BCPP	WWF	NGOs	50,000 /-	50	Nation	Trade-offs	Policy
PBR	NGOs	Villagers	5,000/-	100	District	Development	Law

But this hardly benefited real knowledge holders, villagers themselves. Such unfair knowledge transactions eventually destroy the TKS, besides making derived new seeds and drugs prohibitively costly for the villagers.

CR provided an innovative channel to bring TKS into the broader public domain, without compromising the erstwhile advantages to the individuals or communities. These included community recognition to knowledge holders like the folk medicinal practitioners, besides access to and control over livelihood resources, like crops or kitchen garden medicines. About a dozen such CR documents were compiled by various NGOs scattered in southern India from villages in their vicinity.

Such recognition including in modern systems akin to modern IPRs was also being increasingly availed to village folk through the efforts of Indian Institute of Management (IIM), around its base in Ahmedabad. This programme, popularised as SRISTI or honeybee network, primarily focused on promoting grass-roots innovations and creativity, primarily individualistic, whether traditional or modern. CR differed a little in focus on community base and traditional nature or knowledge. Both the efforts got highlighted in the media and among scientists, including ethnobotanists. The CR documents and lessons therein however remain confined to NGO offices. Information gathering lasted barely a few days per village, costing food and travel of the researches.

Banking on Convention on Biological Diversity

Community Biodiversity Register (CBR) was the next logical step during 1995, linking it to the international Convention on Biological Diversity (CBD) that for the first time provided spaces for the rights to communities about their biological and cultural heritage. Spearheaded by the Indian Institute of Sciences (IISc), this phase contributed more to methodology development, in

handful of villages scattered along the Western Ghats mountains. The documentation, lasting about a year per village, was shouldered by college teachers and students. Costs rose manifold due to manifold travel and lodging expenses of outside researchers than the CR.

The innovative additions to CR in this phase included documentation of not just species but even their habitats ranging from forests to cultivation, thus embracing the landscape. This helped in understanding not just `which' biodiversity was important but also `where'. The scope of documentation expanded beyond usage to recognise conservation, including traditional practices. For instance, broader recognition was accorded to sacred groves i.e. forest vestiges preserved fearing wrath of the deity upon harvests from the patch.

Internalising Conservation Trade-Offs

The next phase naturally harped on marrying traditional conservation forest practices with the modern ones especially the protected areas (PA) like wildlife sanctuaries, national parks and biosphere reserves. Facilitated by the Worldwide Fund for Nature- India (WWF-) and coordinated by IISc during 1996and 1998, this phase formed a part of the nationwide exercise, the Biodiversity Conservation Prioritisation Project (BCPP). Under strategies component of BCPP, registers were prepared by over two dozen NGOs and dozen colleges, besides few forest officials; in over 50 villages scattered allover the country. Lasting over a year per village, the documents were the costliest, much due to travel and stay of the national and state level coordinators, in this vertical dissemination phase. This phase brought the concept to the notice of nationwide elite conservationists, including policymakers.

The focus of this phase was to facilitate compromise between conservation and development at the village level, also by involvement of external users besides local communities. This phase partially resolved the conflict in individual against community foundation of the knowledge by enlisting the biodiversity user groups (UG) like fisherfolk or artisans besides enlisting knowledgeable individuals (KI). Specific ethnic identity, if any, besides TKS of groups as well as individuals was also mentioned. Other innovative additions included documentation of ecological history of the landscape and its social drivers like land reforms or forest acquisition by the government that eroded the community based conservation practices. The resultant locality specific documents remain confined to the NGOs but their gist was widely publicised in national media.

LOCAL CONFLICTS

Forests and fisheries exclusively owned and managed by the government has promoted erosion of rights of local communities and subsequently, their practices of sustainable use such as sacred groves (Gokhale et al, 1998). This is especially true of protected areas such as wildlife sanctuaries and national parks that even displace local people or curtail their resource rights in the name of global goods such as environmental conservation. Unfortunately, after depriving the local people of their resources the government often ends up in meekly surrendering those to industrial interests, even by subsidizing and promoting the abuse of nature (Gadgil and Guha, 1995). Such governance policies that promote unequal resource access to various social sectors, only trigger social conflicts and agitation, at times even bloody fights. Thus, industries and forest producers are at loggerheads in the Western Ghats of Karnataka while traditional fishermen struggle with mechanized fisheries and aquaculture all along the coast. Similarly, temple trusts and local community nurturing the sacred forests are fighting the encroachment by industrial exploitation and urbanization (Gokhale *at al*, 1998). Above instances illustrate that the existing governance paradigms for both conservation and development only ignore and erode the grass-roots traditions of conservation and sustainable use such as the sacred forests and waters, instead of learning from them design principles for social sustainability (Ostrom, 1992). Such resource confiscation by the elite is unsustainable, promoting only insecurity and conflicts.

Popularising the Registers

People's Biodiversity Register (PBR) was how numerous publications had re-christened the effort by now, doing away with the academic debate over the community and individual domain of knowledge. There was no central co-ordination except to introduce the concept, characterising this most decentralised phase, based on local initiatives facilitating wider horizontal dissemination. Many local innovations include focus on documenting local cultivation practices, as in over 50 village registers scattered all over Andhra Pradesh state, promoted by Deccan Development Society (DDS). Second innovation cut the costs manifold by hinging documentation efforts on educated village youth and rarely, technical translation by urban experts. About 50 registers under preparation in western part of the Karnataka state illustrate this. These were motivated by Vruksh Laksha Andolana (VLA) and Nagarika Seva Trust (NST), local NGOs with solid mass base. VLA also persuaded the local forest officials to sponsor some of these programmes under the joint forest management (JFM) scheme. Kerala Shastra Sahitya Parishad (KSSP) in Ernakulam district of Kerala state inspired 80 such registers from the government funds under the `People's planning' campaign for decentralised governance.

These NGOs influenced most important innovation by obtaining village council's ratification to some of these registers. Village councils took pride in declaring the registers as their cultural heritage and pledged to regulate outsider's access to it. An important symbolic step in social dynamics, such resolutions validate the documentation for future use in litigation, if any. But it hardly helps in actually regulating usual outsiders, often local traders or government machinery; extracting the bioresources from public lands,

including village property. Today village councils are not authorised to prevent exploitation of such common property resources. When outsiders' influence becomes over-riding, local planning, including registers, is crushed.

FORESTRY NETWORK

Role of registration in empowering the communities in the natural resource management is evident from the existing network of institutions pioneering the biodiversity register programme spearheaded by the Indian Institute of Science (IISc) (Achar *et al*, 2000, Gadgil *et al*,2000). Here, local college or NGO researchers compile knowledge and management perceptions of local communities in a participatory fashion, such as rural appraisal (Chambers, 1992). However, this programme has yet to establish as an ongoing activity and diversify so as to garner strength from and feed into some existing efforts. For instance, there exists a strong network of village forest management committees (Poffenberger and McGean, 1996) and an emerging network of joint protected area initiatives allover India where local people and government collaborate (Kothari *et al*, 2000). On the other hand, scientists have joined hands with local people is developing participatory resource monitoring of non-timber forest produce (NTFP) in Karnataka state (Bawa *et al*, 1999).

This popularisation phase influenced local media greatly, turning biodiversity news in to headlines and cover stories. This media impact coupled with social gatherings motivated the local politicians to raise these issues in the assembly and parliament. This helped in partially shaping the national lawmaking process. Many IPR bills and amendments today variously recognise traditional knowledge, including village level documentation; in scrutinising the IPR claims. Biological Diversity Bill also marginally buttresses the rights of the village councils, besides state and central government; to regulate biodiversity trade and other deleterious activities within their jurisdiction. Such authorisation would further require complementary changes in Panchayat Raj Act empowering village councils, beyond granting ownership rights over minor forest produce in scheduled areas through 1996 amendments.

No Lock and Key this...

A common perception confusing some researchers, besides activists seems to be keeping the registers in lock and key, not allowing its access to outsiders without prior informed consent (PIC) so as to prevent biopiracy. In practice, this will not only prove futile but also deleterious to the very objective, as information in the register could be somehow stolen. Moreover, most information within a register may not be unique, also known from other areas or even publications, databases etc. The purpose of better local natural resource management cannot be served without submitting the information on landscape, bioresources and proposed activity plan to the government, thus making it public. Preventing frivolous IPRs is not possible without incorporating local knowledge claims in an authentic database, thus making it public. Thus, there are more gains than losses by publicising the information in the register. Some secrecy could be maintained beyond respective village in hiding the register, at least its knowledge component, till it gets authentically computerised in the government system. But no such government system

starts functioning till long, publication of summary if not the details about register could become a better evidence of prior public knowledge than simply the register itself.

KNOWLEDGE NETWORKS

For protecting the intellectual property of rural, farmer innovators, modern technology such as electronic databases offers promise as demonstrated by efforts at Indian Institute of Management (IIM) <Url: http://www.sristi.org/innovations.htm>. This has eventually grown into a government-sponsored movement to scout and protect grassroots innovations and rewarding those, including through development of small-scale rural enterprise <Url: http://www.gian.org>. Though initiated in the context of biotechnology and IPRs, comparison and synthesis of the traditional and modern knowledge systems remains a theme little explored otherwise (Berkes *et al*, 1995). However, exploring the multidimensional issue of ecology, especially biodiversity would require data collection at multiple locations through a network of researchers at all levels, ranging from village to the globe. The research proposal intends to benefit from and provide positive feedback to such existing parallel networks in India, to foster their closer cooperation. The need for linkage between rights to resources and knowledge is amply demonstrated by the pioneering but abortive attempt of sharing biotechnology benefits with the tribal community that provided the basic information for triggering formal innovation (Rao, 2000). In this case, attempts by a premier government research institute from southern India towards such benefit sharing with the people failed in the absence of policy and institutional framework as well as lack of people's resource rights.

Is It Any Use?

Most people wish to know about example where such registration has lead to any meaningful benefit sharing. Unfortunately concrete examples are lacking in the absence of legal framework, besides insignificant awareness and empowerment. In cases like Neem or Turmeric prior documentation like scientific publications, but not registers; have been used to successfully fight fraudulent IPRs. Incidentally, no registers were prepared in areas of relevant TKS. The Jeevani (Trichopus zeylanicus) provides an illustrious case of sharing industrial benefits with the knowledgeable community, thanks due to prior scientific documentation and knowledge transaction by the enlightened and sympathetic researchers. Here, Kerala State government's research institute acquired and transferred tribal knowledge of using a local plant Jeevani to an Ayurvedic pharmacy for commercial development of a tonic. Part of the royalty was shared with the concerned Kani tribals in Trivandrum district. Unfortunately, the arrangement could hardly last as the tribals had nor resource rights and the forest department prohibited extraction of the plant from the its forest habitat. This curtailed drug production and royalty sharing, amongst other obstacles.

These cases demonstrate that if developed properly, register movement can generate such benefit sharing more widely. Thus recent global publications such as by the International Union for Conservation of Nature (IUCN) emphasise PBR as a promising option for equitable benefit sharing and to prevent unfair IPRs. The Biological diversity (BD) bill and the Plant Variety

Protection and Farmer's Rights (PVPFR) bill, besides Patent Act amendments, due for parliamentary approval soon, provide for such documentation and benefit sharing.

TRANSGENIC CROP IMPORTS?

Impending Agreement on Agriculture (AoA) under the WTO might lift restrictions on agricultural imports including GMOs, as hinted by the liberal Exim policies of late, opening the floodgates to foreign goods like never before. Urban consumers are busy buying Australian apples or American Soya sausages, turning blind eye to ethnic food and eco-labeling prevalent in the industrial markets. This could only further fuel controversies like the Bt-cotton in southern India. Several dryland cashcrop farmers from southern India went on suicide spree couple of years ago after their cotton crops succumbed to pest attack for two consecutive years, sinking them in to debt trap. Investigations fixed the blame on poor quality pesticides, without proper government controls. Incidentally, Monsanto, a multinational pesticide corporation soon advertised divorce to pesticides owing to pre-launch field trials of its transgenic variety named Bt-cotton after the bacterium *Bacillus thuringensis* whose pest resistant gene is transplanted to cotton crop. The fear about environmental and health hazards of this transgenic cultivar triggered much controversy. It was further fueled by the appropriateness of the central government in permitting Monsanto's Indian subsidiary Mahico seeds to conduct field trials without any checks from local government researchers or NGOs. Most telling was the misplaced fear that Monsanto is trying to import its terminator technology through Bt-cotton, thereby ensuring germination failure of seeds produced and replanted by the farmers. That stirred A Hornet's nest as farmers refusing to be enslaved to the industry for seed purchase for each sowing blocked the roads both in India and abroad. While timing of this episode raises several questions, it also exposes the agony of the farmers without compensation for the failure of promised pest resistance by the industry. As most farmers from irrigated plains have already lost their traditional breeds they have no option but to be enslaved to seed companies at whatever price. Farmers elsewhere are also fast getting lured into this death trap, with government incentives for industrialisation of agriculture. One moot question the Bt-cotton controversy threw is who controls the farmer's fate, biotechnology or environment? The respective government departments are simply vying with each other than stem the rot. Meanwhile, PVPFR drafted by the agricultural ministry merely prohibits entry of terminator technology like applications without its permission.

Revitalise Traditions?

Interestingly, much of the PBR movement is not motivated by desire to fight alien IPR invasion. Often, they are driven by the desire as a local revitalisation of traditions, such as through public functions to reward local knowledgeable individuals like folk medicine men. The amount of pride earned by such folk scientists apart, these functions also make younger generation about social relevance of local knowledge. Register also serve as a tool for better planning of local natural resources. Many movement activists have declined in the local media the excessive lopping of fruit yielding forests trees by the contractors leaving the trees and forest denuded. Some village councils have gone further, with resolutions declining such wanton destruction of their resource base by outsiders and wishing to regulate it, even through financial tax barriers. This contributes to continuation of local knowledge systems and sustainability practices, which are crucial indirect benefits. The movement which centrally

began to resist unfair IPRs now seeks broader resource rights, much due to local initiatives.

Exploring Allied Channels

The aforesaid growth of the PBR movement was critically inspired by its flexibility, facilitating broadening of scope, shifting focus and inviting new players. These key features of success can now profitably integrate the movement with independent government initiatives, besides biodiversity and IPR legislations. These include computerisation drive connecting villages, besides decentralised governance initiatives like People's planning campaign in Kerala state and Janmabhoomi programme

EVERGREEN REVOLUTION THIS…

The primary bottleneck in the agricultural controversy rests with ensuring farmers control over seeds. This is possible only in the case of traditional cultivars reaped and sown by them as industry would wrest the control of new breeds they produce whichever way. The most significant step in this direction has been taken by DDS, an NGO working with dryland, marginal farmers in Andhra Pradesh state. DDS has motivated numerous farmer's groups and NGOs to prepare registers of their diversity of cultivars and knowledge, including cultivation practises and uses. To be authorised by respective village councils, these Community Biodiversity Registers (CBR) could ideally fit the BDB mandate in legally challenging unfair IPRs besides facilitating equitable sharing of benefits, even under PVPFR. As seen in the cotton belt, all farmers tend to be constantly lured by the industrial forces into death traps like cash-cropping, including monocultures. Devoting a part of the land for traditional cultivars could ensure farmer's rights to seeds and sustainability in case of crop failures. However, such mixed cultivation is hardly affordable to marginal farmers given their small land holdings and drive for cash. Unfortunately, they can also ill afford to compete with large farmers in heavy investments like irrigation and chemical inputs nor have the reserves to overcome inevitable losses. To address these difficulties, DDS has variously motivated numerous farmer groups towards community farming with a traditional flavour. Encashing on Ministry of Rural Development support, amongst others, DDS has promoted community farming over marginal lands, including degraded and uncultivated ones. Besides, it has organised annual biodiversity festivals to re-emphasise the social importance of traditional cultivars, including awards for the most diverse farmers, through a community gene fund. Further, it has started an innovative insurance scheme for traditional cultivators, as formal insurance schemes only favour the elite cash-crop farmers. To ensure food security especially of the weaker sections, DDS has successfully run an alternative public distribution system (PDS) through community grain fund. This has equitably distributed excess production from cultivating the uncultivated lands with traditional cultivars. Socially, this provided unmatched incentives for assertion of weaker sections like scheduled communities and womenfolk. Moreover, it has ridden the villagers from the adversities of cash-cropping. However, the net production and economic gains have multiplied and have ensured social equity both from ensuring food supply and gainful employment to weaker sections. The diversity of crops has nearly doubled, with many local varieties being pulled back from near extinction. These varieties sidelined by the market are more nutritious and provide fodder and manure, and bring women to the fore, unlike the cash-crops. Several of local cultivars also provide domestic medicine, besides medicinal plants separately cultivated by many framers of late. The farmers have themselves compared cost benefit analyses of cash-crop and traditional cultivars themselves. Despite their high total market return, high yielding, market driven cash crops need heavy external inputs costing dearly. Ultimately, due to manifold subsistence uses, local cultivars edge out the market driven crops in terms of net returns. Evolution of this local understanding without external preaching is the most significant achievement of the process of participatory planning and documentation. This has triggered the gradual extension of such efforts to many other parts of

the country, as an informal consortium of NGOs working for People's Ecological Planning (PEP). Anyone interested in initiating such activities may kindly write to authors for further information.

in Andhra Pradesh which involves education community into village planning. Besides Kerala and Karnataka, states with formidable performance in Panchayat Raj system, like West Bengal and Madhya Pradesh are also gearing up to join the movement. This integration would help reduce the costs and enhance sustainability due to multiple benefits offered.

Landscape Management

For maximising the variety of benefits offered, it was the programme is not only inviting diverse actors but also broadening its scope from biodiversity to ecology, and mending folk knowledge with modern science. This is evident from the ongoing ecosystem assessment exercises in Karnataka and Maharashtra, where scientific recording of soil and water quality parameters is given as much importance as people's perceptions about driving forces like land use changes and ways to enhance ecological sustainability. Besides validating folk claims of ecological degradation or restoration, such participatory, scientific assessment by external agencies also buttresses accountability of the register process as a local environmental monitoring mechanism. Further, soil and water management components provide added incentives to local people for sustainable utilisation of biodiversity. Several NGOs across India are currently deliberating over formation of network for People's Ecological Planning (PEP), an informal consortium. PEP seeks to integrate channels availed by ongoing political decentralisation and information revolution to foster sustainable ecological management at the village level. PEP intends to be hinged on People's Ecological Registers (PER) as tools for participatory planning for sustainable development.

Legal Support?

These efforts today gain strength only from the extension in 1996 of provisions of Panchayat Raj Act (PRA) i.e. 73rd constitutional amendment to scheduled areas, thereby entrusting ownership of minor forest produce with the gramsabha (village electorate) subject to state government legislations. This covers many tribal areas of the country, including the north eastern states. This provision has proved cosmetic and controversial with some states like Maharashtra and Madhya Pradesh excluding vital non-timber forest produce like Bamboo and Beedi leaves from the definition of minor forest produce. This reserves the revenue from these products for the state forest department, allowing villagers benefits from the remaining low value trade. Social activists and scientists have criticised this partisan move and demanded that village councils be given rights over all non-timber forest produce (NTFP). However, these provisions have no mechanism of accountability that will ensure sustainable use of forest produce by the villagers.

These deficiencies are overcome by the biological diversity bill (BDB) which is due for enactment by the parliament in the millennium year. BDB will override other existing, overlapping legislations like the wildlife conservation act. Most significantly, BDB seeks to establish biodiversity management committees (BMC) at each self government institution like village council. The state and central government must consult the BMCs before using local bio-resources and related knowledge or establishing conservation sites. Besides, BDB prohibits commercial activities regarding biodiversity without the permission of central and state government, except in the case of normally traded commodities. Thus, to assert need for local consent by the state or central governments or their appointees before using local bioresources including those normally traded, a legal document would come in handy. Such claims by villagers could be vindicated by the documentation of local bioresources entrusted to the BMCs by the BDB. Furthermore, this could also help village council to add to their revenue by taxing the traders for collecting seeds of trees like Beedi leaf, Sal seeds or other such forest produce from the village catchment. For, BDB empowers BMCs can levy cess on biological resources being extracted out of their jurisdiction. However, BMCs must periodically submit to state legislature reports of their activities and fund management. This emphasises the role of PBRs in enforcing physical resource rights of the people while ensuring accountability.

Additionally, BDB proposes a local biodiversity fund primarily distributed amongst BMCs by the state and central government from royalty charged to commercial firms for using Indian biodiversity. However, to gain a fair share of these funds, village councils can argue strongly if they have documented claims. BDB proposes documentation of not only bioresources but also local efforts for their conservation and sustainable use, that could come handy in augmenting such local funds.

IS BIODIVERSITY BILL ANY USE?

The environment ministry has edged other government wings by providing the only straw to the sinking farmer in challenging the GMOs. It has drafted the Biological Diversity Bill (BDB) drafted by the Environment ministry drawing strength from the international Convention on Biological Diversity (CBD). Pending before Parliament for enactment, BDB prohibits GMOs with likely environmental and health hazards including erosion of agro-diversity. Further, BDB empowers Biodiversity Management Committees (BMC) to be established by each village council to take measures for conservation and sustainable use of biodiversity, including registration of local cultivars and related knowledge. The bill intends to protect such knowledge through *Sui Generis* i.e. independent IPR system, for instance by government sponsored opposition to domestic or even foreign IPRs on Indian biodiversity or knowledge. Unfortunately, the strongly community oriented bill leaves most agro-diversity related questions to a less pro-people PVPFR bill! Even the utility of biodiversity bill in stemming the rot is called into question with multinational agro-corporations primarily housed at US nearly sabotaging the Biosafety negotiations under the CBD. This compelled even the EU, amongst others, to permit imports of transgenic foods but for cosmetic restraints! Furthermore, multinational corporations are busy trying to further corner the market by ousting small industries form the developing nations through environmental and human rights related barriers. Fortunately for the farmer, such

attempts failed at the millennium conference of WTO at Seattle and the AoA was dropped like hot cake by the historical unity of developing nations. However, such controversies would soon haunt again and the only lasting resolve could come from initiatives of local producers and consumers.

These funds can be used for rewarding efforts of villagers like conservation of local crop diversity by farmers. Further, central government can directly channel commercial benefits by respective firms to specific persons or BMCs is they can claim to be distinct contributors of the biodiversity or knowledge concerned. In any case, such documentation can help the government in contesting unfair intellectual property rights claims in India or abroad by commercial firms, like the unjust Turmeric and Neem application patents abroad defeated through publications of prior knowledge in India. Parliament is also expected to soon enact similar amendments to Patent Act and Plant Variety Protection and Farmer's Rights (PVPFR) bill. This underlines the role of PBRs in strengthening intellectual rights of the people through *sui generis* (i.e. independent) system as the BDB claims. To conclude, empowerment of village communities sought by BDB through PBR has set the tone for PER.

IMPACTS

While the biological diversity bill has generated significant public debate and discussion on many issues (Url: http://ces.iisc.ernet.in/pub/mg/bdb2000.doc), provisions relating to access and benefit sharing remain most controversial. National Biodiversity Strategy and Action Plan (NBSAP) (Url: http://sdnp.delhi.nic.in/nbsap) is a nationwide participatory process initiated by the Government of India along with the United Nations Development Programme (UNDP). NBSAP involves numerous NGOs and educational institutions besides government functionaries. At the global level, hopes stem from the group on indigenous people established by the World Intellectual Property Organisation (WIPO) in promoting grassroots knowledge (http://www.wipo.org/eng/meetings/1998/indip.rt). Other channels to pursue these ideas include the International Union for Conservation of Nature and Natural Resources (IUCN). Besides research publications and policy implications, the PEP network will have significant social impact due to intended news in the popular media, spearheaded by various institutional collaborators with their rich experience in manifold social campaigns.

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BIODIVERSITY

The Sacred Grove Of Umanglai: Traditional Bio-Diversity Conservation

MANIPUR

Khuraijam Bijoykumar Singh

Introduction

The institution of sacred grove is reported from most parts of the Indian sub-continent. It is a traditional means of bio-diversity conservation system sanctioned through the religious belief. In the term 'sacred grove' the word 'sacred' is very important because of its particular function related to environment. There are vast lands of virgin forest, there are lakes or spring or stream which are dedicated to a particular deity. The use of this grove is well regulated and divine sanction has to be obtained before mortals can satisfy their needs. It, thus, reflects a system of what Ecologists called 'Social Fencing'. It is a whole series of complex equations between the bio-diversity conservation and consumption pattern.

Traditional societies although have less degree of rationality as compared with those of the modern societies, they are also very much aware of their environment and ecology. They have their own system of ecological management. The Harappan people's worship of bath, trees tiger, rhinoceros, deer etc is a clear instance of traditional system of environment management and bio-diversity conservation. Although they were highly urbanized, they never go away from the nature. They had their own way of maintenance of their environment and ecology. The only difference is that traditional society maintains their environment with the sanction from a body of religious belief. Sociologist says that in the absence of written law, religion played an important role in enforcing social norm and codes for the organization of a total system of society. The best way to protect something (in traditional society) was to make it sacred and attribute what is required to the wish of the god.

The traditional society invented many sacred objects like plant, animal, place etc. and attributed its values in terms of sacred. Thus it makes easier for them to protect those objects from any harm to be done to it. It also shows an importance of such objects in the society. And to invent it in terms of sacred is, thus, the easiest way of protecting them. Those objects so invented as sacred are also associated with some territory, which is also taken as a sacred grove or abode of that particular object. The system of this sacred grove invention may

help them to maintain their ecology. However, not realizing their importance and also due to ever-increasing pressure of demand, today the tradition was neglected while the resources deteriorated.

Sacred groves that are a tract of virgin forests are vestiges of an ancient practice in which people protect a forest to avoid the wrath of its resident gods. It is a particular territory, which is reserved for a particular deity. However, it ranges in size from a few trees to dense virgin forests of hundreds of hector. Despite the lack of adequate information, it would not be wrong to inform that sacred groves were prevalent among all over India. According to Kosambi, sacred groves represent a very old institution, which dates back to the pre-agrarian stage of hunting and food gathering. Such forest patches were usually dedicated to a particular deity and were afforded special protection. Only limited used of their resources were sanctioned in the time of calamity. And no personal needs are granted. It can be seen as socio-religious control over the unlimited use of resources.

In Manipur there are various sacred groves dedicated to different traditional Meitei local deities. Though it exists in various parts of Manipur and are unique example of ecological understanding and management, vary few study have been done on them in this region. It attracts only few scholars who are interested only in the philosophical world of the Meitei spiritual life and not able to take adequate notice of religious concern about the environment and ecology. Thus, the primary objective of the present paper is to focus particularly on two basic functional issues of this age-old system of the *Umanglai* as a traditional way of bio-diversity conservation and a system of environment management. From the ecological perspective, it can be examined as maintenance of the environment through the sanction of religion. From the cultural perspective it can be viewed as magico-religious significance attributed to particular plants and animals. Those people whose belief is deeply rooted in this religion may not aware of this particular functions, however, the system itself clearly shows the importance of the ecological understanding and management, and the needs for preserving it. Thus, the sacred grove of the *Umanglai* in Manipur serves these two important functions.

Socio-Religious Background

Manipur was an ancient kingdom. As far as its history could be traced the kingdom began with the accession of Pakhangba (the first King of Manipur) in the 33 AD. The state is geographically divided into two distinct parts the centrally situated valley and the surrounding hills. This distinct geographical division is a determinant factor in the socio-cultural and historical development of the different communities in the land. The valley which is highly fertile is inhabited by the Meiteis who are predominantly Hindus and the hill areas are inhabited by various tribes such as the Nagas, the Kukis and other small tribes most of which have adopted Christianity. These two groups the Meiteis in the valley and the different tribes in the surrounding hills have

been living together in this small territory as brothers since time immemorial. Therefore, there has been developed an age-old common culture among them.

The Meiteis have their unique traditional social and religious institutions. The main feature of the social structure of the Meiteis is the institution of the *Salai*, which is a large exogamous unit, each tracing itself from a common mythical ancestor who is part of Meitei divine pantheon. It can be loosely translated as clan. It has seven patrilineal units called *Yek-Salai.* These are *Mangang, Luwang, Khuman, Moirang, Angom, Khabanganba* and *Chenglei.* These *Yek-Salais* are again classified into many lineages called *Yumnak*. The head of the *Yek-Salai* is called *Piba*, who is the priest of the respective *Yek-Salai.* Each *Yek-Salai* also worships different ancestors called *Sagei Lai Apokpa.*

The fundamental belief in Meitei religion is that there is one supreme God followed by a descending hierarchical order of subordinate deities bellow which are the large mass of human beings who surrender their destiny to these supreme deity. The concept of *Tengbanba Mapu*, also called *Atiya Mapu Sidaba* (immortal sky god), represent the highest God who is the soul of the universe, the guardian of the cosmos. The Meiteis also believe in *Sanamahi* and *Leimarel* (both are household deities), *Pakhangba* and *Nongshaba* (both are royal deities), and other 484 hosts of Umanglai (God of forest or countryside). All these are the manifestation of the Supreme God *Atiya Mapu Sidaba*. They occupy different places like forest, hill, river, lake etc. They are also celebrated with the festival of *Lai-Haraoba* (pleasing of God), which are public worship and celebration of the creation of Universe with song and dance.

Totemic Function of Salai System in Regard to Species Conservation

The organization of *Salai* system under a particular belief of the Meitei religion may help the conservation of many species in Manipur. The totemic character of the Meitei Salai organization is the clear-cut evidence of this effort. The classification of different species related to different *Salais* and its respective lineages provides the particular animal or bird or fish of to be touch or not to be touch.

All the seven *Salais* have strict prescribed forms of worship for their respective ancestors. In fact the way one person worships, the specific items he offers and particular day on which he offers the *Salai* deity denotes the *Salai* to which he belongs. Since *Mangang*'s ancestor Pakhangba, was born on Tuesday, the 15th lunar day of the Inga month (around 15th June), all the *Mangangs* worship their ancestor on that day. For offering they have to collect water from *Nungcheng Pukhri* (name of a holy pond), in *Kangla* (the oldest palace ground at Imphal). The plate on which the offerings are to be kept is *Thamnakhenjong* (leaf of lotus), offerings include red lotus with 108 petals, *Thamjet* (lotus fruit), red *Sareng* (a kind of fish), fire wood called *Shayee* (oak tree), fire (*Meithangtaret*), knife (*Chakthang*), and a sprinkling leaf (*Uruman*). Similarly,

prescribed date, modes and materials for worshipping their respective ancestors are specified for the rest of the six clans. In Meitei society, different *Salais* have a number of different totems forbidden from touching or eating. For example, the taboo object of *Mangang Salai* is reed, of the *Khuman* Salai is a *Simul* cottonseed, of the Moirang Salai is a buffalo, and of the *Angom Salai* is a white goat. And the killing of snake is also forbidden among the *Mangang Salai.* Like this all the *Yumnaks* also have their respective taboo may be a plant or an animal or a bird associated with their respective ancestors. For example, the sparrow is the taboo for the *Khuraijam Yumnak* of the *Khabanganba Salai,* and pumpkin is the taboo of the *Salam Yumnak* of the *Luwang Salai.* A Yumnak member, thus, has to observe the clan taboo as well as the lineage taboo. This particular system of the Meitei socio-religious system can be seen as the control of religion over the unlimited utilization of natural objects. It stops the unlimited exploitation of natural resources. It limits the killing of different species and thus becomes a traditional way of bio-diversity conservation.

Umanglai and Environment Conservation

Meiteis believe that they are surrounded by a number of gods and deities who reside in all the places of the region. Hence, the entire stretch of villages, hill forests, rivers and lakes may be considered as a sacred grove. The household deities who are considered as the gods of live and death, reside in the corner of the house of every Meitei. The gods of village called *Umanglai* usually reside in the forests of the village. In fact every stream, river, hill, lake, forest, old trees are regarded as the abode of some deities. As mentioned already above, there are more than 484 such of the sacred groves in Manipur. These areas are particular areas, which are reserved forest in the name of these local deities of *Umanglai.* These groves are protected and preserved in the name of these local deities since time immemorial.

The literal meaning of *Umanglai* is forest deity (*Umang* means forest and *Lai* means god). This does not, however, indicate that the gods belongs to the forest. Its religious meaning is much more than this literal meaning. What precisely this title implies is that the places of worship of these gods are in reserved areas, near or inside the localities. The temples are surrounded usually by a rich growth of trees, which look like a forest. Because of the traditional preservation of a grove or forest area decorated with trees and flowers as the abode of a particular deity outside or inside the residential campus of the people, these Meitei deities have been termed as *Umanglai.*

This grove is also an object of reverence. Women are not permitted to enter the sacred groves during their menstruation. There are strong prohibitions against lopping or cutting of trees in this sacred grove. The belief is that if these taboos are violated, people would fall sick or die. The entire forest is supposed to be owned by the particular deity. It is also always under a supervisor of a particular person called *Lai Sellungba*.

In Manipur every village has its respective *Umanglai*. It is believed that this deity protects the crops and people from the attack of evil. The guiding principle behind these entire *Umanglai* Grove is the supremacy and control of religion not only over the individuals and community but also over the entire forestry and environment. The community designated a forest area as protected and to enforce the protection, declare it sacred, usually by dedicating it to a deity. In such groves, all the plants, fruits, flowers, trees, animals and birds belong to the deity. Grazing and hunting are prohibited in this sacred grove. It protects the unlimited use of the resource. Thus limited uses of the resource are sanctioned by this system and it is also for the purpose of the community welfare and not for individual purpose. In this regard, Madhav Godgel of the Indian Institute of Science, Bangalore, says, " the stronger and malevolent a deity, the greater its protection". The *Umanglai* in Manipur with its people's strong belief in it also follows the same pattern. The villagers are really afraid of these deities. James Frazer, in the *Golden Bough* written in 1935 narrated how people right from Paleolithic times preserved forest by worshipping them. However, in Manipur people do not worship the forest directly. They worship it in the name of some sacred deities. In these forests no tree could be axed, no branch broken, no firewood gather, no grass burnt and no animal harmed. Many of such sacred groves of *Umanglai* also contained springs, steams, lakes, and ponds. Polluting these springs, streams, lakes and ponds are forbidden because all these things are associated with this sacred grove of the deity. In this regard, we can say that apart from its socio-religious importance of these sacred groves, it too functions as an important ways of understanding and management of environment.

The tree worship is also found among the Lois (Scheduled Caste community of Manipur) of Manipur. According to K.B. Singh 1964), "the Lois of Manipur regard the tree as an actual God, although it may perhaps be more plausibly suggested that the *Tairen* is thought to be either the symbol or the abode of spirit." This tree is also still used by the pre-Hindu religious priest and priestess called *Maiba* and *Maibi* for cultic purpose. A branch of *Tairen* tree is waved by the *Maiba* during his incarnations for the exorcising of evil spirit and such branch also play a significant part in the *Lai Haraoba* ceremony. Another plant called *Langthrei* is also a very important plant related to the Lai Haraoba ceremony of the *Umanglai*. These two plants are the most sacred plants related to these *Umanglais*. Thus these two plants are always protected under the sacred grove of *Umanglai*. All the Meitei *Sanamahi* family and Loi family plant the *Tairen* tree in the middle of their courtyard as a sign of sacred symbol. Many of these families also plant the *Langthrei* in their garden for the ritual as well as medicinal purposes.

The tradition of this tree worship in thus common among the Meiteis of Manipur. They also worship many old trees like Banyan, Leihao, Heibong etc. These trees are believed to be the abode of the spirit of some important personalities who played an important part in the Meitei socio-religious life in

the past. For instance the *Heibong-Pambee* of Yaireipok Thambanu, the *Leihao-Pambee* of Wangwoo Baji, the *Khongnang Pambee* of Lourembam Khongnangthaba etc. can be mentioned in this regard. All these trees occupy different particular reserved areas, which are dedicated to the above personalities. Along with these particular trees, there are also many other trees in these sacred groves. These tees are still protected by the people with their true belief in these personalities. Thus all these human personalities who attained the order of the divine by virtue of their superior disposition, nature and efficiency that placed them above the normal human being had been added to the concept of *Umanglai* which are very respected Gods in Manipur. Thus now they are also worshipped as *Umanglai.* These places are also full of trees and flowers, which are reserved for these deities.

Following the religious philosophical books called *Puya* and the traditions of the Meiteis it is evident that certain Gods have been associated with particular places or directions. They are treated as the guardians of particular direction guarding in the eight directions of the country. These deities are called *Maikei-Ngakpa-Lai.* The people also worship them as *Umanglai* with great reverence. They occupy different particular reserved forest in eight direction of the state. It is believed that these deities would save the people from diseases, death and disasters. Thus they are considered to be the controlling gods of particular geographical directions. And the names of the deities and their respective controlling directions are given in Table:2.

Table: 2 Directional deities and their associated directions.

Names of the Deities	Directions
Nongpok Ningthou	East
Irum Ningthou	South-East
Wangbren	South
Thanging	South-West
Khoirifaba	West
Loiyarakpa	North-West
Marging	North
Chinkhei Ningthou	North-East

Source: L. Bhagyachandra Singh, *A Critical Study of the Religious Philosophy of the Meitei Before the Advent of Hinduism In Manipur*, The Paradise Publishing House, Imphal. P-34, 19191

All the above deities are associated with a particular sacred grove reserved for the particular deity. Some of the important aspect of these deities in regard to the preservation of forest and species are narrated as followed.

In the southern part of the valley of Manipur there is a village called Sugnu. In this village there is a sacred grove of Umanglai, which is dedicated to a particular deity called *Wangbren.* This deity is the directional deity and believed to be the owner of death, illness and disease. According to Meitei religion every dead person first goes to this place. While interring the abode of this deity for

prayer and worship, people should not speak unclean words, should not spoil the plants and trees growing there. In this abode of the *Wanbren* deity, there are also trees for east king, which is called *Meetam-U* (the tree for each king). The growth, decay and falling of the tree indicated the well being and ill fate of the king. There is the row of trees for the queens also. These trees are well protected with fear and belief. Thus the Umanglai of the *Wangbren* protected the forest at the southern side of the valley.

There is also one important interesting story associated with this deity. It is a story about a British Engineer, who hold the position of a state Engineer during the early British period in Manipur. He took a number of Gorkha Jawan belonging to the Assam Rifle forces to cut down pine trees from the compound reserved for the Lord *Wangbren*. It is told that the local people dissuaded the officer not to cut down the trees in the said compound without first offering due homage to the deity and also without getting communication with the help of priest called *Maibi*, about his sanction in the matter. Not heeding to the warning given by the local people, the Jawans started cutting down a few trees. The result was that in the first night many of the Jawans died due to some unknown causes. Whether it was a matter of accidental coincidence or not, will be a matter of further research from all angles, scientific as well as spiritual. But it is reported that the said incident did occur and the state Engineer had had to reconsider his step. From his point of view it was essential that the trees must be cut down at any cost and the jungle cleared for a varieties of reason. However, before he order further felling of the trees in the compound, he stood in front of the deity with folded hands and prayed as followed.

"*Lord Wangbren, I know the jungle and all the trees are your property, but I need them for the welfare of the state and your people. Allow me to cut them down. Stop punishing my men and I promise you that for every tree cuts down, I will plant two seedling so that you will get back your family of trees in due course of time*"

After this prayer, he ordered the Gurkha Jawan to start felling the trees again. As the story carries like this, the jungle was cleared quickly without any more deaths of the Jawans. In fulfillment of his promise, the state Engineer planted two seedlings in place of each of the tree felled down. Today we see there trees in their full growth and the jungle has again its destiny and dignity.

Nongpok Ningthou who is the guardian of the East is situated in the *Nongmaiching* hill, which is situated to the eastern of Imphal. This hill is dedicated to this particular deity. There are large forest tracts of trees attain immense size and high, comprising Nageshwor, Jarul, India-rubber, tum, oak, ash, bamboo etc. This high peak is clothed with clumps of these trees which superstition has preserved from the axe of the woodcutter. The belief here is that anyone who damages the grove of this deity is panalized to death by this deity. There are also all forms of wild life in this hill of *Nongmaiching.* All these wild life are protected under the belief of this particular deity. There is also a stream flowing down from this hill into a rivulet called *Chingkoi-Turen*, which is taken to be pure and sacred just like the water of the Ganges for the Hindus. No fishing is allowed in this area of the hill but to the lower part of the

river. Thus polluting the water of this stream, cutting down the tree from this hill and hunting and fishing are forbidden.

Lord *Thangjing* at the Moirang at the southern side of Imphal is also one of the directional deities of Manipur. The original abode of this deity is in the Hill of *Thangjing*, which is situated to the western side of Moirang. This hill is the sacred abode of this deity. It has a rich forest with variety of plants and animals. In this hill also no hunting and cutting down the tree are sanctioned. There is an important story regarding the protection of animal by this deity. Chingkhuba Jubaraj, the king of Moirang set a bullock free in Moirang. This bullock is called '*Kao*'. No harm is to be done to this bullock. This bullock is believed to be the carrier of Lord *Thangjing*. It is also said that if any bullock is used in heavy work, the *Kao* will come to stop the work and punish the person. Thus every one is afraid of this bullock.

Kaubru hill at the northwest side of Imphal is the abode of *Loiyarakpa* who is the guardian of the Northwest. This hill is considered to be the original settler of the Meiteis. The highest peak in Manipur is in this mountain. Many rare fauna and flora are also found in this mountain. It is forbidden to collect timber, hunting animal and cutting down the trees in this area. There is one belief that one white elephant is guarding this sacred grove of the *Kaobru*. This elephant is believed to be incarnation of this deity. If someone cuts down the tree and hunts animal in this area this elephant will kill him. Thus it is very afraid to do any harm to the plants and animals in this mountain. In this way the forest of the *Kaobru* is well protected. It is also traditional belief of the Meiteis that on the day of the *Lamtai-Thangja* (first Saturday of the Month *Lamta* somewhere around the month of March), all the Lais (Gods), in the country held for meeting. It is also said that many clumps of grass, which look like the seat, are in this mountain. Still today there is the tradition of pilgrimage on the mountain peak of *Kaobru* during the fine day after the celebration of *Chairaoba* festival (New Year day of the Meiteis).

The *Kangla* at the hearth of the Imphal city is believed to be the most sacred grove of the Meitei. It has an area of around one Km. Sq. with hundreds of trees inside its compound. It is dedicated to the most important royal deities like *Pakhangba*, *Nongshaba*, *Yumtei Lai* etc. Since the Hinduisation of the state in the beginning of 18th century these deities were controlled by the immigrant Brahmins.

And when Manipur came under the British control in 1891, the Britishers started entering this holy place of *Kangla* where the above said popular deities are worshipped. In 1947 when British left Manipur they did not hand over this sacred place to the Manipuris but it was occupied by the Assam Rifle's forces. The Manipuris were not allowed to enter this holy place freely to worship and maintain this sacred place. Due to public pressure the government of Manipur is committed to ensuring an early vacation of this area by the Assam Rifle's

forces and restoration of the Kangla to its original historical glory. As a result *Kangla* was opened to the public in 1992 August. According to the *Lainingthou Sanamahi* Temple Bill of 1966 and its Amendment Bill 1977, the idol of the *Sanamahi* was removed by the government from the Brahmin's control and returned to the original temple situated inside the Assam Rifle compound on October 12.1977. But the actual shifting of Assam Rifle's forces is as yet to take place.

Mahabali originally called *Mongbahanba*, is also one of the sacred grove of the traditional Meitei religion. It is situated at the northeastern side of the Imphal City. During the process of Hinduisation, many of the traditional forest deities were destroyed and buried in this place, at the same time the temple of the *Hanumal* (the alley of Ram of the Epic *Ramayana*) was created there. This area is a particular reserved forest comprising around half Sq. Km. with hundreds of trees inside the compound. This sacred grove is also the home of many monkeys and different birds. Killing these monkeys and birds and cutting down the trees in this compound are strictly forbidden. Thus apart from the important function of the belief of this sacred grove, it too serves another important function of the bio-diversity conservation and environment management.
Reasons for the decline and

Conclusion

The decline of the sacred grove of Umanglai had been witnessed during the period so-called 'Golden Era of Vaishnavism' from 1771 AD to 1930. The forcible conversion of Meiteis into the faith of Bengali school of Vaishnavism led to the complete decline of the culture of Umanglai in Manipur till 1930. With the instigation of Hindu missionaries the king Pamheiba ordered to destroy the whole groves of *Umanglai* for the fulfillment of the new faith of Hinduism. So all the groves and temple of *Umanglai* were destroyed and thus the whole culture of the *Umanglai* became dead till the end of 19th century. But the British colonization, which stated in 1892, gave an end to the state monarchical control over social and religious institutions. It liberated people from the traditional state control with respect to several social and religious institutions. Therefore from the early 1930s. there had been a trend of revivalism among the Meiteis.

The most profound impact of this revivalism is on the cultural preservation of the *Umanglai.* There has been a growing interest and popularity of the *Umanglai Haraoba* (pleasing of *Umanglai*). At present different villages are forming new administrative bodies to organize *Umanglai Haraoba* and build permanent brick temples inside the grove of *Umanglai.* There is also a trend towards young educated men replacing the older group of the *Umanglai Haraoba*. An institution called 'All Manipur *Lai Haraoba* Committee' was also set up in 1968 due to revivalist interest. This committee also publishes a quarterly journal called *Umanglai Khunda Ahanba*. Although many of such

sacred groves of Umanglai are revived newly though the movement of *Sanamahi* revivalism, still we have to
revive some of such groves which had lost their existence but are found in the folklore, songs and prayers of the people.

With the onslaught of the modernism, the pressure of the city, and the complete failure of government policy toward these traditional systems of the sacred grove conservation, these groves started losing their significance and they no longer form an integral part of the lives of the modern society. No strong taboo against the cutting down of trees exists today and the people do no longer fear the wrath of the gods. They thought that the forest can be utilized for other genuine collective needs. The problem is that people do not know the importance of the grove surrounding the temple. Though the place is still an important place of worship, the forest surrounding the temple has become relatively unimportant and people cut down the trees and clean some portion for other purpose. Now most of these sacred groves are encroached upon by organization of local club. Government also started creating many schools in this compound. Thus, the powers of sacred groves are started overcoming by the power of secular groves.

The decline of the sacred grove in the hill area has another reason. Before the period of Hinduisation there were a common belief among the people of hills and valley in Manipur. The adoption of Hinduism by the valley Meiteis and Christianity by the hill tribes is the main responsible for the decline of such sacred groves in the hills. Most of the sacred groves in the hills are no more cared by the hill tribes because these tribes lost the significance of this traditional belief due to the impact of modern Christianity. They no more feel fear of these traditional sacred groves. As a result this groves in the hill has now become an easy sources of their livelihood.

Thus the people of the region need to know the significance of this sacred groves of the *Umanglai*. Most people lack this important function of the Umanglai with regard to the environment management. In the hill area the vast burning of the forest for hunting and *Jhum-farming* affect the ecology of the region. The continuous failure of monsoon in Manipur for the last one decade is a clear evidence of the environment degradation. In the valley due to the lack of the knowledge of the function of the *Umanglai* in regard to the environment people do not plant new trees in this compound. They built only the permanent brick temple but no one cares about the decline of the grove. The maximum utilization of the land in the valley for cultivation due to population pressure cannot kept other reserve forest areas. But this traditional system of the preservation of sacred grove is the only way by which the valley peoples can conserve forest (in the valley). Thus, today the people in the region need to have the knowledge of the relationship between the nature and culture for conserving these forests and its species

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Scope Of Sacred Conservation Practices In India

Yogesh Gokhale

Introduction

India being a developing country continues to be the follower of centralized management regimes in the hands of powerful nations at international level and at national levels in the hands of handful of bureaucrats and politicians. Our ideologies of development and conservation of nature and natural resources have been highly influenced by developed countries like the big dams for water and electricity and wildlife protected areas for nature conservation.

Even though there is growing trend towards locally accepted models of development mainly followed by non-governmental organisations and enthusiastic bureaucrats, lot needs to be reformed at government level to understand the local needs. There are several case studies all over the country where the people dependent on the natural resources around them have fell victim to the non-considerate attitude of the government in completing the larger urban needs at cost of local resources.

In 1962, Koyna dam, one of the largest dams in the Western Ghats of Maharashtra was constructed to complete the need of electricity by the industrial sector and growing urban population in Maharashtra and the neighbouring states. About 100 villages were submerged in the dam water. The displacement due to it was the biggest of its kind in Maharashtra. In first phase only 30% of the refugees were resettled in scattered localities in Thane, Raigad, Sangli and Solapur districts. And even today almost rest 70% villagers are not rehabilitated (Bokil, 1999). The rehabilitation policies hardly could understand the sociological problems in rehabilitation. The rest 70% most of them on their own got settled in the catchment area. Koyna catchment is known for its forested areas since historic times. By 1985 most of the Forests in the catchment area was declared as Wildlife Sanctuary by the State Forest Department. There are about 10 villages which are inside newly declared sanctuary and almost 40 villages which are on the boundary of the sanctuary. The wildlife sanctuary laws do not permit any human interference inside sanctuary and also do not allow dependence of any village on the sanctuary. Hence, these villagers are again ready to fight against their eviction out of the area. Since 1962, they struggled for their rights to live as a normal citizen of

India. Now after almost 40 years, the next generation of these villagers is preparing themselves for one more battle in protest of the wildlife sanctuary.

Most of the protected areas in the country face similar kinds of conflicts, sometimes even more complicated than Koyna such as Rajaji National Park. Fortunately, initiatives like Joint Protected Area Management, Joint Forest Management are talked about to deal with such problems. But so far we have not recognized traditional nature conservation practices as a tool for conservation of nature and natural resources. India is bestowed with innumerable traditional conservation practices restricted to local areas. Among the different natural resource management practices like tanks in central and southern India; the sacred conservation practices are quite significant because of their widespread occurrence all over the country. I discuss here the indigenous ways of natural resource conservation as a supplement to the efforts of broader nature conservation efforts in the country.

Different Kinds of Sacred Conservation Practices in India

In India sacred traditions of nature conservation are found almost in all parts. Mohenjodaro and Harappan civilizations had tradition of worshiping fig trees. Since that time range of species to ecosystems is conserved religiously.

Here I discuss mainly two kinds of sacred nature conservation efforts practiced traditionally by local societies namely:

- Landscape level conservation practices
- Species level conservation practices

In case of first practice a patch of local landscape or the whole landscape like forest, grove mountain, hillock, riverbed, streambed, pond is left aside or its use is regulated due to faith or fear associated with the local deity in that landscape.

In case of second practice, specific species are given protection due to religious importance or due to economic importance.

Landscape Level Sacred Conservation Practices

Sacred groves - These are the patches of natural or near-natural vegetation, dedicated by local communities to their ancestral spirits or deities. Such groves may consist of a multi-species, multi-tier primary forest or a clump of trees, depending on the history of the vegetation. These groves are protected by local communities, usually through customary taboos and sanctions with cultural and ecological implications (Malhotra et al, *in press*).

The institution of sacred groves is reported from most parts of the country. However, in the following States there are no reports available regarding the

presence or absence of the tradition: Andaman and Nicobar islands, Jammu and Kashmir, Lakshadweep, Nagaland, Delhi, Goa, Punjab and Tripura.

In Andhra Pradesh, WWF- A. P. (1996) reports more than 750 sacred groves (SGs) spread over 23 districts of the State. In Arunachal Pradesh and Sikkim SGs are attached to Buddhist monasteries called as Gumpa Forest Areas, which are managed by lamas. Chatterjee (*in press*) reports 58 such monastery groves from Arunachal Pradesh. In Assam the SGs of the Bodo and the Rabha are called as *than*. The institution of SGs in the Dimasa tribals from Haflong district of Assam is called *madaico* (Gokhale et al, 1998). Bihar shares several tribes with the neighbouring State of Jharkhand. The anthropological monographs of these tribes in both the States suggest strong base of the SG institution and referred by names like *sarana* and *jahera*. Similarly with the States like Madhya Pradesh and Chhattisgadh, the *sarana* and *jahera* are important landscape features of tribal villages.

There are 29 SGs reported from Banaskantha district of Gujarat (Gupta et al, *in press*). Haryana also has 248 SGs reported, which are associated with temples, Gurudwaras, etc.(NAEB, 1995). SGs are found all over Rajasthan and are called by various names like *vani* in Mewar, *kenkri* in Ajmer, *oran* in Jodhpur, Bikaner and Jaisalmer, *shamlat deh* and *devbani* in Alwar (Mitra and Paul, 1994).

Western Ghats of India is one of the 18 biodiversity hotspots in the world. The States covering the Western Ghats ranges like Maharashtra, Karnataka, Tamilnadu and Kerala harbour large number of sacred groves. In Maharashtra it is called as *devarai* or *devarahati*. There are about 1600 SGs reported from Maharashtra (Deshmukh, 1999). In Karnataka SGs are referred as *devara bana*. There are 1214 SGs in Kodagu district in Karnataka called *devarkadu* spread over 5947.23 acres. The groves having serpent deities are called as *nagarbana* in Karnataka. In Tamilnadu SGs are called *kovilkadu*. In Kerala the groves are called as *kavu*. It is estimated that about 500 ha of forest area is under SGs in Kerala (Prasad and Mohanan, 1995).

In Meghalaya (Tiwari et al, 1998) report 79 SGs. There are 365 *umanglai* SGs of Meitei tribals reported from Manipur (Sobita Devi, *in press*). Churchandpur district of Manipur shows revival of earlier *gamkhal* SGs in Gangte tribe (Gadgil, Hemam and Reddy, 1997). Christian dominated Mizoram State also shows remnants of earlier SGs in form of safety and supply reserves (Gokhale et al, 1998; Malhotra, 1990).

West Bengal, Orissa also have broad based institution of SGs (Das and Malhotra 1997; Malhotra et al *in press*). In Himalayan States Uttaranchal and Himachal Pradesh SGs are called as *dev van*.

Sacred grazing woodlands - Sacred grazing woodland is a popular practice in western Rajasthan, locally called *oran*. It is reported that *orans* account for 8 to 9 percent of the desert area (Mitra and Paul, 1994). The famous 'Bishnoi' community in western Rajasthan is known for the conservation practices associated with *orans* like protection to 'Khejadi' (*Prosopis cineraria) trees and the* Chinakara deer. There are possibilities of getting sacred grazing woodlands in southern India as one of them was documented in Bhambarde village in Pune district of Maharashtra State (Gokhale 1998, *unpublished*).

Sacred alpine meadows - In villages of Himalayan States mainly Uttaranchal and Himachal Pradesh, alpine meadows are important grazing resource. These meadows have been used in regulated fashion traditionally by considering them sacred. In Uttaranchal these meadows are called *bugyal* whereas *rang* in Himachal Pradesh. In *bugyals* people can graze the sheep only after the worship of the local deity, usually during July-August. This ensures the completion of flowering and fruiting cycle of the herbs in *bugyals;* so that grazing does not affect the next year harvest of the herbs. One of the famous deities in *bugyals* of Uttaranchal is Nandadevi, her festival 'nandashtami' falls during July - August. In the festival, it is mandatory to have garland of flowers brought from the *bugyal* (Bhatt 1997). Similar practices are also found in Himachal Pradesh where the festival is called 'sonechang' (Negi H. R., pers. Comm.).

Sacred Waterbodies - The pools in streambeds and riverbeds of north Indian States Himachal Pradesh, Uttaranchal are protected because of religious importance and are called as *machhiyal.* No one is allowed to kill fishes from the *machhiyal.* Fishing is allowed upstream or downstream of the sacred pond keeping some distance from the pond. One of the famous *machhiyals* is the stretch of river Ganga between Haridwar and Hrishikesh. Similar to *machhiyal* the riverbeds in the Western Ghats of Karnataka are also protected for fishes at places like Sringeri, an important place for Hindus due to Math of Shankaracharya. Temple ponds in states like Kerala, Karnataka and Maharashtra are also given protection for fishes. In the Barak valley of Assam ponds associated with mosque are considered as sacred and fishing activities are totally or partially restricted due to the religious taboos (Gokhale et al, 1998).

Species Level Conservation Efforts

The ecosystem level conservation efforts like sacred groves; ponds are also supported by species level conservation efforts. These species level conservation efforts are mainly of three types.

a. Totemic species
b. Species of ritualistic or religious importance
c. Other restraints on utilization

a. Totemic species:

Presler (1971) describes following as the main features of totem tradition:

1. The tribesmen regard themselves as related or descended from the totem animal or plant.
2. Tribesmen will not injure the totem.
3. The totem clan partakes of the life of the totem, meaning that one common life flows through all animals or plants of the totem class and through all human members of the clan. That means to this shared life is the annual communion meal, in which the totem is eaten by all; the life of the totem passes into the members who eat him. The aboriginals have no notion of death as final; they do not `kill' the totem in the sense of extinguishing its life; its life flows into the other members of the group through indigestion. Moreover, they eat only one animal, meaning a part of the life distributed among all totem animals. They do not indigest all the life extensive in many other animals of the totem species.
4. The aborigines tell myths to account for their connection with a totem. The Katang Kondal or bamboo sect of the Kharias says that a girl in the family of their ancestors went to cut bamboos and never came back. Her parents went to search for her and heard a voice calling out from the bamboos, but could not find their daughter. Then they understood that the bamboo was of their own family, and must not be cut by them.

Totemic species of subclan /clan /tribe are not supposed to be hunted by the respective group. It means the particular species is made available to others.

There are at least thirty-five tribes in Central India that exhibit features of totemism. The commonest sacred animals are the tiger, calf, peacock, tortoise, cobra, elephant, monkey, buffalo, bear, jackal, dog deer, and black buck. Plant totems include rice, *kodan* (cereal), sandalwood, cucumber, and peppers (Presler, 1971). To illustrate totemic species from a case study of southern West Bengal, a cursory look suggests a range of organisms like mushrooms, tubers, flowering plants, insects like moths, grass hoppers, birds, reptiles like rat snake and even large mammals like tiger are considered as totems. (Deb and Malhotra, 1997).

In the Meitai tribe of Manipur the different clans have a number of totems forbidden from touching or eating. For example, the taboo object of the Ningthouja clan is reed, of the Khuman clan a simul cotton seed, of the Moirang clan a buffalo and of the Angom clan a white goat. For example, killing a snake is forbidden for the members of the Khuman clan. The clan lineages also have certain taboo regulations to validate their blood affinity. For example, if lineage member meets his death in an extra - ordinary way the elders of the lineage assemble together and declare the object, tree, plant or animal causing the miraculous death a taboo applicable only in the lineage. Thus the pumpkin *(Cucurbita_moschata*) is a taboo for all the members of the Salam lineage. A

lineage member has to observe the clan taboo as well as the lineage taboo (Singh and Singh 1998 *unpublished*). Ecological anthropologists do not have sufficient information about conservation status of totemic species, which are already in conservation list of local people.

b. Species of Ritualistic/ Religious Importance

Various tribal mythologies as well as mythologies of organized religions like Hinduism have given importance to several individual species for ritual performance. Many festivals are also associated with specific species of plants or animals.

In South - west Bengal in tribes like Bhumij, Kora, Lodha, Munda, Santal several species are associated with important events. Many species associated with rituals may have other importance like medicinal value, food value, economic value etc. Also the season in which the species is used or ritual is performed may have other implications than only the sacredness i.e. the table above mentions about Salui and Karam pooja associated with *Shorea robusta* and *Adina cordifolia*. Both the species are economically important. The months of the worships of these species are flowering and fruiting season of both the species. Before worship no one is allowed to use the species, thus allowing plants to reproduce to use in future is probably the major implication along with the sacredness of the worship (Deb and Malhotra 1997).

Thus, as mentioned in the table above, specific species are required for the respective ritual. In northeast Indian tribes like Dimasa specific variety of bamboo is needed to perform many rituals in the sacred grove called *madaico*. The Dimasa also maintain a separate banana plant in their homestead gardens and leaves, flowers, fruits of that plant are used only for performing rituals (Thousain S., pers. comm.).

Similarly, Hindu mythology prescribes several events some are called `Vratas' i. e. ritual performances for respective deities like Ganapati vrata, Laxmi vrata, Nitya Somawara vrata, etc. Each vrata has its own objective associated with the qualities of deity like the deity Ganapati is known for his quality of clearing obstacles while completing any task in hand. So Ganapati vrata is performed to please Ganapati so that he will remove all the obstacles in way of achieving the objectives. Laxmi is the goddess of wealth. So Laxmi vrata would fulfill the desire of money. These various vratas need to be performed by using specific plant species. Most of the sacred Hindu literatures like Puranas prescribe unaccountable vratas which require specific plants. A smaller compilation by Karnataka Forest Department regarding vratas and associated plants describes about 19 vratas and more than 100 plant species required for 19 vratas altogether (KFD, 1998).

Swarna Gowri vrata which has been vouchsafed by Lord Shiva himself to his son Shanmukha. It could bestow wealth and worldly well being to the people. It

is also said that the vrata is so powerful that even a dried up tree will sprout into greenery after the performance. To perform this vrata about 13 species of plants are required; out of which flowers of 8 species like *Jasminum grandiflorum, J. offcinale, Clitoria terneata, Pandanus odoratissimus, Nelumbium speciosum, Michelia champaka, Chrysanthemum indica, Nyctanthes arbortristis* and leaves of 6 species like *Artimisia indica, Chrysanthemum indica, Aegle marmelos, Oscimum sanctum, Hibiscus abelomoschus, Origanum marjorana* are prescribed. All these 13 species are also medicinally important and some of the species also have other useful properties. e.g. *Pandanus odoratissimus* yields medicinal oil, useful for headache, rheumatism, earache. Fruits are used on Vata and Kafa. The flowers are famous for the fragrance. *Aegle marmelos* has rich medicinal properties. Its roots, bark, leaves, flowers and fruits are used for various disorders. The plant is also considered as sacred to Lord Shiva (KFD, 1998).

In Kerala certain crocodiles are regarded as sacred, and are fed in tanks at certain temples. Priests regularly tend to them at such places as Pommala, Palliport, Tripayar, Madai, etc. On the western bank of the Ponnani is a famous temple dedicated to the crocodiles; the animals are decorated with gold and other ornaments, and it is the religious duty of the pilgrims to feed them (Presler 1971).

In a study done by Colding and Folke (1997) on species-specific taboo, they could find that 30% species out of 70 species picked up from the literature are considered as threatened by IUCN Red Data book. The taboos on the 30% species occurring in IUCN Red data book are due to local understanding or importance of those species and not because the global importance. But today approximately 300 x 106 individuals following traditional lifestyle inhabit one-fifth of earth's surface. So it is important to understand about this socially broad based tool of species conservation suitable to local areas (Colding and Folke, 1997).

c. Other Restraints on Utilization:

Other than the events particularly associated with the rituals, local people have followed various beliefs which indicate regulated or sustainable harvest of plants or animals. It has been reported from various parts of India that pregnant female or any female of animals like Sambar is specifically avoided during the hunting excursions. The one who doesn't follow the belief is supposed to face the disaster. There is no information available regarding the beliefs associated with the harvesting practices of local people. In Bemba people of Zambia during honey collection in forest it is believed that to find one beehive is lucky, to find two is very lucky and to find three is witch craft thus regulating the over exploitation with the help of belief. (Deutch 1984).

Unlike landscape level efforts of conservation, the species level efforts have been rarely looked into by the conservationists and policy makers.

Potential of Sacred Conservation Practices

Both these traditions are not local phenomena but are found all over India. One of the landscape level conservation traditions which has been attended by researchers, sacred groves are reported from all over India as mentioned above. According to Malhotra et al (*in press*), there are about 4,875 sacred groves recorded from tribal or non tribal areas all over India where for 4,125 sacred groves are recorded for the extent of the area. The area covered by 4,125 groves is about 39,000 Ha. It is estimated that the number of sacred groves in the country is likely to be between 100,000 and 150,000 (Malhotra et al *in press*).

In many parts of the country local practices of management could persist even without recognition by the process of modern development.The Gangte tribals of Manipur restarted the system of safety reserves around the villages as a protection from fire due to shifting cultivation. Mahseer fishes and species of *Channa* are religiously protected in streambeds and temple ponds distributed all over the country.

India is a conglomeration of 40,000 - 50,000 endogamous groups, out of which 3000 groups are categorized as tribals, different religious communities other than Hindu and historical migrant populations like Parsis (Malhotra 1998). Out of 3000 communities 1/3 i. e. about 1000 endogamous groups practice totemism (Malhotra pers.comm.). There may be overlap amongst clans, tribes regarding totemic species living in the same geographical area and of similar life style e.g., several tribes like Oraon, Munda, Birjia etc. coexisting in Chhotanagpur plateau may have same totemic species common in between them. Keeping this in mind one may list probably more than 500 species including plants and animals protected as totemic species in India corresponding to about 1000 endogamous groups.

The landscape level and species level conservation traditions have importance restricted to local areas. But in several cases such spots have served as the refugia for the rare and endangered species of plants and animals. There are discoveries of new species from such places. *Kunstleria keralensis*, a climbing legume, reported from a sacred grove in southern Kerala, is a new genus record for India and a new species altogether (Mohanan and Nair 1981). *Blepharistemma membranifolia, Buchanania lanceolata* and *Syzygium travancoricum* are rare species found only in the sacred groves of Kerala (Nair and Mohanan, 1981). Mohanan also discovered a rare species of cinnamon, *Cinnamomum quilonensis*, in some of the *kavus* of Alapuzha district in Kerala (Unnikrishnan, 1995). Chandran (1993) found a high level of endemism in the sacred forests of Uttara Kannada district of Karnataka.

Dipterocarpus indicus is an evergreen timber tree endemic to the southern Western Ghats. Palynological study shows that over 3,500 years ago it was also a common tree of Uttara Kannada in the central Western Ghats. Today it is mainly confined to two *kans* in the district, which form the northern limit for this tree. In the entire 10,200 km2 area of Uttara Kannada, with closed forests covering over 60%, the natural population of another dipterocarp, *Vateria indica*, occurs only in few sacred groves in villages in Siddapur taluk, which is the northern limit for this Western Ghat endemic species (Chandran 1993).

Present Day Needs of Conservation

Present day of conservation strategies are multi pronged. Conservation biologists are aiming at conservation of biodiversity in ecosystems, species and within species at genetic level. Myers reemphasize the 'biodiversity hot spots' approach for conservation prioritization to achieve the biodiversity conservation within available financial support (Myers et al 2000). Species and landscape level conservation efforts of traditional societies could be viewed as tool for conservation of biodiversity. These local institutions have proved their importance as refugia for species as discussed earlier.

These local phenomena requires recognition of government as well as conservation biologists. In all the traditions biological conservation might not be the primary objective but the incidental effect of the traditions has benefited the conservation efforts e. g. out of only 6-7 roosts of flying foxes (*Pteropus giganticus*); 3 roosts are protected due to the religious *Ficus* tree in Bangalore city (Krishnan and Gokhale, unpublished). The cultural milieu of local societies also overlaps with the present day conservation needs through out the country. Such efforts can not certainly replace the ongoing efforts like protected areas, but these local institutions will help to make the efforts of conservation more people friendly instead of continuing with 'guns and guards' approach.

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BIODIVERSITY

Conservation of Mangroves Along the East Coast

Jaya Chatterji

What are Mangroves?

Mangroves are woody, seed-bearing, highly specialised plants ranging in size from shrubs to tall trees. Under favourable conditions mangrove trees grow up to 35 mt in height. Trees may be stunted and unable to grow tall and strong because they are subject to continuous physiological stress; however they still survive under very difficult and variable conditions of salinity, temperature, dryness and lack of oxygen. Mangrove forests are found along low-lying, flat tropical coasts; they grow best where the slope of the coastal plain is gentle; where there is a mixture of sea water with fresh water from land run-off as in estuaries and deltas. They can be classified as specialised forest types or as wetlands.

Mangroves are characterised by their ability to grow on land periodically flooded by seawater and in anaerobic and acidic soils. Although mangroves grow in saline environments, they have the usual requirements for fresh water, nutrients, oxygen and sunlight. Many of the individual species possess unique adaptations which enable them to thrive in an environment where other plants cannot grow.
The detrius from mangroves make mangrove areas important habitats for mammals, reptiles, birds, fishes , molluscs, crustaceans, insects, micro-organisms.

Till recently mangroves were viewed as economically unproductive and they were felled extensively to make way for aquaculture and agriculture. The ecological and economic functions are better understood now and there is greater willingness to conserve this resource.

Mangroves are found in 30 countries in tropical and sub-tropical coasts paralleling the geographical distribution of coral reefs. The estimated total mangrove area of the world ranges from 14,000 to 24,000 square kilometers. Various estimates have been made of the area of mangrove forest in India. The Forest Survey of India, 1999 has estimated the mangroves cover as 487,000 ha.

In India, mangroves are located in the deltas of rivers such as the Ganges [Sundarbands], Mahanadi, Godavari, Krishna and Cauveri and in the Andamans and Nicobar Islands. Mangroves are found in Gujarat around the Gulf of Kutchch and in the Marine Park of Jamnagar. Extensive mangroves around the Gulf of Khambat have all been completely denuded.

Tenurial Arrangement of Mangrove Forests

Mangrove forests in India are found in Reserve Forests, Sanctuaries and National Parks owned by the Forest Department. They are also found on government lands of the Revenue department [mostly in Gujarat]. The fundamental difference between Protected Forests on the one hand and Reserve Forests, Sanctuaries and National parks, on the other, is in the rights of the communities to the forest produce, as granted under the law. In Protected Forests the community have some usufruct rights. In the rest of the categories these rights do not exist, becoming more stringent going from Reserve Forests to National Parks.

Key Challenges Facing Mangrove Management

Mangroves have generally been treated as coastal forests and have been managed by the Forest Department like other forests. However, mangroves are wetland eco-systems whose functions and values are governed by their specific hydrological regimes. The supply of freshwater from the rivers are important to maintain certain salinity gradients and support other ecological processes. Diverse human activities in the adjacent upstream areas, such as agriculture, urbanization and industrialization have increased demands on fresh water reducing its flow into the mangrove, often to negligible amounts. The siltation patterns have also altered in this process. The changes in hydrology and salinity have not, until recently, been perceived as major degrading factors. Over exploitation by proximate communities, mainly for timber, fuel wood and fodder and reclamation of land primarily for paddy cultivation and / or aquaculture have further aggravated the degradation process.

India - Canada Environment Facility [ICEF] has been supporting M S Swaminathan Research Foundation [MSSRF] since 1996 to demonstrate strategies of conservation and management of this resource. The project is being implemented in four States along the east coast of India - Tamil Nadu, Andhra Pradesh, Orissa and west Bengal. Two major mangrove sites have been selected in each State: Pichavaram and Muthupet in Tamil Nadu, Godavari and Krishna in Andhra Pradesh; Mahanadi and Devi Mouth in Orissa. The project sites are in the deltas of different river systems. They differ greatly in their ecological characteristics [amount of freshwater flow, salinity gradients, tidal amplitude, sediment characteristics] and biotic composition including the dominant taxa, migrant fauna and total biodiversity as well as in their interaction with the local communities. They have different levels of legally supported protection in the form of being located in Reserve Forests, Wild Life Sanctuaries and National Parks.

Why Conserve Mangroves?

The framework developed by White and Cruz-Trinidad[1] brings out the diversity of functions that mangrove resources perform. Using the above framework, the

[1] White, A.T. and A. Cruz-Trinidad. 1998. 'The value of Philippine Coastal Resources: Why Protection and Management are Critical" Coastal Resources Management Project. Cebu city, Philippines.

direct and indirect use and non-use goods and services for the mangrove resource can be spelt out.

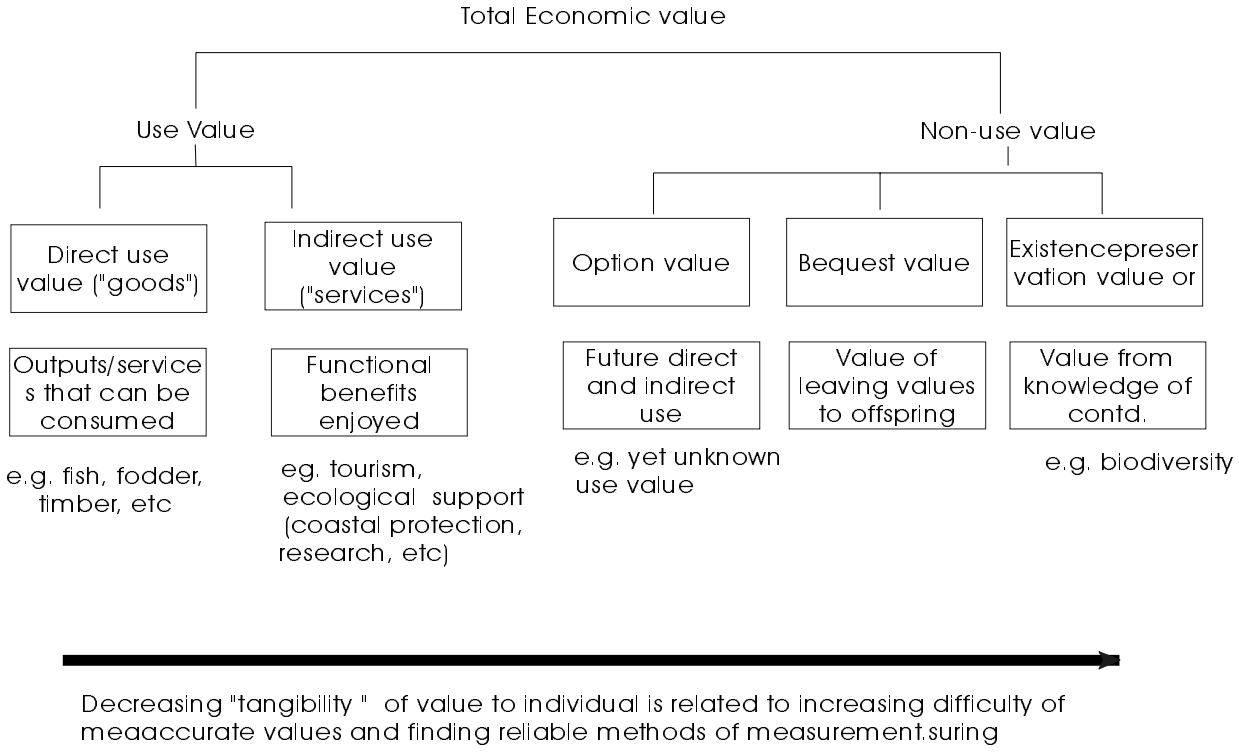

Table 1: Value of Mangrove Resources

Use Value Goods	Indirect Use Value Services	Existence or Preservation Value
• Fuel wood • Fodder • small timber for fencing • house building material • charcoal material • thatching material and grass for making mats • medicinal plants • material for agricultural	• fishery resources crabs clams edible oysters mussels mullets other fishes prawn hatchling collection • eco-tourism potential • protection against	• habitat for birds, reptiles, semi-terrestrial wildlife • repository of valuable genes of salinity tolerance that can potentially be transferred to food crops

Use Value Goods	Indirect Use Value Services	Existence or Preservation Value
implements, fishing implements, for making cots	erosion due to wave action • protection for coral reefs • Protection against cyclones, storm surges	

The major lacunae in understanding the need to conserve mangroves is the unavailability of reliable studies that have given monetary values to these above mentioned functions, using acceptable methodologies. Without such figures that indicate the costs of degradation and of deforestation, the arguments for conservation tend to be anecdotal and dependant on the powers of articulation rather than on hard figures on which real debate can take place.

Given below are some indicative dimensions that the above uses can take. The relatively more valuable functions of the mangrove are the fishery resources that it supports and the ecological function of protecting the shoreline from storms and cyclones and from erosion. For the proximate communities, the mangroves perform a critical economic function of providing fuel wood, fodder, timber for house construction, for fencing and for agricultural implements and collection of prawn hatchlings.

Fishery Resources

The report on Mangrove Resources and Resource Utilization Pattern for Pichavaram, Tamil Nadu, prepared by MSSRF in April 1998 quotes a study by Chandrasekaran and Natarajan [1992] that studied the harvest of fish, prawn and crab harvested from the Pichavaram mangroves, between April 1981 and March 1982. According to their estimate, 245 tons of fish, prawn and crabs [85% was accounted for by prawns] was harvested in one year. Prawns are primarily detritivores [detritus eaters] and they thrive in mangrove areas that harbour large quantities of detritus imported from adjacent mangrove forests. In Andhra Pradesh, for example, according to an estimate of the Centre for Marine Fishery Resource Kakinada, the prawn catch per boat load from mangrove areas of Godavari and Krishna is 25% more than in non-mangrove areas.

Over the last 10 to 20 years, however, according to the local fishermen, there has been a sharp decline in the quantum of fishery resources. Of all the fishery resources, about 26 species of finfish, 7 species of prawns and 4 species of crabs are important for subsistence and for marketing. Of these only 5 species did not show a decline. According to them, sea bass, a highly priced fish, declined by

80%. In the case of prawn, the harvest has declined from 200 kg. two decades back to 2 -10 kg. at present.

The fishery resources from the Godavari mangrove wetlands supported 32,300 families from 26 hamlets in 1998. The total value of their catch was estimated at Rs. 2.53 crores per annum in 1998, or an average income per family of about Rs. 3500 per annum. [2]

Shelter from Cyclones

Cyclones destroy life [human and livestock], property [houses, schools], uproots trees and agricultural fields become saline. The mitigating effect of the mangroves on the wind speeds have been documented by scientists and recalled by the local people. The disaster management costs can be reduced substantially with investment on regeneration of mangroves that act as shelter belts.

Listed below are the devastating cyclones and storm surges recalled by the village people, that caused severe damage, destroying life and property worth lakhs and crores of rupees. Besides these, cyclones and storm surges of lesser severity occur frequently.

Orissa: 1964, 1972 and 1982, 1999
Godavari and Krishna districts of Andhra Pradesh: 1949, 1969, 1977, 1986, 1990, 1996,

Mangroves, acting as speed breaks, reduce the impact of the cyclonic winds and waves. Thus the destruction wrought by the cyclones and storm surges is contained.

Protection Against Erosion

The violent action of the ocean waves can cause sections of land at the coastline to be broken off. Often these are cropping lands that are then irreparably lost. Mangroves act as a buffer against this.

Fodder

The mangrove areas are used as grazing grounds to maintain scrub livestock that produce a paltry level of milk, but which can be sold in times of need for cash. They graze in the mangrove forests, especially during the cropping season [single one]. In village Bhairavalanka, Andhra Pradesh, for example, the benchmark survey conducted by MSSRF revealed that about 375 tones of fodder grass was obtained from the mangrove area every year in this manner. [Also see section III. C. 3].

2 Benchmark survey of Andhra Pradesh sites - MSSRF

Fuel wood and Timber

Often 80 to 90% of the fuel wood needs and substantial amount of timber needs are met from the mangrove areas. Where substitutes are available, they are preferred. However, ease of access and lack of alternatives force the people to use the mangroves. Mangrove timber is also used for house building, for fencing and for agricultural implements. See Section III. C. 3 for some indication of the quantum of fuel wood and timber needs met by mangrove forests.

Existence or Preservation Value: Genetic Resources

Mangrove species are characterised by their ability to thrive in salinity conditions that food, fodder and horticutural crops cannot tolerate. In the context of global warming and rising sea levels, substantial extent of the coastline may be expected to be flooded. Under such circumstances, saline tolerant genes from mangrove species would have immense value for integration into agricultural crops to be raised in coastal areas.

Habitat for birds, reptiles, semi-terrestrial wildlife

Mangrove forests are the habitat for a large variety of aquatic and semi-terrestrial wildlife. Conservation of the habitat is supportive of such life forms, including coral reefs. The preservation value and future bequest value of this is immeasurable. Such areas can support livelihoods through the potential to support eco-tourism.

Causes of Degradation of Mangroves

Over the decades mangrove areas have been shrinking in area and getting degraded in quality. For example, the Gulf of Khambat in Gujarat once had thick mangrove forests. At present there is some scrub vegetation in places or in other places it is completely bald. Along the west coast, mangrove forests in Kerala and Karnataka have been completely deforested, while along the Maharashtra coast, it is confined to a few hectares. Of concern is the degradation – the reduction in the quality – of the forests that continues.

MSSRF using satellite imagery, and further cross-referenced by supported by ground truthing, found mangrove vegetation changes as follows:

	Pichawaram	Muthupet
1970	969 ha.	2762
1987	486 ha	1767
1996	457 ha.	1297

The factors causing degradation of mangroves, along the east coast of India, may be grouped into three categories:

A. Effects of actions in other eco-systems – external effects
B. Management practices and policies of the Forest Department and
C. Local effects - use of mangrove resources by the proximate communities

A. Effects of action in other eco-systems

A.a. Siltation caused by unsustainable land and water management practices upstream

Soil erosion from lands in the catchment of the rivers leads to a high level of sediment being transported by the rivers and deposited at the estuary. As a result, the mouth of the river gets blocked and the depth of the sea at the mouth gets reduced.

In Pichavaram, Tamil Nadu, the mouth of the river used to remain open throughout the year. Large quantities of tidal water along with adult fish and its juveniles and prawn juveniles would move into the mangrove areas along with high tide water. The depth of the water was high due to the large inflow of tidal water and this was a favourable environment for the fish and prawn juveniles to grow.

At present, because of the high level of sediment transported and deposited at the mouth, the estuary is completely open only during the monsoon [south - west monsoon, from October to December] and that too when the rainfall is high. Between April and May the mouth is completely closed, the water level in the mangrove water bodies reduces and the temperature of the water increases. Consequently, salinity levels of the water also increase sharply. These months also happen to be the suitable season for the migration of many of the marine fish that fetch high prices in the market, into the mangroves. Due to the closure of the mouth, the migration is made difficult.

A.b. Construction of dams and reservoirs upstream leading to reduced inflow of freshwater

Diversion of river water for irrigation purposes upstream and construction of dams without consideration of freshwater requirements of mangroves, has reduced the quantum of freshwater into the estuary.

Fishermen in Pichawarm noted that when there was large quantity of freshwater inflow in the river, the mouth of the estuary would be kept open with the force of the heavy flow. The increased salinity due to reduced freshwater creates a stressful condition for mangroves. This is reflected in reduced fishery resources and in the composition of vegetation being dominated by the hardier variety of mangrove species.

A.c. Effect of cyclones and floods

In Jagatsinghpur district [that was the in the eye of the 1999 Orissa cyclone] the village people of Bandara village felt that high stream velocity during floods and cyclones was also responsible for uprooting trees adjacent to the stream banks .

B. Management practices and policies of the Forest Department

B.a. Coupe felling

The village people in Pichavaram recall that between 1950 and 1970, mangrove trees were cut in large numbers by contractors and by the Forest Department that followed coupe felling as a management strategy for mangrove forests. This practice has now been terminated.

B.b. Centralised management practices of the Forest Department

The management practice of the Forest Department has been centralized with a policing approach – there was no structure for the participation of the users. The dichotomy between managers and users and the weak policing by the managers [the Forest Department] has led to the mangrove areas being treated as open access resources. The proximate communities view the forests as belonging to and the responsibility of, the Forest Department. It is also a resource that fulfills some of their urgent basic and subsistence needs when other alternatives do not exist. All that is required of the village people is to either avoid being caught by the Forest Department functionary or to bribe them. The result is an adversarial relationship between the Forest Department and the local communities. The local communities – from neighbouring villages, coming from as far as they were willing to travel – use the mangrove forests to meet their own consumption needs and to support their livelihoods.

In this situation, efforts to regenerate the forests by the Forest Department invariably fail.

C. Use of mangrove resources by the proximate communities

C.1. The fishing methods of non-traditional fishers in Pichawaram, Tamil Nadu

This is practiced by one particular community - the Irulars of MGR Nagar, Pichawaram, in Tamil Nadu. The Irulars originally migrated from Andhra Pradesh to the Pichawaram area. They used to hunt rats or gathered paddy from rat burrows. Not being fishermen and being very poor, they developed their own methods of fishing with no crafts, gears or boats. These are 'groping' method and 'bunding' methods.

(i) The *groping method* consists of groping under water with bare hands, for prawns. The prawns that are caught are held in a bag submerged in the water and held there by the fishers, by their teeth. Long hours of doing this is strenuous by itself. It is compounded by cuts from oyster shells or being stung by cat-fish, which is extremely painful. This method does not yield any significant quantity of catch.

(ii) B*unding method*: The Irulars construct mud embankments of about half a meter height within the mangrove forest. The embankment usually covers about 2 - 3 acres. It is opened at about 3 or 4 places.

During high tide, tidal water along with fish and prawns enter the embankments. During low tide, when the water begins to recede, the openings are closed to allow the water recede, leaving the catch behind.

The groping method inhibits regeneration because of the heavy trampling by those who are fishing. The bunding method obstructs tidal flushing and the mangrove habitat is brought under stress.

C.2. Clearing of mangrove forests to make way for aquaculture

State policy towards aquaculture has been erratic. Initially aquaculture was promoted by the State in view of the domestic demand for prawns and its foreign exchange earning potential. As the ecological unsustainability of the intensive, chemicals-using technology that was employed became evident, the Supreme Court ruled against undertaking aquaculture in the coastal region of up to 500 meters from the high tide line. However, enforcement of the ruling has been lax and the bulk of the activity continues unabated. Even when the prawn ponds are to be dismantled, only marginal damage is inflicted on them - e.g. the field bunds [field borders] are barely broken. They are not planted over or put to any other use, but allowed to lie unutilised, making it easier to revert them to prawn farming.

The bunds of the farms impede free flushing of the mangrove areas. The high level of chemical use in prawn ponds, whose waters drain into the mangrove areas, also threaten the mangroves. Although ecologically sustainable and economically profitable aquaculture technology is now available, it has not been promoted or adopted on a scale in India.

C.3. Conversion of mangrove forests to other land uses

A number of villages, especially in Orissa, e.g. village Bandara in Devi Mouth area of Orissa, reported that the villages were established after clearing mangrove forests. The mangrove areas are cleared for agriculture, for settlements of the village and for construction of jetties to facilitate fishing operations.

C. 4. Collection of fodder, fuel wood and timber

Fodder

Livestock is owned more as an insurance for times of need when they can be disposed of for cash, than as an productive asset. Thus it suits the households to let them graze in the mangrove forests, especially during the cropping season. The leaves and fruits of *Avicennia marina* is relished by the cattle. Till 1982 - 83 the Forest Department permitted grazing in the mangroves after a token payment was made. Since then grazing in the mangroves is illegal. However, the illegal grazing continues because there is no other source of such cheap fodder and it is not worth the cost of cutting and carrying or of purchasing fodder.

The grazing pressure on the mangrove forests is gauged by the fact that in Pichawaram, Tamil Nadu, about 2924 cattle, 2653 goats and 879 sheep from 16 hamlets utilize 360 ha. of healthy mangroves to graze in – an excessive

livestock to land ratio. [3] Not only is there an excessive consumption of mangrove leaves, but the continuous trampling inhibits regeneration.

Fuel wood and timber

Almost every household in all the project hamlets and villages use wood as fuel for cooking. In addition, fuel wood is cut for sale, either as a sole source of earning or to supplement other meager sources. Families can earn up to Rs. 1,000 a month through sale of fuel wood, for which there is a ready market. The costs involved are harassment by Forest Department functionaries and risks of snake and insect bites. Often mangrove timber, obtained illicitly, is the only source of timber for house construction or for fencing.

The estimated fuel wood consumption in a family [of 5 members] in Orissa [village Kharinasi, Kendrapara district] is about 6.5 kgs per day, out of which 3.5 kgs. are collected from the mangroves. In Tamil Nadu, the average consumption of fuel wood is 4.4 kgs/day/family in Muthupet and 4.8 kg/day/family in Pichawaram. The total estimated quantity of fuel wood extracted from mangroves in Muthupet, Tamil Nadu, is about 965 kgs. in a month or 8.68 tones per annum; in Pichawaram, Tamil Nadu, it is 4140 kgs in a month or 37 tonne per annum. [4] In Andhra Pradesh, the requirements in Matlapalem village, Godavari district, for fuel wood is 55.5 tones per year.

An estimated 100-150 poles [at least 25 cm girth at breast height] are required by each household, every 2 to 3 years, for house construction. Most of the wood requirement is met from the mangroves with occasional use of substitutes like bamboo, acacia, eucalyptus etc. In Andhra Pradesh it was found that 1.3 tones per year was required for fencing and 48 tones over five years for house construction. Other villages of the project reported demand ranging from 45 to 76 tones per year. [5]

In most of the villages, the exploitation of mangroves for fuel wood and timber came as much from neighbouring villages as from the proximate ones. With no rights over these mangrove areas, the people in the proximate villages have no means of controlling the people from neighbouring villages.

The data on mean annual increment [MAI] of the mangrove species are not available for these above areas. However, given the scant nature of the mangrove areas, the net extraction rate – exploitation over regeneration - is likely to be at a significant level.

C.5. Collection of prawn hatchling

Owing to the prawn farms nearby, many households of villages in Orissa and West Bengal collect hatchlings of tiger prawns from the rivers and creeks adjacent

3 Benchmark Survey for Pichawaram, Tamil Nadu, conducted by MSSRF

4 Socio-economic Benchmark Survey of Mangroves Areas in Tamil Nadu, Muthupet and Pichawaram, 1998, for MSSRF

5 Reports of Participatory Rural Appraisal and Micro-plans for each of the respective viallges

to the village and sell them for prawn ponds. Mostly children and women engage in this operation. On an average Rs. 50 - 60 is earned per person per day. Middlemen collect these hatchlings and the supply links go up to Puri and Kolkata.

The large number of people collecting the hatchlings constricts regeneration through continuous trampling.

Strategy for Conservation of Mangroves

A strategy for conservation should address all the factors causing degradation. Such factors with respect to the mangroves, have numerous sources, as described in Section III. The project being implemented by MSSRF with ICEF support and the issues being discussed here refer only to causes 'C' i.e. "the use and exploitation of mangrove resources by proximate communities", and the "management practices of the Forest Department" from 'B'. [Coupe felling as a management practice has been discontinued by the Forest Department]. This does not imply a lower importance of factors enumerated in 'A'. Those deal with macro issues that requires a systems approach to decision – making - this involves significant shifts in the way decisions are currently made. Understanding the dynamics of mangroves species and habitat and an appreciation of the need to conserve them should serve as the starting point to bring about such shifts in decision - making. Macro issues are likely to take longer to influence. Changes in management and use practices by the local people and by the Forest Department, is a necessary condition for sustaining regeneration and conservation of mangrove resources and hopefully a step towards appropriate macro changes.

The strategy followed in the MSSRF - ICEF project is three pronged:

A. Make institutional arrangements for conservation and sustainable management of the mangrove resources
B. Reduce pressure on the mangroves by providing alternatives
C. Demonstrate restoration and regeneration techniques

a. Institutional arrangements for conservation and sustainable management

The steps pursued is given below: [6]

Conduct Rapid Appraisals in all the villages in the proximity of the mangrove wetlands and choose the points of intervention

↓

Generate awareness regarding mangrove conservation in the chosen hamlets / villages

6 Annual and Six-monthly Progress Reports of Tamil Nadu and Andhra Pradesh, MSSRF

↓
Undertake Participatory Rural Appraisal exercises
↓
Form or strengthen Community Based Organization
↓
Impart training to major stakeholders [Community, Forest Department, NGOs, others]
↓
Identification of Mangrove Management Unit
↓
Prepare microplans jointly by community, Forest Department and MSSRF, for poverty alleviation, substitute products, socio-economic development and mangrove management through the Community Based Organization
↓
Implement the microplan activities through the Community Based Organization

A rapid appraisal was first undertaken of the entire mangrove forest area. A choice of villages / hamlets was made out of the villages / hamlets proximate to the mangroves. The criteria for choice of the project hamlet / village was:

- Where the community is dependant on mangroves - their activities adversely affecting mangrove forest health
- The community is homogenous in caste and in income, majority being poor
- Village / hamlet is of manageable size, of about 100 to 125 households. Very large villages are likely to be stratified - socially and economically - and likely to lead to a number of conflict situations. Such villages are taken up later in the project life [given second priority], once some success stories are demonstrated.

One of the first activities is to raise awareness regarding mangroves and their uses amongst the communities. The local people are unable to correlate the health of the mangroves with fishery resources or other ecological and economic functions of mangroves. With awareness raising activities, this correlation takes place quickly.

Participatory Rural Appraisal [PRA] exercises and intensive discussions with the communities at each site bring out information useful not only to the external intervening agency, but also helps the participants to articulate information and knowledge they already possess. Separate exercises are conducted with women to elicit their concerns.

Boxes 1 to 4 give the concerns of the people of 3 villages - of MGR Nagar, Pichawaram, in Tamil Nadu, of Kandarapatia in Orissa and of Matlapalam in Andhra Pradesh , as prioritized by them.[7] The primary occupation of the people of MGR Nagar is fishing and that of Matlapalam village is agriculture. Boxes 1

7 Source : Report on Mangrove Resources and Resource Utilization Pattern of MGR Nagar, Pichawaram, Tamil Nadu and PRA Reports of Kandarapatia, Kendapara, Orissa and of Matlapalam village, Ahdhra Pradesh

and 2 show the different levels of importance women and men place on the commonly agreed concerns in MGR Nagar, Pichawaram, Tamil Nadu. The need to consult men and women separately is brought out by this.

The development needs are clearly site-specific. It is interesting that in the list of concerns of the village people, conservation of mangroves does not come very high in priority. The weighted average of the concerns of women and men in MGR Nagar puts the concern regarding mangrove conservation at fifth place.

The concerns of the people may be categorized into two groups:

a) Those that may be termed *general village development activities*.
b) Those that are *related directly to mangrove use*.

These concerns are addressed through yearly Micro-plans. Before the Micro-plans are prepared, the Community Based Organization is formed and given training on various organizational and technical aspects, to take up planning and implementation responsibilities.

Community Based Organization

The creation or strengthening an existing institutional arrangement at the local level is critical to the sustainability of the interventions. The formation, the composition, the capacities and empowerment of this body is of vital importance. The *process* followed in how each of these is achieved is an important factor in the resilience that institution acquires.

The process followed in MSSRF-ICEF project, is of working *with* the people - as against *for* the people - through mutual sharing and consultations, where knowledge and experience of both the village people and the outsider determines action. This is a time consuming process. But it builds long term relationships between the partners who have to balance competing needs and achieve sustainable management of the mangrove forests.

After the Participatory Rural Appraisal exercises, the community based organization is formed with members paying a nominal fee to become members. These organizations are formed under existing Orders of the Forest Department, i.e. the Joint Forest Management Orders in Tamil Nadu and in Orissa and the order relating to Eco-Development Committees in Andhra Pradesh. They are named Village Development and Mangrove Council [VDMC] in Tamil Nadu, Vana Samaraksha Samiti [VSS] or Eco-Development Committee [EDC] in Andhra Pradesh and Luna Jangala Sarakshyana Samiti [LJSS] in Orissa. No additional rights are being granted to these organizations formed by MSSRF - ICEF, besides those permitted in the relevant Government Orders.

With the formation of the CBO, the first Executive Committee is formed. The members are chosen – by consensus and not by election - from the General Body such that there is representation of all community groups. A President and Vice – Secretary are chosen from amongst the Executive Committee members. The

Secretary is ex-officio the Range Officer of the Forest Department. Each Executive Committee holds office only for a year, so as to broad base participation and responsibility.
During the year Self-Help Groups [SHG] of women and men are formed. Priority is given to mobilizing the poorest women. Each SHG chooses its own leader by consensus. From the second year onwards, these leaders of the SHGs are the members of the Executive Committee. The CBO is thus a federation of women and men's SHGs. The advantage of the SHGs being the foundation of the CBO are:

♦ There is a two – way flow of information and step – wise [SHGs to CBO], decentralized decision making process.
♦ Resource spread and access is broad based
♦ Capacity, self – confidence and self – esteem of women are built and are used for community level activities in a natural progression
♦ Savings of the SHGs are available for productive activities undertaken by the CBO, besides meeting the consumption needs of the members of the SHGs.
♦ The concerns of women is integrated to the community's concerns. Thus 'gender issues' is not a stand – alone issue but one that is organically part of all project activities.
♦ With all the discussions and decisions taking place in small groups [of SHGs], potential for conflict is reduced.

Members of the Executive Committees receive various training and are taken on exposure visits to build their capacity in organizational matters.

All the funds for all the activities to be implemented are routed through the CBOs - VDMC / EDC / LJSS. An MSSRF staff is a co-signatory as a check. The funds are released from MSSRF headquarters office to the bank account of the CBO directly. Implementation of planned activities are supervised by the Executive Committee. The capacity of the members is built by doing and by discharging their responsibilities with critical assistance from MSSRF staff.

The following cases exemplify the extent to which the CBOs are being strengthened and community cohesion being built:

i) In Vadakku Pichawaram, Tamil Nadu, when the underworld leader was put behind bars, a large number of individuals of the village, including over ten members of different Self-Help Groups and of the VDMC, took up illicit brewing of liquor, with large profit. The leader of the VDMC was unable to control it. Some women members of the SHGs took up this issue. When persuasion failed, they called the police and ensured that it was completely brought to an end. After that a General Body Meeting of the VDMC was called, the leader removed from his post and a fresh leader chosen. It was a women - the one who had taken up this issue vigorously - who was chosen to head the VDMC.

ii) In Muthupet, 11 fishing families fish in canals that facilitates the ingress of tides. [See section IV.c] The tidal flushing improves the habitat for mangrove species. However, these canals get heavily silted up. The fishermen find it difficult to desilt these canals regularly. Since the village people have begun to appreciate the advantages of a healthy mangrove forest in their vicinity, they have decided to contribute 2 to 3 days' labour every year, to keep the canals desilted.

Micro-plans to address the alternatives

The Participatory Rural Appraisal exercises and discussions thereafter, help the community to prioritize the issues that they would like to address. Based on this a microplan is prepared that should satisfy some of the development needs of the village and also result in reduced pressure on the mangrove resources. The strategy involves giving people alternatives wherever the exploitation is taking place to meet the basic, subsistence needs. They are persuaded to reduce the level of of use of mangrove resources. The transition period is difficult for the village poor. Wage employment opportunities - in the course of restoring the mangrove areas - help during this period. Continuous awareness and education is required during this period. The income generating activities are also put in place rapidly.

After an iterative process of action, analysis and learning, MSSRF found that the identification of the activities to be taken up for village development and for poverty alleviation, decisions regarding who should get assistance, in which order and to what extent, should be determined by the village people themselves. They are given the criteria for making the choice and the budget available. For example, the village people are told that women – headed households and the poorest households that depend for their entire income on selling mangrove wood as fuel, should be given the first priority.

Members of the Executive Committee of the CBO and MSSRF staff explore channels of resource mobilization, such as the Panchayat, the Banks, various development schemes of the government, the Forest Department and even the Member of the people in the Legislative Assembly - the MLA - and the Member of Parliament, MP.

The final plan is presented to the General Body and finalized after discussions.

a. General village development activities

Through experience, MSSRF found that the village people were unable to focus on conserving the mangroves, as long as their pressing development needs were not met. In one village it was constructing a saline embankment to prevent sea water from entering the agricultural fields, in another, it was getting a building constructed for a primary school..... These concerns, however, can only partly be funded by the intervening agency [in this case, MSSRF - ICEF, but on a long - term basis, it will have to be the responsibility of the Forest Department]. To a large extent, the programmes of the different departments of the government have

to be leveraged. This establishes the external agency's credentials with the village people and begins the rapport building process.

Given below is an example of one such intervention, from Tamil Nadu:

One generation back, the Irulars of MGR Nagar used to catch snakes and rats or steal grain from the burrows of rats from the forests, to eke out a living. This was stopped by the Forest Department. They then became bonded labourers who at times would steal fish from the mangrove waters. Members of the community lived dispersed, near their masters' lands. They were terrified of any contact with any officials or any outsiders. MSSRF brought them together, assisted them to acquire land allocations from the government and provided the necessary documentation for them to obtain the caste certificate. The latter gave them access to government development programmes. Forest Department officials visited and interacted with the community. The Forest Department officials took part in the Participatory Rural Appraisal and Micro-plan preparation exercises of the VDMC. The rapport with MSSRF and even with the Forest Department is very positive.

Initially district level committees called Joint Working Group, chaired by the District Collector was mobilized. This Committee was meant to ensure co-ordination with various development agencies in the district and to mobilize financial and technical support for various socio-economic development activities. These groups were functioning in Tamil Nadu and in Andhra Pradesh for a short period initially. Subsequently it was found that such support was more effective at the Block level. Various programmes of the government can cover most of the development needs of the community. The problem lies in the community having information about these programmes and being able to access them - through complicated and time - consuming procedures. Even if the capacity of the Community Based Organization is built to take on much of this responsibility, an external agency [Forest Department or an NGO] would have to lend critical support.

MSSRF has been able to leverage considerable funds, from a variety of government departments and other institutional sources. See Table 2.

b. Development activities related directly to mangrove use

This should be an integral part of the intervention to conserve the mangroves.

Table 3 indicates the activities undertaken in the 3 States to (a) provide alternative sources of income to those who use mangrove resources as their livelihood support and (b) to provide substitutes for mangrove products directly consumed by the communities.

Smokeless chullahs, kerosene stoves, gas cookers have been distributed to reduce the demand for fuel wood and village common lands have been planted with fast growing fuel wood species to increase supply. Families that are willing to cull their scrub cattle are given easy loans to purchase milch animal whose milk

would be sold to help pay off the loans. At the same time, the village commons are planted with fodder species. Homestead lands have been used to raise timber and fencing material. The income generating activities are more complex. The role of MSSRF has been to assess the locally available raw materials and markets and search for appropriate income generating activities.

Table 2 - Financial Assistance Received by Self Help Groups in Pichawaram, Tamil Nadu

Hamlet	Loan amount in Rs.	Purpose	Scheme	Loan in Rs.	Subsidy	Amount repaid by March 2001
MGR Nagar						
Women SHG	65,000	To repay debts to money lenders	SHG loan under NABARD	65,000	0	35,000
Vadakku Pichawaram	25,000		SHG loan under	25,000	0	15,000
	25,000	Crossbred cows	NABARD	25,000	0	15,000
Women SHG	25,000	Crossbred cows		25,000	0	15,000
	250,000	Crossbred cows	SGSY	125,000	125,000	Rs. 1,000 per head per month
	475,000	Palm candy production	SGSY	350,000	125,000	
Men SHG	250,000	Crab culture Fishing boats and nets	SGSY	125,000	125,000	

Source: Annual Progress Report April 2000 - March 2001, Pichawaram and Muthupet, MSSRF, March 2001

Organizations that specialize in micro-enterprises have been brought in to have been brought in to give the village people [members of SHGs] information about a range of possible activities that may be undertaken. This could range from apiculture and horticulture (coconut is particularly popular with the people) , it could be ways of improving agricultural incomes, it could be chalk making, coir – rope making, value addition to fish catch, setting up petty shops etc.

The activities encouraged are such that households taking them up these would be able to continue with them with no external assistance. For example, supply of water crabs is a constraint and hence the activity is restricted to a few households, although is generates a high net income.

The earlier sources of income that relied on exploiting the mangrove resources illegally, had a high level of drudgery, indignity and uncertainty. The alternatives generate incomes manifold more than what was earned previously, and the members can practice them with dignity and self - assurance. These non-tangibles carry a substantial weight in making these alternatives attractive.

Complementing the income generating activities are initiatives like the Self - Help Groups, which enable the members [who are also the first candidates to receive assistance for alternate income generating activities] to save part of their enhanced incomes and settle exploitative loans from traditional money lenders. Kitchen gardens and awareness regarding nutrition and hygiene imparted to women in the SHGs result in improved health status. Community cohesion and Village Funds provide the wherewithal to offer seed money to access development funds from the government on a priority basis. The Micro-plans provide the community the priorities and acts as the reference point.

Table 3: Alternatives to reduce the pressure on mangroves

Tamil Nadu
Pichavaram , • Facilitate use of boats and nets for fishing in place of 'groping' and 'bunding' techniques • Develop alternatives to 'groping' and 'bunding' methods of fishing, in particular • Crab fattening • Rope making • Pickle making • Bullock cart hire • Training on sea fishing • Promote activities to supplement income from fishing, for example • Paddy cultivation on leased land • Animal husbandry , including milch cattle and poultry • Promote Self - Help Groups as a source of credit, for training women and for facilitating women's participation in income generating activities and in decision - making bodies
ANDHRA PRADESH
• To reduce dependance on mangrove for fuel wood • Smokeless chullahs distributed • Kerosene stoves distributed • Encourage use of *prosopis juliflora*, coconut wastes and palmyra as fuel • Plantation of casuarina and eucaplyptus for fencing, use as fuel wood and for house construction, on homestead lands; and jatropha as live fencing, which will also be a source of income • Plantation on 15 ha. of temple land and temple pond cleaned • To improve income levels - • Encourage use of farm yard manure and fertiliser to improve soil fertility and production of agricultural crops • Plantation of fruit trees - coconut, mango, lemon, guava. Pomegranate, moringa • Distribute vegetable seeds for kitchen garden - with the vegetables being sold • train women and promote coir making

• Prawn and fish pickle making • Developed an innovative daily credit scheme for fisher women • Develop Self- Help Groups as a source of credit, for training women and for facilitating women's participation in income generating activities and in decision - making bodies.
ORISSA
• To reduce dependence on mangrove for fuel wood - • Providing improved chullahs developed by Orissa Renewable Energy Development Agency [OREDA] leading to estimated reduction of 30-49% in fuel consumption • Demonstration of solar cookers [not accepted by the people] • Plantation of bamboo and coconut, predominantly, and other species such as acacia, neem, babool, eucalyptus, teak, sisso, casuarina, arecanut, on village common lands • To improve income levels - • Promote paddle pumps that will improve irrigation facilities and permit vegetable growing • Poultry farming with assistance from KVK [Krishi Vidhyan Kendra] and Central Poultry Breeding Farm, Bhubaneshwar. • Bee- keeping, with assistance from KVK • Supply of diesel pumps to the local institution managing the mangroves [LJSS] for irrigating village common lands plantations and for hiring out to village people to generate income for the Village Fund. • Cultivation of drumstick • Cultivation of horticultural plants like coconut, papaya, lemon... • Integrated Pest Management training for pest control • Develop Self- Help Groups as a source of credit, for training women and for facilitating women's participation in income generating activities and in decision - making bodies

Effectiveness of the Strategy

How effective are these measures in raising the income level of the households that depend on the mangrove resources due to their poverty and in providing substitute products ?

♦ Many of the people of Bandara village, of Jagatsinghpur district, Devi Mouth area, in Orissa reported a high level of dependence on mangrove resources for fuel wood till about 20 years back. Then forest lands adjacent to the village were developed with *Casuarina* plantations. Now the branches and twigs from these trees along with the needles swept from the forest floor are used together with cow-dung cakes and brushwood from homestead trees as fuel wood. The mangrove forests are not exploited for fuel wood. The *Casuarina* plantations are protected and used judiciously by the village people, even though they had difficulties in doing so, at the initial stages. Success of the protection initiative is cited by the village people as an example of their ability in managing natural resources that is important for their sustenance.

♦ In Pichavaram, Tamil Nadu, a total of 82 such households have been identified and targeted for the activities listed in Table 3 above. An outlay of about Rs. 5.30 lakhs from the project is in the process of leveraging an additional Rs. 2.30 lakhs of institutional finance and government programme funds. This is expected to generate an annual net income ranging from Rs. 4,500 to Rs. 66,000 per family. See Table 4.

♦ Tables 5A, 6A and 7A give village – wise statistics that show the reduction of pressure on mangrove resources that can be brought about, on a long term basis, within a short period of one or two years.

TABLE 4: Poverty Alleviation Programme and Expected Increases in Income for MGR Nagar

Activity	Number of families involved	Expected revolving fund in the first year	Expected annual net income per family	Source of funding
Objective 1: Alternate to groping and bunding method of fishing				
Activity 1: Using boat and net	20	Rs.2,83,800 for 12 units	Rs. 36,000	Project 12 units
Activity 2: Net alone	13	Rs. 52,000 for 13		Forest Dept. 2 units Project
Objective 2: Alternate income generating activities				
Group activity				
Activity 1: Crab fattening	13	Rs. 97,215 for 5 units	Rs. 65,920	Project
Activity 2: Coir rope making unit	10	Rs. 76,050 for 10 members	Rs. 36,000	Project
Individual activity				
Activity 3: Tyred bullock cart hiring	1	Rs. 45,000 loan	Rs. 25,000	Central Bank of India
Objective 3: Supplementing income from fishing				
Activity 1: Group farming	10	Rs. 100,000 loan	Rs. 4,500 or 15 bags of paddy	Community Banking
Objective 4: Avoiding over-fishing in the mangroves				
Activity: Sea fishing training	15	Rs. 125,000 loan		Central Bank of India
TOTAL	**82**	**Rs. 758,065**		**Project share: Rs. 528,565**

Source: Annual Progress Report April 2000 - March 2001, Tamil Nadu, MSSRF

What is the level of investment that is required to be made in each village / hamlet? How effective are these measures in reducing pressure on the mangroves?

The fund outlay on general village development activities has ranged from Rs. 6,000 to 79,000 in the project villages of Andhra Pradesh. This has been supplemented substantially from the Eco-Development Funds Forest Department and from other government programmes, to the extent of Rs. 1 lakh to Rs. 18 lakhs per village. In the villages where large funds have been spent, it has been to meet the housing needs of the village people.

The fund outlay in providing alternative products or micro-enterprises and other income generating activities have ranged in Andhra Pradesh, from Rs. 1 to 2 lakhs per village. In Tamil Nadu, as indicated in Table 4 the outlay in one hamlet was of Rs. 5.28 lakhs.
The development funds used in the MSSRF - ICEF project are given as grants to the hamlets / villages to be used as Revolving Funds, with substantial contributions from the benefiting members. For replication, an amount of Rs. 2 to 3 lakhs per village may be required. The project experience is that this amount may be best used as a Revolving Fund. The Revolving Fund is given as a one-time grant to the CBO, which manages it and is accountable for it. At present no interest is charged for these loans to the individuals in SHGs. The levy of an interest rate on the loans could prod the grantee to repay the loans at a quicker pace and could be a means of increasing the quantum of the Fund, over time.

The CBO in turn gives The Revolving Fund as a grant to each SHG for onward loaning to the members for income generation activities. The SHGs are collectively responsible for repayment of the loans by each individual. Where the SHG consists of women headed households and / or those that subsist entirely by selling fuel wood collected from the mangroves, all the members are given assistance simultaneously, to take up alternative income generating activities. Repayment till date - for more than two years of operation - is 100%. In other SHGs, only a few members receive assistance at any one point of time. How many receive assistance, to what extent is determined by the funds available to each SHG and the activities proposed.

Besides the Revolving Fund, the SHGs have their own savings which they use for interloaning for consumption and for productive purposes. All decisions regarding both their own savings and the Revolving Fund, are taken by the SHGs and recorded as Minutes of their meetings.

Tables 5, 6 and 7 give an indication of the level of expenditure incurred in villages Matlapalam, Corangi – Dindu and in Bhairavalanka in Andhra Pradesh. Tables 5 A, 6A and 7 A, show the impact of these interventions on the level of pressure on the mangroves.

Table 5 : Expenditure incurred on development activities in village Matlapalam, Godavari district, Andhra Pradesh.

Activities	Source of funds in Rs.		
	ICEF /MSSRF	**Community**	**Forest Department [FD] / other departments**
Village developmental activities			
Medical camp	1,000	-	1,000
Community hall	10,000	-	80,000 {FD}
School material	5,000	-	-
Continuing Education Center	8,200	1,800	12,500 / year Adult Education Department
Drinking water	2,500	1,000	25,000 [FD]
Drainage	3,000	1,000	
Total	**29,700**	**3,800**	**118,500**
Land based alternatives and poverty alleviation			
Distribution of plants	10,000		
Community plantations	30,000	10,000	
Giriraja chicks	5,000	5,000	
Kerosene stoves	5,000	5,000	
Smokeless chullahs	1,000	1,000	
Agricultural inputs	3,000	-	
Coir rope door mats	10,000	2,000	
Other micro-enterprises being developed	135,000		50,000 [FD]
Total	**199,000**	**23,000**	**75,000**

Source: Six - Monthly Progress Report, Andhra Pradesh, 2000-2001, MSSRF

TABLE 5 A: CHANGES IN THE LEVEL OF DEPENDENCE ON MANGROVE RESOURCES DUE TO PROJECT INTERVENTION - VILLAGE MATLAPALEM, GODAVARI DISTRICT, ANDHRA PRADESH

Particulars	Matlapalem		
	1998	**1999**	**2000**
No. of houses / families in the village	171/183 (87 fishermen families)	171/183 (87 fishermen families)	Matlapalem only 84 houses, 84 families Population - 370
No. of concrete houses	22	49	49
No. of thatched houses	63	36	35
No. of houses that depend on mangrove fencing	19	-	-

No. of houses depend on mangrove fuel wood	38	-	-
No. of houses that depend on mangroves for timber (requirement in M.T)	63 (31.5 m.t. / 5 years)	36 (18 m.t. / 5 years)	35 (17.5 m.t. / 5 years)
Grazing by cattle No. of cattle No. of Goats	 107 101	 107 100 (The livestock do not go into the mangroves for grazing)	 32 147 (The livestock do not go into the mangroves for grazing)
Agriculture land			18 families having 20.5 acres

Source: Six - Monthly Progress Report, Andhra Pradesh, 2000-2001, MSSRF

TABLE 6 : EXPENDITURE INCURRED ON DEVELOPMENT ACTIVITIES IN VILLAGE CORANGI – DINDU, DISTRICT GODAVARI, ANDHRA PRADESH

Activities	Source of funds in Rs.		
	MSSRF / ICEF	**Community**	**FD / other Govt. departments / NGOs**
Village developmental activities			
Medical camp	1,000	-	1,000 Kiran Eye Hospital
0.5HP motor for School	3,000	-	1,000 (FD)
Drinking water*	2,000	500	5,000 (FD)
Housing - 20 houses Each house- Rs. 30,000/- Individual contribution – 5,000 Govt and NGO – 25,000	-	1,00,000	5,00,000 Sravanthi-NGO and Andhra Pradesh state housing corporation
Total			
Land based alternatives and Poverty alleviation			
Distribution of plants	10,000	-	5,000 (FD)
Community plantations	20,000	10,000	5,000(FD)
Giriraja chicks	5,000	5,000	-
Kerosene stoves	5,000	5,000	-
Smokeless chullahs	1,000	1,000	10,000(FD)
Agricultural inputs	-	-	-
Fodder development	-	-	-
Coir rope/ door mats	15,000	2,000	25,000 Coir board
Micro-credit and Micro-enterprises*	1,00,000		90,000 (FD)
Total			

Source: Six - Monthly Progress Report, Andhra Pradesh, 2000-2001, MSSRF

TABLE 6 A : CHANGES IN THE LEVEL OF DEPENDENCE ON MANGROVE RESOURCES DUE TO PROJECT INTERVENTION - VILLAGE CORANGI - DINDU, GODAVARI DISTRICT, ANDHRA PRADESH

Particulars	Corangi-Dindu		
	1998	**1999**	**2000**
No. of houses / families in the village	89/95	85 (4 houses destroyed and not constructed)/90	Dindu only 52 houses 57 families population 250
No. of concrete houses	36	64	32
No. of thatched houses	53	21	20
No. of houses that depend on mangrove fencing	49	-	-
No. of houses depend on mangrove fuel wood	31	2	4
No. of houses that depend on mangroves for timber (requirement in M.T)	53 (26.5 m.t. / 5 years)	21 (11 m.t. /5 years)	20 (10 m.t. / 5 years)
Grazing by cattle No. of cattle No. of Goats	 27 24	 27 30 (The livestock do not go into the mangroves for grazing)	 10 48 (The livestock do not go into the mangroves for grazing)
Agriculture land			2 families having 3 acres

Source: Six - Monthly Progress Report, Andhra Pradesh, 2000-2001, MSSRF

TABLE 7: EXPENDITURE INCURRED ON DEVELOPMENT ACTIVITIES IN VILLAGE BHAIRAVALANKA, DISTRICT GODAVARI, ANDHRA PRADESH

Activities	Partners contribution (in Rs.)		
	MSSRF / ICEF	**Community**	**FD / other Govt. departments / NGOs**
Village developmental activities			
Medical camp	2,000	-	5,000
School teacher and material Rs. 1200/month for 2 teachers	5,000	-	28,800
Anganwadi teacher and Anganwadi building	1,000	-	1,25,000 ICDS

Drinking water (Plastic tank)	6,000	-	-
Housing - 50 Houses Each house- Rs. 40,000/- Individual contribution – 5,000 Govt and NGO – 35,000	-	2,50,000	17,50,000 ARTIC-NGO and Andhra Pradesh state housing corporation
Land based alternatives and Poverty alleviation			
Distribution of plants	10,000		5,000 (FD)
Community plantations	10,000	10,000 Volunt. Labour	3,00,000 VSSplantation (FD)
Giriraja chicks	5,000	5,000	-
Kerosene stoves	5,000	5,000	-
Smokeless chullahs	1,000	1,000	-
Agricultural inputs - 21 marginal farmers	10,000	1,000	30,000 (SC Corp.)
Fodder development	1,000	-	-
Coir rope/ door mats	5,000	24,000	12,000 Coir board
Micro-credit and Micro-enterprises*	60,000	50,000	2,50,000 (DRDA) 1,00,000 (SC Corp.) 1,00,000 (Bank loan)

Source: Six - Monthly Progress Report, Andhra Pradesh, 2000-2001, MSSRF

TABLE 7 A: CHANGES IN THE LEVEL OF DEPENDENCE ON MANGROVE RESOURCES DUE TO PROJECT INTERVENTION - VILLAGE BHAIRAVALANKA, GODAVARI DISTRICT, ANDHRA PRADESH

Particulars	Bhairavalanka		
	1998	1999	2000
No. of houses / families in the village	74/86	74/86	83 houses 86 families Population 433
No. of concrete houses	7	61	61
No. of thatched houses	67	13	22
No. of houses that depend on mangrove for fencing	41	-	-
No. of houses depend on mangrove for fuel wood	22	-	-
No. of houses that depend on mangroves for timber (requirement in M.T)	67 (34 m.t. / 5years)	13 (7 m.t. / 5years)	13 (7 m.t. / 5years)

Grazing by cattle No. of cattle No. of Goats	41 56	129 56 (The livestock depend on mangroves for grazing)	84 50 (Present livestock depend on river bunds for grazing)
Agriculture land			22 families having 30.20 acres

Source: Six - Monthly Progress Report, Andhra Pradesh, 2000-2001, MSSRF

Role of the Forest Department

Since the mangrove wetlands are in Reserve Forests or Sanctuary Areas, the Forest Department is the legal owner and a major stakeholder in the conservation of mangroves. There is a legal requirement to obtain permission from the Forest Department before any physical interventions can take place in these areas.

The experience of the project with the Forest Department has been varied in the three States it is being implemented in. The response in Tamil Nadu and in Andhra Pradesh has been more positive. In Orissa there are delays. This is also the experience with respect to the participation of the field staff in the processes of appraisal, planning and implementation of the different components of the design being demonstrated. In Tamil Nadu and in Andhra Pradesh, the CBOs have been officially recognized by the respective Forest Departments. The field staff, being ex-officio Secretaries of the CBOs, regularly attend meetings of the VDMC / EDC. They approve the Micro-plans prepared by the CBOs.

The Forest Departments of these two States have committed funds for village developmental activities, and in Tamil Nadu, for restoration of the mangrove areas. In Andhra Pradesh, the CBOs are formed under the Government Order of December 15, 1997 regarding formation of Eco-Development Committees in Protected Areas. There is thus a direct ownership of the CBOs that are formed. The villages are able to access the substantial funds available for village development works under this Eco-Development Programme.

In Tamil Nadu, the positive attitude of the top echelons of the Forest Department, combined with the efforts made by MSSRF to share the learning from their work on the ground, has helped. Senior Forest Department officials, up to the Principal Chief Conservator of Forests [PCCF] have visited the field sites. This has led to an appreciation of the strategies being demonstrated by the project. The training imparted for senior, middle and field level officials, by MSSRF, has further created awareness regarding the dynamics and the value of mangrove resources.

In Andhra Pradesh, politically there is an enabling environment for participatory processes. This has been reinforced by continuous interaction and sharing by the project with all levels of the Forest Department.

One of the indicators of success of achieving the project objectives is the adoption of the strategy being demonstrated for conservation of mangroves, by the Forest Department as its own programme. In Tamil Nadu, the Forest Department has committed funds for the restoration of mangrove areas in village T.S. Pettai, Pichawaram.

To facilitate the larger adoption of the strategy being demonstrated by the project, it is intended to persuade the Government of India and the three State Governments to formulate a Joint Mangrove Management policy. This Policy would support participation of the proximate communities in the demarcated mangrove areas. It would facilitate commitment of funds to create alternatives to mangrove products and to undertake poverty alleviation activities. It would support the formation and building capacities of community based organizations through a participatory process.

Restoration and Regeneration of Mangrove Areas

The MSSRF - ICEF project intends to demonstrate restoration techniques by demonstrating it on 1500 ha. of degraded mangrove forests.

First of all, the Forest Department demarcates the mangrove area that is to be protected and managed by the hamlet / village in question. The demarcation is along the area that is traditionally used by the particular hamlet / village. It helps to limit conflicts over use, especially when over-exploitation occurs because of unrestrained use from neighbouring villages. A sense of ownership and accountability is created when the area is clearly demarcated.

There are three aspects to restoration and regeneration of mangrove areas:

i) Understanding the geo-morphological and hydrological, as well as socio-economic dynamics of degradation
ii) Construction of physical structures, if any.
iii) Plantation, keeping biodiversity and the natural ecology in view
iv) Protection of restored areas and other healthy mangroves

i) Geo-morphological, hydrological and oceanic factors:

Study of the geo-morphological, hydrological and socio-economic dynamics of degradation led to an appreciation of the role of fresh water availability, the effect of past coupe felling management strategy of the Forest Department, the role of tidal amplitude, the topography of the inter-tidal area, angle of wave action and of oceanic currents. Superimposed on this was the socio-economic factors.

Coupe felling by the Forest Department led to the cleared land subsiding. The low tidal amplitude resulted in the sea water stagnating in a pool in the subsided areas, resulting in increased evaporation and salinity in those areas and creating stress conditions beyond the tolerance of even the hardier mangrove species, like Avicennia marina.

Steeper the topography of the inter-tidal area, smaller the distance inlands flushed by high tides.

The angle at which the waves meet the coast would determine whether erosion or accretion of land takes place.

ii) Construction of canals to improve tidal flushing

Over 270 years ago, the British constructed 5 canals in the Muthupet area of Tamil Nadu, to bring sea water, through mangrove forests, to the area behind the forests, for making salt. Some of the families who worked as labourers in constructing these canals noticed that during high tide these canals were full of fish and prawn and that catching them in the canals was much easier than doing so from the sea. Later, for over 100 years, between 1750 and 1840, these areas were clear felled of the mangrove trees and the fishermen of the area used the cleared area to construct canals in. The fish and prawn traveled up the canals with the tide and stayed and fed on the rich detritus made available by the surrounding mangrove forests. Simple, but ingenious and effective fish traps were devised by the fishermen to trap the fish and prawns. The fishermen obtained a rich haul. The descendants of these families retain the exclusive rights to fishing in these canals. They are also responsible for maintaining the canals by desilting them every year.

In the process of undertaking the biophysical survey of the Muthupet area of Tamil Nadu, at the beginning of project activities, the MSSRF team noticed this unique method of fishing practiced by the local fishermen. They noticed that the canals ensure free flow of tidal water in and out of the mangrove wetlands thereby providing suitable biophysical condition - especially moisture and salinity levels - for the growth of mangrove plants. They found that the fishers earn between Rs. 10,000 to Rs. 20,000 every year from each of these canals. Most important, the team noticed that in the areas where canal fishing was followed, the mangrove forest was healthy, whereas in the nearby areas where no canal fishing was practiced, the mangrove was highly degraded due to stagnation of tidal water. This was confirmed by remote sensing maps of the area.

This traditional practice has been adapted by the MSSRF - ICEF project to constructs similar canals that facilitate free tidal flushing in the mangrove areas. Fisher families are given exclusive rights to the fishery resources of each canal and are entrusted with the responsibility of maintaining them, de-silted. The project has also adapted a practice, from elsewhere in the State, of cultivating crabs in pens within the canals. This is a high income generating activity limited only by the availability of water crabs.

This method integrates mangrove development with improvement of livelihoods through fishery development. The upper width may range from 1.8 mt to 2.5 mt. and the lower one 1 to 1.2 mt. The average depth of the canal is about 1.2 mt. Canal construction is undertaken such that there is a pattern of main and feeder canals so as to ensure tidal inflow covering a maximum area.

iii). Plantation:
A vegetation survey has been undertaken of each of the mangrove areas which was to be regenerated. Plantation of species is consistent with those found in the degraded areas to be restored. The propogules of Avicennia species are collected from the wild and directly dibbled, immediately after the south west monsoons. Other species - *Avicennia officinalis, Bruguiera cylindrica, Ceriops descandra, Aegiceras corniculatum* in Tamil Nadu, *Sonneratia apetala, Excoecaria agallocha* in Andhra Pradesh and *Rhizophora, Exococaria , Sonneratia* in Orissa - are introduced after a period of protection to the restoration area and after tracking the regenerating species.

iv). Protection:
The CBOs - VDMC / EDC / LJSS - have the responsibility of protecting the regenerated and restored areas and the healthy mangroves. Various options have been tried. Rather than entrusting it to individuals, the responsibility of protecting the mangrove areas is given to the SHGs.

In Pichawaram, Tamil Nadu, it was found that the SHGs with non-fishers as members were not very effective in protecting the mangrove areas. They were preoccupied with their own livelihoods and perhaps had relatively less motivation. The VDMC discussed this and entrusted the protection responsibility to the SHG consisting of fishermen. The ten families constituting this SHG were given permission by the Forest Department to set up their huts within the mangrove areas. This falls within the Reserve Forest areas and is another example of the mutual trust between the community and the Forest Department and an example of the change in the latter's perception of associating the local people to meet their ecological objectives. With direct economic stakes in the health of the mangroves, the fisher families are undertaking effective protection.

Conclusion

The MSSRF - ICEF project has successfully demonstrated on the ground the strategy that should be adopted in-situ, for conserving the mangrove wetlands. The following are required:

1. At the national level, conservation of mangrove resources needs to be given a higher priority than it receives at present.
2. The government should make a policy statement permitting the participation of the proximate communities in the joint management, along with the Forest Department, of mangrove forests. These forests may be in Reserve Forests, in Sanctuary Areas or in National Parks.
3. The forests are most effectively conserved when the community, or substantial part of a community, has an economic vested interest in its conservation. This means that their livelihood should be dependant on the continued health of the resource. The direct link between mangrove health and fishery resources gives a great opportunity for a recognized set of fisher families to be given

exclusive fishing rights over a clearly demarcated mangrove area in return for their protection of the area.

4. The non-fishing families who use the mangrove resources for their basic requirements or as a source of income, have to be given alternatives that are more attractive than exploiting mangroves. Without this, any effort to conserve the mangroves will be unsustainable.
5. Given the constraints of financial resources, the approach of Revolving Funds lent to Self Help Groups at a nominal interest rate makes for individual gain with group accountability and a continuous availability of funds.
6. A functioning and resilient Community Based Organization is a fundamental requirement. ***How*** this CBO is formed, its composition, the decision-making procedures will determine the strength of the CBO. The process is vital.
7. The capacities of the community that will participate in the CBO managing the mangroves have to be built to discharge this responsibility competently. This involves building awareness and educating them regarding the functions and uses of mangroves. It involves building cohesiveness and a 'community' feeling and training them to take collective decisions, on their own. The relationship with the Forest Department has to be built to one of mutual trust with both sharing a common goal.
8. The capacities of the Forest Department functionaries have to be built to adopt participatory processes, to work with the communities and in the technical aspects of mangrove conservation.
9. Given numbers 7, 8 and 9 above, the functions of mobilizing the CBO, building their capacities, building the capacities of the Forest Department officials and building bridges between the Forest Department and the communities, may be best performed by non-government organizations that have a long term stake in the sector.

BIODIVERSITY

HALKAR: THE SYMBOL OF HOPE IN COMMUNITY MANAGEMENT

KARNATAKA

M.D. Subash Chandran

Community based management systems of natural areas such as forests, estuaries and other coastal waters, and stretches of rivers were characteristic of the pre-colonial Western Ghats-west coast region of India. Stretches of forests from few to few hundred hectares were preserved as sacred groves in almost every hill village and smaller groves in the coastal villages. Fishing in the ponds and rivers were season bound- and community controlled. The traditional village communities had a system of partitioning natural resources, although it was caste-based. For instance, the basket and mat weaving materials from the wild, such as bamboo, rattan canes, palm leaves, and reeds were partitioned between various caste groups specialised in weaving them in any given area. The coastal areas were inhabited by many kinds of fisher-folks, each one having expertise in wielding one or few of a diversity of fishing gadgets. Specialization existed in systems of agriculture, hunting and resource gathering from the wild obviously to minimise overlapping of niches and over-exploitation of any one kind of resource (Gadgil and Iyer, 1989; Chandran and Gadgil, 1993a). It is not in the scope of this write up to examine the ethicality of the overtones of caste that such a traditional system implicated.

These traditional, community based systems of resource partitioning and sustainable use faded away from most of the region with the onset of British era from early 19th century. Sacred groves and shifting cultivation areas were merged with state-reserved forests. As transportation and communication networks increased and cultural changes swept through even forested villages the impact of Sanskritsation left its telltale marks on the sacred forests too. Many guardian deities of villages, hitherto resident in the dark shade of evergreen groves, were linked to gods of Hindu scriptures. Soon followed construction of temples and shrines in the groves which safeguarded biodiversity and watershed through ages, paving way for their neglect and even exploitation (Chandran *et al.* 1998).

The British East India Company's relentless exploitation of marine timbers like teak (*Tectona grandis*), poon (*Calophyllum tomentosum*) and

Artocarpus hirsuta, caused their depletion in coastal forests by mid-19th century. The Forest Department, well organised by 1860's harvested timbers according to "working plans", claimed to be scientific, but unfounded on experience from humid tropical forests (Cleghorn, 1861). When shifting cultivation was banned, fire factor minimised, causing timber rich deciduous secondary forests turning into evergreen. This prompted a saga in forestry involving clearing of natural forests to raise teak plantations, creating ecological impoverishment, drying of watershed and hardships to locals who depended heavily on biodiversity (Chandran, 1998).

Logging was intensified to meet the requirements of railways, defense, public works and commercial sectors. The *kan* sacred forests, landmarks in pre-colonial conservation, were not even mapped properly. Destructive harvesting methods of the contractor replaced the care natives gave to pepper and cinnamon in the *kans* (Chandran and Gadgil, 1993a). Subsistence hunting by village communities gave way to sport hunting by British and Indian shikaris (Chandran and Gadgil, 1993b).

Since Indian independence the state governments of Bombay and later of Karnataka granted heavy favours to forest based industries of Uttara Kannada district overlooking local needs. Even sacred *kans,* were not spared from timber exploitation, Bamboo, a multi-purpose forest produce, abundant once and treated as a weed by the Forest Department, was depleted through over-harvest by a paper factory. Trees of subsistence importance and even rarer species were felled. Between 1947 and 1985 about 12 per cent of Uttara Kannada forests were released for various non-forestry purposes (Gadgil and Chandran, 1989).

The British, admittedly, had also tried to pacify the public when there was an outcry for forest biomass. The degraded forests, and lands savannised in the past for cattle grazing, in the vicinity of local towns and villages, were allotted as "minor forests" for exercising the privileges of the people. Thus the British period witnessed the management of vast areas of community controlled forests slipping into the hands of the state. There were, however, isolated pockets along the Uttara Kannada coast where village community control over forests survived. In this article is attempted to present a profile of Halkar village, the one where the community management survived to this day. The case study of Halkar is all the more significant especially when, following the 1992 Convention on Biological Diversity, there is renewed interest in making the local communities partners in conservation.

Uttara Kannada: Pre-colonial Land Use

Uttara Kannada, formerly North Kanara, (13° 55' and 15° 31' N lat and 74° 9' and 75° 10' east long), is a district of Karnataka located on the

shores of the Arabian Sea. The hills of the Western Ghats, one of the global hot spots for biodiversity, covers most of the district, barring a narrow coastal strip. The coastline is also interrupted by hills protruding into the sea as well as by the wide mouths of five rivers which originate in the hills and run their short courses winding through valleys and gorges before joining the sea. The district receives rainfall of 200 to 500 cm a year and is one of the most well-wooded places of peninsular India. Despite last two centuries of organised exploitation of forests by the state, 60 per cent of its total land surface 10,200 km² is still under forest cover. From various forest records and based on the observations of British officer Francis Buchanan, who traveled through the district in early 1801, it appears that the forests were under the control of village communities (Buchanan, 1870).

Most villages typically had sacred *kans* which were community controlled areas whose extent ranged from few to few hundred hectares. Tree cutting was a taboo inside the *kans*, but gathering of non-timber forest produce such as black pepper, or fruits and seeds, palm toddy etc. was not a violation. The *kans* performed several ecological services including the conservation of watershed and endemic species. The *kadu* or ordinary forest was used by the people for gathering routine biomass needs such as fuel, leaf manure, poles, timber etc. The *hakkalu* or *kumri* lands were shifting cultivation areas, where during the fallow period the forest would re-grow. The *benas* were grazing areas (Chandran and Gadgil, 1993a).

In 1920's the Forest Department of Bombay Presidency wanted to free itself from the unprofitable task of safeguarding the desolate coastal minor forests. The Chief Conservator of Forests of the Bombay Presidency declared: "The Forest Department is commercial and its position must be criticised from a business point of view. Consequently this Department cannot look after the forests where people are to be allowed to satisfy their wants...This Department readily abandons these coastal minor forests." But a survey by Collins, the Forest Settlement Officer showed many patches of good tree growth. Relinquishing these forests to the Revenue Department would have caused their dissolution (Collins, 1922). On Collins' recommendation, the Bombay Government, also using the provisions of the Indian Forest Act of 1927, initiated the formation of Village Forest Panchayats (VFP). By 1930, in Kumta forest range nine VFPs came into existence covering 11 villages, and a total area of 1814 ha of forests. The Halkar village, on which this case study has been made, is one among them (Gadgil *et al.* 1990).

Halkar: a Profile

Halkar village of Uttara Kannada coast, is towards the outskirts of Kumta town (population: 30,000 people), on the southern bank of the

Aghanashini river estuary. The river rises in the Western Ghats, running its short course in rapids and falls and through gorges and valleys it meets the Arabian Sea, about 15 kms towards the north-west of Halkar. Its estuarine expanse along the coast covers about 25 km², dotted on all sides with well-populated villages. Of Halkar's 200 ha area, 60 ha are covered with the backwaters. The village forest having an area of 89 ha was community-managed even before the Village Forest Panchayat system was formalised. The villagers had even kept a "Rakhhavildar" or watchman for guarding the forest (Collins, 1922; Gadgil *et al.* 1990).

Halkar village has 186 households and 1100 people. It has a multi-caste Hindu society. The castes, despite their social hierarchy live in harmony, which is expressed more in resource conservation and sharing than in social activities (see Table-1 for social profile of Halkar village).

Table 1: Social profile of Halkar village

Castes	No. of households	Traditional occupation	Present occupation
Harikantra	65	Fishing, fish selling	Fishing, fish selling, agriculture, miscellaneous
Patgar	51	Agriculture, agricultural workers	Agriculture, agricultural workers, government jobs, miscellaneous
Gunaga	35	Potters, priests to village gods	Potters, business, agriculture
Mukri	19	Labourers, gathering of forest produce	Labourers, petty jobs
Havyak Brahmin	13	Arecanut cultivation, priesthood	Arecanut cultivation, priesthood, various professions
Madival	7	Washermen	Washermen, agriculture, miscellaneous
GSB*	5	Traders	Traders, various professions
Achari	5	Carpentry, smithy	Carpentry, smithy
Hulswar	3	Basket weaving, grazing of village cattle	Basket weaving

Others	3		

*GSB: Gouda Saraswat Brahmin

Patgars are specialists in traditional estuarine rice cultivation, although their average land-holding is not more than one hectare. After planting rice during the onset of monsoon rains in June, many of them moved into the interior of Uttara Kannada, to work in the areca nut gardens of Havik Brahmins. These days some are in white collar jobs as well. The Gunagas or Kumbhars are traditionally potters. They also officiate as priests for village deities. Their hand-made roofing tiles were widely used before the factory-made tiles arrived. The demand for earthenware also dropped with the spread of metal and plastic wares. Barring few, the rest of the families have diversified into small-scale agriculture, business, transportation etc. The villagers believe that the Gouda Saraswat Brahmin landlords brought the Havyak Brahmins for priesthood in their family temples. These Brahmins, most of them educated, got landed property and became an influential segment of the society. Some of them practice Ayurveda. Their younger generation has entered into various professions. Their advice on managing the village forest and solving the related legal problems is esteemed by the community.

The Madivals or washermen also have diversified into other professions. The younger generation of GSBs has migrated to urban centres for business purposes. The Mukris, hunter-gatherers and agricultural labourers of the past continue to be economically and socially backward to this day.

The Tragedy of the Estuaries

Tropical estuaries are endowed with high rates of productivity, and have sustained large human population. When torrential rains strike the Western Ghats, the Aghanashini river would transport large quantity of organic litter and silt and deposit the same in the backwaters. The mudflats and mangroves (on the decline in recent years) would be teeming with organisms. People of the estuarine belt harvested substantial quantities of fish, shrimps, bivalves, crabs etc.

The estuaries have an age-old system of rice cultivation, which neither need manure nor tilling. Earthen embankments were built in shallow parts of the estuaries, to prevent inundation of salt water. The mangrove trees planted just outside the embankments would strengthen the embankments with their entanglement of aerial roots. Towards the close of May, these rice fields or *gajnis*, traversed with a network of natural tidal canals were drained through sluice gate. As monsoon rains from early June filled these *gajnis* and diluted the salt, *kagga*, a salinity tolerant rice strain, was planted. The rice, popular all along the coast

once, was harvested in November when the rains subsided. Thereafter tidal waters would flow freely in the *kodis*. The fishing families traditionally shared the numerous *kodis* between them for fishing rights. The *gajnis* ranged in size from few to few hundred hectares. The *gajni* fields are under the collective ownership of farmers. The farmers if at all fished in the *kodis*, it was for their own consumption. However, women and children in hundreds, of different castes routinely gather bivalves for food from the backwaters for food. The bivalve sale is an important source of income for fisher-women. The river has been a lifeline through ages.

The estuaries have a fascinating bird fauna of about 130 species, many of them migratory These include, Avocet, Brahminy duck, Common teal, Eastern redshank, Golden plover, Gray plover, Greater spotted eagle, Indian whiskered tern, Kentish plover, Marsh sandpiper, Night heron, Pin-tailed duck, Rosy pastor and Whimbrel (Daniels, 1989).

From 1960's, the traditional socio-economic and ecological set up of the estuaries was subjected to a tumultuous upset, when the Government of Karnataka State started building permanent stone dams for *gajnis*, replacing the earthen ones. This paved the way for entry of fishing contractors and external capital in the estuarine area. Tempted by the cash flow, ignoring the original purpose of these dams as a protection for rice crop, the farmers stocked their *gajnis* with tidal waters for catching fish, after the harvest of rice. The impounding of salt water throughout the post-harvest period made them unsuitable for cultivation due to salinity increase. The contract system deprived the estuarine fisher-folks of their traditional fishing rights in the *gajnis*. There was no more planting of mangroves, and most mangroves of earlier times were liquidated.

From early 1990's, the rising profits from shrimps than from other fish, tempted many farmers to lease out their *gajnis* for conversion into aquaculture ponds, involving destruction of the entire biota including the mangroves, as well as restructuring the *gajnis* to suit the specifications of shrimp culturing. The initial euphoria of success vanished when the shrimps got afflicted with a recurring virus disease. The shrimp ponds abandoned consequently are unsuitable for rice cultivation; nor other fish grow due to the ecologically sterility of the habitat. As the economy and social harmony were upset many fisher-folks joined the marine-fishing sector as workers. Their women were worst hit as seldom they got opportunity to vend fish. The farmers of Halkar, however, desisted the temptations of leasing out their *gajnis* for shrimp culturing. Nevertheless, the building of the permanent embankments for their *gajnis* in 1960's saw, as elsewhere in the estuarine belt, a negation of traditional fishing

rights. Moreover due to impeded drainage following the building of permanent dams half of the *gajnis* became unfit for rice cultivation.

Forest Biodiversity

The forest of Halkar is of stunted semi-evergreen type, interspersed with blanks. These blanks were planted recently, by the Forest Department, with Australian Acacia (*Acacia aurculiformis*), *Casuarina* and cashew (*Anacardium occidentale*). Among the evergreen trees are *Carallia brachiata, Garcinia indica, Mammea suriga, Memecylon umbellatum, Mimusops elengi* and *Syzygium cumini.* Notable deciduous trees are *Careya arborea, Terminalia paniculata* and *Lannea coromandelica*. Medicinal plants like *Abrus precatorius, Asparagus racemosus* and *Gloriosa superba, Gymnema sylvestre* also are found.

Since Halkar forest lost its corridors with rest of the wilderness, due to the spread of Kumta town, it is destitute of any major mammals, which earlier included occasional panthers, boar and hyena. However, Jackals, Hanuman langur and Black-naped hare are frequent. Of the birds noted here are Bee-eaters, Cuckoo, Herons, Jungle fowl, Kingfishers, Kites, Lapwings, Golden oriole, Parakeets, Peafowl, Spotted dove, Tree-pie, and Warblers. The people of Halkar do not hunt any animals although people from nearby villages, once a year, conduct a ritual hunting and might capture some hares at the most. The birds of the forest face no major threat. However, the large-scale disturbances in the estuary have surely caused decline in the bird fauna.

The Functioning of the VFP

The formal institutional structure and bye-laws for the VFP were framed by the Government of Bombay in the 1920's. The present VFP has a General Body (GB) composed of one member each from 186 households of Halkar. To be eligible for membership a householder must have attained minimum 18 years of age and should be a legal right-holder in the family property. The family should have resided in the village for minimum of ten years, should own cattle and should take active part in the VFP activities.

The GB has an elected Managing Body (MB) of nine members, the various caste groups being almost proportionately represented. The MB has presently two members each from Harikantra, Patgar and Gunaga castes, one each from Brahmin and Harijans (castes in the lowest rung of the social hierarchy), and one member from a general category, by popular choice. One among the nine would be elected as Chairman of VFP and another as Vice Chairman. A Secretary is appointed on a modest honorarium to look after the day-to-day administration of the VFP. A forest watchman (formerly *Rakhhavaldar*) is also appointed on payment. The election to the MB is conducted once in three years, under

the supervision of the Tahasildar or administrative head of Kumta taluk. The voters assemble in the premises of the VFP office and each caste group elects its representative(s) separately. All members vote for electing the general category representative. The MB meets every second Sunday of the month, and the GB every six months, as well as during important contingencies. The accounts of the VFP are to be audited every year by the Tahasildar.

The social hierarchy has not affected the democratic spirit of the VFP. The present Chairman is from the potter caste and the Vice Chairman from the Patgar caste. In the past, Brahmins, although a minority in the village, had been elected as the Chairmen. Although men and women may contest so far women have not contested, mainly because, the householders, who are the voters, are mostly men. At the same time women do take part in other democratic institutions. Sushila, a woman from a fishing caste of the village is presently president of Holanagadde Panchayat*, to which Halkar belongs.

Halkar has a democratic system of sharing the benefits from the forest. Each household is issued a "pass" every year by the VFP for a fee of Rs. 15. In 1999, 187 such passes were issued. During the dry season, one member from each family is allowed to collect fallen leaves for manure and dry wood for fuel. The family quota is not more than one head load per day weighing 25-30 kg. Fallen branches may be gathered or dead branches just broken by hand from the trees. During the rainy season green twigs for manure may be collected from bushes. There are no restrictions on gathering of medicinal plants for own use or wild berries barring few species. Dead trees are auctioned among the villagers only. A family that purchases a fallen tree through auction cannot bid for a second time, thereby favouring the cause of the poorer people. The sale of laterite bricks for construction from the quarries of the forest is the main source of income for the VFP. The villagers are given bricks at concession rate for their own constructions. The members of the MB have opted to discontinue a nominal sitting-fee for meetings.

Resource Availability and Livelihood Opportunities

Whereas for the sake of firewood and leaf manure, people from the denuded coastal villages, especially women, trekked several kilometers into the interior forests, the people of Halkar did so only sparingly. They used their village forest sustainably and went to the interior forests only to make up for the shortages. Such shortages have been overcome in the last few years through raising of tree plantations. Collection rights of

* The Panchayat is a system of local self government consisting of elected representatives of the people. The Panchayat takes care public works such as roads, drinking water, running of schools, health care systems etc.

some of the forest produce from such as surugi flowers (*Mammaea suriga*- used for dyeing of silk and preparing perfume) and kokum fruits (*Garcinia indica*) as well as collection of cashew nuts (*Anacardium occidentale)* are annually auctioned among the villagers. Collection of these forest produce does generate some employment for women. The women also are spared of the travails of bringing head-loads of fuel and leaf manure from far away forests. The cutting of laterite bricks generates some employment for the poor.

Concerns of Conservation

Halkar forest is an isolated patch, surrounded by habitation and subjected to open grazing by cattle. It is not that rich in biomass (basal area 10-12 m^2/ha and 10-15 species of trees/ha) and in biodiversity unlike the forests in the interior (b.a. 25-45 m^2/ha and tree species 30-50/ha). Therefore the norms of quantitative quotas per household and closed seasons for gathering biomass are strictly followed; more needs are to be met from forests elsewhere. The VFP arranges for supply of poles of plantation trees like *Acacia* and *Casuarina* to the needy households at less than market rates. The pass holders are not allowed to use knives or axes in the forest. Collection seasons are strictly adhered to and forest materials are not to be transported out of the village. Once a year, during the rainy season, the entire community, each household represented by at least one member, examines the boundary trenches of the forest

Monitoring and Evaluation

The Halkar village community exercises considerable vigilance on the functioning of the VFP system. The performance of the MB members is critically evaluated. Accounts are to be maintained meticulously. Since the VFP is officially constituted body the government has a strong say, sometimes more than necessary, in the matters of it's functioning. The elections are to be conducted by the Tahasildar of Kumta. He also has to verify the financial accounts of the VFP.

Crisis Management

When the fate of fragile grass root level organisations such as village community forest management are formalised and tied up with the whims of the bureaucracy, they may not outlast the stresses and strains. In the 1970's, when there was an overall depletion of industrial timbers in the Karnataka Western Ghats, the Government permitted industrial logging in the well-wooded VFP forest (area about 1100 ha) of Muroor-Kallabbe villages of Kumta. In an apparent effort to counter the protest of the community, the Deputy commissioner of Uttara Kannada, passed an order in 1979 abrogating the system of VFP. The order contented that the

VFP system was an introduction of the Government of Bombay* and the Karnataka Forest Act of 1963 did not reckon it.

Following this order seven of the nine VFPs of Kumta taluk surrendered their forests to the State. The VFPs of Halkar and Muroor-Kallabbe took the issue to the High Court of Karnataka. Both the communities have won their cases, but only Halkar survives today. The VFP system of Muroor-Kallabbe, did not unfortunately recover to be back on the rails, as the decade long litigation brought the fragile organisation into dissolution and as their forest was facing dissolution too due to uncontrolled felling, was brought under state control.

The Halkar VFP, faced a period of hostility from the State, despite winning the case in 1989. The State's insensitivity to community management surfaced again in 1991 when it unilaterally allotted 6.5 ha hectares of Halkar forest for the passage of coastal railway line. The VFP failed to change the course of the rail but just managed to get the trees cut for the people. The request seeking compensation for the lost land has not been considered. The Tahasildar of Kumta did not conduct the VFP election even after the lapse of four years. The community's appeal to the Deputy Commissioner went unheeded. Hope did not desert the community who preserved their forest through crisis period. In 1994, the VFP, assisted by an NGO, approached the Divisional Commissioner at Belgaum, who took a lenient view. S.K. Pattanayak, the then Deputy Commissioner of Uttara Kannada, felt something amiss with the official impression given to him of Halkar VFP. He instructed the Tahasildar of Kumta to conduct the elections. On 14th of December, 1994 Mr. Pattanayak himself visited Halkar and having studied the case personally inscribed in visitor's book:

> "I was happy to know that the forests are being managed by the Forest Panchayat Committee. Efforts should be made to involve the landless labourers, women and members of weaker section. The organic relationship between man and nature is best exhibited here- the public are the best guardian of forests is best demonstrated here."

Despite the functioning of VFP winning praise from many NGOs, difficulties continue to haunt the community. The Tahasildar is formally required to audit its accounts. Since the last two years the Tahasildar has been, using Government auditors for the purpose. The procedure for a formal auditing of a grass root level organisation is a stressful affair. Activities carried out informally through tacit understanding among the villagers, or as conventions through generations may not find validity in

* Uttara Kannda (North Kanara) was part of the Bombay Presidency until the district was transferred to Karnataka State in 1956.

a government audit. Auditors want tenders to be called for sale of timber or fuel, and objected to the concessional supply of these by VFP to the villagers. They objected to the recent construction of VFP office building without calling for tenders. The villagers regard the Government auditing as a challenge to their traditional system of functioning on mutual trust and harmony. Moreover they feel that the audit fee levied was quite high and since the VFP is not using Government grants there should not be such formal auditing.

An Appraisal of Community Management

Left to itself, the VFP has the resilience to contain stresses and strains. But coping up with the exacting demands of the state bureaucracy, requires legal knowledge and administrative skills of a formal kind, which the villagers can scarcely afford to comply with.

The community is not instructed on the ecosystem value of the forests. The environmentalists who have visited this forest have rightly expressed their dissatisfaction with the planting of exotic species in the numerous gaps of the forest. They stressed the importance of planting more of NTFP species that could generate more employment for the people and income for the VFP. The VFP should be guided to adopt an ecosystem oriented approach to replace its commodity based approach

There are indeed apprehensions among the villagers also of mass planting of fast growing exotics. The villagers are not at fault as the exotics are introduced by the Forest Department, under the Social Forestry scheme, without consulting the community. The VFP's financial condition was also precarious to undertake planting of more local species, which need greater care. The soils are very impoverished and lateritic as the litter cover is entirely taken off by the people for fuel and manure. Open grazing by large number of cattle is also pernicious for re-establishment of local species.

Gender equity is lacking in the present VFP. The inclusion of women members would have given a greater biodiversity oriented approach to the VFP. Since most forest resource collectors are women, the VFP should amend its bye-laws and give more gender equity in its affairs

Conclusions

Local level ecosystem management was more holistic and sustainable than modern utilitarian systems, prejudicial to sustainability, as studies in Uttara Kannada show. The age old- agriculture- fisheries-mangrove growing system of Aghanashini estuary was disrupted beginning in 1960's through external interventions without assessing environmental and socio-economic impact. Uttara Kannada witnessed the destruction pre-colonial indigenous forest management system without any viable alternatives. Story of community management of forest in Halkar village,

shows that even a stressed ecosystem, that the colonial state wanted to relinquish, but decided to leave it under the formal care of the village community, nevertheless, could be managed sustainably, and equitably to benefit hundreds of people. India is said to live in villages. The state should aim at rehabilitating and restoring disrupted ecosystems and train local communities in participatory and holistic ecosystem management. This appears to be a very practical way of enhancing the quality of life for millions of Indians, who live in poverty, while restoring the countryside ecologically.

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Medicinal Plants Conservation Programmes: Lessons for Policy Makers

Darshan Shankar

One can make the bold assertion that medicinal plants ought to be given the status of a national resource. This is because their sustained availability is essential to sustain one of world's oldest medical traditions, a priceless legacy of the Indian people.

Millions of rural households use medicinal plants in a self-help mode. Over one and a half million practitioners of the Indian Systems of Medicine, in the oral and codified streams use medicinal plants in preventive, promotive and curative applications.

There are estimated to be over 5000 manufacturing units in India with an annual turnover of over Rs. 2000 Crores/year. In recent years, the growing demand for herbal products has led to a quantum jump in volumes of plant material traded within and across countries. Conservative estimates put the economic value of medicinal plant related International trade to be of the order of US $ 880 million and this is growing. The current growth trends of the Indian herbal industry suggest that the annual turnover may reach Rs. 4000 Crores by the turn of the century.

While the demand for medicinal plants is increasing, their survival in their natural habitats is under growing threat. Species like Coscinium Fenestratum, Janakia Arayalpathra, Dactylorhiza Hatagirea, Saussurea Costus are critically endangered in the wild. It is presumed that around a 1000 species of medicinal plants are facing threat to their existence in the wild, and some of them like Plectranthus Vettiveroides, have become extinct in the wild.

It is necessary to bear in mind that even if a particular variety of a plant is put under several million hectares of active cultivation, the species can still go extinct in the wild, if its wild populations with all their inherent intra specific diversity are not conserved. It is an established fact that the evolution of species depends on diversity. Hence it is an alarming fact that the wild populations of medicinal plants are under threat. Therefore,

it is essential to take urgent steps to conserve India's medicinal plants wealth.

Conservation of the country's medicinal flora will not only serve national interests but also serve global needs, since there is a growing worldwide demand for natural medicine.
Analysis of published information on medicinal plant use, indicates that around 8000 species are used by the different systems of medicine in India.

Medical Applications

It is evident that the Indian people have a tremendous passion for medicinal plants. In the oral traditions, local communities in every ecosystem right from the trans Himalayas down to the coastal plains have discovered the medical uses of thousands of local plants found in their surrounding. They use them for a very wide range of health related applications from common cold to memory improvement; treatment of poisonous snake bites to cure for muscular dystrophy and enhancement of the body's general immunity.

India probably has one of the richest plant medicine cultures in the world. It is a culture that is of tremendous contemporary relevance because it can on one hand ensure health security to millions of people and on the other hand it can provide new and safe herbal drugs to the entire world.

There are estimated to be around 25,000 effective plant based formulations used in folk medicine known to rural communities all over India. Around 10,000 brilliantly designed formulations are available in the indigenous medical texts many of which are yet to be sufficiently tapped.

Distribution of Medicinal Plants

The analysis of the distribution of medicinal plants shows that they are distributed across diverse habitats and landscapes. Around 70% of India's medicinal plants are found in the tropical areas mostly in the various forest types spread across the western and eastern ghats, the Vindhyas, Chotta Nagpur plateau, Aravalis, the Terai region in the foothills of Himalayas and the North East. While less than 30% of the medicinal plants are found in the temperate and alpine areas of higher altitudes which include species of high medicinal value. A small number of medicinal plants are also found in aquatic habitats and mangroves.

Studies show that a larger percentage of the known medicinal plants occur in the dry and moist deciduous vegetation as compared to the evergreen or temperate habitats.

Ayurveda	1769
Folk	4671
Homeopathy	482
Siddha	1121
Tibetan	279
Unani	751

Families

Of the 386 families and 2200 genera in which medicinal plants are recorded, the families Asteraceae, Euphorbiaceae, Lamiaceae, Fabaceae, Rubiaceae, Poaceae, Acanthaceae, Rosaceae and Apiaceae share the larger proportion of medicinal plant species, with the highest number of species (419) falling under Asteraceae. (see fig. 5)

Destructive Harvesting

An estimated 800 species are currently used in Industry for large scale production of herbal products. But less than 20 species are under commercial cultivation i.e. more than 95% of medicinal plants used by the Indian Industry are collected from the wild. More than 70% of the collections involve destructive harvesting from the wild, because of the use of parts like roots, bark, wood, stem and the whole plant (herbs). This poses a definite threat to the genetic stocks and to the diversity of medicinal plants.

Red Listed Plants

A threat assessment exercise carried out for southern and northern India, as per latest IUCN guidelines, have brought to notice around 200 species of medicinal plants that are under various degrees of threat.

CITES has notified 11 Indian medicinal plant species in its schedules and in 1998, the Government of India has recommended restriction on export of about 29 species which are believed to be threatened in the wild.

	VU	EN	CR	LRnt	EX	EW	Total
Herb	10	5	6	3	1	1	26
Shrub	1	4	3	3	-	-	11
Tree	28	11	5	6	2	-	52
Climber	6	5	3	1	-	-	15

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Red Listed Medicinal Plants in Southern India

(Assessed through four CAMP workshops organised so far)
Endemic Medicinal Plants

Botanical Name	**Status - Global**	
Adhatoda beddomei C. B. Clarke	CR	
Aerva wightii Hook.f.	EX	
Amorphophallus commutatus (Schott) Engl.		VU
Ampelocissus araneosa (Dalz. & Gibson) Planch.	VU	
Artocarpus hirsutus Lam.	VU	
Asparagus rottleri Baker	EX	
Calophyllum apetalum Willd.	VU	
Cayratia pedata (Lam.) Juss. var. glabra Gamble	EN	
Cinnamomum macrocarpum Hook.f.	VU	
Cinnamomum sulphuratum Nees	VU	
Cinnamomum wightii Meisn.	EN	
Curcuma pseudomontana Grah.	VU	
Decalepis hamiltonii Wight & Arn.	EN	
Diospyros candolleana Wight	VU	
Diospyros paniculata Dalz.	VU	
Dipterocarpus indicus Bedd.	EN	
Dysoxylum malabaricum Bedd. ex Hiern	EN	
Eulophia cullenii (Wight) Blume	CR	
Eulophia ramentacea Wight	DD	
Garcinia gummi-gutta (L.) Robson	LRnt	
Garcinia indica (Thouars) Choisy	VU	
Garcinia travancorica Bedd.	EN	
Gardenia gummifera L.f.	VU	
Glycosmis macrocarpa Wight	VU	
Gymnema khandalense Santapau	EN	
Gymnema montanum (Roxb.) Hook.f.	EN	
Heliotropium keralense Sivar. & Manilal	CR	
Heracleum candolleanum (Wight & Arn.) Gamble	VU	
Humboldtia vahliana Wight	EN	
Hydnocarpus alpina Wight	VU	
Hydnocarpus macrocarpa (Bedd.) Warb.	EN	
Hydnocarpus pentandra (Buch.-Ham.) Oken		VU
Janakia arayalpathra J.Joseph & V. Chandras.	CR	
Kingiodendron pinnatum (Roxb. ex DC.) Harms	VU	
Knema attenuata (Hook.f. & Thoms.) Warb.		LRnt
Lamprachaenium microcephalum Benth.	DD	
Madhuca diplostemon (C.B.Clarke) Royen	DD	
Madhuca insignis (Radlk.) H.J.Lam	EX	
Michelia nilagirica Zenk.	VU	
Myristica malabarica Lam.	VU	

Nilgirianthus ciliatus (Nees) Bremek.			EN	
Ochreinauclea missionis (Wall. ex G. Don) Ridsdale			VU	
Paphiopedilum druryi (Bedd.) Pfitz.			CR	
Piper barberi Gamble			CR	
Plectranthus nilgherricus Benth.			EN	
Pterocarpus santalinus L.f.			EN	
Semecarpus travancorica Bedd.			EN	
Shorea tumbuggaia Roxb.			CR	
Strychnos aenea A. W. Hill			EN	
Swertia corymbosa (Griseb.) Wight ex C.B.Clarke			VU	
Swertia lawii (C.B.Clarke) Burkill			EN	
Syzygium travancoricum Gamble			CR	
Tragia bicolor Miq.			VU	
Trichopus zeylanicus Gaertn.subsp. travancoricus (Bedd.) Burkill				EN
Utleria salicifolia Bedd.		CR		
Valeriana leschenaultii DC.			CR	
Vateria indica L.		VU		
Vateria macrocarpa B. L. Gupta			CR	

Non-Endemic Medicinal Plants

Botanical Name	**Status - Regionally**			
	KA	KL	TN	
Acorus calamus L.		DD	EN	VU
Adenia hondala (Gaertn.) Wilde		VU	VU	EN
Aegle marmelos (L.) Corr.		VU	NE	VU
Amorphophallus paeoniifolius (Dennst.) Nicolson		DD	LRnt	VU
Ampelocissus indica (L.) Planch.		EN	EN	EN
Aphanamixis polystachya (Wall.) Parker		VU	VU	DD
Aristolochia tagala Cham		VU	LRlc	DD
Baliospermum montanum (Willd.) Mull.Arg.			VU	VU
DD				
Canarium strictum Roxb.		VU	VU	VU
Celastrus paniculatus Willd.		LRnt	VU	LRnt
Chonemorpha fragrans (Moon) Alston		EN	VU	DD
Commiphora wightii (Arn.) Bhandari		NE	NE	NE
Coscinium fenestratum (Gaertn.) Coleb.		CR	CR	CR
Cycas circinalis L.		CR	VU	CR
Drosera indica L.	EN	LRlc	LRlc	
Drosera peltata J.E.Sm. ex Willd.		EN	VU	EN
Embelia ribes Burm.f.		VU	LRnt	VU
Embelia tsjeriam-cottam (Roem. & Schult.) DC.		VU	VU	VU
Garcinia morella (Gaertn.) Desr.		VU	LRnt	VU
Gloriosa superba L.		VU	VU	LRlc
Hedychium coronarium Koenig		LRnt	LRnt	LRlc
Helminthostachys zeylanicus (L.) Hook.		DD	VU	CR
Holostemma ada-kodien Shultes		VU	EN	LRnt

Kaempferia galanga L.	NE	NE	NE	
Madhuca longifolia (Koen.) Macbr.		VU	NE	LRlc
Madhuca neriifolia (Moon) H.J.Lam		VU	LRlc	LRlc
Michelia champaca L.		EN	LRnt	VU
Moringa concanensis Nimmo ex Dalz. & Gibson		NE	NE	LRlc
Myristica dactyloides Gaertner	VU	VU	LRlc	
Nervilia aragoana Gaud.	LRnt	VU	EN	
Nothapodytes nimmoniana (Graham) Mabber.		EN	VU	VU
Operculina turpethum (L.) Silva Manso		VU	EN	LRnt
Oroxylum indicum (L.) Benth. ex Kurz		VU	EN	DD
Persea macrantha (Nees) Kosterm.		EN	VU	EN
Piper longum L.	NE	LRnt	EN	
Piper mullesua Buch.-Ham. ex D.Don		CR	LRnt	VU
Piper nigrum L.	LRnt	LRlc	LRnt	
Plectranthus vettiveroides (Jacob) Singh & Sharma			NE	NE
CR				
Pseudarthria viscida (L.) Wight & Arn.		VU	VU	LRnt
Pueraria tuberosa (Roxb. ex Willd.) DC.		CR	NE	VU
Rauvolfia serpentina (L.) Benth. ex Kurz		EN	EN	EN
Rhaphidophora pertusa (Roxb.) Schott		VU	LRlc	LRnt
Salacia oblonga Wall. ex Wight & Arn.		CR	EN	LRnt
Salacia reticulata Wight	CR	DD	NE	
Santalum album L.		VU	EN	EN
Saraca asoca (Roxb.) Wilde		EN	DD	DD
Schrebera swietenioides Roxb.		VU	NE	DD
Smilax zeylanica L.		LRnt	VU	LRlc
Symplocos cochinchinensis (Lour.) Moore subsp. laurina (Retz.) Nooteb.	LRnt	LRlc	LRlc	
Symplocos racemosa Roxb.		VU	DD	LRnt
Terminalia arjuna (Roxb. ex DC.) Wight & Arn.		LRnt	LRnt	LRlc
Tinospora sinensis (Lour.) Merr.		VU	LRnt	NE

The following is a list of North Indian Medicinal plants categorised according to New IUCN Red List Criteria, under the Biodiversity Conservation Prioritisation Project by a Conservation Assessment and Management Plan Workshop Process (WWF, India, ZOO/CBSG, India, U.P. Forest Department, 21-25 January 1997, Kukrail Park, Lucknow)

CRITICAL

Aconitum balfourii - CR-NWI
Aconitum deinorrhizum -CR-NWI
Aconitum falconeri-CR-NWI
Aconitum ferox-CR-NWI
Aconitum heterophyllum -CR-NWI
Aconitum violaceum-CR-NWI
Acorus calamus-CR-NEI

Angelica glauca-CR-NWI
Aquilaria malaccensis-CR-NEI
Arnebia benthamii-CR-NWI
Atropa acuminata-CR-NWI
Berberis kashmirana-CR-NWI
Coptis teeta-VU-NEI
Craterostigma plantagineum CR-CEN
Curcuma caesia CR-CEN
Dactylorhiza hatagirea - CR-NWI
Delphinium denudatum-CR-NWI
Dioscorea deltoidea-CR-NWI
Fritillaria roylei-CR-NWI
Gentiana kurroo-CR-NWI
Inula racemosa-CR-NWI
Ilex khasiana-CR-NWI
Luvunga scandens-CR-NEI
Meconopsis aculeata-CR-NEI
Nardostachys jatamansi-CR-NWI
Nepenthes khasiana-CR-NEI
Podophyllum hexandrum CR-NEI
Podophyllum hexandrum CR-NWI
Przewalskia tangutica-CR-NEI
Saussurea costus-CR-NWI
Taxus wallichiana-CR-NEI
Valeriana jatamansi-CR-NEI

ENDANGERED
Berberis aristata-EN-NWI
Berberis lycium-EN-NWI
Bunium persicum-EN-NWI
Gastrochilus longiflora-EN-NEI
Gloriosa superba-EN-CEN
Hedychium coronarium-EN-CEN
Heracleum candicans-EN-NWI
Hydnocarpus kurzii-EN-NEI
Lavatera kashmiriana-EN-NWI
Panax pseudo ginseng- EN-NEI
Picrorhiza kurroa-EN-NEI
Picrorhiza kurroa-EN-NWI
Polygonatum verticillatum-EN-NWI
Rauvolfia serpentina-EN-CEN
Rheum nobile-EN-NEI
Saussurea gossypiphora-EN-NWI
Saussurea obvallata-EN-NWI
Saussurea simpsoniana-EN-NWI
Swertia angustifolia-EN-CEN

VULNERABLE
Berberis chitria-VU-NWI
Bergenia ligulata-VU-NWI
Clerodendrum colebrookianum-VU-NEI
Clerodendrum serratum-VU-CEN
Curculigo orchioides -VU-CEN
Curcuma angustifolia-VU-CEN
Gymnema sylvestre-VU-CEN
Hedychium spicatum-VU-NWI
Ipomoea turpethum-VU-CEN
Paeonia emodi-VU-NWI
Rheum australe-VU-NWI
Rhododendron anthopogon-VU-NEI
Rhus semialata -VU-NEI
Thalictrum foliolosum- VU-NWI
Tylophora indica-VU-CEN
Urginea indica-VU-CEN

LOW RISK-NEAR THREATENED
Baliospermum montanum -LR-NT-CEN
Celastrus paniculatus-LR-NT-CEN
Cinnamomum tamala-LT/NT-NWI
Cordia rothii-LR/NT-CEN
Jurinea dolomiaea-LR/NT-NWI

low risk-least concern
Evolvulus alsiniodes LR-LC-CEN

The 42 medicinal species assessed at the Kullu Camp held between April 16-19, 1998

Jammu & Kashmir
critically endangered - CR
Aconitum chasmanthum Stapf ex Holmes
Arnebia benthamii (Wall. ex G.Don) Johns
Dactylorhiza hatagirea (D.Don) Soo
Fritillaria roylei Hook.
Gentiana kurroo Royle
Saussurea costus(Falc.)Lipsch

endangered - EN
Aconitum deinorrhizum Stapf
Aconitum heterophyllum Wall. ex Royle
Angelica glauca Edgew.
Arnebia euchroma (Royle) Johns

Artemisia maritima L.
Betula utilis D.Don
Ephedra gerardiana Wall. ex Stapf
Jurinea dolomiaea Boiss.
Meconopsis aculeata Royle
Picrorhiza kurrooa Royle ex Benth.
Podophyllum hexandrum Royle

vulnerable - VU
Aconitum violaceum Jacq. ex Stapf
Allium stracheyi Baker
Bergenia stracheyi (Hook.f. & Thoms.) Engl.
Ferula jaeschkeana Vatke
Heracleum lanatum Michx.
Malaxis muscifera (Lindley) Kuntze
Physochlaina praealta (Walp.) Miers
Polygonatum multiflorum (L.) All.
Polygonatum verticillatum (L.) All.
Rheum australe D. Don
Rheum moorcroftianum Royle
Rheum spiciforme Royle
Rheum webbianum Royle
Rhododendron lepidotum Wall. ex D. Don
Saussurea gossypiphora D.Don
Saussurea obvallata (DC.) Edgew.

lower risk-near threatened - LR-NT
Hippophae rhamnoides L.
Hyoscyamus niger L.

lower risk-least concern - LR-LC
Selinum tenuifolium Wall. ex DC.
Selinum vaginatum (Edgew.) C.B. Clarke

data deficient - DD
Ferula narthex Boiss.

not evaluated - NE
Inula racemosa Hook. f.
Nardostachys grandiflora DC.

critically endangered - CR
Arnebia benthamii (Wall. ex G.Don) Johns
Dactylorhiza hatagirea (D.Don) Soo

endangered - EN

Aconitum deinorrhizum Stapf
Aconitum heterophyllum Wall. ex Royle
Angelica glauca Edgew.
Arnebia euchroma (Royle) Johns
Betula utilis D.Don
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Rheum spiciforme Royle
Rheum webbianum Royle
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Critical Role of Forestry Sector

It is only the "forestry sector" that can effectively ensure long term insitu conservation and sustainable availability of the country's medicinal plants.

The forests of India are estimated to harbour 90% of India's medicinal plants diversity in the wide range of forest types that occur across the country. Probably only 10% of the known medicinal plants of India occur in non-forest habitats (agricultural fields, swampy and marshy lands, water bodies, wastelands, etc.).

The State Forest Departments (SFD) being the custodians of the forests, have a very critical role to play in the conservation of medicinal plants of the country. This note discusses how this role can be operationalized.

Public Expectation from the Forestry Sector

Given the fact that forests harbour most of India's medicinal plants, what specific roles can SFDs be expected to play ? There are four possible roles that the forest departments can undertake:
(i) Insitu conservation of wild populations. This will help conserve inter and intra specific medicinal plant diversity.
(ii)Supply of planting materials to both non-commercial and commercial users via a network of medicinal plant nurseries and seed centers.
(iii)Supply of medicinal plant raw materials of only such plants which can be sustainably collected from the wild.
(iv)Growing of native medicinal plants on degraded forestlands.

In the context of (ii), (iii) and (iv) it may be borne in mind that the conservation movement worldwide no longer talks of conservation for sustainable utilisation.

Southern India's Medicinal Plants Conservation Initiative

Since 1993, the State Forest Departments of Karnataka, Tamil Nadu and Kerala have taken the lead and have been engaged in implementing a pioneering programme to demonstrate how the SFD with the cooperation of local communities can effectively conserve medicinal plants that occur in the different forest habitats of the three States. Three operational models being developed in these States are outlined below.

The significance of the operational models lies in the fact that they address all the types of public expectations. The models also envisage the participation of local communities in the protection and management of

forests and benefit sharing based on Joint Forest Management (JFM) principles. The decision to involve local communities is based on two realistic assumptions. Firstly, the belief that local communities support and co-operation is critical to ensure effective conservation action on the ground. Secondly in the context of medicinal plants, the belief that local communities, women and folk healers have traditionally been the custodians of both the medicinal plants knowledge and resources, they must, therefore, be involved and benefited from any effort to promote their conservation and sustainable use.

Operational Models Developed

Three operational models being evolved in Southern India to fulfill the public expectations from the Forest Departments are described in the following sections.

The Medicinal Plant Conservation Area (MPCA) Model

In the MPCA model, a network of about 10 conservation sites per state (depending on the size of the state) of 200 to 300 hectares each are demarcated and officially notified as MPCAs. The sites are located in relatively undisturbed forests of different vegetation types, lying in different altitude ranges, soil types and rainfall regimen. This is an attempt to capture the wild populations of the entire medicinal plant diversity of the state across the MPCA network (see fig. 10 & 14).

Forest areas with high bio-diversity, sites traditionally valued for medicinal plant diversity or sites with the presence of known red-listed medicinal species, are specially identified for creating MPCAs. The boundaries of the MPCA may correspond to the natural boundary features of the selected site and ideally a MPCA should be located in a micro watershed.

The MPCAs are visualised as “no harvest” sites. Their protection and management involves the participation of the local communities. This involvement and support of local communities is essential to sustain the MPCAs on a long-term basis. In order to meet the requirements of the local communities, it is necessary for the department to establish medicinal plant nurseries around the MPCAs, to supply local households with such medicinal plant seedlings that will be useful for their primary health care needs and also those which are of high economic value, which they can grow, harvest and sell.

Detailed botanical studies are expected to be carried out at MPCA sites which will help forest departments to know what plants exist in the MPCA and about the natural conditions in which the plants grow. Such studies across the MPCA network will provide reliable information on the presence, distribution and distribution pattern of medicinal plants across

the various forest types in the state and correlate their occurrence with various ecological parameters like soil type, soil pH, rainfall pattern, altitude range etc. This data coupled with studies on threat assessment and trade can also guide informed and focused conservation actions like species recovery programmes.

The analysis of the botanical, ecological and also socio-economic studies (on local utilisation and trade) conducted across the MPCAs, will provide guidelines to the department for the management of the medicinal plants of the state.

The MPCA network can also be considered to be a network of "in situ field gene banks" of the medicinal plants of the state.

Broader Goal of MPCA Model

While the MPCA network is expected to harbour most of the medicinal plant diversity of the State, all the species present in the various sites are unlikely to be in viable breeding populations. It is therefore certainly not enough to merely protect the 200 -300 ha. sites that make up the MPCA network to ensure long term conservation of the states medicinal plants diversity.

It is imperative that the information and experience gained from MPCA network program should be fed into the working plans of the SFDs so that a medicinal plants dimension is added to the working plans and management practices in the entire state forestry sector.

The Medicinal Plant Development Area (MPDA) Model

This model demonstrates how eco-restoration of degraded forests can be carried out with the replanting of native medicinal plant species (trees, shrubs, grasses) and their 'sustainable harvesting'. In this model local communities are expected to participate via Joint Forest Management (JFM) schemes, in the regeneration of the degraded forests, and in long term benefits - sharing of the revenue arising out of sale of the harvested materials. This model envisages intensive community participation under the JFM framework and needs reliable technical advice related to selection, planting, harvesting and storage of the produce. It also requires securing market linkages for sale of produce. All these inputs are essential to ensure long term sustenance of the programme. MPDA model could be implemented in all the JFM program areas of the SFD.

NTFP-Medicinal Plants Sustainable Harvesting Model

The Non Timber Forest Produce (NTFP) sustainable harvesting model is expected to be implemented in such areas where medicinal plant collection is already under way. Today 90% of the plants needs of the traditional medicine sector come from wild collections. But, there are no scientific guidelines in place to ensure sustainable collection of wild plants.

In this model, at the outset a benchmark socio-economic study needs to be carried out, to know what species are being collected and the prevailing collection system and its sustainability. Such a study will help the departments to understand what interventions are needed to be put in place to ensure a more sustainable system of harvest and where it is necessary to ban destructive harvesting practices for specific species.

The model aims at demonstrating sustainable harvest practices of NTFP (medicinal plants) via

a) intensive community organization,
b) training in scientific collection and
c) field research (to determine sustainable levels of harvest for different species).

The central objective of this model is to rationalize the collection system of wild plants so as to make it sustainable. Local community organizations (see fig.15) which are seen as key partners need to be strengthened and given a long-term stake in the protection and sustainable management of the forests selected for this project. In this model market links also need to be secured to assist local community organisations to sell medicinal plants at prices that reflect market trends. This model could also be implemented in some of the JFM programme areas of the SFD.

BIODIVERSITY

Turtle Conservation

ORISSA

Roshni Kutty

Introduction

What is community based conservation and who constitutes a community? To answer this simply, wildlife conservation techniques have so far ignored the human component of conservation, i.e. the human population that is dependent on the natural resources as much as the wildlife that the conservationists seek to protect. Only recently have conservationists realised the need to address the issue of stakeholders who have as much a right to these resources as the wildlife and by ignoring them conservation does not achieve the goal it was set out to be. Thus, participation of the local community in the conservation and management of natural resources with official protection agencies constitutes community-based conservation or CBC. As Jack Frazier, puts it: "CBC is more a philosophy than a technique – there are few standard procedures, but instead a gamut of approaches to similar problems." For the purpose of this study, a local community is defined as a group of human population, which meet with more than one of the following criteria:

1) Share the same geographical area
2) Have cultural linkages with the area being conserved
3) Have the biggest stake in the conservation and utilization of natural resources.

This study has been carried out with the main objective of documenting the community initiatives in Goa and Kerala and based on the lessons learnt in these cases, chalk out a community participatory management plan for a non-PA turtle-nesting site in Orissa. Informal methods of study such as through interviews and by conducting meetings and slide shows, information was collected. Most of the information collected for this study is as a result of these inter-actions with local communities and government officials. There were several occasions when scientific literature on turtle biology as well as scientists working in this field of research had to be consulted for clearing facts on marine turtle behaviour.

What is characteristic in both Goa and Kerala is that both of these are community *initiatives*. I would like to stress here the importance on the word "initiative". There are several cases of community based conservation of sea turtle nesting sites in the world. However, as far as my knowledge goes, the ones described in the following sections may represent very few examples of conservation and management of a turtle-nesting site by local communities themselves. The origin of the CBC process itself lies within the community, i.e., the entire conservation process began from the local community itself, without facilitation from outside agencies. This is why even though a "plan" for CBC is brought out here, one needs to keep in mind that this is not a general mould that can be adopted for every turtle nesting area. Each area with its ecological and social factors are highly specific and hence a CBC plan that has been brought out for Rushikulya cannot be the same for another mass nesting area, such as Devi River mouth. What can, however, be done, is to follow certain guidelines that this process has adopted in order to bring about a consensus between conservation concerns and livelihood issues. What has to be kept in mind is that each community has its own peculiarities and these need to be understood and addressed before conservation plans such as the one brought out here are implemented.

Traditional rights and responsibilities exist as unwritten, even implicit, understandings at the community level. These are rarely reflected in the legal structures of modern states as will be apparent in the following sections. Hence some of the solutions suggested and arrived at required flexibility/ deviation from structured official governance for the concerned government agencies and this needs to be appreciated. It is a common belief of CBC advocates that rural communities have far lesser number of anti-social people among them than urban communities. Although this is not necessarily true, what is observed is that their destructive impact is lesser on the natural environment. In the present times, rural people are caught between traditional-valued culture and consumer oriented social pressures. These societies are dynamic and are exposed to unprecedented alterations in their lifestyles along with an ever-increasing human population. This has resulted in increasing pressure on their natural resources. As a result, traditional practices maybe inappropriate to present situations or there is a loss, even rejection, of traditional knowledge and values, which can guide us to sustainable usage of natural resources (Frazier 1999). What has also been noted is that nearly all the CBC initiatives or programs have begun or are likely to begin, after the community has faced a period of hardship. For example, local communities in Orissa took up the protection of the forests in their vicinity after they faced a series of droughts. In case of Goa, the villagers were experiencing reduced fish catch and unemployment prior to taking up eco-tourism. The local community in Kerala too was facing the same problems. But added to

that was the serious threat to their coast that they were facing due to sand mining.

The Olive Ridley turtle nests on both the coasts (primarily the east coast) and Andaman and Nicobar Islands. They forage in deep, soft-bottomed areas with crabs and other crustaceans. During the breeding season, males and females migrate from their feeding ground to the breeding ground, which may be thousands of kilometers apart. Mating occurs in the offshore waters of the breeding ground. After mating, the females come ashore to nest, mostly at night. They crawl above the high water mark, find a suitable nesting site, clear away the surface sand (making a body pit), and dig out a flask shaped nest with their hind slippers. This may be two to three feet deep depending on the size of the turtle. They lay 100-150 eggs in the nest and fill it with sand and thump the nest with their body to settle the nest. Once the turtles start laying eggs, they go into a “nesting trance” and usually cannot be disturbed during this stage. They then throw sand around the nest for camouflage and return to sea. After they have completed nesting, they return to their feeding grounds until the next breeding migration. Most turtles generally lay within the same area (0 to 10 kms) each time they nest. When the turtle hatchlings emerge from their nest, after about 50-55 days, they are guided back to the sea on the basis of the brighter horizon (this is the sky above the sea).

Beach selection by the female turtles is affected by accessibility of the beach as well as height and substrate. Sea turtles, which nest at night, get disoriented by artificial lights and are known to avoid brightly illuminated beaches. Further, sea turtle hatchlings emerging from the nests at night are strongly oriented towards the source of illumination and stray away from the nesting beach. As a result, they remain stranded on the land during the day and are either predated by avian predators or are desiccated, resulting in very heavy hatchling mortality (Pandav, et al. 1998). Olive Ridleys prefer beaches and sand bars at river mouths for nesting. Despite having highly localised nesting, Olive Ridleys remain the most numerous turtles in the world and in India. Yet because very high numbers attain mortality in trawler nets and through poaching, the Olive Ridleys are listed in Schedule I of the Wildlife Protection Act, 1972 of India. They are also included in Appendix I of Convention of International trade in Endangered Species of Wild Fauna and Flora (CITES) which prohibits trade in turtle products by signatory countries, India being one of them. What is also significant is that by protecting these turtle and their nesting and foraging habitat, we are protecting the extremely vulnerable marine-shore ecosystem as well as

the deep seas. Both these ecosystems sustain a highly diverse range of flora and fauna that are essential for the existence of mankind.

Case Study One: Morjim Beach, North Goa

Goa has witnessed the Olive Ridley turtle nesting along its entire coastline in the past. Due to unplanned and uninhibited tourism that brought in its wake the destruction of the coastline, turtle nesting was affected in most touristed beaches such as Calangute, Miramar, Colva, Majorda where the sand dunes which is an integral part of the coastal ecosystem were destroyed and replaced by high rise five star hotels and their accompanying pools and discotheques. Consequently, Goa was left with very few beaches that was not bitten by the tourism bug. Morjim figures in this category of beaches. And it is in these relatively undisturbed beaches that the Olive Ridley turtles continue to nest during the nesting season of September to February. However, poaching of turtle eggs was rampant even in these parts by local villagers as an additional source of income. But, through the enlightened efforts of a retired army officer, Capt. Gerald Fernandes, the coastal community of Tembwado, a small hamlet of Morjim Village Panchayat, sought to protect these turtle and their eggs from both the poachers and natural predators.

A little known beach, sandwiched between the more famous Vagator and Harmal beaches in Pernem taluka of North Goa, Morjim is relatively undisturbed - one of the reasons why the Olive Ridley turtles (*Lepidochelys olivacea)* come to nest here every year. Protecting the gravid turtles and the eggs from being poached, round the clock vigilance by the locals, over the beach to see that the nests remain undisturbed have also ensured that the turtles feel safe enough to come and nest here every year.

Ecological Profile

Morjim Gram Panchayat is comprised of 15 hamlets of which Tembwado, Vithaldaswado and Gawdewado are located along the coast. Morjim beach, which is about five kilometres in length, is sandwiched between the more famous Vagator and Harmal beach in Pernem taluka of North Goa. The area under community conservation is roughly a one and a half kilometre beach stretch that stretches from Chapora estuary in the south to Vithaldaswado in the north. As one stands on the beach, one can see the ruins of Chapora fort across the river in the south, on a clear day. It is a typical coastal area with sand dune backed beach at the confluence of Chapora River and the Arabian Sea. The average width of the beach at low tide would be about 200-300 m. Mangrove vegetation is present on the south eastern end at the estuary mouth. The sand dunes are bound by *Ipomea* creepers and *Spinifex* grass. A road runs parallel to the beach

for about 400 m and forms the entry point for tourists. Casuarina plantations are present towards the southern end of the beach.

Tembwado is like any other typical small Goan village - where a cluster of fruit trees surrounds the houses with laterite stone fencing of private property. To reach this hamlet from the state capital, Panaji, one has to come up to Siolim by road and then catch the government run ferry that takes one across Chapora river to Morjim. To reach the beachfront, one has to continue by road for about three to four kilometres after disembarking from the ferry. As one approaches the beach, one is greeted by sign boards put up by the Forest Department that notify the area as a sea turtle nesting site and warning tourists and locals from harming the turtles or their habitat. The road leads directly up to the beach where, if it is the tourist season, one is greeted by the sight of several colourful flags and banners waving in the wind from atop temporary shacks made out of dry palm thatch. Eager and enterprising local youth are quick to welcome tourists to their shacks, although, they respect the tourist's choice and privacy.

Morjim, witnesses sporadic nesting of Olive Ridley turtles from October to February. During nesting season, the small beach stretch is dotted with turtle nests. Apart from the Olive Ridleys, which form the major attraction for tourists and locals alike at Morjim, there are a number of migratory birds that attract the tourists.

Most of Goa, witnesses small scale poaching of turtle eggs and, to an even lesser extent, turtle meat, by the local villagers. The powerful trawling lobby, which is backed by local politicians is also stated to be responsible in contributing to turtle deaths here. However, no study has been carried out so far to determine the exact factors contributing to turtle deaths here. Violations of the Coastal Regulation Zone Notification, 1991 is proving to be a far more real and long-term threat to the habitat of the Olive Ridleys. These are mostly in the form of beachside construction and development catering to the tourism industry. Most of the beaches are being defaced by tourism, which has affected the number of turtles arriving for nesting on Goan beaches. Beach erosion is also posing a threat to the turtle nesting habitat.

Socio-economic Profile of the Conserving Community

The fisherfolk community at Tembwado belong to both the Hindu and Christian religions. They are a fisherfolk community comprising of 150 families living harmoniously together. Apart from fishing, agriculture, toddy tapping, rope making, and liquor distilling are other occupations that this community pursue. It is stated that some of the best coconut

feni[1] is produced in Morjim. With the disappearance of the traditional fishing techniques like "*rapon*"[2] fishing which required a large labour force, the unemployed fishermen have resorted to small jobs like plumbing, masonry etc. The latest trend is tourism that the village youth have cashed upon after Olive Ridley turtle conservation took shape here.

The major source of livelihood, however, still remains fishing. Traditional fishing is slowly but surely being replaced by mechanised fishing and small-scale trawling. Some of the fishermen who used to own boats and fish themselves at one time have now turned to being labour on medium sized trawler boats. This is because the traditional methods of fishing do not bring in as much fish as it used to since the marine resources near the shore are being heavily depleted by the unsustainable methods adopted by the mechanised sector. Fish drying used to be a regular occupation for the fisherwomen but since eco-tourism required a clean beach, this activity stopped about ten years ago.
However, there is a trend to move away from this traditional source of livelihood and increasingly enter the more lucrative tourism business by putting up a temporary shack on the beach during the tourist season. Most of the catholic fisherfolk are involved in this eco-tourism business by putting up temporary shacks on the beach during the nesting-cum-tourist season.

Administrative Profile

Morjim beach falls under the jurisdiction of Morjim Gram Panchayat of which Tembwado forms one of the 15 wards. Morjim Panchayat is located in Pernem Taluka of North Goa district of the state of Goa. Mapuca is the nearest town to Morjim and to reach Morjim beach one has to reach either Mapuca bus stop from the state's only airport Dabolim located about 40 kms away from Mapuca or from Pernem railway station on the Konkan Railway route. From Mapuca one has to catch a local bus or the unique motorcycle taxi (if one is travelling alone and light) and get down at Siolim. Morjim beach forms the coastal village common land for Tembwado and is demarcated as Coastal Regulation Zone I (CRZ-I) as per the CRZ Notification. Previously, Morjim beach was designated CRZ - III in the Coastal Zone Management Plan that every coastal state and Union Territory had to prepare in order to conform coastal development along the lines of the Notification. The Notification was brought about to protect the coastline from unhindered and

[1] Feni is a locally brewed alcoholic beverage from the Cashew fruit. In this case, from the coconut.
[2] A traditional method of fishing where two groups of fishermen go into the sea in dug-out canoes called "vodde" and cast a long net in a semi-circular fashion. The ends are then slowly pulled from the shore by these two groups fishermen. Since the lower end of this net is not very heavy, turtles can easily escape and are not harmed by this type of fishing.

damaging coastal development. After the local villagers started protecting the Olive Ridley turtles and their nesting sites, pressure was brought on the state government to re-designate this area as CRZ-I, by the NGO, Goa Foundation. The beach is used for bringing in boats and during the nesting season is used temporarily to make business from the shacks that are temporarily set up for that purpose. In the Regional Plan for Goa, Morjim is shown as a fishing village. It is stated that the prospective Regional Plan envisages Morjim as a fish landing point.

Historical Profile

Morjim beachfront has been traditionally used by the fisher folk community in and around Morjim village for fishing purposes such as landing point as well as parking bay for their boats and drying fish. Previously the Lambada community - a nomadic community from Karnataka - visited Morjim to dry fish on the beach. With the advent of turtle tourism that required the beach to be kept clean in order to ward off stray dogs and crows (natural predators of turtle hatchlings), these nomadic members were driven away by the shack owners. Apart from this, there has been no change in the land use where community conservation is taking place.

Mechanised trawling has not only endangered turtles, but also the lifestyles of local artisanal fishing community. Although, traditional “rampon” fishing is still carried out in boats called “vodde”, these are now increasingly becoming a rare sight to see on Goan beaches. This is because these fishermen lose out to the mechanised trawlers. During high tide, trawling is carried out even within 50-100 m from the shore. This reduces fish catch for the artisanal fisherfolk. Thus several of these traditional fisherfolk have now become the labour force on trawler boats that are owned or backed by powerful politicians.

Community-based Wildlife Management Initiative: Description and Analysis

The credit for this community initiative goes to Capt. Gerald Fernandes when he began an awareness cum education campaign in a very informal way in 1995-96. After taking voluntary retirement from the Armed Services, Capt. Gerald Fernandes decided to move back to his native village, Morjim, from Bombay. Capt. Fernandes was aghast to see that the village of his childhood memories was fast disappearing under the onslaught of what he terms as “the disease of uncontrolled greed”. Migration to the towns as casual labour in search of jobs, by once self-supporting families disturbed him. As also, the changing traditions and the increasing pressure on the natural resources of Tembawado, by the construction and trawler lobby. What alarmed him even more was the

increased poaching of turtle eggs from the beach during the nesting season. Turtle eggs were being poached heavily by the locals in Morjim and turtle meat was sold in the local market.
The turtle conservation movement would not have taken off so quickly and so effectively if it were not for the support he received from Merle, his wife and other community members such as Domio D'Silva, Prakash Saptoji, Gilbert and Domnic Fernandes. What is interesting is the fact that Domio and Prakash have nothing to do with fishing or the sea except that they reside near the beach. They are bricklayers. Gilbert and Domnic Fernandes were fishermen but are presently known as successful businessmen running their own shacks at Morjim beach. There are several other locals, mainly fisherfolk, who are also involved in the initiative. According to the previous Pernem Range Forest Officer, Mr. Phadte, it is those who are directly affected by the happenings on the beach who participate in the conservation effort - shack owners, fisher folk and other families residing near the beachfront.

The conservation movement was a gradual process that began with the Fernandes couple making the locals aware of the importance of conserving sea turtles. Capt. Fernandes himself became aware of the endangered status of the Olive Ridleys very recently and he approached Mr. Claude Fernandes of Goa Foundation for help and support. Mr. Alvares advised him that his best bet to protect the sea turtles would be by roping in the co-operation of the community themselves. Goa Foundation notified the Forest Department about this effort, who in turn came forward to support this initiative. Capt. Fernandes and his wife explained to the local fisher folk the importance of protecting the turtles and suggested ways to turn the area into a potential tourist spot through conservation. Since the fisherfolk were any way disillusioned with receding fish catch and since most of the youth were unemployed, they thought it would be a good idea to try out this new venture, where, through turtle nesting they could lure tourists and especially foreign tourists to their beach.

However, it was not as easy as they imagined and required patience and hard labour. The state government through the department of tourism extracts a fee of Rs. 10,000/- per shack as license fee but does not provide any amenities in return. The local youth complained that no drinking water or drainage facilities are provided by the tourism department. Since most of the tourists who visit Morjim beach are white foreigners, good revenue is obtained from entertaining them. Since these foreign tourists come to Morjim for its peaceful atmosphere, the shack owners do not have to invest much in music or other equipment to attract the tourists. Simple palm thatch shacks with good food and drinks are all what is required to lure the tourists. Simple bamboo structures/benches are constructed for sunbathing. Some of the locals

have added an extra floor or room to their house, which is let out for the visitors. Researchers or other wildlife enthusiasts who require cheaper accommodation mostly take these up.

Thus began a community conservation effort that has lasted now for about six years. As explained earlier, the gravid turtles come to nest during the night and that too around full moon time when the tide is highest. During this period the local youth maintain a 24-hour vigil over the beach. There are quite a few cases where, a small group collects around the turtle as she lays her eggs. Frenzied photography and filming takes place at this time. As soon as a nest is laid, the Forest Department is notified and a protective fencing is erected around the nest. This fence consists of bamboo poles erected at the four corners and an old fishing net wrapped around them. A flag of the Forest Department is tied to the fence and a signboard, that indicates the date of laying of the nest and the expected date of hatching, is stuck into the sand beside the nest. During daytime, the shack owners keep an eye on these nests, which have been demarcated for easy spotting as well as to indicate that they are under official protection. Whenever a nest is about to release its hatchlings, a depression or a “dimple” appears in the sand that indicates that hatching and release of turtle hatchlings is imminent. The locals, especially the shack owners, notify not only the Forest Department officials but also tourists who then visit the beach early in the morning or stay overnight. Hence, during the release of hatchlings, there is an increase in the number of visitors to Morjim and the shack owners as well as other locals cash in on this through the hospitality business.

The turtle eggs, which are softer and rounder than poultry eggs fetch a local market price of three or four rupees per egg while a poultry egg costs a rupee. Hence it is more lucrative for the fishermen to poach turtle eggs and sell them in the market during the nesting season. Capt. Fernandes decided that if he needed the co-operation of the local villagers to protect the turtles he would have to offer them an economic alternative and not mere rhetoric about wildlife conservation. So he pooled in an amount of Rs. 5,000/- from his personal savings for awards to individuals who reported turtle nesting sites. This weaned the villagers, especially the youth, away from poaching turtle eggs. Those who were reported indulging in poaching were discouraged from repeating the offense as it led to disgrace in the small community. Breakthrough was achieved when once-expert-poachers such as Bautis Fernandes, late Benjamin Fernandes, Anand Pednekar and Ratnakar Halankar, all fishermen from the village, started reporting on nesting sites that needed to be protected.

The fuss created around the Olive Ridley turtles caught the attention of the rest of the villagers, apart from some tourists who visited Morjim.

Those who were enterprising enough cashed in on this conservation tide and set up temporary shacks on the beach. Initially, like any other beach in Goa, they installed music and lighting equipment to attract the tourists. However, they soon realised that this was actually decreasing the number of foreign tourists who visited Morjim to seek solitude and peace, away from the crowds of heavily visited spots. The shack owners have responded by not blaring music, and maintaining a clean beach. This was important as any litter on the beach would attract beggars, stray dogs and crows. Beggars were an eye sore for the foreign tourists and would also be a nuisance to the shack owners and tourists alike. Stray dogs and crows are natural predators of turtle hatchlings. Turtle conservation is now a means of attracting tourists to this beach. Apart from turtles, dolphins are another source of attraction as also a sizable number of migratory birds that flock to this area.

The release of sea turtles from the community protected area in 1995-96 marked a beginning in the turtle conservation movement and consequently it was reported in the local newspapers. The publicity caught the interest of the State Forest Dept., especially the present Deputy Conservator of Forests (Wildlife), Mr. C.A. Reddy, and their participation boosted the movement in the subsequent year. The State Forest Dept. stepped into the effort in 1996-97 by deploying two guards to patrol the beach during the nesting season and assist the village youth in nabbing the poachers. These guards along with 30-40 youth volunteers of the village have helped in arresting the increase in poaching incidence. The department also pays daily wage to some locals for keeping guard over the beach during the nesting season. Apart from these, the Forest Department has also continued with the award-giving scheme to locals who report nesting sites. Presently an award of five hundred rupees is given to each volunteer.

In recognition of his efforts, Capt. Fernandes was awarded a plaque by the Govt. of Goa in October 1998 for wildlife preservation. Mr. Reddy's enthusiasm to sustain this effort has resulted in Project Turtle of the Forest Department of Goa that pays six of the local youth on a daily basis to watch over the beach and report nesting and hatching. A 'Turtle Study Centre' has been set up at Pernem within the campus of the Range Forest Officer, Mr. Phadte, who has also been deeply involved with this movement. The Turtle Study Centre provides basic facilities for visiting dignitaries, forest officers, journalists, academicians, researchers and environmentalists. There is a small library with literature collected from all sources about turtle biology and conservation. There is also a small laboratory under construction to study various aspects of turtle conservation.
The Forest Department proposes to monitor the beach during the nesting season by deploying mobile guards for which vehicles are being sought.

They are also in need of one sea - going vessel by which they can contact trawlers. They also hope to educate the fishermen and trawler owners to use turtle excluder devices (TEDs) to conserve turtles.

Some Negative Fallout of the Initiative

This initiative, is only six years old, and maybe too early to be written as a success or a failure. Morjim, having caught the attention of national and international media, has become a tourist spot. There has been a marked increase in the number of VIP tourists, especially local politicians and bureaucrats who visit Morjim out of curiosity. Consequently, uninformed and misguided moves such as declaring the beach as a tourist centre as part of local development, setting up street lights on the beach for the convenience of tourists, are reported to be in progress. This move will prove harmful for the turtles, and especially the hatchlings. Obviously, beach lighting will serve to confuse the hatchlings thus making them easy prey for birds and leading to high mortality due to desiccation.

It has also been reported that the local youth, in their enthusiasm to please the VIP tourists, have begun to catch the young hatchlings as soon as they emerge and keep them in a water basin till the tourists arrive, after which they are released into the sea. This is interfering with nature's process. Turtles are programmed to swim constantly for two to three days after emerging from the sand. The young hatchlings are provided with enough reserve energy to take them to the sea up to a certain point after which they meet currents that carry them to ancestral feeding grounds. After this period of incessant activity they stop swimming and begin to feed. Consequently they need to be released almost as soon as they hatch, else they will tire out even before they have reached the currents that would safely take them to their feeding grounds.

Some of the local "guardians" have started digging out nests that are about to hatch and bring out the hatchlings into the water basin where they are kept for tourists to see. Unhatched eggs are opened up manually and the underdeveloped hatchlings are also put into the same water basin!

Officially, the number of tourist shacks permitted on Morjim beach is six. However, it is reported that there are twelve crowding this small beach. This has affected the turtle nesting as there is hardly any space left for the gravid turtles to come and lay their eggs.

Although, the Forest Department has been made aware of these occurrences by tourists as well as by local concerned individuals, no action has been taken so far to punish the offenders. The former RFO,

Mr. Phadte, who was deeply interested in this effort has been transferred and since Morjim is under the territorial range of the Forest Department, the present RFO does not match up to his predecessor's interest in "wildlife" issues. Greater inter-divisional co-ordination and co-operation in the Forest Department is required here. Politically motivated transfers and changes in the forest department has seen decreasing enthusiasm for supporting this community initiative from the top officials of the department. Tourists have been complaining of dead turtles washing up on the beach. These are turtles that have been trapped in trawler nets that fish illegally near the coastline. There is no official policing of these trawlers, as powerful politicians in the state own most of them.

The local guardians who have now turned offenders (in their over enthusiasm) exhibit "territorialism" over the beach. The neighboring Vithaldaswado – joined the conservation effort very recently. A couple of sincere local guards from this hamlet have been patrolling the beach during the nesting season and reporting the nest sites that have been missed out by Tembwado guards. There is information that the old timers, i.e., the local guards who kept watch over the beach in Tembwado, have a laid back attitude and have becomes slack in patrolling the beach. Their interests and efforts lie towards attracting tourists than protecting the turtle nests. These “old timers” warn the “new comers” to keep away from their section of the beach as apparently they do not want to be caught napping.

This is an example of economic interests overriding conservation concerns. The underlying presumption of CBC by most advocates of this method of conservation is that traditional rural communities are not besieged by the evil designs observed in urban societies. What we see in the above example is that this need not be true. The evils of greed exist in traditional rural communities too. Probably the difference lies in the extent and scale of damage done to the environment.

Lessons Learnt

Both, to the Forest Department as well as to the community members, it is evident that this initiative will not survive without the participation and support of both parties. They have realised that in order to make turtle conservation lucrative and at the same time keep conservation aspects in the main hold, the community members would require increased support from the Forest Department. Education and awareness on the importance and relevance of sea turtle conservation for their well-being may hopefully turn the negative trend. The participation of the community members has helped the Forest Department to help protect these turtles effectively without high expenditure on personnel, equipment and others. At the same time, the department has also earned

the goodwill of the local community (a rare case as far as formal conservation measures are concerned). For the local community, this has been a novel experiment, which has made them realise that without having to sell away their ancestral land or without having to migrate to cities, they could continue to earn a living. Yet, it also faces the risk of individual greed destroying the unity of community members jointly involved in conserving the turtles.

Case Study Two: Kolavipaalam Beach, Kozhikode, Kerala

Also known as Kotta Kadapuram, Kolavipaalam is the birthplace of Kunhali Marakkar, a famous maritime warrior of Kerala during the rule of the Zamorins (1120 – 1498). Recently Kolavipaalam has been in the local newspapers for a different reason: the local community here was awarded the P.V. Thampy award in November 2000 for environmental protection through community participation. This award, instituted by the P V Thampy Trust, hopes to boost individual and local community efforts towards preservation of their natural resources. This community is not only protecting the Olive
Ridley turtles that come to nest on the beach, but has also undertaken mangrove afforestation in the estuarine area. And all this on their own initiative.

The beach is located in Iringal village of Payyoli Gram Panchayat in Quilandi Taluka of Kozhikode District (11°32'N; 75°45'E). Kolavipaalam beach is situated 46 km north of Kozhikode. The nearest town is Payyoli, which can be reached by private buses plying from Kozhikode. Payyoli also has a railway station. The bus service from Payyoli to Kolavipaalam is irregular. Autorickshaws from Payyoli are available in plenty.

The community-conserved area is an eight-kilometre stretch of coastal village commons that faces the Arabian Sea on its western side with the Kottapuzha River draining on its eastern side. Part of Kolavipaalam beach is backed by this estuary, away from community dwellings of the area. This sandy beach spreads over an area of 50 acres stretching from the estuary mouth towards Kolavipaalam, and is an ideal turtle nesting site. Kerala coast (like much of the western coastline of India), experiences coastal water kinetics that leads to beach erosion. River mouths are known to be especially dynamic with regard to erosion of beaches and formation of new sand bars and beaches by accretion. The state administration has attempted to counter the erosion by erecting continuous sea walls, composed of granite blocks, along the coast. Mangroves grow in the brackish water estuarine regions. Leaving a one kilometre stretch from the river mouth, the sea wall has been erected all along the eight kilometre coast with intermittent gaps given for landing boats by traditional fishermen. The

Olive Ridley turtles come to nest on these open sandy stretches of the beach as well as on the narrow sandy stretch between the sea wall and the sea. There is human habitation very close to the shore line. Private coconut plantations occupy the space between these inhabitations and the sea wall.

Socio-economic Profile of the Conserving Community

This is traditionally a fishing community with the majority of the population being Hindus (Thiyya community[3]) and a few Muslim families. Like any other typical coastal village, this community too draws its major source of income from fishing in the sea. Apart from that they supplement their income through toddy tapping, exporting dried fish and selling coconuts from their private plantations. Around 135 families belong to the Hindu community and five from the Muslim community. Since most fisherfolk families do not possess any land, very few cattle are kept. Only the more prosperous families keep cattle. These are either stall-fed or grazed on private land. Although fishing continues to be the major occupation of the community here, the present generation of fishermen has either opted out of this traditional income source or has supplemented fishing with other sources of income. This is because of a combination of two factors – a) Depleted fish resource and b) increasing aspirations for a better living standard. The secondary occupations include mostly self employment opportunities such as working as trained electricians, autorickshaw drivers, casual labour and running small bakeries, or other kiosks. The current People's Plan[4] has helped the women in this village to set up and run two eateries, a dry rice mill and a sweet shop within the village. Due to the recent pest attack of coconuts that has affected the coconut production of the state, toddy tapping has also been adversely affected and this year there has hardly been any production at all. Mostly residents from the neighbouring Payyoli village are involved in toddy tapping. Dry fish export was a major cash earner for this village and had employed around 500 fisherwomen. Due to the receding beach stretch, space is no longer available for the women to dry large quantities of fish. The number of women in this occupation has now reduced to around 50. Some amount of seashell collection was generally conducted in the rainy months of June – August. Seashell mining met local needs for lime mortar (which is extracted from seashell) and also added to the small incomes of some of the families through sale outside the village.

Ecological Profile

[3] In the caste hierarchy, Thiyyas come below Nairs in Kerala, in the broad sense, in Shudra caste.

[4] Decentralisation process in Kerala resulting in devolution of power and finance to local governing bodies such as Village Panchayats and Municipalities.

Falling within the coastal eco-region of the state of Kerala, this shows a typical coastal ecosystem with an estuarine region towards the northern part of the CCA. Mangroves grow in these estuarine soils that attract a large number of marine birds to this area. The mean annual rainfall is 3,500 mm with the annual temperature range between 20°C to 34°C. A four km stretch of coastal sandy beach as well as brackish mud flats can be seen in this area. The natural fauna include jackals, several migratory and local birds as well as Olive Ridley turtles that come to the beach during the nesting season. Of these, the Olive Ridley turtles face threat of survival – both through loss of eggs and habitat destruction.

Administrative Profile

As mentioned earlier, the CCA is a stretch of coastal village commons and is administered by the Revenue Department. About half a kilometre stretch of the northern portion of the CCA (near Kottapuzha river mouth) falls in Vadakara municipality while the rest is in Payyoli Gram Panchayat area. This is a coastal village where traditional/ artisanal fishing is carried out. At a recent political function in the village, there was a suggestion to convert the CCA into a marine national park. However, the office of the Kozhikode (Wildlife) Divisional Forest Officer has not yet brought out any official proposal. As far as the Forest Department is concerned, Kolaavipalam comes under the Peruvannamuzhi Territorial Range. Locals say that the Tourism Department also plans to organise boat rides for tourists from Kunhalli Marakkar's house in Iringal village to Velliyaangal (also referred to as the Sacrifice Rock) in Quilandi. Velliyaangal is a rocky island off the coast of Payyoli, situated fourteen kilometres into the Arabian Sea. At present, there are boat rides organised along the Kottapuzha river, near the river mouth.

Historical Profiles

Beginning of Turtle Conservation

Olive Ridley turtles have been visiting on Kolavipaalam beach since ages. In 1992, some of the youth of the village came across an article in *The Hindu* that informed about the endangered status of the Olive Ridley turtles. The young men realised that the marine turtles, which came to nest on their beach so regularly needed protection and this motivated them to act upon what nature had blessed them with. They formed a group called Theeram Prakriti Samrakshana Samiti with twelve members. The key persons in this effort are the present President of *Theeram*, Mr. Surendra Babu and the Joint Secretary Mr. K.Vijayan. The group also met with active support from the Forest Department. The Divisional Forest Officer (DFO) in charge during 1996, Mr. Amit Mallik took interest in the effort. Later, in 1997, Mrs. Prakriti Srivastava, DFO, encouraged the local youth to keep watch over the beach by paying daily wages for four members during the nesting season.

Community Conservation Details

The conservation effort at Kolavipaalam CCA includes – (1) Protecting the eggs of Olive Ridley turtles that come to the beach shore to nest and (2) Afforestation of mangroves in the estuarine region of the CCA. By conducting annual camps for local schoolchildren, awareness and education about the Olive Ridley turtles is spreading. When *Theeram* members learnt that the Olive Ridle turtles are an endangered species, they decided to protect the turtles that came to nest on their beach. Simultaneously, they also started reading up literature on coastal environment issues through which they hoped that they would learn more about how to effectively protect them. They relate how, initially, nobody knew how many days were required for turtle eggs to hatch. Hence, the first nesting season when the protection measure began, they literally spread mats over the nest and slept for two reasons – 1) to protect the nest from jackals that abound the area and, 2) to see when the hatchlings came out. They deduced that since nobody in their village knew how long it took the turtle eggs to hatch and since they have not seen hatchlings come out during daytime, the eggs hatched during night-time and hence they decided to sleep over the nests. Week by week they opened one egg at a time to confirm if egg development was taking place or whether the eggs were dead. It was this lack of knowledge that prompted these educated village youth (readers should keep in mind that very few people are not literate in Kerala), to read up related literature. And that was also how, they realised the importance of protecting the mangroves in their area for the benefit of the coastal ecosystem.

Elements of Community Wildlife Management

During the Olive Ridley nesting season of October to March, the youth of the village keep watch over the beach to check on turtles that come to nest. As soon as a turtle lays its eggs and returns to the sea, the watchful youth transfers the eggs into a sheltered hatchery that has been constructed for this purpose. A meticulous record is maintained of the number of eggs that are laid by each turtle, the dates when these were laid and so on. On hatching, the turtles are immediately released into the sea. The hatchery is a part of the beach that has been fenced off. The fence is made of dried palm thatch supported on bamboo stakes and wrapped with old fishing nets. The fence is about seven feet tall to provide protection from stray dogs and jackals. Inside the hatchery, the pits are marked out and paper boards are stuck into the sand that notify the day when the eggs were laid and when they are expected to hatch. A big threat to these eggs is from the jackals that inhabit the mangroves nearby. They smell the eggs as soon as they are laid and immediately prey on them. It is for this reason that the village youth transfer the eggs into the protected hatchery. Initially, the youth tried to protect the nests

in its natural state, by fencing them with dried palm thatch. But, the jackals burrow through the sand and eat the eggs.

Role of the Forest Department

Later, the Forest Department provided them with iron cages. However, these iron cages have not become popular with the youth. Allegedly, these cages have been responsible for the death of hatchlings that got trapped beneath these cages and could not come out. The Forest Department now pays six members of *Theeram* a daily wage of around Rs. 2,500/- per month per person. This scheme is only during the nesting season from October to March. What is admirable is that these wages do not go for personal use but is pooled into the *Theeram* kitty and forms the main funding source for their protection efforts.

On realising the important role of mangroves in the conservation of the coastal ecosystem, the youth have started an afforestation programme of mangroves in about 5 acres in the estuarine portion of the CCA. This began in 1998 when the Forest Department and other NGOs conducted nature camps and slide shows for the residents of this village. The Forest Department initially supplied mangrove seeds to the villagers. About Rs. 15,000/- has been donated by the Gram Panchayat to buy mangrove seeds from private sources in Kannoor. Theeram members encourage and involve local residents as well as local school children in planting these saplings along the estuarine region of their area.

The Forest Department has plans to set up a nature interpretation centre here. Theeram members conduct their meetings in a small single-storey building that has been constructed with financial aid from the Forest Department. This building also serves as a shelter where, during the nesting season, the patrolling members rest. There are also a few specimens of turtles and turtle hatchlings kept as exhibits for visitors. Photographs and posters informing the visitors about turtles, their habitats as well as the importance of conserving them are put up on the walls. This building thus doubles up as an informal nature interpretation centre as well as Theeram's office.

Although, the youth of the village and especially *Theeram* members are actively involved in the conservation efforts, the rest of the community is aware of the conservation effort and provide passive support to it. Before the involvement of the Forest Department, funds for guarding the eggs were generated by donations in cash and kind from within the group and the community. Even now, the community participates in the mangrove afforestation programme. Whenever nature awareness programmes are carried out, they are keen to learn anything new from these.

Social and Ecological Impacts of the Initiative

Although no scientific studies have been carried out in this area to judge the conservation efforts, locals have been emphatic on the positive outcome of these efforts. Some of these go as follows:

- Increased fish catch in the areas surrounding the mangroves. Young boys who fish through simple hook and line fishing in the mangroves claim that fish yield has increased.
- It has also been noted that the drinking water wells located near the mangrove area still contain sweet water whereas the rest of the region experiences salinity ingress in their drinking water wells. This has led the Theeram youth to believe that the mangroves, apart from various other functions of coastal protection and marine life replenishment, also help in reducing salinity ingress in to the ground water table.
- There has been an increase in the number of turtles coming to nest as per *Theeram*'s records and the most astonishing part is the high rate of hatching success in the hatchery.
- What is most heart warming is the sense of empowerment that these young villagers experience as a result of protecting their natural area. As a result of their interaction with the Forest Department as well as being talked about in the local media, the youth are now treated with respect by various government officials, which is otherwise rarely seen. So the villagers have taken advantage of this and have submitted a proposal to the Irrigation Department (through the good offices of the Forest Department) to install a drinking water pipeline for their village.
- As a consequence of being in the news, several people have visited Kolavipaalam and met Theeram members. This has not only been an enriching experience for the visitors but also for these young men. As it has given them a wider perspective of their actions and learning about similar efforts elsewhere.
- Even the local governing body, the Village Panchayat has recognised their efforts and has set aside funds for planting mangroves this year. This comes as part of the empowerment of village panchayats through the People's Plan programme that is currently going on in Kerala.

The success of these men has, allegedly, also brought in its wake jealousy among other villagers. The fame of Kolavipaalam has been attempted to be hijacked by the neighbouring Mudiyam beach of Vallikunnu Panchayat situated about 80 kms from Kolavipaalam. A news report of turtle nesting on their beach turned out to be a false one. When Theeram members read this news report they made a visit to Mudiyam beach to share the information they had with the local people there. However, according to Theeram members, they were instead approached by the local villagers of Mudiyam beach for turtle eggs so that the latter could claim that nesting goes on in their beach. This was allegedly done to attract the funds allocated for turtle conservation to their village.

Constraints and Opportunities Faced by the Initiative

While this community initiative has been able to bring some positive steps towards protecting the turtle and its habitat, it is also facing a large number of hurdles. Enlisted below are both the positive and negative trends of this effort.

1. Turtle eggs are considered to be a good curative for piles and were sold in the local market. This is no longer seen.
2. Predation of turtle eggs by jackals, as mentioned earlier, is a considerable threat. The community has overcome this problem by transferring the eggs into the hatchery as soon as they are laid and round the clock patrolling of the beach during the nesting season.
3. Mangroves were being used by some of the local community members as cattle fodder. Mangrove areas were also cleared to make space for retting of coconut fibres. This has led to the depletion of mangrove cover in the last few decades. Theeram members have been trying to protect the natural mangrove areas and at the same time carrying out plantation of mangrove saplings. However, since the original mangrove area (vegetation) is considered to be village commons, some of the villagers continue to cut the trees for domestic purposes, although there is a tacit understanding that the offenders will not destroy the newly planted mangroves. The offenders are under increasing pressure to desist from such activity through social disapproval.
4. The sand mining lobby, however, poses the biggest threat, not just for the Olive Ridley turtles but for the existence of this beach. Coastal erosion of the sandy beach has reached the critical stage in Payyoli village because of the illegal sand mining that is being carried out in Kottapuzha estuary. Consequently, the process of sand transfer and deposition from the estuary to the beach and vice versa through changing tides and currents has been disrupted. Due to sand mining in the estuary, the sea is no longer able to replenish the beach with more sand from the estuary, while reverse currents continue to erode the beach. The end result is that at Kolavipaalam beach, year after year, the beach stretch is getting narrower, thus leaving very little area for the sea turtles to nest. Theeram Prakriti Samrakshana Samiti has filed a case in 1999 in the High Court against the sand mining lobby that is operating here. An interim stay order was granted by the court, but the enforcing authorities seem to be helpless in putting a stop to this. Political interference is seen to have a major role to play in this. The fish drying occupation of the fisherwomen have also been affected by the diminishing beach stretch. They no longer find the space to dry fish that used to be exported. This has affected 500

fisherwomen who were otherwise employed during the summer season. Theeram members have had to repeatedly construct the hatchery since the advancing waves destroyed it year after year. It would not be an exaggeration to say that this community initiative runs the real risk of fizzling out since the natural habitat of the Olive Ridley turtles is disappearing and the residents themselves are threatened.

5. Another negative fall out of the sand mining issue is the pessimism that has crept among some of the community members here. Although not legally permitted, seashell collection continued on the seashore as a customary right till the locals realised that this was harming their coastal ecosystem. Hence they stopped mining for a year or so. However, when sand mining in the estuary continued unabated, the residents decided to make full use of this natural resource. They have thus resumed collection of seashell fragments on the argument that since the coast is anyway being eroded due to unabated sand mining in the estuary, they might as well make some money out of it before it finally destroys them.
6. Financial resource crunch has limited the group's activity to simply that of a protection effort. The youth have expressed their desire to study turtle biology in more detail. They hope to have a school for nature training, survey and research. The objective of this school would be to impart knowledge, evince interest and hence create concern for the community's natural wealth.
7. A couple of private individuals whose business interests would violate the CRZ Notification have not been supportive of the protection efforts. Theeram had complained about their illegal construction to the Panchayat who ensured that the construction was stopped. The community as a whole has been supportive of the group's efforts at conservation and has even provided assistance – monetary, material or otherwise – to them.
8. During the nesting season, the young men have to keep long hours patrolling the beach. This meant that they had a dual responsibility of earning their living during the day and keeping awake during the night (in shifts) to protect the turtles and their eggs. This responsibility has also curtailed their choice of occupation – in that, only self employed occupations allowed this kind of flexibility in working hours. What is heart warming though is that *Theeram* members insist that this is not seen as a constraint as they have chosen to undertake this responsibility themselves.
9. The Kottapuzha river-bed is leased out by the state government to rope makers for retting coconut fibres. Due to the leases granted, there is no land available for afforestation of mangroves. This has restricted *Theeram* members from bringing more estuarine land under mangrove cover.

There was a traditional system of conflict resolution called "*kadal kodathys*" (literally translated as marine courts) where disputes of all kind were settled. These conflicts may be domestic in nature such as disputes over property, marital disputes and others. Decisions arrived at these community courts were respected by the formal law and order system. Most of the disputes were resolved at this community court level and very rarely did they spill over to the formal conflict resolution systems that are in place. The *kadal kodathy* of Kolaavipalam is situated in Payyoli, which is stated to be not active any longer. However, there are other community courts, which are active and playing an important role in the coastal areas, north of Payyoli.

Some Negative Fallout of the Initiative

Since the motivation to conserve by the community has been purely out of educated local concern for turtles, there aren't any negative fall-outs of the initiative as compared to the Goa scenario. However, party politics play a very important role in Kerala's social structure and this has seeped even into the conservation scene. So far, Theeram members have been successful in keeping out party politics from the conservation activity. However, there has been increasing pressure from these parties to include their members into the group. This is due to the high media coverage that *Theeram* has received in recognition of their efforts through awards such as the P V Thampy Award and the Green NGO Award. To give an example, when the original members of Theeram decided to open up membership into their group, the youth wing of one of the dominant political parties in Kerala threatened that if their members were not included then *Theeram* would face dire consequences. This prompted *Theeram* founder members to close the membership and thus *Theeram* continues to be comprised of twelve members who had joined them nine years back. For the future of the group, this does not bode well for its continuance. Fresh blood is always necessary to keep a group active and to make new ventures and strategies.

Previously, small-scale sand mining took place at the Kottapuzha river mouth. During the 1970's, Kerala was experiencing the Gulf boom with increased remittance inflow into the state, which resulted in the construction boom in Kerala. The repercussions were felt here too, when sand began to be taken away on a larger scale to meet the demands of the construction industry. However, it is stated that the saline sand collected from the estuary is not suitable for house construction. Most of the sand, however, goes for land flling paddy lands and other wetlands to meet increasing urbanisation demands of the state. After Theeram members filed a petition in the High Court in 1999, it has been felt by the community, that sand mining has increased with a vengeance and

that matters have got worse. Since no government lease of land for sand collection has been given and nor have licences been issued for the miners, the sand mining occurring at Kolaavipalam is illegal. Yet, by having approached the court, and on the basis of the subsequent orders given, the community members feel that an entirely illegal activity is now being regularized by the state machinery.

Lessons Learnt

Although the role of the Forest Department has not been as active in this initiative as it's counterpart has been in Goa, the stand of the Forest Department in the sand mining case has helped the community to obtain a favourable interim order from the court. Yet, political pressure seems to have scuttled the rest of the effort, leading to non-implementation of government/ and court orders. For the local community, this initiative has led to the empowerment of their community. They have been recognised for their efforts at environment protection. Where normally, various government department officials ignore villagers coming to their office for various requests, Theeram and their friends are respected and their requests (such as installing drinking water facilities in the village) are dealt with quickly. What is most interesting and probably unique in the entire world is that this is a community initiative born purely out of concern for the natural environment and continues to be so without any notable benefit attached to it as in the case of Morjim beach.

Community–Based Conservation of Mass Nesting Site of Olive Ridley Turtle in Rushikulya Beach, Ganjam, Orissa

Olive Ridley turtles are known to exhibit the phenomenon of annual mass nesting or *arribada,* when several thousand turtles migrate to the breeding ground to mate and nest simultaneously. This phenomenon can be witnessed only in three places in the world – two beaches in the Pacific Coast of Costa Rica, one beach in the Pacific Coast of Mexico and the Eastern Orissa Coast in the Bay of Bengal in India. The 480 km Orissa coast harbours three such mass nesting beaches. These are the Gahirmatha rookery near the mouth of rivers Brahmini and Baitarni along the northern Orissa coast in Kendrapara District, the rookery near the mouth of river Devi, located 100 km south of Gahirmatha in Puri District and the Rushikulya rookery, located 320 km south of Gahirmatha near the mouth of river Rushikulya along the southern Orissa coast in Ganjam District. Our focus for the present study will be on Rushikulya rookery for reasons mentioned below.

Realising the importance of turtle conservation, the Orissa state government has brought in some protection efforts. The mass nesting beach at Gahirmatha is a part of the Gahirmatha Marine Sanctuary. The coastal waters off Gahirmatha coast have been declared a marine

sanctuary in 1997. The coastal waters off Devi and Rushikulya rookery have been declared as a no-fishing zone during sea turtle breeding season.

A study of community based conservation of mass nesting site of the Olive Ridleys was decided to be carried out in Rushikulya mouth for three reasons – 1) Easy accessibility; 2) Operation Kachhapa – a conservation program involving the local communities and several NGOs is already in existence here; 3) It is not an officially protected area.

The main objective of this study was to evaluate whether community based conservation is possible in this site and if so, to draw up a plan wherein the local community members, concerned government authorities – Wildlife Department, Marine Fisheries Department, District Collectorate, Revenue Department - NGOs and other concerned bodies are involved in the protection and management of the mass nesting site and the turtles.

Description of the Mass Nesting Site in Rushikulya

The Rushikulya rookery, located 140 kms south of Bubhaneshwar, the state capital, is located on the Rushikulya river mouth up to Kantiagada, a fishing hamlet located six kms north of the river mouth. It is one km east of the Madras-Calcutta National Highway No. 5 and the South Eastern Railway line near Ganjam town along the southern Orissa coast. This entire stretch between Purnabandha and Kantiagada witnesses heavy sea turtle nesting during January to May every year. The nesting beach along this stretch is more or less flat with scattered sand dunes of 1-2 m high. The average beach width is 80 m above the high tide line though at some places, the beach extends for more than 200 m (Patnaik et al, 2001). An artificial canal, the Palur Canal, connects Chilika Lake with the Bay of Bengal, through the Rushikluya river mouth and runs parallel to the nesting beach for about 8 kms. This canal is located to the west of the villages Gokhurkuda and Podampetta while it runs east of Purnabandha village. The northern part of the beach, has privately owned Casuarina plantations. Other flora, including creepers of *Ipomea pescaprae*, *Calatropis gigantea* and *Spinifex littoreus* grass help in binding the sand of the beach. The co-ordinates of the river mouth read as follows – 85° 4' 3" E and 19° 22' 30" N.

This rookery was discovered in March 1994 during a survey of sea turtle nesting habitats along Orissa coast carried out by the Wildlife Institute of India in collaboration with the Orissa Forest Department (wildlife wing) (Pandav et al., 1994). Since 1994, the recorded number of nesting females has fluctuated from 60,000 in 1995 to 8,000 in 1998 (Pandav et. al., 1998). No mass nesting was observed here in 1999 (Pandav, 2001).

Three villages– Purnabandha, Gokhurkuda and Kontiagada-Podampetta are located along the mass nesting area. Of these the latter two are revenue villages while Purnabandha is a hamlet. All three belong to Pallibando Gram Panchayat. While the residents of Purnabandha depend entirely on Rushikulya river for fishing, the residents of Gokhurkuda are partially dependent on the sea and partially on the river. The residents of Podampetta hamlet of Kantiagada depend entirely on the sea while those of Kantiagada do not depend on fishing as an occupation.

The Need for Community Participation in the Conservation of Nesting Sites

The key to long term conservation of the Olive Ridley on the Orissa coast lies in not only mobilizing the local community to participate in conservation programmes, but also to instill in them the sense of belonging and that by protecting the turtles they are ensuring a secure future for themselves. However, it should be noted that mere community based conservation programs will not be sufficient in protecting the turtles and their nesting habitats. Strict and quick policing needs to go hand in hand with community efforts at conservation of the mass nesting site. Ideally, policing measures by the Forest and the Fisheries Department complimenting and supporting local community based efforts would ensure a more secure future for these hapless creatures. A community participation approach, where the local communities benefit economically through increased occupational opportunities, would be expected to yield better results than a completely protectionist approach. This was realised by the Orissa Forest Department based on prior experience with local people's involvement in the protection of Gahirmatha rookery as also with the anti-poaching camps in Simlipal Tiger Reserve. Not only did a co-operative local community decrease the number of problems that the Forest Department faced while ensuring wildlife protection of a protected area, but it also helped the government officials in checking illegal activities in the area through prompt reporting of offences by community members. Lastly and most importantly, since the major cause of mortality of adult turtles is due to modern fishing practices which have also endangered traditional coastal lifestyles in addition to the turtles, a solution lies in encouraging existent artisanal fishing in the Orissa coast.

Historical Profile of the Communities

Although Oriya is recognised as the official language of the state of Orissa, there is a mixture of Telugu and Oriya speaking communities in southern Orissa and especially in Ganjam District. The reason for this is that prior to 1936 (before the state of Orissa was formed), Ganjam district extended from Khallikot to Vishakapatanam and formed the northern boundary of Madras Presidency. Even before the formation of the district, this area was ruled by several kings and there was a

continuous mixture of both Oriya and Telugu speaking communities. In fact, the last independent Hindu King, Mukunda Dev, of the Bhoi dynasty (1560) was from the Telugu speaking community before the Muslim era began in Orissa. According to Shri Govind Panda, founder member and ex-President of United Artists Association, a local NGO which has been working with the fisherfolk communities in Ganjam coast, there are three communities along the coast that is of concern for our present study. The *Khandayats* are Oriya speaking non-fishing communities, the *Khandaras* are Oriya speaking fishing communities mostly found along the Chilika coast and the *Nolias* are Telugu speaking communities found all along the Ganjam coast and mostly fish in the sea.

The art of sea fishing originated in Kerala and slowly found its way to other states – Tamil Nadu, Andhra Pradesh and now Orissa. What is striking is that the Oriya speaking fishing community – the *Khandaras* and the *Kevtos* do not go to the sea for fishing, traditionally as well as at present. Instead they fish in the rivers, i.e., they are mainly active in inland fishing. It is believed that they do not posses the skill nor the inclination to go out and fish in the rough seas. True to form, *Kevtos* of Purnabandha and Gokhurkuda fish in Rushikulya river mouth, while the *Nolias* of Gokhurkuda and Kantiagada are active in the sea. In Purnabandha, due to vicinity and ease of fishing in the river, the *Nolias* too fish in the river. The *Nolias*, form a minority here and hence are also politically weak (See appendix 1 for further information on the communities). Illiteracy is high among this community and hence they are subjected to exploitation by the *Khandayats*. The *Khandaras* are also politically weak and hence are exploited by the politically stronger *Khandayats*. Historically, the *Khandayats* were a warrior class of people who constituted the soldier force during wars fought by the king. During peacetime, they were appointed to collect revenue from the villages. Thus, they had a tradition of power vested in them, which was misused at various times. In the present political scenario, this class of people is more educated, has access to information and various other facilities and is politically stronger. In the *Karya* and *Karan* system of land revenue, the *Karanas* are the people who maintained land records. They were the ones who issued *pattas* to the people. Since the *Khandayats* were a politically stronger group, they were issued *pattas*, while the *Nolias* and the *Khandaras* were left ignorant about the *Patta* system. It is only now through education, that they are slowly realising the importance of land records and are demanding *pattas* from the administration. However, there is still a majority of this community who, although they have been residing in these areas for generations, do not possess *pattas* and are treated as encroachers. When in fact, it is the politically stronger class of *Khandayats* who have encroached onto the *Nolias* land and are holding *pattas*. The present administration is looking into the matter and trying

to resolve the same [Panda, Govind. 2001. Pers. Comm., Kumar, Anil, Ganjam Tehsildar. 2001. Pers. Comm.].

Socio-economic Profile of the Local Communities

While in the case of all three villages, the majority of the residents are fisherfolk, there are certain peculiarities in each village. They are a mixture of Oriya and Telugu speaking communities. The fisherfolk of Purnabandha village only fish in the river and do not go to the sea. In Gokhurkuda, the fisherfolk community in the old and new settlements (the new settlements are situated on the high sand dunes of the beach while the old settlements are located half a kilometre from the beach) fish from the sea as well as from the Palur canal (during high tide). The fisherfolk of Podampetta, rely only on the sea for their livelihood. Although Podampetta is a hamlet of Kantiagada, there is complete disparity between the two. Kantiagada is located about three kilometres from the beach and the residents derive their income from non-fishing sources such as paddy cultivation, Casuarina and Cashew plantations, salt production, aquaculture and small/ minor trade. The residents of Podampetta are *Nolias* while that of Kantiagada is dominated by *Khandayats*. It is stated that the *Khandayats* have been suppressing and harassing the *Nolias* for a long time in this village. Hence, although they do not go to the sea themselves, the *Khandayats* demand fish for free from the *Nolias*. This is a typical example of exhibition of power by the *Khandayats* over the *Nolias* that has been described earlier.

Literacy is poor among the fisherfolk communities of the three villages. However, it is seen that the residents of Purnabandha are more aware of the importance of turtle conservation than those of the other two villages. One reason could be that Purnabandha is more easily accessible by road than the other two villages and hence members of the general public visit this village to seek information regarding turtles. Also adding to their awareness, is a conservation program that is currently going on in Purnabandha called Operation Kachhapa. More details on this program in the following sections.

Notable from the community based conservation point of view, is that there exists village level governing bodies that deal with the general affairs of the village, including rules and regulations of fishing. Every traditional marine fishing hamlet has a “kulo” committee which, comprise of all the fishermen of the village. This could be equated to a gram sabha of a gram panchayat, except that women do not form part of this committee. The head of the committee - “kulo behera” - is chosen informally through discussions among the fishermen of the village. Normally, the most skilled fisherman becomes the “behera”. There is no specific time period for the tenure of “behera”. Unless, the “kulo” committee is dissatisfied with his performance, the “behera” continues in

his position as the head and resolves social or economic disputes in the village and at sea. There is an apex body comprising of the "kulo beheras" of every fishing hamlet. The chief of this apex body is called the "kulo raja". Inter-village disputes or disputes that cannot be resolved at the individual "kulo" level are taken up by this apex body of "kulo beheras". This could be equated to the Supreme Court in the formal legal system.

About 95% of the population are employed in fishing while the rest are occupied in daily wage labour, private service and small trade. While the women of the *Nolia* community do not involve themselves in the sale of fish, the womenfolk of *Kevtos* are shrewd businesswomen in the sale of fish. Of the three hamlets, economically, Purnabandha residents fall in a relatively higher income bracket as compared to the other two hamlets. The main contributing factor for this is the sale of prawn seed that is carried out by Purnabandha residents. Prawn seeds harvested from the sea by means of *Irigari* nets are either supplied to the aquaculture farmers of West Bengal, Andhra Pradesh as well as Orissa or are exported to south-east Asian countries. The price varies depending on the market. However, since this activity does not require much skill, even women and children are involved in the activity during their spare time. Some of the residents of Gokhurkuda are also involved in prawn seed collection. However, they have observed that not only has the quantity of prawn seeds decreased over the years, but this activity has also affected their fish stock in the sea. Of the three hamlets, Podampetta village is economically the lowest. They do not possess *pattas* for their houses and are subjected to exploitation by the *Khandayats* of Kantiagada village. Podampetta residents live in either mud houses or thatched shelters right on the beach.

Fishing hamlet	**Village**	**Gram Panchayat**	**Total Population**	**Percentage of fisherfolk**	**Fisherfolk communities**
Purnabandha	Pallibandha	Pallibandha	1,070 – 200 families	92%	Kevto – 85% Nolia – 15%
Gokhurkuda	Gokhurkuda	Pallibandha	2,222 – 146 families	68.5%	Kevto – 46% Nolia – 64%
Podampetta	Kantiagada	Pallibandha	1,877	100%	Entirely Nolias

Current Conservation Programmes – Operation Kachhapa and Orissa Wildlife Department

This section briefly touches upon the present protection measures in place at Rushikulya. These protection measures are being carried out by, both, state government agencies as well as non-government organisations.

Operation Kachhapa (OK) is a conservation program launched by the Wildlife Protection Society of India, a national NGO. This program began in 1998-1999 as an effort to protect the breeding and nesting sites of Olive Ridley sea turtles and to stem their large scale slaughter by mechanised fishing vessels off the coast of Orissa. The project is a collaborative effort between WPSI, the Orissa State Forest Department, the Wildlife Institute of India, the Wildlife Society of Orissa (WSO) and other local NGOs. Initially, the programme was concentrated in Gahirmatha and Devi river mouth and from 1999-2000, included Rushikulya river mouth.

A certain number of local boys are appointed by WSO to conduct patrolling over the mass nesting beach and to protect the nests/ eggs and hatchlings that face various threats on the beach. The boys are also responsible for ensuring that the ban on fishing is being properly implemented in the mass nesting area. Some of the functions of OK field personnel include the following:

1. Protecting nests/ eggs from natural predation, especially stray dogs.
2. Preventing poaching of eggs by the local villagers, which are either consumed for domestic purpose or are sold in the local market.
3. Counting the number of dead turtles and recording the male – female ratio of dead turtles.
4. Rescuing hatchlings, which have strayed towards the landward side of the beach due to artificial illumination near the beach.
5. Ensuring that nests are not disturbed due to beach related activity of the fisherfolk. Villagers walk over the beach for various purposes and this can adversely affect the hatchlings especially when they are about to emerge from the nests.
6. Ensuring that the ban on fishing is implemented. This also includes preventing the local villagers from prawn seed collection.

However, there are a number of difficulties that OK are faces – both at the management level as well as at the field level. These include:

1. Inadequate number of personnel to protect the six kilometer beach stretch. The number of local boys patrolling the beach is not fixed – six in Rushikulya during 1999-2000 while this year 2000-2001 ten boys were appointed – in response to a larger population of turtles nesting in 2001. Adding to their problem, the boys are appointed only when mass nesting begins. Prior to that, only a couple of boys are

kept to patrol the beach during sporadic nesting. And their appointment is discontinued even before the mass hatching has finally ended. This leads to uncertainty and insecurity among the patrol members and affects their efficiency.

2. Artificial illumination from nearby factories and towns has added to the problem of insufficient personnel. The factory lights contribute to a brighter horizon that confuses the hatchlings, which move towards the direction of the light. With limited personnel, it has been extremely difficult for the boys to rescue all the hatchlings that get trapped in the shrubbery adjoining the villages or which wander towards the landward side.
3. Lack of proper equipment has also handicapped the protection efforts. The boys make do with buckets into which the hatchlings are collected on emergence and dumped straight into the sea. There is no provision of a shelter, such as a tent, on the beach for the members to take rest or to seek protection from inclement weather.
4. No rotational basis of work, since the program is understaffed. Thus there are ten boys expected to work round the clock during the nesting season. Naturally, on field, there are fewer number of boys actually patrolling the beach.
5. During mass nesting season, there is high incidence of beach erosion. It is seen that the turtles come ashore only at those points where the beach gently tapers towards the sea. This is also the point or place where the fishermen park their boats up on the beach or push down towards the sea. This activity disturbs the turtles and damages nests.
6. Lack of co-ordination between the staff of the Forest Department as well as those of OK. Although, the Forest Department also deploys temporary labour from the villages to patrol the mass nesting area, these protection efforts remain isolated from each other. If both the teams co-ordinated, larger number of turtles and hatchlings could be protected.
7. Disparity in pay scales, both, within OK as well as between OK members and Forest Dept. patrolling members, has led to discontent among the participating youth. While the OK members at Devi river mouth are paid Rs. 2,500/- per month, those at Rushikulya are paid Rs. 1,200/-. The Forest Dept. labour is paid a much lower Rs. 1,000/- a month. This brings about a feeling of injustice among the village youth, that while some are paid higher for the same effort, others are being exploited. This has caused open resentment among the patrolling members as well as against the management. Disparity exists not only in pay scales but also in various types of incentives being given by different agencies (CCF (WL), 2001).
8. Scarcity of funds has affected the working of Operation Kachhapa and hence problems such as those stated above have crept in.

The protection efforts undertaken by Orissa Forest Department vis-a-vis Rushikulya rookery can be stated as follows (Patnaik et al, 2001):

1. Since 1974-75, issuing of licences for collection of sea turtle eggs from nesting beaches of Orissa has been effectively stopped.
2. The subsequent trade of adult sea turtles through goods trains were stopped since 1975-76. Trade of adult sea turtles (as fishery products) stopped since early 1980's. Increased vigilance in the early 1980's stopped the illegal trade of adult sea turtles through roadways.
3. In 1993, the state government empowered the DFO and the ACF of Mangrove Forest Division to implement the Orissa Marine Fishing Regulation Act (OMFRA), 1981and OMFR Rules, 1983.
4. Twenty kilometres seaward radius from Chilika mouth (Magarmukh) to Rushikulya mouth has been declared as 'No Fishing Zone' in 1996/97.

A strict enforcement of the ban on near shore mechanised fishing and in areas of high sea turtle conservation has been noted by conservationists and scientists as the need of the hour. The Government of Orissa has declared the coastal waters off Gahirmatha a marine sanctuary and the coastal waters off Devi river mouth a no-fishing zone during the breeding season. Besides this, the OMFRA, 1981 prevents any kind of mechanised fishing within 5 kms of the shoreline while mechanised fishing vessels of 25 gross tonnes and above or having a length greater than 15 m are prohibited to operate within ten kilometres from the shore. The latest amendment to this Act carried out on 17th April, 2001, prohibits mechanised fishing without the use of turtle excluder device. Apart from these, the OMFRA also prohibits mechanised fishing in one square kilometre area in the sea adjoining any river mouth with a view to protect the interests of artisanal fisherfolk.

Present Scenario

The coast of Orissa witnesses the arrival of sea turtles – mainly Olive Ridley species, every year during September and October. Mating takes place in the shallow coastal waters during November and December followed by sporadic and mass nesting from January to April. Fishermen state that during mating season and subsequent nesting season, the coast is characterised by strong winds that result in extensive beach erosion. While adult turtles were once sold *en masse* in the markets of Calcutta, the trade in adult meat has reduced greatly in the last decade. After the introduction of protection measures by Operation Kachhapa, poaching and local consumption of eggs is nearly absent in Rushikulya.

During the non-nesting season, normal artisanal fishing activities continue along the coast. It is to be noted here that there is no trawling by the Orissa state government occurring along Ganjam coast. However,

a large number of trawlers are seen along Rushikulya coast which are mainly from Andhra Pradesh while some belong to south-east Asian countries. Most of these are stated to be trawling illegally without proper licences. Several researchers have stated that the greatest danger to adult turtles is mortality due to incidental catch in these trawl and gill nets of mechanised fishing boats (Pandav et al., 1997; Pandav, et al. 1998; Rajagopalan, et al. 2001). Although the local communities residing along the Rushikulya rookery practice artisanal fishing, some fish in the sea, while other fish in the river mouth region.

Once sporadic nesting begins at Rushikulya, one or two village youth (read Purnabandha youth) appointed by Operation Kachhapa are deployed to patrol the beach. When mass nesting begins (sometime during the end of February), both the Forest Department as well as Operation Kachhapa deploys about 16 boys (in total) to patrol the beach and conduct protection measures. Whenever the situation demands, more labour force from the villages are deployed for patrolling and rescue operations. After mass hatching, the number of patrolling members is reduced drastically.

Plan for Community- based Conservation (CBC) for Rushikulya Rookery

Solutions that came up for the above mentioned problems were varied and many. These came up during the course of several interviews with all concerned government officials, local NGOs, other interested individuals, scientists and at village meetings held in each of the three hamlets. A joint meeting of all concerned stakeholders was then held in order to arrive at certain decisions with joint consensus from both the local community and the government. This has resulted in a practically applicable community based conservation plan for Rushikulya that could resolve livelihood issues to meet conservation concerns. However, it is to be noted that although solutions to all the problems were suggested from various quarters, a consensus could not be reached for all of them. This does not mean that the perceived problem is unsolvable, it means that more time and effort needs to be undertaken in order to obtain solutions. It is also hoped that with increased awareness among the community about turtle conservation leading to conservation of their coastal habitat, they are likely to be less resistant to changing certain practices that are currently being practiced by them, but which is proving to be detrimental for the conservation of the turtle and its mass nesting site. Carrying capacity studies as well as detailed studies on the impacts of suggested alternative livelihood options need to be carried out, before implementing them.

For ease of understanding, the plan is put forward in the form of a table. A separate table on some of the studies that would be required to be carried out simultaneously is also given at the end of the plan.

Following is the list of stakeholders who have been identified with regard to Rushikulya rookery. Special mention is also made of those who were present at the final consensus meeting, which helped in arriving at this plan.

1) Purnabandha village - Five members of the “kulo” committee from this village were present at the meeting.
2) Gokhurkuda village – Since the meeting was held at this village, a large number of “kulo” committee members were present to vociferously put forward their views.
3) Podampetta village – Only one advisor of their kulo committee could attend the meeting as the fisherfolk of this village had seized an errant trawler earlier in the day and were busy with officials in sorting out the issue.

Apart from the above-mentioned representatives, the sarpanch and ex-sarpanch of Pallibando Gram Panchayat also attended the meeting.

4) Wildlife Wing of the Forest Department – The Chief Wildlife Warden, Chilika Divisional Forest Officer (Wildlife), Research Officer, Rambha

Range Forest Officer and forest guard were present at the meeting to express their views and suggest solutions.

5) Fisheries Department – Field Extension Officer and Fisheries Demonstrator of Ganjam Block were deputed to attend the meeting as the Assistant Director, Fisheries (Ganjam) was trying to resolve the trawler issue at Kantiagada. However, it was disappointing to note that inspite of several reminders, the office of the Directorate of Fisheries was not represented due to which a couple of problems could not be discussed to its logical end. Valuable insights and inputs from the ex-Director, Fisheries during the course of an interview also helped with the plan.
6) Tourism Department – The Joint Director of Tourism stated his department's stand vis-à-vis eco-tourism as an alternative source of income for the villagers.
7) District Administration – Represented at the meeting by Ganjam Block Development Officer.
8) United Artists Association – A local NGO who has been working with the fisherfolk communities of Ganjam district for more than twenty years. They have been identified as possible candidates for overseeing the implementation of CBC plan at Rushikulya. Representatives of this NGO were present at the meeting.
9) Orissa Traditional Fisherfolk Union – A people's organisation that is basically a union of the artisanal fisherfolk as the name implies. Every marine fishing village has a unit of this organisation. The secretary of this union discussed various problems and came up with solutions too.
10) Wildlife Protection Society of Orissa – As the state agency for implementing Operation Kachhapa, and to discuss their experience with the conservation of turtle nesting site, their inputs were valuable. Unfortunately, the Secretary of the organisation was busy with a court case and Operation Kachhapa was represented by some of its field personnel.

During the course of the final meeting, formation of a committee (termed as Uniform Protection Committee or UPC) was suggested that would consist of field level staff of the Forest Department, Fisheries Dept., local police and an equal number of members from the three concerned villages. It is hoped that with this the problems regarding wage disparity or some villages being ignored for protection efforts, will be removed. The responsibility of patrolling the nesting area during the mass nesting season would solely be theirs. They would also be overseeing all the field level solutions and resolving any difficulties that may be faced in the field.

***Funding*:** There is a need to explore sources of funding for running the UPC. A corpus fund could be created through funds obtained from all concerned agencies who have funds available within them for turtle conservation efforts in Orissa like the WPSI, OK, other national and

international agencies as well as Central and State govt. departments. The Orissa Forest Department has promised an initial support with whatever funds available with them. This corpus fund will remain untouched and only the interest accrued will go in the payment of wages for the patrolling members and any other expenses accrued. This would ensure that even after the funding agency withdraws from the project, the UPC can continue to function. Apprehensions regarding misuse of funds are valid. A unique system that the tribal villagers in Mendha of Gadchiroli district, Maharashtra have come up with could prove as a useful guideline in preventing misuse of funds. The corpus fund can be put into an account in the UPC's name in a local bank. The account shall be in the name of two members. Two other people would be authorized to withdraw money. The people who withdraw the money cannot spend it. Only some other members are authorised to spend the money. The account of the money spent will be maintained by two other members and disclosure of the accounts to the villagers or any other concerned people is done by people who have not been involved with any of the above. This ensures a large amount of transparency of the accounts (Pathak & Gaur-Broome, 2001).

Sr. No.	Perceived Problems	Suggested Solutions	Decisions arrived at	Implementing Agency
1.	Ban on fishing in the sea by local fisherfolk using traditional gear	Traditional fishing, during mass nesting season, to be allowed except fishing activity involving gill nets. Alternative livelihood options to be explored such as eco-tourism, backyard hatcheries etc.	Fisherfolk will voluntarily stop fishing activity during the 7-10 day period of mass nesting and mass hatching. For the rest of the four months, they will continue to fish. Eco-tourism to be carried out on an experimental basis from the next turtle season by equipping Purnabandha village with a well-equipped nature interpretation centre. Simultaneously, training of village youth as tourist guides will also be carried out.	The Uniform Protection Committee (UPC) will oversee the implementation of the self-imposed ban and non-use of gill nets during the mass nesting/hatching period. Tourism Dept. to regulate the no. of tourists arriving at the mass nesting area through their publicity campaign specifying that only a limited number of visitors will be allowed on the beach during mass nesting. They will also be responsible for the transportation of tourists up to the village from where the villagers will take over. Issuing of tickets to tourists and assigning a group of tourists to one guide to be carried out by villagers. Training of tourist guides and setting up of a meaningful nature interpretation centre will be the responsibility of the Wildlife Division in consultation with NGOs such as CEE, KV, WPSO,

				UAA.
2.	Loss of livelihood due to turtle conservation measures	Apart from the above mentioned options to supplement the income, cash compensation to be given to the affected active fisherfolk.	Relief-cum-Savings Scheme of the Fisheries Dept. that was running five years back to be revived and upgraded to current standards. Since there was no appropriate authority from the Fisheries Dept. side no concrete decision could be taken on this. However, the Fisheries Dept. had informed that due to financial crunch (because of a slashed budget), the Fisheries Dept. could not carry on with the scheme.	The Wildlife Division will contribute some amount for this scheme. They will also make efforts to pressurise the state govt. to increase the budget for the Fisheries Dept.
3.	Prawn seed collection.	A complete ban on this activity would have been ideal for the Fisheries as well as the Forest Dept. Alternative occupations, such as eco-tourism or culturing of crabs (*pani kankada*) could be adopted. It was also suggested that the Fisheries Dept. should stop the manufacture of *Irigari*[5] nets. It was also suggested that marine squad members could check the transport of prawn seeds to the market, by conducting surprise raids at check posts. This method was effective in checking the collection of prawn seeds for some time during	As mentioned earlier, because of the absence of the relevant authority from the Fisheries Dept., concrete decisions could not be taken. The present marine squad with members from the Fisheries and the Police need to conduct frequent raids at check posts to check the prawn seed trade.	The UPC would be responsible in implementing the ban on prawn seed collection in the nesting area during the nesting season.

[5] Small mesh size nets used to catch prawn seeds.

		the tenure of the previous Fisheries Director.		
4.	Turtle mortality – Dead turtles washing up ashore due to incidental/ intentional killing by trawlers and gill netters.	The need for better co-ordination between the Forest Dept. and the Coast Guard came up during the meeting wherein the Forest Department informed that steps are being taken to remove the various hurdles between the two agencies such as, for instance, incompatibility in the transmitting frequencies between the Coast Guard and the Wildlife Division radio transmitters. The Forest Dept. should involve the local fishermen in nabbing the errant/illegal trawlers. Traditional fishermen should be given more powers to seize trawlers that cross the inshore limits. Efficient back–up facilities at the shore by the Forest Dept. or the local police required for handing over the seized trawler and for further legal procedures.	Fishermen at sea, on noticing an illegal trawler, will immediately report back to shore. Any of the UPC members would then notify the relevant authorities. It was decided that initially, atleast one Forest or Fisheries Dept. official would be present with the local fishermen when they seize an illegal trawler. This would send out a message to the trawler owners that local fisherfolk will actively assert their rights over the ten km region with active support from the govt. It is hoped that this will dissuade the trawler owners from entering the ten km region in future.	Overall co-ordination at the field and at the highest level among the Coast Guard, Forest Dept., Fisheries and Police is required in order to effectively stop this.
5.	Natural predation of eggs by	Fencing off the mass nesting area and deployment of some	Constituents of the UPC to be decided before the nesting	Overall implementing agency – United

	jackals, dogs etc.	patrolling members has been suggested. [See Picture]. Protecting the egg *in situ* as well as by transferring them into hatcheries during sporadic nesting season, would compensate for the loss of eggs through natural factors during mass nesting season. Patrolling to be carried out by UPC members.	period begins. *In situ* nest protection can be carried out by any UPC member. However, hatchery system of protection would require trained personnel from the Forest Dept. Additional training on the techniques of transferring eggs to be given to some of the UPC members, if required.	Artists Association - will oversee patrolling and fencing operations in tandem with the UPC, and also provide necessary equipment.
6.	Lack of awareness/ education on the importance of sea turtle conservation among the fisherfolk communities. (Although there is a religious belief that the sea turtle is an incarnation of Lord Vishnu, but which is now on the wane).	A sea turtle conservation awareness program can be initiated in these villages, by integrating the program with the UN sponsored disaster management awareness program that is currently going on in Ganjam block. This program has been recently initiated by UN programme officers in co-ordination with the Block Development Office and local NGOs.	The institutional mechanisms and infrastructure of the disaster management awareness program could be utilised as a tool for spreading awareness on the importance of sea turtle conservation. Besides the local communities, generating awareness among the urban communities, especially among those residing in the towns/ municipalities around Rushikulya river mouth (Ganjam, Humma, Chhatarpur) need to be given adequate importance too.	The Block Development Officer along with the UN disaster management awareness programme co-ordinator would be the key implementing agency of the conservation awareness program (after intimation through proper channels). The overall co-ordination of the awareness program would be carried out by the United Artists Association – a local NGO working with the fisherfolk communities. The Forest Dept., Centre for Environment Education (CEE) and other NGOs or agencies will support with relevant education material.

7.	Lighting near the beach affecting the hatchlings adversely.	Switching off the powerful factory lights during mass nesting and mass hatching.	On intimation from the villagers, the factory management will switch off the affecting lights.	The UPC members will be responsible to intimate the factory management regarding switching the lights off whenever mass hatching or mass nesting begins.
8.	Beach related activity by the locals such as walking over the beach and parking of boats harming turtle nests.	A little bit of disciplining through awareness programs to encourage villagers to walk, as far as possible, along the inter-tidal zone would, to some extent, decrease the damage to nets where hatching is imminent. Parking of boats near the river mouth during the time period of mass nesting and hatching.	Villagers agreed to ensure that minimum damage was done to the nests due to walking activity. However, there was no consensus regarding parking of boats near the river mouth, as the villagers (particularly those of Gokhurkuda and Podampetta) found it very inconvenient to park their boats in the river mouth located 4-5 kms away.	UPC members, patrolling the beach, to oversee that locals stick to the inter-tidal zone as far as possible during the mass hatching period.
9.	Rushikulya mass nesting area designated as CRZ-III	It has to be redesignated as CRZ-I.		The Forest Department will take up this issue at the CZMA level as well as at the state secretary level. Kalpavriksh will draw the attention of the relevant authorities to this mistake and will urge them to correct it as soon as possible.

Implementation of the CBC plan

It is pertinent to note that any plan of this kind requires sincerity and dedication from the involved parties. It is seen that wherever government officials sincerely believe in community based conservation and respect the views of the local community, only there does an excellent example of

community based conservation come up. Unfortunately, the present system of administration is such that the implementation of various schemes and plans largely depend on the person in authority at that time. In other words, for all the community participation that we talk about, unless it is equally matched by concerned government officials and policies, this will be a wasted effort. It is hoped that local level NGOs will take up the over-all implementation of this plan, as they are best agencies to do so. Needless to say, promised co-operation from various government departments will go a long way in seeing what could perhaps be the first community based conservation effort of a sea turtle nesting site in India. The local NGO has been identified as United Artists Association who has been working with the fisherfolk communities of Ganjam district for more than twenty years. As mentioned in the plan, the role of the Uniform Protection Committee (UPC) will be extremely important.

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