Park – People Relationship and its Implications for Protected Area Management in Satpura Conservation Area, India

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Abstract
I studied park- people relationships in Melghat Tiger Reserve (MTR, Maharashtra) and Bori Wildlife Sanctuary (BWLS, MP) located in Satpura Conservation Area, having considerable tribal and non-tribal population dependent on forest resources of both protected areas (PAs). Socio-economic data were collected through household interviews in villages located within the PAs using open and closed-ended questionnaires. A total of 318 households (>20%) were sampled. While >50% were tribal households, >70% households were landless, marginal or small landholders. >80% families owned livestock. While >60% tribal households identified lack of employment opportunities within the PA and crop damage by wild herbivores as major problems; >50% households considered livestock predation a major conflict. More than 90% agro-pastoralist households in MTR were resentful of restrictions on livestock grazing. Alternative agricultural land was a major requirement for >50% families in BWLS as quite a few families were deprived of their landholdings due to submergence under the backwaters of Tawa reservoir which was built on the western side of the sanctuary. The creation of these two PAs in early 1970s has brought about significant changes in the dimension and equations of dependence. For local communities it translated in loss of economic opportunities and benefits which they traditionally derived. This has resulted in negative attitudes towards the forest department due to increased human-wildlife conflict bringing considerable strain on park-people relationships. Major management issues that need to be addressed are- dependence of local communities resulting in conflicts with the objectives of conservation and negative attitudes of the people towards forest department; inadequate coordination between forest department and district administration and other institutions/agencies working in the area; and lack of sensitization of forest staff in people related issues.

Key words: Satpura conservation area, local communities, park-people relationship, human-wildlife conflict, management issues

INTRODUCTION

In India, reserved and protected forests were established during the 19th century, with the prime objective of harvesting timber and other produce, and also protecting and conserving forest ecosystems. This was done through policies, legislation and enforcement of laws to regulate the use of forest resources. Imposing restrictions on rural communities has resulted in a number of negative consequences such as, denial of access to traditionally used resources, illegal removal of timber and non-timber produce, increased depredations of crop and livestock by wild animals and at

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times, displacement of people from their traditional lands (Croft, 1981; Mishra, 1984; Calhoun, 1972; Lusigi, 1984; Hough, 1988 and Murthy, 1999). This has created a rift between the protected area (PA) managers and people. Relations between protected areas and their immediate neighbours have been a major problem in most countries (Shelton, 1983).

In 1990, the Wildlife Institute of India initiated a project in two of the PAs within Satpura Conservation Area (SCA) *viz*., Melghat Tiger Reserve (MTR) and Bori Wildlife Sanctuary (BWLS) with the objective of developing area specific guidelines for the management of these areas after examining the issues relating to local people's dependence on the forests and the resulting problems and conflicts (Musavi, *et al.* 2000). Both PAs are situated in the Satpura hills along the boundary between the states of Maharashtra and Madhya Pradesh within the 'Central Highlands' province of the Deccan Biogeographic Zone of Peninsular India (Rodgers and Panwar, 1988). In this paper I have examined the relationships between the management of MTR and BWLS and the local communities, majority of whom are tribals (80%), so as to identify the problems and to find ways for better long-term management strategy for the protected areas (PAs).

MTR and BWLS were created for long term conservation of biodiversity focusing on some of the most endangered species, especially the tiger. The considerable tribal and non-tribal population living in and around these two protected areas has been exploiting the resources of these forests for their survival since time immemorial, though the equations and dimensions have undergone a significant change.

STUDY AREA

MTR lies between 21° 15´ N to 21° 45´ N and 76° 57´ E to 77° 30´ E in the southern part of SCA. It covers an area of 1597 km² and comprises the Gugamal National Park, Melghat Wildlife Sanctuary and the Multiple Use Area (MUA). Melghat was declared a tiger reserve in 1973. Bori lies between 22° 19´ N to 22° 30´ N and 77° 56´ E to 78° 20´ E in the northern part of SCA. Bori was declared a wildlife sanctuary in 1975 and is much smaller in size (486 km²).

MTR consists of a succession of hills and valleys and has a rugged terrain. BWLS however has an undulating terrain. While the forests of Melghat and Bori are dominated by teak (*Tectona grandis*), Melghat typically represents the Central Indian dry deciduous forest and Bori represents the South Indian moist deciduous forest (Champion and Seth, 1968). Both the PAs are rich in floral and faunal diversity and have environmental and derived values, in terms of soil conservation and maintaining water regimes (Sawarkar and Panwar, 1987), as well as providing sustenance and livelihood to the local people.

SOCIO-ECONOMIC SCENARIO

There are 61 revenue villages within the MTR and 17 forest villages in BWLS. Both PAs are inhabited by three major communities *viz*. a) Scheduled tribes, constitute 80% of the population. Major communities are Korku, Gond, Nehal, Burad and Rathiya who were hunters and shifting cultivators before the British took over these forests. Most of them are now engaged as labour and also practice subsistence agriculture; b) Scheduled and backward classes constitute 5% of the population. Communities in this group are Balai, Vanjari, Lohar and Gaolan. They practice

agriculture in addition to being employed in jobs or being engaged in commercial activities. c) Agropastoralists or Gawli constitute 15% of the population and their major occupation is dairying although some of them also practice agriculture. Originally the agropastoralists did not belong to these areas, but over the years have migrated into these forests from adjoining regions due to increasing population pressure and depleting resources. Most of the people living in and around the PAs are dependent on it for subsistence. The major sources of income are forestry works, which are continuing in adjoining reserved forests, collection of NTFP and commercial head-loading of fuelwood (in MTR). Agriculture in the region has been primarily for subsistence however it also helps the people to supplement their incomes. Moreover, most of the landholders, except those with large landholding, depend on the monsoons for irrigation. Over the years, population growth and the consequent increase in family size has resulted in fragmentation of agricultural fields leading to small non-viable parcels of landholding (Musavi, *et al*. 2000).

METHODS

I collected socio-economic data in the two PAs from 1993 to 1996. This was the first major study of people's dependence and resulting park-people relationship in the two PAs. The data collected are the only primary information on the villages in both study sites (Musavi, *et al*. 2000). Data were collected both from primary and secondary sources. As the villages were heterogeneous, I used stratified random sampling. Villages were classified on the basis of the size of human and livestock populations. More than 20% sampling was done in both the PAs (Table 1). Both closed / open-ended questions were used to gather socio-economic data. For easier interpretation fixed response questions were used to collect data on problems faced by the people on account of the restrictions on resource use and conflicts with the wild animals in the PAs. These were broadly divided into four categories viz., (i) Basic village amenities, (ii) livelihood issues, (iii) agriculture related issues and (iv) livestock related issues. During the household surveys, effort was made to interview the entire family together especially the adult members. This was done to reduce any gender or generation bias. The information obtained during the interviews and discussions was further corroborated with the information obtained through observations made by the author during her stay in each of the sample villages.

RESULTS

Dependence

Both PAs have large human and livestock populations which depend on them. This results in management problems for the forest department and thereby straining of the relationship between the PA managers and the local people. In MTR 243 households in 15 villages were sampled with a total population of 1616. Out of the sampled households 69% were tribal households while 31% were non-tribal households. In BWLS, 75 households were sampled in 5 villages with a total population of 485. Out of the sampled households 85% were tribal and 15% were non-tribal.

While 69% households in MTR and 92% of the households in BWLS owned land (Table 1) majority of them were marginal or small landholders (49.5% in MTR and 89.9% in BWLS). 30.8% of families in MTR and 8% families in BWLS were landless. Overall 8% of the households belonging to non-agropastoral communities had neither land nor livestock. The mean landholding size varied between 2.48 acres in

BWLS and 6.28 acres in MTR. There was significant difference (Kruskal-Wallis 1-way ANOVA $\chi^2 = 65.8036$, $p < 0.01$) in mean landholding size across communities varying between 2.69 acres (community A - Tribals in BWLS) and 9.7 acres (community B - Scheduled and backward classes in MTR). Traditional agriculture was practiced irrespective of landholding size. Agriculture was rain fed, and only the large landholders were able to hire diesel pumps for irrigating their fields. Consequently, not many people were able to grow the winter crop. The main monsoon crops were various indigenous varieties of paddy, soya bean and pulses, the main winter crops were wheat, gram and *jagni* (oil seed) (Musavi, *et al*. 2000).

The average livestock holding per family varied between 4.97 in MTR to 23.09 in BWLS. For communities A and B who are mostly engaged in agriculture mean livestock holding per family varied between 5 to 9 animals. Whereas for the agropastoralists the mean livestock holding varied between 19.96 to 23.09 animals. The livestock ownership pattern also showed significant difference across communities (Kruskal-Wallis 1-way ANOVA $\chi^2 = 38.4193$, $p < 0.01$) (Musavi, *et al*. 2000).

Table 1: Basic socio-economic information of Melghat Tiger Reserve and Bori Wildlife Sanctuary

Parameters	MTR	BWLS
Number of villages	61 (Revenue)	17 (Forest)
Human population	25196	4000
Livestock population	26499	7500
Villages sampled	15 (24.5)	5 (29.4)
Households sampled	243 (22.9)	75 (37.5)
Population sampled	1616 (26.4)	485 (35.4)
Tribal households sampled	167 (69.0)	64 (85.0)
Non-tribal households sampled	76 (31.0)	11 (15.0)
Landholders	168 (69)	69 (92)
Livestock holders	210 (86.4)	67 (89.3)
Households sampled	243 (22.9)	75 (37.5)
Population sampled	1616 (26.4)	485 (35.4)

Source: Records of the revenue department (Maharashtra) and forest departments of Melghat Tiger Reserve and Bori Wildlife Sanctuary and primary data collected during the course of this study.
MTR=Melghat Tiger Reserve; BWLS=Bori Wildlife Sanctuary.
Figures in parentheses are percentages of the total of each parameter.

The local economy was a subsistence economy with people depending on various forest resources throughout the year, both directly and indirectly. Agriculture was primarily for domestic consumption and only the surplus was sold or exchanged in weekly markets for essential commodities like salt, pepper, oil, etc. The local communities were therefore heavily dependent on forest produce not only for grazing their livestock but also for their sustenance, especially during monsoons as the previous year's agricultural produce was exhausted by that time and the roads were cut off in remote villages making it necessary for the people to depend on the forest. The seasonal calendar of major activities shows the extent of people's dependence on the forests (Table 2). Most of the local communities both tribal and non-tribal in the two PAs, except the agropastoralists of MTR followed the same activity pattern.

Moreover, in areas where the forests had become degraded, agriculture and labour activities also formed a source of income.

Table 2. Seasonal calendar of subsistence activities of sampled households in Melghat Tiger Reserve and Bori Wildlife Sanctuary

Activity Pattern	Months											
	J[1]	F	M	A	M	J[2]	J[3]	A[1]	S	O	N	D
Cultivation & Agriculture	*	*	*				*	*	*	*	*	*
Collection of Mahua flowers & seeds			*	*		*	*					
Collection of Tendu leaves				*	*							
Collection of tubers, bamboo shoots, mushrooms, etc.							*	*	*	*		
Collection of grasses & fodder	*									*	*	*
Agricultural labour	*	*	*					*	*	*		
Forest labour		*	*		*	*					*	*
Repair of houses, fence, agricultural implements, etc.					*	*						
Storage of fuelwood	*	*	*	*	*	*					*	*
Fishing	*	*	*					*	*	*	*	*

(J[1]=January; F=February; M=March; A=April; M=May; J[2]=June; J[3]=July; A[1]=August; S=September; O=October; N=November; D=December).

Problems and conflicts

The creation of the two PAs in the 1970s had created certain problems leading to conflicts between local people and PA officials. The use of the PA resources like the waterholes and extraction of grasses and timber often led to problems like spread of diseases from domestic livestock to wild animals, attack on the people and grazing cattle by the predators, forest fires which were set by the agropastoralists, etc. Moreover, the PA managers had to face the problem of hunting of wildlife by the local people using traps and dogs, mostly for domestic consumption. At times the local people resorted to killing of wild animals, especially the Sambar and Wild pig, by using country made bombs; poisoning the carcasses of livestock to kill tiger and leopard. This may take a serious turn in support of illegal trade in wild animal products. The local people also harvested fish illegally by blasting bombs under the water and poisoning the water bodies using agricultural pesticides and insecticides, even though they were permitted to catch fish for domestic consumption, using indigenous methods like nets (Musavi *et al*. 2000).

The sample households were asked to respond to a list of problems and conflicts that they faced in the PA; these were broadly sub-divided into four categories viz., basic village amenities, livelihood issues, agriculture related issues and livestock related issues (Table 3). Under each of these categories the families responded to a set of listed problems and conflicts.

Table 3. Problems and conflicts in Melghat Tiger Reserve and Bori Wildlife Sanctuary.

Problems / Conflicts	Melghat Tiger Reserve			Bori Wildlife Sanctuary	
	A	B	C	A	C
Basic village amenities					
Lack of drinking water for people	71.86	68.75	35.71	51.56	36.36
Lack of medical facilities	25.75	33.33	28.57	89.06	100.00
Unavailability of electricity	22.75	27.08	25.00	7.81	-
Lack of education facilities	3.59	10.42	7.14	1.56	-
Improper roads	11.98	25.00	7.14	76.56	90.91
Livelihood issues					
Lack of employment opportunities	63.47	85.42	14.29	90.63	81.82
Unavailability of land	8.98	22.92	3.57	57.81	90.91
Shortage of fuelwood	11.38	22.92	3.57	-	-
Shortage of timber	25.15	41.67	14.29	3.13	-
Agriculture related issues					
Lack of irrigation facilities	77.25	54.17	35.71	78.13	90.91
Crop raiding	71.85	56.25	28.57	90.63	100.00
Lack of protection from crop raiding	71.25	62.50	39.29	85.94	90.91
Livestock related issues					
Shortage of fodder	31.14	47.92	92.86	15.63	18.18
Lack of drinking water for livestock	56.87	54.17	53.57	43.75	9.09
Livestock predation	5.39	12.5	7.14	56.25	54.55
Lack of veterinary services	22.75	31.25	50.00	87.50	100.00

A=Scheduled tribes; B=Scheduled castes and backward classes; and C=Agropastoralists. The figures are percentages of sampled families in each community group.

Basic village amenities

Five problems were listed in this category i.e., lack of - drinking water for people, medical facilities, education, unavailability of electricity and improper roads. Lack of drinking water was considered a major problem by >50% households in both PAs, except agropastoralis. While lack of medical facilities was considered a major problem by >80% of tribal and agropastoralist households in BWLS <50% households of all communities in MTR considered it as a problem. Improper roads were considered as a problem by >75% of households in both communities of BWLS and ≤ 25% households in MTR. Unavailability of electricity was considered a

problem by of ≤27% households in MTR and BWLS. Lack of education facilities was considered a problem by ≤10% households in both PAs.

Livelihood issues
There were four livelihood issues, i.e., lack of employment opportunities, unavailability of land and shortage of – fuelwood and timber. Lack of employment opportunities was considered a major problem by >60% households except the agropastoralists in MTR. Unavailability of land was considered a problem by >50% households in BWLS. Less than 25% households in the two PAs considered shortage of fuelwood as a problem, however, 41% of families of scheduled and backward classes considered shortage of timber as a problem.

Agriculture related issues
The major issues in this category were lack of irrigation facilities, crop raiding and lack of protection from crop raiding. Except for the agropastoralists in MTR, >50% of the families considered lack of irrigation as a major problem. Moreover, >50% of families of these communities also considered crop raiding and lack of protection from crop raiding as a major problem.

Livestock related issues
The four major issues in this category were shortage of fodder, lack of drinking water for livestock, livestock predation and lack of veterinary services. Shortage of fodder was considered a major problem by >50% agropastoralist families in MTR only. Lack of drinking water for livestock was considered a problem by >50% of families across all three communities in MTR. Livestock predation was considered a problem by >50% tribal and agropastoralist households in BWLS. Lack of veterinary services was considered a problem by 50% agropastoralist families in MTR and >80% tribal and agropastoralist families in BWLS.

Overall, inadequate or lack of employment opportunities was considered a major problem by majority of the households (>60%) from all the communities, except the agropastoralist families of MTR Fodder shortage for the livestock was considered a major problem by the agropastoralists in MTR (>90%) and they were resentful for not being allowed to graze their cattle in the National Park and Tourism Zone of MTR. However <50% households of other communities considered fodder shortage as a major problem. Unavailability of land was considered a problem by 57% - 90% of households of both communities in BWLS. Crop damage by wild herbivores was considered a major issue by >50% of households in both PAs, except the agropastoralists in MTR (28%). Livestock predation however, was considered a major issue by >50% of the households belonging to both tribal and agropastoralist communities from BWLS as compared to the households from MTR (5% -12%).

DISCUSSION

The long-term survival of a protected area may depend to a great extent on the goodwill and support of the people living in and around it. Conflicts with local communities have occurred practically throughout the world wherever PAs were created ignoring the local people's social, economic and political aspirations (Lusigi, 1981; Abel and Blaikie, 1986; Carew-Reid, 1990; and Talbot and Olindo, 1990). The problems are exacerbated in developing countries where rapidly growing human and livestock populations are putting increasing pressure on often fragile ecosystems

and the governments do not have the resources to invest in protected areas (Hannah, 1992; Durbin and Ralambo, 1994).

Another factor that has proved detrimental to conservation has been the sectoral programmes of other agencies in the region. These programmes are mostly counter-productive to the conservation efforts of the PA managers. It has also proved difficult to make these governmental agencies to change their policies. Unfortunately the laws governing the PAs have also alienated the local people from the PA managers Lal, 1989; Musavi *et al*., 2000). Consequently most of the PAs, including the intensively managed tiger reserves, are facing management problems such as growing conflict between conservation goals of the PAs and interests of local communities living in and around PAs, significant increase in poaching of wild animals, crop raiding incidence by herbivores and man eating and livestock depredation by large carnivores.

In MTR and BWLS, the five major problems and conflicts that emerged from this study were i) lack of employment opportunities within the two protected areas, ii) shortage of fodder for livestock; iii) unavailability of land for agriculture iv) crop damage by wild herbivores and v) livestock predation by wild animals. Over the years, the rift seems to have widened between the local people and the managers of the two protected areas. Most people held the change in status of these forests to National Park, Sanctuary or Tiger Reserve, as being responsible for their problems.

Lack of employment opportunities - The local people especially the non-agropastoralists were traditionally employed as labour in forestry operations. However, these operations were stopped with the passing of legislation against any commercial activity within the protected areas. Consequently, majority of the local communities feel deprived of their livelihood due to loss of employment opportunities within the two PAs. The remoteness of the area, especially BWLS, has aggravated the problem further. As a result, quite a few of the families are seasonally disturbed or displaced from their homes as they go in search of employment opportunities in towns and urban centres. This period coincides with the slump in employment opportunities in the agricultural sector in the villages inside the PAs. Moreover, the few employment opportunities available with the forest department are not a very dependable source of income due to delayed wage payments attributable to the pattern of flow of funds.

Shortage of fodder - The agropastoralists from MTR are resentful at not being permitted to graze their livestock in the NP and Tourism Zone of MTR, where there is plenty of grass due to absence of grazing by domestic livestock. For other communities it is not such a major problem. One probable reason for this could be the large livestock holdings of the agropastoralists in MTR (more than 19 animals per household) and the age-old pernicious practice of grazing cattle through cattle camps (haites). However, even though the mean livestock holding for the agropastoralists from Bori is higher (23 animals per family), shortage of fodder is considered a problem by less than 20% of the families. This could be due to three reasons, i.e., (i) total domestic livestock population for MTR was higher (20 animals per sq. km) compared to that of Bori (15 animals per sq. km) causing overgrazing leading to non-availability of fodder in the areas close to the villages; (ii) the forests of Melghat are of 'dry deciduous' type, whereas that of Bori are of 'moist deciduous'

type. Consequently, most of the grasses and leaves dry earlier in MTR, while in Bori they are available for a longer period; (iii) while the agropastoralists in Bori also practice agriculture, majority of them in MTR (64% families) do not own any land. As a result most of them are completely dependent on earnings from livestock for their livelihood. Moreover, they do not have the agricultural by-products and residue for feeding their livestock. Therefore, these families have to migrate with their livestock, to areas outside the Reserve in search of fodder and pastures. This annual migration causes hardship to the agropastoralist families and they hold the Project Tiger officials responsible for their problems.

Unavailability of land for agriculture - More than 50% of the households from both communities in BWLS consider unavailability of land and marginal landholding as a major problem. Primarily this is because quite a few families were displaced from the western side of the Sanctuary as the villages in this area have come under the submergence of the backwaters of the Tawa Reservoir. However, no compensation or alternatives have so far been provided to these families, and they have been subsisting without land in other villages of the Sanctuary. As a result most of them have to either depend on labour employment opportunities within and outside the PA for their sustenance, or rent land or undertake share cropping. This pushes them into the vicious 'debt trap'.

Crop damage by wild herbivores - Crop damage by wild herbivores is another conflict area for most of the non-agropastoralist households, as well as the agropastoralists of BWLS. Most of these families practice subsistence agriculture and depend on its produce for sustenance. However, the agropastoralists of MTR do not perceive it as a major problem as most of them are landless (64% families) and their primary occupation and source of livelihood is dairy farming and its allied activities. Agriculture is only a secondary source of livelihood for most of them. Crop depredation by wild herbivores has reportedly been a regular occurrence in villages within and adjacent to forests for a long time and people have lived with this problem for centuries. But in the present scenario they consider the establishment of PA and the consequent protection given to the wild animals, as well as the ban on the use of firearms for crop protection, which have resulting in increasing the numbers of wild herbivores.

Livestock predation by wild animals - Livestock predation is considered a major conflict by communities in Bori as compared to those in MTR, although the latter has a far higher number of the large predators viz, tigers and leopards. Also, the cases of livestock predation are comparatively higher (more than 360 cattle kills per annum) in MTR. However, due to a larger number of Territorial and Project Tiger field staff being posted in the villages, the recording of the cases and the disbursement of the compensation is a speedy process therefore the people were less antagonistic towards the forest department. On the contrary, the perceived casual attitude of the forest staff towards recording cases and disbursing compensation in BWLS is a major source of resentment of the local people towards the former. There are several conditions that need to be met before compensation can be settled and often the time taken to do so is attributed to ‘casual attitude’. There off course may be some cases with avoidable delay.

In India too, the forest department has been taking new initiatives aimed at participatory decision-making approach and allowing the local communities to share the benefits of management. This has given encouraging results in some of the areas (Panwar, 1982; Saharia 1984; Lehmkuhl, et al., 1988; Bahuguna et al., 1994; and Dhar, 1994). In the present scenario, this approach holds ample scope for the future, provided there is commitment, not just on part of the forest department but people too.

CONCLUSION

With change in legal status to a PA, legal restrictions have been imposed on extraction of resources from these forests. Consequently, people's perceptions of their problems have changed. As a result of this, the relationship between people and the PA manager has come under considerable strain leading to conflicts between the people and wildlife. Moreover rapid rise in human and cattle populations and increasing biotic pressures have led to more encounters between people and wildlife. This has created negative attitudes of the people towards the Forest Department.

Thus while on one hand it is the struggle for day to day survival for subsistence on the other hand it is the un-sustainability of this resource-use which is undermining the conservation efforts. Moreover, the legal restrictions on resource-use have resulted in people's perceptions of their problems being intensified as opposed to direct costs due to damage by wild animals. Relations between parks and their immediate neighbours have always been a major problem everywhere, especially in the tropics, as the local people want to continue to exercise their traditional rights. Nepal and countries in the African continent have also experienced growing park-people conflicts (Newmark *et al*., 1993). Various strategies, including participation of local people have been explored to tackle this problem (Mishra, 1982; Western, 1982). Allowing local people 'controlled access' to certain resources of the protected areas may be necessary for meeting their critical resource-needs. Moreover, permitting such uses can also build local support for these protected areas (Lehmkuhl et al., 1988 and Schelhas, 1991). Such experiments have been successfully tried in Amboseli National Park, Kenya, Royal Chitwan National Park, Nepal and Kosi Tappu Wildlife Reserve, Nepal. Local participation may help in creating social fencing of the forests.

Therefore major management issue is the protected area-people relationship, which can only be addressed by increasing the coordination between district administration and the forest department and undertaking training and motivation of the forest staff, especially in terms of people related issues as well as. The Forest Department can also take up ‘Trust building activities’ like free health and medical facilities, improving primary and secondary education facilities and also arranging for vocational training of the youth to help them in being self sufficient, and will make the new generation less antagonistic towards the Forest and Wildlife officials and more aware of its responsibilities towards conservation. Moreover, the Forest Department has a potential to play a major role in developing an institutional set up for inter-departmental coordination, across agencies operating in the area, with the former acting as the nodal agency, as they best know what can be beneficial or detrimental to the objectives of conservation. MTR set an example in initiating a workshop in 1995 of all government agencies in the area (e.g., tribal welfare, irrigation, soil and

moisture conservation, agriculture) and various local NGOs, to help in developing greater coordination between the departments. These agencies can collectively help local people to adopt improved and appropriate techniques of dry farming, water harvesting, soil conservation, animal husbandry, agro-forestry, etc., aimed at enhancing their income from on- and off-farm activities, so as to reduce their dependence on the forest.

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