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# Farmer's perception towards adoption of bamboo in Mahi ravines

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### ABSTRACT

In this paper, a PRA study was carried out in Khorwad watershed located on the bank of the river Mahi in Umreth taluka of Anand district in Gujarat state during December, 2011. The farmers' perception towards adoption of bamboo in Mahi ravines was studied with the help of PRA techniques in detail. Mapping of social habitation and resources availability in Khorwad watershed was done. It was found out that few farmers of Khorwad watershed were cultivating bamboo in ravine wastelands and boundaries of their farms, whereas they were cultivating crops and fruits trees on leveled lands on upper side of Mahi ravines. Seasonal analysis of bamboo cultivation activities in Mahi ravines is also dealt in the paper. The different activities of bamboo cultivation were carried out by the farmers and they were very much busy in the month of April to June. The transect walk was also carried out along with the local farmers to verify and observe the information provided by the villagers during PRA exercise. The preference of bamboo adoption in Mahi ravines by the farmers was studied and it was found out that the 33.3 per cent of farmers of Khorwad village preferred bamboo plantation in ravine beds. A few farmers of other villages preferred bamboo plantation in ravine wastelands. The problems faced by farmers in bamboo adoption in Mahi ravines were found out with the help of matrix analysis technique. The farmers of Khorwad watershed perceived the wild animals attack and termite attack as major problems in the Mahi ravines area in bamboo cultivation.

### 1. INTRODUCTION

Adoption is the mental process through which an individual passes from hearing about an innovation to final adoption. Adoption is a sequence of thoughts and actions, which an individual goes through, before he finally adopts a new idea (Rogers, 1962).

Extent of Adoption of soil and water conservation technologies varies from farmer to farmer according to their knowledge and understandings about conservation measures. Some farmers are innovators who adopt the improved innovations of natural resource conservation measures immediately but some farmers are laggards who are very slow and last to adopt innovations. Adoption of soil and water conservation innovations depends on situation and needs of the ultimate user. Adoption of Soil and Water Conservation (SWC) technologies is also affected due to very high initial requirement of money in adoption of SWC structures and resource poor farmers are unable to afford high cost of adoption.

Participatory Rural Appraisal (PRA) helps in interacting with local communities, for understanding and learning from them. It facilitates the process of involvement of local stake holders for harmonizing with their indigenous knowledge. It is a way of learning from and working with community members to investigate, analyze and evaluate constraints and opportunities as well as make informal and timely decisions about development initiatives.

PRA is a means of generating different kinds of data, identifying and mobilizing intended groups, evoking their participation and also opening multi-way channels with stake holders. This banks upon the intimate knowledge of the community about local resources and empowers them for decision making, project designing, execution, monitoring and evaluation. It provides an alternative frame work for data collection and analysis, to focus attention on people, their livelihoods, socio economic relationships, local solutions and ecological imperatives (Samra, 1998).

PRA, as practiced in the field, has given rise to different schools of thoughts with difference in style and emphasis (Chambers, 1996).

As per latest harmonized database on land degradation in India, about 120.72 million ha is degraded, primarily due to water erosion (82.57 million ha), which contributes 68% with erosion rates more than  $10 \text{ t ha}^{-1} \text{ y}^{-1}$  (Anonymous, 2012). In India, 3.67 m ha area is covered under ravine lands which constitute 1.12% of total geographical area of 328 m ha (NCA, 1976). In Gujarat, ravine belt covers 500,000 ha area and extends from the southern bank of Tapi, banks of Narmada, Watrak, Sabarmati and Mahi basins (Dhruvanarayana, 1993). Ravines of Mahi River pose considerable threat to the adjacent agriculture lands as the top soil is eroding at  $28.34 \text{ t ha}^{-1} \text{ y}^{-1}$  as per a study undertaken by Foundation of Ecological Security (FES). Using Remote Sensing imagery it is estimated that the extent of such ravenous land along the River Mahi is about 19,000 ha and is spread over 107 villages (FES, 2008).

Researchers have clearly established the importance of bamboo plant as an effective means for natural resource conservation. Various research findings have reported positive utility of bamboo plantation for enhancing natural resource conservation (Lawler, 1993; Yanhui *et al.*, 1995). Zhou *et al.* (2005) reported that soil erosion was low in bamboo plot ( $178.15 \text{ kg ha}^{-1}$ ) as against other types of forest plantation. Sharma *et al.* (1992) have also reported that bamboo conserves soil moisture and mitigates the adverse effects of drought on flora and fauna.

Thus, keeping these points in mind the study was undertaken with the main objective to study the farmers' perception towards adoption of bamboo (*Dendrocalamus strictus*) in Mahi ravine areas with the help of PRA techniques

## 2. MATERIALS AND METHODS

A PRA study was carried during December, 2011 in Khorwad watershed regarding farmers' perception towards adoption of bamboo in Mahi ravine areas. Khorwad watershed is located on the bank of the river Mahi in Umreth taluka of Anand district of Gujarat. The Khorwad watershed

comprises of five villages namely Khorwad, Navapura, Timaliyapura, Prabhatpura, and Waghmarepura. The Khorwad watershed area was selected purposively in the study because the Khorwad watershed was adopted by Central Soil and Water Conservation Research and Training Institute, Research Centre, Vasad under National Bamboo Mission project for bamboo plantation. The Tree Growers' Cooperative Society (TGCS), formed by farmers of Khorwad watershed, managed bamboo plantation in community land with the support of Foundation for Ecological Security (FES) an NGO located in Anand, Gujarat. The Khorwad TGCS was organized and registered in 1992 with the active support of FES. The Government of Gujarat leased an area of 40 hectares to the TGCS cooperative in 1993 in Mahi ravine wastelands for development through plantation of different tree species. Bamboo plantation was done on the same land. PRA techniques were applied under this study for data collection and their analysis.

## 3. RESULTS AND DISCUSSION

### Adoption of Bamboo

Adoption or acceptance of a new idea is not a unit act but a complex process involving a sequence of thoughts and actions. Usually decisions are made after multiple contacts with various communication channels. These contacts are made over a period of time (Reddy, 1987).

Adoption behaviour varies from person to person according to their knowledge and understandings. Some people in rural villages adopt innovations immediately but some people are slow to adopt innovations. Some people accept innovations and put them into practices quickly, while some others are slow to put innovations in practice. Adoption of innovations also depends on felt needs of the ultimate user. Adoption of bamboo plantation in the villages is given in Table 1.

Table 1 revealed that 16.66 percent of farmers in Khorwad village adopted bamboo in their fields, followed by 15.78 per cent of farmers in Prabhatpura, 13.33 per cent in Waghmarepura, 10 percent farmers in Timaliyapura

**Table: 1**  
**Adoption of bamboo by farmers of Khorwad watershed villages in Mahi ravines**

Khorwad Watershed Villages	Total number of farmers	Number of farmers adopted bamboo in ravines	Percent of farmers adopting bamboo
Khorwad	150.00	25.00	16.66
Navapura	80.00	5.00	6.25
Timaliyapura	20.00	2.00	10.00
Prabhatpura	19.00	3.00	15.78
Waghmarepura	15.00	2.00	13.33
Overall	284.00	37.00	13.02

adopted bamboo and only 6.25 percent of farmers in Navapura village adopted bamboo in their fields in Mahi ravines. The table also revealed that overall 13.02 percent farmers of Khorward watershed adopted bamboo cultivation to earn income from wasteland of ravines. It was found that a few farmers cultivated bamboo in their ravine fields.

### Seasonal Analysis of Bamboo Cultivation Activities

Seasonal analysis was carried out to identify patterns of peak and low points in various aspects pertaining to bamboo cultivation in village environment. Seasonality was analyzed with the aim to have information regarding fluctuations in bamboo cultivation operations in a year. The data in Table 2 shows the seasonal analysis of bamboo plantation activities carried out by farmers of Mahi ravine area.

The farmers applied irrigation to bamboo seedlings during January to June months of a year. The farmers were busy in the month of April and May in cleaning land and digging of pits for plantation of bamboo seedlings. In the month of June and July, they carried out the operation of planting of bamboo seedlings after termite treatment in the soil of already dugout pits. The farmers applied irrigation to bamboo seedlings from the month of August to December. The weeding and cleaning activities in the bamboo cultivation were carried out during the month of August and September. The farmers were also protecting the newly planted seedlings by surrounding them with bushes in the

month of June and July. Farmers also applied fertilizer to bamboo plants during the month of August.

### Transect Walk in Khorward Watershed Area

Transect walk was carried out across the village along with a group of old and young farmers, who were cultivating bamboo in Khorwad watershed. Villagers having good knowledge of the topography, settlement pattern, resources and land use pattern of the whole watershed, were involved in this activity.

It was revealed that soil type of the upper and middle area of Khorward watershed was sandy loam, whereas in the lower sides the soil type was sandy. The slope of land was 2 to 3 per cent in Khorwad watershed area. The major crops grown by farmers in leveled lands on upper side of Khorward watershed ravines were tobacco, bajra and paddy and none of crops were taken in middle and lower side of watershed ravines. Mango, blackberry, guava and sapota fruit plants were cultivated on upper side of ravines on table land. Papaya was cultivated in middle side of ravines by some farmers and in lower beds grasses were grown. The most favoured forest trees by farmers in the Mahi ravine area were neem (*Azadirachta indica*), babul (*Acacia nilotica*), ardusa (*Ailanthus excelsa*), and jungle jalebi (*Inga dulce*). In lower side of ravines, farmers planted shrubs, babul and bamboo. The wild life attack in Mahi ravine area was observed highest in lower sides of ravine and less on upper side of ravines on table lands (Table 3).

**Table: 2**  
Seasonal analysis of bamboo cultivation activities

Activities	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Land Cleaning				√	√							
Pit making					√							
Termite Treatment						√						
Plantation						√	√					
Irrigation	√	√	√	√	√	√						√
Weeding & Cleaning								√	√			
Protection of seedling						√	√					
Apply Fertilizers								√				

**Table: 3**  
Transect walk with farmers in Khorwad watershed area to observe land use pattern in the Mahi ravine area

Particular	Upper side of Khorwad watershed	Middle side of Khorwad watershed	Lower side of Khorwad watershed
Soil type	Sandy loom	Sandy loom	Sandy
Slope	2 - 3%	2 - 3%	2 - 3%
Crop	Tobacco, Pearl millet, Paddy	Chili	————
Fruits	Mango, Jamun, Guava, Sapota	Papaya	————
Trees	Neem ( <i>Azadirachta indica</i> ), Babul ( <i>Acacia nilotica</i> ), Ardusa ( <i>Ailanthus excelsa</i> ), Jungle jalebi ( <i>Inga dulce</i> )	Neem, Babul, Kanaj ( <i>Holoptelia integrifolia</i> )	Akada ( <i>Calotropis procera</i> ), Shrubs, Babul, Bamboo
Wild life attack	Low	High	Very high

### Farmers' Perception towards Bamboo Adoption

Preference ranking was done to know farmers' attitude towards a particular item of interest. This helped in enlisting the choice of the rural community about bamboo cultivation in Mahi ravines. The Table 4 shows the perception of farmers towards bamboo adoption in their fields in Mahi ravine areas. It was found that about one-third (33.30%) of farmers of Khorwad village desired to adopt bamboo plantation in their fields. About 13.30 per cent farmers of Waghmarepura village, followed by 12.50 per cent of Navapura village farmers desired to grow bamboo in their fields in ravines to earn income from the waste Mahi ravine lands. Few farmers (13.30%) of Waghmarepura village were already cultivating bamboo on their field boundaries. The above data shows that overall about one-fifth (21.90%) population of farmers was having ravine wastelands in Mahi ravineous area without cultivating any crop in these lands and now, after bamboo plantation under National Bamboo Mission project in degraded Mahi ravines in the

Khorwad watershed area, these farmers have shown their interest to cultivate bamboo in their Mahi ravine waste lands to earn income from degraded wastelands.

### Problems in Adoption of Bamboo Cultivation

Matrix ranking was done to prioritize the constraints faced by farmers in adoption of bamboo cultivation in Mahi ravine area. The matrix analysis exercise attracted large participation of farmers from all the sections of the society of Khorwad village. The Table 5 reveals that all farmers perceived that wild life attack on bamboo plants is the most dangerous problem. The wild life attack causes maximum damage in bamboo plantation in Mahi ravines. The major damages in the bamboo plantation were due to monkey, blue bulls and pigs. Majority (87.50%) of farmers perceived that termite attack on bamboo plantation was also a major constraint in bamboo cultivation. Three-fourth (75.00%) of farmers surveyed were of the opinion that the lack of protection was also a problem in bamboo cultivation. Fifty per cent of farmers considered the non-availability of good

**Table: 4**  
**Farmers' perception regarding bamboo adoption in their fields in Mahi ravines**

Khorwad Watershed Villages	Number of farmers want to adopt bamboo	Area to be covered (Acre)	Total number of farmers	Percent of farmers preferred bamboo adoption
Khorwad	50.00	42.00	150.00	33.30
Navapura	10.00	15.00	80.00	12.50
Timaliyapura	0.00	0.00	20.00	00.00
Prabhatpura	0.00	0.00	19.00	00.00
Waghmarepura	2.00	Boundary plantation	15.00	13.30
Overall	62.00	57.00	284.00	21.80

**Table: 5**  
**Problems faced by farmers in adoption of bamboo in Mahi ravines**

Problems	Market ing	Good variety	Techno logy	Seed ling	Water scarcity	Protection	Money	Termite attack	Wild life attack	Magnitude of problem
Lack of Market for bamboo (P1)	———	P2	P3	P4	P5	P6	P7	P8	P9	P1=0, (0.00%)
Lack of good variety (P2)	P2	———	P2	P2	P5	P6	P2	P8	P9	P2=4, (50.00%)
Lack of Technology (P3)	P3	P2	———	P3	P3	P6	P7	P8	P9	P3=3 (37.50%)
Lack of seedlings(P4)	P4	P2	P3	———	P5	P6	P4	P8	P9	P4=2 (25.00%)
Water scarcity(P5)	P5	P5	P3	P5	———	P6	P5	P8	P9	P5=4 (50.00%)
Lack of protection(P6)	P6	P6	P6	P6	P6	———	P6	P8	P9	P6=6 (75.00%)
Lack of money (p7)	P7	P2	P7	P4	P5	P6	———	P8	P9	P7=2 (25.00%)
Termite attack (P8)	P8	P8	P8	P8	P8	P8	P8	———	P9	P8=7 (87.50%)
Wild life attack (P9)	P9	P9	P9	P9	P9	P9	P9	P9	———	P9=8 (100.00%)

variety of bamboo seedlings as well as water scarcity as the problems during cultivation of bamboo in ravines. The lack of seedlings availability and money were also the problems faced by the farmers during bamboo cultivation as perceived by 37.50 per cent and 25.00 per cent of farmers respectively. The marketing facility is not a problem in Khorwad watershed area.

#### 4. CONCLUSIONS

The study revealed that a few farmers (13.02%) of Khorwad watershed adopted bamboo in their fields in Mahi ravine beds and they were cultivating crops on table lands on upper side of ravines. Those farmers, having only ravine lands, were cultivating bamboo in beds of ravine wastelands. It was also found that about one-fifth (21.90%) population of farmers of Khorwad watershed areas desired to adopt bamboo plantation in their fields. It shows that more number of farmers preferred bamboo adoption in their ravine wastelands but the major constraints in bamboo cultivation in Mahi ravines were wild life attack, termite attack and lack of protection as perceived by the farmers. Therefore, it can be concluded that the measures to protect bamboo cultivation from wild life attack and termite attack should be adopted by the famers collectively in Mahi ravines to increase bamboo cultivation in the area, so that the local farmers can increase their income from ravine wastelands by increasing bamboo cultivation in Mahi ravines.

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