



# Joint Forest Management and Community Forestry in India

An Ecological and Institutional Assessment

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## CHAPTER 12

# ECOLOGICAL AND ECONOMIC ASSESSMENT OF JOINT FOREST MANAGEMENT PROGRAMME IN TRIPURA

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### 1. Introduction

Historically, the Forest Department and tribal communities of Tripura have had conflicts over land use practices. The tribal communities in this region practice shifting cultivation (locally called "Jhum"). Previously, each rotation cycle lasted 10-15 years but now, crops are rotated every 3 to 4 years. This decrease in crop rotation cycle is considered to affect forests and lead to unsustainable land use. Besides jhum, the unsustainable and uncontrolled logging done to meet the increasing demand of urban industrial centres in India and Bangladesh has accelerated the pace of forest denudation in the state. Growing anthropogenic pressures caused by agricultural expansion and increased immigration across the international border have resulted in substantial depletion of the state's forest cover. The Joint Forest Management (JFM) resolution of the Government of Tripura provides a sound framework for collaborative planning and improving the forest management system.

Among the seven states of north-eastern India, Tripura was first to implement the JFM programme. It adopted and implemented the JFM resolution in 1991. By 1996-97, all the four districts of the state had been brought under JFM. At present, a total of 3203 ha of forestland, covering around 106 villages, is being managed and protected through JFM with active involvement of the Territorial and Social Forestry wings of the State Forest Department.

In recent years, the emphasis has been on involvement of the rural communities in protecting and managing the forests within the framework of JFM as envisaged in the Government of India order, 1990. The success of JFM in conserving and regenerating the forest areas and mitigating the problems of forest dwellers will depend on how the JFM schemes are implemented in the socio-economic and socio-cultural environs of the beneficiary communities.

The government of Tripura, vide resolution No.F 17(140) For Dev/90-91/470-30-529 dated 20<sup>th</sup> December 1991, has implemented the JFM programme in a phased manner in nine forest divisions namely, Kailashahar, Kanchanpur, Manu, Ambassa, Teliamura, Sadar, Udaipur, Bagafa and Jatanbari.

## 2. Location and Salient Features of the JFM Site

Tripura has a geographical area of 10,486 km<sup>2</sup> and the forest cover is nearly 53%. A net increase of 8 km<sup>2</sup> of forest area was recorded during 1993-1995 (FSI - 1997). West Tripura district, where our study site is situated, has 53% area under forest cover of which nearly 37% is dense forest and the remaining, open forest.

The JFM site where this study was conducted comes under Sadar Forest Division in Melaghar block, which belongs to the administrative sub division of Sonamura in West Tripura district. Its approximate position is: 23°30'48"N latitude and 91°21'10"E longitude. The altitude ranges from 20 m to 60 m above MSL. The core area is 100 ha and the fringe area is approximately 130 ha. The core area falls within the Melaghar Proposed Reserved Forest (PRF) as notified Vide NO. F-6-91/Land/For-89/3660 dated 19.2.93. This is one of the oldest JFM plots in the state and the programme was initiated in 1992-93. What was then a degraded forest, has now been sufficiently regenerated through JFM and the active involvement of an NGO, the Forest Department and local people. Therefore, the site was found most suitable to conduct studies on ecological and economic aspects of JFM with the following objectives:

- To document the institutional mechanism involved in the JFM programme.
- To understand the changes in vegetation attributes such as, species richness and phyto-sociological parameters, and status of natural regeneration in response to protection.
- To study the flow of NTFPs, mode and sustainability of NTFP extraction over the years and economic returns.

The climate is tropical, generally warm and humid, with three distinct seasons, viz., summer, monsoon and winter. The average minimum and maximum temperatures for the state are 6.4° C and 36.5° C respectively. The Southwest monsoon reaches in the month of June and most of the rainfall occurs between May and September. The texture of the soil is generally sandy loam and acidic in reaction with pH ranging from 4.8 to 5.8.

Originally, the study site and adjacent areas were covered with dense forests dominated by *Dipterocarpus turbinatus*, *Shorea robusta* and other tree species such as *Lagerstroemia parviflora*, *Vitex peduncularis* and *Terminalia bellerica*. The felling of trees by the "Mukti Joddha" during 1971 Indo-Pakistan war for making military camps and over-exploitation of the forest resources by local communities caused denudation of the forest and the area became degraded. However, after the adoption of the JFM resolution by the state government, the area was brought under the JFM programme and was protected from all disturbances to enable the degraded forest to regenerate naturally.

### 2.1 Socio-Economic Profile

A total of 1050 persons were involved in the JFM programme. The participating villagers were selected by the Divisional Forest Officer (Research) in

consultation with a local NGO called Acharya Jagadish Chandra Bose Brikshamitra Sangha (AJCBBS) in accordance with clauses 1 (i) and (ii) of the JFM Resolution. They were drawn from the four surrounding villages namely, Chandigarh, Rudijala, East Nalchar and Mohanbhog. The number of households identified as beneficiaries from Mohanbhog village belonged to a homogeneous tribal community, whereas in Rudijala 4 households belonged to higher castes and 6 households to a scheduled caste. In Chandigarh, 82 beneficiaries were from the general category, 58 from scheduled caste and 12 households were from scheduled tribe category. The caste categories of beneficiaries from East Nalchar village could not be ascertained. The details of villages are given in table 1.

Table 1: Basic information about the villages involved in JFM programme in Melagarh, Tripura.

| Village    | Total area of village (ha) | Forest area (ha) | Total population | Livestock population | Households involved | Population involved |
|------------|----------------------------|------------------|------------------|----------------------|---------------------|---------------------|
| Chandigarh | 550                        | 100              | 3096             | 2575                 | 152                 | 694                 |
| Rudijala   | 595                        | 20               | 2506             | 2241                 | 10                  | 66                  |
| E.Nalchar  | 630                        | 30               | 2609             | 1763                 | 28                  | 140                 |
| Mohanbhog  | 835                        | 80               | 3533             | 3129                 | 46                  | 150                 |
| Total      | 2520                       | 230              | 11744            | 9708                 | 230                 | 1050                |

The occupation pattern of the study villages indicate that a majority were wage labourers, engaged in occupations such as carpentry, rubber tapping, auto-driving, country liquor brewing, rubber cultivation, bidi making and rickshaw pulling and the rest were farmers and government employees. Women were engaged in household work and incense stick making in all the four villages.

Table 2: Average landholding per household and land use pattern in four study villages.

| Village    | Average land holding per household (in ha) | Land use (%) |              |           |         |
|------------|--|--------------|--------------|-----------|---------|
|            |  | Garden       | Uncultivated | Irrigated | Rainfed |
| E.Nalchar  | 0.45                                       | 80.2         | 2.0          | 6.6       | 11.1    |
| Mohanbhog  | 1.39                                       | 49.6         | 36.4         | 4.6       | 9.4     |
| Chandigarh | 0.40                                       | 71.2         | 13.5         | 4.4       | 10.8    |
| Rudijala   | 1.15                                       | 41.7         | 35.7         | 5.2       | 17.4    |

It is evident from Table 2 that the average land holding per household varies from 0.4 ha (Chandigarh) to 1.39 ha (Mohanbhog). The land use pattern reveals

that households in all the 4 villages have their own garden where bamboo and seasonal vegetables are grown according to the land holding size. They also rear fishes if a small pond is available to them. The communities maintain gardens as a symbol of their cultural heritage. Even the small landholders have large gardens. A few beneficiaries have rubber gardens as well. The uncultivated land is generally restricted to the homestead area.

### 3. The Institutional Arrangement -- An Assessment

In the following section, the structure and functions of the Forest Protection and Regeneration Committee (FPRC) associated with the JFM project in Melaghar, have been described. The roles and responsibilities of different participants, and rules for conservation of the forest have also been discussed.

#### 3.1 Management Institution

The management institution comprises of three Committees - the Forest Protection and Regeneration Committee (FPRC), the Executive Committee and the Para Committees.

*The FPRC:* On 21<sup>st</sup> May 1993, a village level FPRC was constituted under the JFM programme. 230 families from Chandigarh, Mohanbhog, Rudijala and East Nalchar villages under Melaghar block were included in the Committee. The people's response was so enormous that the guidelines regarding the maximum number of beneficiaries in proportion to the available area, had to be relaxed. The Committee comprises one member from each beneficiary household

#### Box 1: Categorization and work distribution amongst beneficiaries

The beneficiaries are grouped into 3 categories. Category A comprises the daily labourers and landless people, category B includes families with 5-7 kanis (1 kani=0.16 ha) of *tilla* land (hill upland) or 1-4 kanis of *lunga* or paddy land (valley land) and category C includes families with over 4 kanis of paddy land or 7 kanis of *tilla* land.

Beneficiaries of category A get the maximum chance to work in the forest area. The work is given to 30 beneficiaries at a time in a rotational manner. Here the beneficiaries earn wages for various cultural operations such as multiple shoot cutting, regeneration of degraded forest etc. An important feature of this case study is the equity issue, where members of the lower income group get more work and have more time at their disposal for harvesting the forest products. Thus the sharing of commodities is work-dependent rather than based on equality principle.

The main function of the FPRC is to ensure protection of forest with the help of its members. The members inform the forest personnel about any attempt to trespass and maliciously damage the forest or commit theft. The Committee ensures smooth and timely execution of all forestry works taken up in the area

under protection. The members also assist the concerned forest officials in selecting and engaging labourers for various works from among the beneficiaries. Every member of the Committee has to take part in matters of protection as well as other duties assigned to the committee. They also ensure proper distribution of the earmarked portion of usufructs among the eligible members of the committee so that the usufructory rights granted by the government are not misused in any way by any of the members. A member who is found prejudicial and detrimental to the interest of a particular plantation or forest is reported to the concerned beat officer/range officer and they take the required action such as, cancellation of membership of the erring beneficiary. None of the beneficiaries included under the participatory management programme is allowed to practice jhum or shifting cultivation.

Group discussions are held with the beneficiary members of the aforementioned four villages whenever required, but no records are maintained. A meeting with all beneficiaries is held once in a year. The achievements, work plan, protection and future plans are elaborately discussed. Suggestions from the beneficiaries are invited and recorded at the meeting.

*Executive Committee:* The Executive Committee has seven members - one selected member from each of the Gaon Sabas of the four villages, one member from AJCBBS, one forester, who also acts as the Member Secretary and a woman member nominated by the members of the Executive Committee. Meetings are normally held on the 25<sup>th</sup> of every month, but if necessary, weekly meetings are also held. A copy of the resolutions made at each meeting are sent to the DFO- Research.

*Para committees:* There are seven Para Committees for Melaghar JFM project, which are subordinate to the Executive Committee. These Committees, comprising senior beneficiary members, were formed six months after the formation of the Executive Committee. The JFM resolution of Tripura does not include the formation of Para Committee. Need for the formation of such Committees was felt when the senior beneficiaries did not follow the instructions/directions of the members of the Executive Committee. The main function of the Para Committees is to work as a bridge between the people and the Executive Committee and to inform the beneficiaries about the Executive Committee. They also keep vigil on the protected forest area to prevent trespassing, encroachment, grazing, fire, theft, damage and use of the land for agricultural purpose. The Para Committee meets as many times as required in a month to discuss the progress, problems and prospects of the project and pass resolutions on the same. These are duly recorded in the minutes book and are sent to the Executive Committee for information, discussion and necessary action.

### 3.2 Protection Measures

The Executive Committee protects the forest managed under JFM. The NGO - AJCBBS, and the research division of the state Forest Department provide

guidance if required. Each executive member has to take up protection duty during day time at least once a week to keep a check on illegal or unauthorised cutting and collection of NTFPs. Non-beneficiaries are not allowed to enter the forest. The seven Para Committees also play an important rôle in protection of the forest. The monitoring of the progress of the JFM programme is done through group discussion, Para Committee meetings, monthly meetings of the Executive Committee and Annual Meeting of all the beneficiaries.

### 3.3 Management of the Site

As a result of adequate protection provided by the beneficiaries to the core area, profuse coppicing of *Shorea robusta* and other species has taken place. When the coppice shoots attain a height of 3 m, cutback operations are undertaken in phases, by engaging the beneficiaries on daily wages. The cutback operations, done twice a year, include weeding, cleaning and multiple shoot cutting twice a year. During 1993-94, 40 ha of degraded forest was rejuvenated and 600 seedlings were planted along the roadside. Similarly, during 1994-95, an adjacent plot of 20 ha of degraded forest was taken up for rejuvenation through assisted natural regeneration (ANR).

### 3.4 Sharing of Benefits/Usufructs

The NTFPs extraction regulation enacted by the Executive Committee with respect to various categories of produce are as follows.

**Firewood:** Those families (one member from each family) who work in the forest are eligible to get one bundle (a headload weighing approximately 30 kg) of firewood after a day's work. Nobody is allowed to work for more than three days a week. However, those who are not involved in the forestry operations can collect a bundle of firewood against a slip obtained from a member of the Executive Committee. A person can get three bundles in a week against a slip. Thus, a family working in the forest for 3 days will get 3 bundles in lieu of labour and if needed, another three bundles against the slip. Thus a maximum of 6 bundles will be available to such families in a week. The firewood is meant for their own use and cannot be sold. The Executive Committee reserves the right to stop the extraction of firewood, depending on its availability.

**Bamboo:** Collection of bamboo is allowed for repairing or maintenance of the houses of the beneficiaries but not for selling. For such collection, prior permission slips are to be obtained from the Executive Committee. Even an Executive Committee member requiring bamboo, has to seek permission.

**Fodder:** The beneficiaries have been regularly collecting fodder for their cattle since the beginning of JFM programme. No written permission is required for this, but the collectors must formally inform the concerned village executive member prior to collection. The fodder is meant only for cattle-feed and not for sale.

**Broomgrass:** Inflorescence of broomgrass (*Thysanolaena maxima*) is used for

making brooms. The beneficiaries are allowed to collect this product and sell it in the adjacent market after obtaining prior permission from the executive members. Some school children collect the broomgrass inflorescence and sell the brooms to buy their books.

*Other forest produce:* The Executive Committee has not fixed any rules and regulations with regard to collection of mushroom from the forests managed under JFM. The villagers are also free to collect medicinal plants and other herbs, including those used for brewing of rice beer for their own use as well as for sale.

### Notable Features of the Institutional Arrangement

The institutional arrangement in Melaghar has many interesting features.

- The Para Committees, for instance, help to monitor the activities in the forest. The seven Para Committees assist the Executive Committee and suggest necessary changes to the system. This is a good way to monitor the functioning of the Committee.
- The system of sharing produce is equitable (Box 1), as the persons directly involved in protection activities get more produce from the forest. This will motivate people to involve themselves in forest protection.
- There are effective regulations for extraction of firewood and other NTFPs.
- An NGO has been instrumental for initiating this system of protection.

### 4. Vegetation Analysis

In this section, the impact of protection and management practices on vegetation is assessed for the three year old protected forest in Melaghar and a control plot which is not under protection.

The protection provided under JFM programme facilitated regeneration of various species from their stumps. The protected forest at Melaghar provides a striking contrast to the adjacent unprotected forest. Each stump of *Shorea robusta*, which is the dominant species here, has at least 3-5 sprouts. A bamboo species, *Melocanna bambusoides*, dominates the hill slopes.

The dense vegetation growth on the JFM site serves as a suitable habitat for wild animals, such as jungle cat, snake (cobra), jungle fowl, fox, porcupine, rabbit, mongoose and kingfisher. Some villagers have also reportedly heard tigers snarl. A phytosociological (vegetation analysis) study was undertaken in September 1995 in a sample area of 1 ha. The vegetation characteristics of the protected forest were compared with those of an adjacent unprotected forest stand. Density, frequency, abundance, basal area and IVI of all the species were calculated.

#### 4.1 Species Number and Height

The protected forest stand has 36 tree, 6 shrub and 28 herb species in contrast to just 5 tree, 1 shrub and 8 herb species in the unprotected stand (Figure 1).

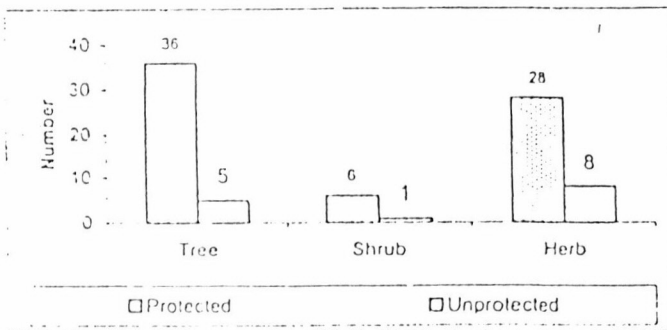


Figure 1: Number of species in the protected Vs. unprotected forest stands.

The dominant tree species in the protected stand are *Shorea robusta*, *Tectona grandis*, *Bridelia retusa*, *Holarrhena antidysenterica*, *Embluca officinalis* and *Lagerstroemia* spp., and those in the unprotected stand are *Holarrhena antidysenterica*, *Syzigium operculata*, *Grewia microcos*, *Syzigium cuminii* and *Cassia fistula* (Table 3).

The tree species showed greater height in the protected forest stand compared to the unprotected forest stand. The canopy layer (tree height > 10m) in the protected forest stand is represented by *Melocanna bambusoides* only. The sub canopy layer (5-10 m tree height) is mainly composed of *Shorea robusta* and *Tectona grandis*. The third canopy layer (height 2-4m) comprises *Lagerstroemia flos-reginae*, *Lagerstroemia parviflora*, *Albizia procera*, *Albizia stipulata*, *Embluca officinalis*, *Terminalia bellerica*, *Vitex penduncularis*, *Syzigium operculata*, *Parkia javanica*, *Trewia nudiflora* etc.

#### 4.2 Importance Value Index (IVI)

The dominant tree species in unprotected (0-year protection) and protected (3-year protection) stands differed to a great extent (Table 3). *Holarrhena antidysenterica* was the only species that was common to both. Judged by its IVI value, it was the most dominant species in the unprotected stand, and ranked 4<sup>th</sup> in the protected stand.

In the protected forest stand *Shorea robusta* was the most dominant species with an IVI value of 129.7 followed by *Tectona grandis* (22.8) and *Bridelia retusa* (15.3). The unprotected forest stand did not support the growth of as many shrubs and herbaceous species as were found in the protected forest stand. Among the herbaceous plants, *Eupatorium* sp. and *Mimosa pudica* were

dominant in the unprotected forest stand, whereas they were completely absent from the protected forest stand. *Tradescantia* sp. was also found in considerable abundance in the unprotected stand.

Table 3: Density, basal area and IVI of top 5 tree species in Melaghar under 0-year and 3-year protection.

| Species                           | 0 Year Protection  |                                 |       | Species                           | 3 Year Protection  |                                 |       |
|-----------------------------------|--------------------|---------------------------------|-------|-----------------------------------|--------------------|---------------------------------|-------|
|                                   | Density (stems/ha) | Basal area (m <sup>2</sup> /ha) | IVI   |                                   | Density (stems/ha) | Basal area (m <sup>2</sup> /ha) | IVI   |
| <i>Holarrhena antidysenterica</i> | 2250               | 0.69                            | 192.7 | <i>Shorea robusta</i>             | 7550               | 9.13                            | 129.7 |
| <i>Syzgium operculata</i>         | 250                | 0.08                            | 34.2  | <i>Tectona grandis</i>            | 133                | 1.23                            | 22.8  |
| <i>Grewia macrocarpa</i>          | 50                 | 0.10                            | 29.6  | <i>Budelia retusa</i>             | 916                | 0.31                            | 15.3  |
| <i>Syzygium cumina</i>            | 100                | 0.02                            | 22.8  | <i>Holarrhena antidysenterica</i> | 566                | 0.17                            | 13.5  |
| <i>Cassia fistula</i>             | 50                 | 0.02                            | 20.7  | <i>Emblia officinalis</i>         | 400                | 1.58                            | 9.3   |
| Total                             |                    | 0.91                            |       | Total                             |                    | 12.42                           |       |

#### 4.3 DBH Distribution

The trees of different species in the protected forest were categorised into three DBH classes viz., 0-4 cm, 4-7 cm and 7-10cm. Maximum trees of *Shorea robusta* were in the DBH range of 4-6cm followed by 0-3cm and 7-10cm DBH classes, respectively (Figure 2). *Tectona grandis* trees had greater representation in the 4-7 cm followed by 7-10 cm and 0-4 cm. The DBH distribution pattern indicates that there was substantial regeneration in the protected forest stand. There were lesser number of trees in the higher DBH class, as protection was initiated recently.

#### 4.4 Basal Area and Biomass

Total basal area of trees in the protected forest stand was 12.42 m<sup>2</sup>/ha. *Shorea robusta* accounted for about 70% of the total basal area (9.13 m<sup>2</sup>/ha) followed by *E. officinalis* (1.58m<sup>2</sup>/ha), *Tectona grandis* (1.23 m<sup>2</sup>/ha) and *B. retusa* (0.31 m<sup>2</sup>/ha). *H. antidysenterica* had the highest basal area (0.69m<sup>2</sup>/ha) in the unprotected stand (Table 3). In the protected stand, mean annual increment in height was maximum in *Tectona grandis* (1.87m) followed by *Shorea robusta* (1.82m). Least mean annual increment in height was observed in *Lannea grandis* (0.06m). However, *M. bambusoides*, a bamboo species had the highest mean annual height increment of 3.34m. Mean annual increment in basal area was maximum in *Shorea robusta* (3.04 m<sup>2</sup>/ha) and minimum in *Baudinia* sp. (3 x 10<sup>-6</sup> m<sup>2</sup>/ha). Using the basal area the total biomass available in the protected forests may be estimated at 133.58 t/ha and the total standing biomass at 30,723 t. Assuming a mean annual growth rate of 2.84% in the forests, the biomass

produced per year can be estimated to be 872 t in the entire protected area. Thus the potential harvest limit could be 271 – 436 tons per year. The data from the Forest Department and the household survey indicate that the people are extracting less firewood (82 t) than the sustainable harvest limit. This shows that people are not exploiting the forests.

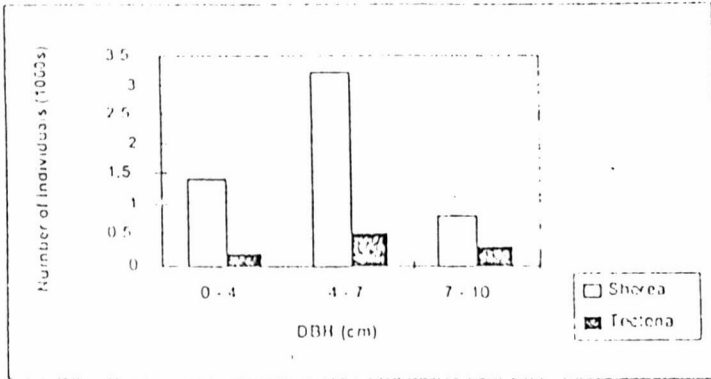


Figure 2: DBH distribution of dominant species in the protected forest

## 5. NTFPs and their Economic Significance

The villagers participating in the JFM programme are mostly wage earners and farmers having small landholdings. The introduction of JFM in the degraded forest is likely to improve the scope for collection of NTFPs - both to meet the villagers' demands and, possibly, provide them some additional income.

### 5.1 Seasonality of NTFP Extraction

The JFM Executive Committee allows extraction of various NTFPs from the protected forest throughout the year. But detailed discussions with the beneficiaries revealed that there was a distinct seasonality in the annual NTFP extraction. Firewood, being a basic requirement for sustenance, is collected throughout the year. The maximum quantity of firewood, however, was collected from September to November. Bamboo, fodder and herbs used in brewing of rice beer were also collected throughout the year. Other NTFPs can be collected only in certain seasons e.g. imlorescence of broomgrass is available only from December to February, thatch grass is collected only between March and April, mushroom from May to August and tubers between November and January.

### 5.2 End Use of NTFPs Extracted

List of NTFPs extracted from the forest managed under JFM, the plant parts

used and their end uses are given in Table 4.

Table 4: The end uses and plant parts of the NTFP species collected from the forests under JFM programme in Melaghar, Tripura.

| Species  | Plant part               | End use   |
|--|--------------------------|---|
| <i>Melocanna bambusoides</i>   | Young shoot, Mature stem | Vegetables, Poles, household works and Cottage industries |
| <i>Imperata cylindrica</i>   | Leaf                     | Roofing   |
| Uluson   | Leaf                     | Roofing, broom and fodder                                 |
| <i>Thysanolaena maxima</i>   | Inflorescence, Leaf      | Broom, Fodder   |
| Mushroom   | Fruiting body            | Vegetable   |
| Thakun, Thache, Thailari, Mushaluma, Thalangi, Thoroi, Akok, Ghantha, Chuanchai, Butkabune | Tuber                    | Vegetable   |
| <i>Ficus hispida</i>   | Leaf                     | Fodder  |
| <i>Cassia fistula</i>  | Root                     | Medicinal value, fodder                                   |
| <i>Colocasia</i> sp  | Whole plant              | Vegetable   |
| Tukuma   | Seed                     | Cold drinks   |
| <i>Trewia nudiflora</i>  | Bark                     | Gum   |
| <i>Eupatorium</i> sp   | Leaf                     | Coagulant   |
| <i>Holarrhena antidiysenterica</i>   | Bark                     | Medicine for worm and dysentery                           |
| <i>Smilax</i> sp   | Leaf                     | Shade to young crop seedling                              |
| Miscellaneous spp  | Dried branches and twigs | Firewood  |

• *Local name*

**NTFPs as vegetable:** Since time immemorial, people living near the forests have been using as **vegetables** leaves, **tubers and** young seedlings of many species growing in the **forest**. The tribal **beneficiaries** in the protected forest of Melaghar also collect **young** shoots of *Melocanna bambusoides*, *Colocasia* sp., edible tubers like **Thakun**, Thache, Thailari, Mushaluma, Thalangi, Thoroi, Akok and Ghantha (local **names**). Fruiting **bodies** of several kinds of mushrooms and young shoots of **edible** fern are **also collected** from the protected forest for use as vegetables.

**Fodder:** The **beneficiaries of the JFM programme** rear cattle, but they graze their cattle outside the **protected forest** as **grazing** is harmful for the regeneration of the forest. During **the** rainy season, stall-feeding is inevitable. The fodder species collected to use as **cattle feed** are: *Thysanolaena maxima*, *Ficus hispida*, *Cassia fistula* and Uluson (**local name**).

**Household repair and maintenance:** **As most** of the beneficiaries live in huts made of bamboo and wood, bamboo is a primary component for construction

and repair of their huts. *Melocanna bambusoides* collected from the protected forest are used as poles. They are also used by women on a large scale, for making incense sticks for sale in the local market. The leaves of *Thysanotena maxima* and Uluson (local name) are commonly used for making broom. The leaves of *Imperata cylindrica* and Uluson are used for thatching their huts.

**Firewood:** Dried or dead branches of *Shorea robusta*, *Tectona grandis*, *Lagerstroemia parviflora*, *Embllica officinalis* and Añri (local name) are collected for the firewood. Firewood is also collected during cutback operations such as thinning and pruning of trees and woody shrubs.

**Medicinal plants:** The leaf extract of *Eupatorium* spp. is commonly used as first aid to stop bleeding. The bark of *Holarrhena antidysenterica* is used as medicine against worm infection. Other medicinal plants collected from the forest are *Cassia fistula*, *Terminalia bellerica* and *Embllica officinalis*.

**NTFPs for other uses:** Leaf and other plant parts of a few species are collected for miscellaneous purposes. The leaf of *Smilax* species is used for shading the young crop seedlings and seeds of tukuma (local name) are used for the preparation of cool drinks. The dried branches of various species are collected for firewood. The bark of *Trewia nudiflora* is used for preparation of gum and the villagers, especially the tribals, collect leaf and roof of Chuanthai and Butikabung (local name) for brewing rice beer.

### 5.3 Quantification of NTFPs

For quantification of NTFPs extracted from the JFM-managed forest, secondary data collected from the research division of the State Forest Department, Tripura was used (Table 5). No NTFPs were reported to have been extracted from the adjacent unprotected forest.

Table 5: Quantity of NTFPs gathered from the forest managed under JFM in Melaghar.

| Product                  | Quantity of NTFPs<br>(per year) |
|--------------------------|---------------------------------|
| Firewood (kg)            | 82,000                          |
| Thatch grass (kg)        | 3,000                           |
| Bamboo (nos)             | 25,000                          |
| Broomstick (kg)          | 1,600                           |
| Medicinal plants (kg)    | 100                             |
| Fodder (kg)              | 27,000                          |
| Honey (l)                | 50                              |
| Edible herbs/leaves (kg) | 300                             |

In order to get first hand information regarding the amount of NTFPs extracted, the quantities of various products collected from the forest were monitored daily for 15 days. The relevant data are presented in Table 6.

Table 6: Data gathered through daily monitoring on the quantities of various NTFPs collected by the people.

| Product               | Men | Women | Children | Total |
|-----------------------|-----|-------|----------|-------|
| Fuelwood (kg)         | 985 | 1222  | 6        | 2213  |
| Fodder (kg)           | 246 | 146   | 32       | 424   |
| Bamboo (nos)          | 185 | 60    |          | 245   |
| Root (kg)             |     | 23.5  |          | 23.5  |
| Tuber (kg)            |     | 132   |          | 132   |
| Edible fern (kg)      |     | 40    |          | 40    |
| Arum (kg)             | 15  | 3     |          | 18    |
| Broom stick (kg)      | 105 | 14    | 70       | 189   |
| Thatch stick (kg)     |     | 30    |          | 30    |
| Medicinal plants (kg) |     | 2.5   |          | 2.5   |

It is evident from the table that it is primarily the womenfolk who are involved in collection of various NTFPs. Of all the NTFPs collected during the fortnight's monitoring, the quantity of firewood collected was the maximum (2213 kg), followed by fodder 424 kg. Wild potato, rhizomes, arum and edible fern shoots were collected in small quantities. Beneficiaries collected 245 bamboo poles over 2 period of 15 days.

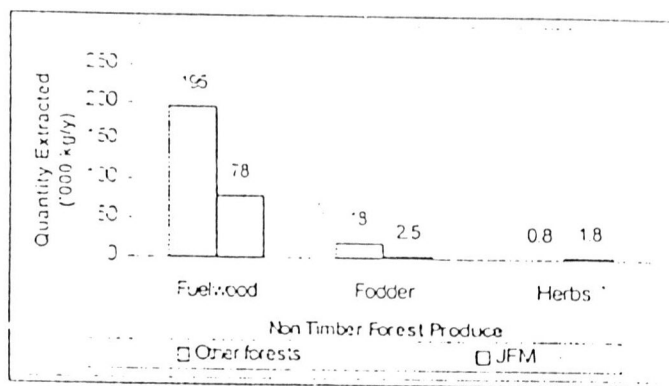


Figure 3: Quantities of fuelwood, fodder and herbs extracted from JFM plantations and other forests.

The secondary data collected by the Forest Department was verified by conducting a sample household survey. Table 7 compares the NTFPs collected annually from the JFM-managed forest and other forests by the four participating villages. Collection of firewood and fodder was more from the other forests as compared to the JFM-managed forest (Figure 3). However, in case of herbs, quantity of collection was more in the JFM-managed forest than the other forests. It may also be noted that the beneficiaries of Mohanbhog village extracted 17.4 kg/year herbs from the forest managed under JFM and

only 802 kg/year from the other forest. The herbs were not collected by other 3 villages. The beneficiaries of the Rudijala village have not yet begun extracting any NTFPs from the JFM managed forest. Details of NTFPs extracted by different categories of beneficiaries in each village are also presented in Table 7.

Table 7: Comparison of annual NTFP extraction (in kg per year) from the JFM managed forest and other forests in the study villages.

| Village      | Category of beneficiaries | JFM managed forest |        |      | Other forests |        |      |
|--------------|---------------------------|--------------------|--------|------|---------------|--------|------|
|              |                           | Firewood           | Fodder | Herb | Firewood      | Fodder | Herb |
| Mohanbhog    | A                         | 6858               | 1352   | 1732 | 21123         | 228    | 750  |
|              | B                         | 1090               |        | 52   | 20650         | 1375   | 52   |
|              | C                         |                    |        |      | 9118          |        |      |
| Sub total    |                           | 7948               | 1352   | 1784 | 50891         | 1603   | 802  |
| Chandigarh   | A                         | 51814              | 550    |      | 72642         | 5008   |      |
|              | B                         | 7816               |        |      | 20436         |        |      |
|              | C                         | 6590               |        |      | 24874         | 1560   |      |
| Sub total    |                           | 66220              | 550    |      | 117952        | 9568   |      |
| Rudijala     | A                         |                    |        |      | 9360          | 7280   |      |
|              | B                         |                    |        |      |               |        |      |
|              | C                         |                    |        |      |               |        |      |
| Sub total    |                           |                    |        | 9360 | 7280          |        |      |
| East Nalchar | A                         | 810                |        |      | 1744          |        |      |
|              | B                         | 3173               | 630    |      | 15240         |        |      |
|              | C                         |                    |        |      |               |        |      |
| Sub total    |                           | 3983               | 630    |      | 16984         |        |      |
| Grand total  |                           | 78151              | 2532   | 1784 | 195187        | 18451  | 802  |

A = Daily labourers and landless, B = Households with 2 - 3 acres of tilla land or 0.5 to 1.5 acres of paddy land, C = Employees or farmers having over 1.5 acres of paddy land.

This data shows that the quantity of NTFPs collected by landless and daily wage labourers (Category A) was high in most of the villages. This could be due to their greater dependence on the forest produce compared to the land-owning villagers.

The data collected through both primary and secondary sources were discussed with the representatives from the four villages for assessing their accuracy and reliability. The detailed valuation of NTFPs extracted per year (through secondary sources) and through daily monitoring over 15 days period (primary) is given in Table 8.

According to Forest Department, total revenue of about Rs.0.7 million/year was obtained from the forest through collection of firewood, thatch grass, bamboo, inflorescence of broomgrass, medicinal plants, fodder, edible herbs, leaves, roots and honey. The maximum revenue was generated from the collection of firewood and bamboo. The data obtained by the fortnight's

monitoring was extrapolated to get annual extraction figures. The income generated from extraction of NTFPs using the secondary data is Rs.747.61/household as well as per hectare. The income figure got from the survey is 857.60 per household and per hectare as well. For individual items, there are differences between the values extrapolated from the survey and those derived from the secondary data. However, the value of NTFPs/household and NTFPs/ha are almost identical. The survey values may improve if it is extended to cover all the seasons.

Table 8: Value (in Rs.) of NTFPs extracted from the forest protected under JFM programme in Melaghar, Tripura.

| Item                        | Extraction per year (Rs.) * | Extraction per year (Rs.) ** |
|-----------------------------|-----------------------------|------------------------------|
| Firewood                    | 52,000                      | 53,849.7                     |
| Thatch grass                | 3,000                       | 730                          |
| Bamboo                      | 50,000                      | 11,923.3                     |
| Broomstick                  | 3,200                       | 941.7                        |
| Medicinal plants            | 1,000                       | 608.3                        |
| Fodder                      | 27,000                      | 7786.7                       |
| Honey                       | 5,000                       | --                           |
| Edible herbs/leaves         | 750                         | 11,558.3                     |
| Roots for brewing rice-beer | --                          | 1,03,372.7                   |
| Total                       | 1,71,950                    | 1,97,246                     |
| Value of NTFPs-household    | 747.61                      | 857.60                       |
| Value of NTFPs/ha           | 747.61                      | 857.60                       |

\* Based on the data provided by the State Forest Department

\*\* Based on daily monitoring. The values are converted to per year basis. There may be differences in values for seasonal NTFPs such as honey.

## 6i Lessons Learnt

The villagers near the JFM site at Melaghar comprised heterogeneous ethnic groups, which made the job of motivating them for participation in the JFM programme difficult and challenging. In the beginning there was also some amount of interference from the local politicians. However, these difficulties were overcome by the local institutions working at the grassroot level. As a result, the villagers developed a positive attitude towards the JFM programme. The success in Melaghar could be attributed to the integrated efforts of several organisations such as Nehru Yuva Kendra, Voluntary Health Association of Tripura, State Forest Department and Acharya JC Bose Brikshamitra Sangha.

The NGO, Acharya JC Bose Brikshamitra Sangha, was instrumental in bringing the community and the Forest Department together. This was an important factor as it boosted the village communities' conservation efforts. The village communities have now developed a sense of pride in the forest that they are managing under the JFM programme. However, the role of AJCBBS is

crucial for JFM's survival in the area as people feel that if the NGO leaves the area, the present institutional and management structure of the JFM may disintegrate. The study team feels that the Forest Department should take a greater initiative to spread the spirit of JFM among the villagers.

The growth of *Shorea robusta* in the protected forest has offered the participating community a new opportunity for income generation, through sal leaf selling. JFM's contribution to their economic upliftment has made the villagers realize the importance of forest protection. Apart from enhancing the income of the local people, protection has also substantially increased the species diversity, canopy cover, and soil fertility in the forest.

Melaghar is a JFM success story, where community participation and motivation by NGOs has led to regeneration of forests and flow of economic benefits. The following lessons may be learnt from Melaghar's experience.

- Protection leads to increase in species richness and diversity.
- Involvement of NGOs improves the relation between the local community and the Forest Department, which in turn helps implement JFM in a meaningful manner.
- Protection of forests enhances the availability of NTFPs and increases flow of economic benefits to the local people.
- One of the important features of this case study is the importance laid on providing the landless participants a greater share of the forest produce and other benefits, which could be an effective way to address the issue of equitable distribution of benefits.
- Formation of Para Committees to assist the Executive Committee in protection activities increases the scope for community participation.

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