Non-Timber Forest Products: Availability, Production, Consumption, Management and Marketing in Eastern India

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NON TIMBER FOREST PRODUCTS:

AVAILABILITY, PRODUCTION, CONSUMPTION, MANAGEMENT AND MARKETING IN EASTERN INDIA

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EXECUTIVE SUMMARY

NTFP Availability, Production, Consumption, Management and Marketing in Eastern India

1. Project Purpose

The project focused on the increased production, consumption and trading of NTFPs as a development strategy to improve the livelihoods of forest-dependent populations in eastern India.

2. Research activities

Participatory resource assessment was used to determine levels of NTFP production, consumption and trading in 24 villages from 2 districts each in Bihar and Orissa. NTFP yields were estimated from sample plots in different forest types. Medicinal plants were collected, identified and their use detailed. Information was collected and analysed on price and cost and the constraints on increased NTFP production and marketing identified.

3. Outputs

A review of NTFP production, collection and consumption highlighted the importance of NTFPs in the economy of the forest-dependent communities of Bihar and Orissa.

Detailed information on annual patterns of household collection, consumption and sale of some 45 different NTFPs was collected and analysed with respect to ethnic group, gender and nearness to markets.

The marketing and infrastructural aspects of NTFP marketing and trade and limitations in the system were identified and recommendations made to overcome them.

Some 300 different species of NTFPs were collected, identified and their medicinal and nutritional importance documented.

The yield of selected NTFPs in the forests of Bihar and Orissa was estimated but the results not representative due to a "poor seed year". Predictive equations were developed which allow more appropriate harvesting limits to be set for long term sustainability.

Due to insufficient and unreliable data only a simple financial model was developed.

Strategies for sustainable development of NTFP production and use were formulated following State level workshops which were attended by FD Officers, NGOs and other stakeholders. Some recommendations are being used to formulate a new NTFP policy in Orissa.

4. Contribution of Outputs to Project Goal

In broad terms the original outputs of the project have been achieved. Unseasonable weather, unreliable official data, data transmission problems, personnel changes and shifts in focus of some of the NGOs involved have combined to give project management problems. The main shortcomings are concerns about the lower than average yield figures due to unusual weather patterns and lack of adequate/reliable data to develop the financial model.

The project has contributed to the RNRRS goal by:

- Providing a fuller understanding of the importance of NTFP production, collection, use and trade in Bihar and Orissa.
- Collating existing official data and data from forest sample plots to estimate actual and potential yield figures and growth patterns for selected NTFPs.
- Identifying the biological, socio-economic, informational, political and legal constraints on the production, collection and use (including marketing) of NTFPs in Bihar and Orissa.
- Determining the actual and potential returns to economic agents within selected NTFP production and marketing systems.
- Developing a simple financial appraisal model (given the provisos raised above).
- Raising the awareness levels of FD officers, NGOs, village forest committees, village cooperatives and villagers of the economic opportunities associated with sustainable and improved NTFP production, use and trade.
- Raising awareness concerning the dangers of over-exploitation of NTFPs.

Glossary of Terms and Abbreviations

Term or Abbreviation	Meaning
Bag (of kendu leaves)	Bag of kendu leaves (60kg) in Orissa
BISCOLAMPF	Bihar State Cooperative Lac Marketing Federation
BSFDC	Bihar State Forest Development Corporation
CF	Community forests
CTRTI	Central Tassar Research and Training Institute
FDC	Forest Development Corporation
ha	Hectare
HH	Household
ILRI	Indian Lac Research Institute
JFM	Joint Forest Management
Kerries	Bundles of 20 kendu leaves (Orissa)
kg	Kilogram
km	Kilometer
Lakh	100,000 (rupees)
LAMPS	Large multi-purpose cooperative society
MFP	Minor Forest Products
MK	Mundari-khuntkattidari – a tribal land tenure system recognised by the Government of Bihar in which the village common lands, including forests, is held by the village chief, Munda, for use by the village community.
MP	Madhya Pradesh
MPMFPF	Madhya Pradesh Minor Forest Products Federation
MT	Metric tonne
NGO	Non governmental organisation
NTFP	Non timber forest product
OFDC	Orissa Forest Development Corporation
OSTSCS	Orissa State Tassar Silk Cooperative Society
PF	Protected forest
Phadi	Temporary storage house for kendu leaves
Phal	Bundles of 30 – 40 kendu leaves
Pola	Bundles of 50 kendu leaves (Bihar)
PPF	Private protected forests syn CF & MK)
Quintal	Unit of weight equivalent to 100 lbs
RF	Reserve forest
Standard bag	Bag of kendu leaves (35 – 40 kg)
TDCC	Tribal development cooperative corporation
TRIFED	Tribal marketing federation
UFP	Utkal Forest Products
UFPL	Utkal Forest Products Ltd
VF	Village forest
WB	West Bengal

GLOSSARY OF LOCAL AND SCIENTIFIC NAMES

Common name	Latin name
Ach	*Morinda tinctoria*
Achu	*Morinda tinctoria*
Ahsing	*Grewia tiliaefolia*
Ainta	*Helicteres isora*
Alcosi	*Mucuna purita*
Alkir	*Smilax parviflora* (Syn. *Smilax macrophylla*)
Am	*Mangifera indica*
Amboo	*Spondias mangifera*
Ambura	*Spondias mangifera*
Amla	*Emblica officinalis (*Syn*. Phyllanthus emblica)*
Amra	*Spondias mangifera*
Amti	*Antidesma diandrum*
Ankol or Akola	*Alangium lamarckii*
Ankula	
Aonla	*Emblica officinalis*
Arar	*Acacia pennata*
Arjun	*Terminalia arjuna*
Arrowroot	*Maranta arundinacea*
Asan	*Terminalia tomentosa*
Ashok	*Sarraca indica*
Asparagus	*Asparagus racemosus*
Aswagandha	*Withenia somnifera*
Baborang	*Embelia robusta* (Syn*. Antidesma ghaesembilla*)
Babul	*Acacia nilotia*
Ba-chom	*Eulaliopsis binata*
Baghanakhi	
Bahada	*Terminalia bellerica*
Bahera	*Terminalia bellerica*
Baibirang	*Emebelia trjeriam-cottam* (Syn*. Embelia robusta*)
Baigoba	
Bair	*Zizyphus jujuba*
Bakain	*Melia azadirachta*
Bamboo	*Dendrocalamus strictus*
Ban tulsi	*Erantemum pulchellum*
Bans (salia bans),	*Dendrocalamus strictus*
Bar	*Ficus bengalensis*
Bara bans	*Bambusa arundinacea*
Baranga	*Kydia calycina*
Barhar, Dahu	*Artocarpus lakoocha*
Barjono	*Thysanolaena agrostis*

Continued overleaf /

Glossary (continued)

Common name	Latin name
Baru	
Bel	*Aegla marmelos*
Belonjan	*Cordia macleodii*
Ber	*Zizyphus jujuba*
Bhant	*Clerodendron infortunatum*
Bhelwa	*Semecarpus anacardium*
Bhurkun	*Hymenodictyon excelsum*
Bhurkund	*Hymenodictyon excelsum*
Bia	*Pterocarpus marsupium*
Bija	*Pterocarpus marsupium*
Bis tendu	*Diospyros montana*
Bondarlauri	*Cassia fistula*
Broom grass	*Thysanolaena agrostis*
Buru-sanga	*Dioscorea sp*
Cashew nut	*Anacardium occidentale*
Champa	*Michelia champaca*
Chandra	*Rauwolfia serpentina*
Char	*Buchanania latifolia*
Chatavan	*Alstonia scholaris*
Chatni	*Alstonia scholaris*
Chilbil	*Holoptelia integrifolia*
Chilla or Reri	*Casearia graveolens*
Chiraita	*Swertia pulchella*
Chireita	*Casia tora*
Chironzi	*Buchanania latifolia* (Syn. *B. lanzan*)
Churanth	*Heteropogon contortus*
Churchu or Beri	*Casearia tomentosa*
Dadki	*Woodfordia fruticosa*
Dahu	*Artocarpus lakoocha*
Dathora	*Zizyphus oenoplea*
Dau	*Artocarpus lakoocha*
Dekamali	*Gardenia gummefera*
Detranga	*Ehretia leavis*
Dhadhki	*Woodfordia fruticosa* (Syn. *W. floribunda*)
Dhak	*Butea frondosa* (Syn. *B. monopserma)*
Dhaman	*Grewia tiliaefolia*
Dhanta	*Anogeissus latifolia*
Dhao	*Anogeissus latifolia*
Dhatki	*Woodfordia fruticosa*
Dhaura	*Anogeissus latifolia*
Dhawai	*Woodfordia fruticosa*
Doka	*Lannea grandis*

Continued overleaf /

Glossary (continued)

Common name	Latin name
Edel	*Salmalia malabaricum*
Eri	
Gaj	*Milletia auriculata*
Galgal	*Cochlospermum gossypium*
Galphuli	*Flemingia chappar*
Gamhar	*Gmelina arborea*
Gara-hatna	*Terminalia arjuna*
Gende	*Type of mushroom*
Genthi-kand	*Dioscorea wallichii*
Ghanto	*Schrebera swietenioides*
Giliri	*Indigofera cassioides*
Gilla	*Caesalpinea crista*
Ginjan	*Lannea grandis*
Harida	*Terminalia chebula*
Harra,	*Terminalia chebula*
Harsinghar	*Nyctanthes arbortristis*
Hathipanjan	*Oroxylum indicum*
Hatna	*Terminalia tomentosa*
Hutar	*Indigofera pulchella*
Hutid	*Lagerstroemia flosreginas*
Icha	*Woodfordia fruticosa*
Imli	*Tamarindus indica*
Indrajab	*Holarhena antidysentrica*
Jackfruit	*Artocarpus integra*
Jamun	*Syzygium cuminii*
Janumjan	*Zizyphus jujuba*
Jarul	*Lagerstroemia flosreginas*
Jharu	*Thysanolaena agrostis*
Jhingan	*Lannea grandis*
Jirhul	*Indigofera pulchella*
Jojo	*Tamarindus indica*
Kachnar	*Bauhinia variegata*
Kadam	*Anthocephalus cadamba*
Kadamba	*Anthocephalus cadamba*
Kahua	*Terminalia arjuna*
Kaim	*Mitragyna parviflora*
Kala shisham	*Dalbergia latifolia*
Kalmegh	*Andragaphis paniculata*
Kalminkeram	*Mitragyna parviflora*
Kamini	*Murraya exotica*
Kamala	*Mallotus philippinensis*
Kanla	*Bauhinia retusa*
Kantar	*Artocarpus integrfolia*

Continued overleaf /

Glossary (continued)

Common name	Latin name
Karam	*Adina cordifolia*
Karanj	*Pongamia glabra, P pinnata*
Karaya	*Sterculia ureus*
Karhhai	*Bauhinia variegata*
Kari	*Miluta velutina*
Karkatta	*Zizipyus xylopyra*
Karunda	*Carissa spinrum*
Kasmar	*Gmelina arborea*
Katahi	*Flacourtia ramontichii*
Katai	*Vangueria pubescens*
Katangai	*Cedrela toona*
Kathal	*Artocarpus integrfolia*
Kathber	*Zizipyus xylopyra*
Kekar	*Garuga pinnata*
Kend	*Diospyros melanoxylon*
Kendu	*Diospyros melanoxylon*
Keonjhi	*Sterculia urens*
Kessai	*Bridelia retusa*
Khaira	*Acacia catechu*
Khajur	*Phoenix acaulis*
Khejur	*Phoenix acaulis*
Khukri	*mushrooms*
Kia-chalon	*Albizzia odoratissima*
Kiri	*Dalbergia latifolia*
Kishkochali	*Bridelia retusa*
Koinar	*Bauhinia purpurea*
Koingata-mata	*Embelia robusta*
Koraia	*Hollarhena antidysenterica*
Koreya	*Hollarhena antidysenterica*
Koronjo	*Pongamia pinnata*
Kotor	*Symplocos racemosa*
Kudmi	*Polyalthia cerasiooides*
Kujri	*Celastrus pamiculata*
Kula-marasal	*Clerodendron infortunatum*
Kumbhui	*Careya arborea*
Kumumung	*Alstonia scholaris*
Kurchi	*Hollarhena antidysenterica*
Kusum	*Schleichera trijuga* (Syn. *S. oleorosa*)
Kuti	*Croton oblongifolius*
Lasarura	*Cordia myxa*
Lodh	*Symplocos racemosa*

Continued overleaf /

Glossary (continued)

Common name	Latin name
Lodha	*Symplocos racemosa*
Lohagasi	*Aegla marmelos*
Lohajangia	*Ixora parviflora*
Ludam	*Symplocos racemosa*
Lupung	*Terminalia bellerica*
Madhbilata	*Combretum decandrum*
Madhcom	*Madhuca latifolia*
Mahua	*Madhuca latifolia* (Syn. *Basia latifolia*)
Mahul	*Madhuca latifolia*
Mahulan	*Bauhinia vahlii*
Mainphal	*Randia dumetorum*
Makar tendu	*Diospyios embryopteris*
Maljhan	*Bauhinia vahlii*
Malkamini	*Celastrus paniculata*
Mango	*Mangifera indica*
Marking nut	*Semecarpus anacardium*
Masia kanda	*Dioscorea spp.*
Matasura	*Antidesma diandrum*
Maula	*Butea parviflora* (Syn. *Spatholobus roxburghii*)
Maulana	*Bauhinia vahlii*
Medha	*Litsea glutinosa*
Meral	*Emblica officinalis*
Moraba	*Agave spp*
Moraphal	*Helicteres isora*
Morud	*Butea frondosa* (Syn. *B. monopserma*)
Muga	
Mulberry	*Morus nigra*
Murabba	*Agave spp*
Murur	*Butea frondosa* (Syn *B. monopserma*)
Nanam	*Lannea grandis*
Neem	*Azadirachita indica*
Nux vomica	*Strychnos nuxvomica*
Oal	
Pader	*Stereospermum suaveolens*
Paiman	*Eugenia operculata*
Palas	*Butea frondosa* (Syn *B. monopserma*)
Pani-alu	*Diosorea oppositifolia*
Panjan	*Ougenia dalbergioides*
Papda	*Gardenia latifolia*
Patal garuda	*Rawolfia serpentina*
Patalkohra	*Rawolfia serpentina*
Pendi	
Perar	*Randia uliginosa*

Continued overleaf /

Glossary (continued)

Common name	Latin name
Pesar	*Pterocarpus marsupium*
Phalandu	*Combretum decandrum*
Phansi	*Anogeissus acuminata*
Phenphena	*Oroxylon indicum*
Phuljhanu	*Thysanolaena agrostis*
Piar	*Buchania latifolia* (Syn*. B. lanzan*)
Piasal	*Pterocarpus marsupium*
Pipal	*Ficus religiosa*
Pipali	*Piper longum*
Pitalu	*Dioscorea wallichii*
Porho	*Ficus cunia*
Poroso	*Artocarpus integra*
Puffballs	*Lycoperdon spp*
Pula	*Kydia calycina*
Putri	*Croton oblongifolius*
Putus	*Lantana camara*
Ramdatwan	*Smilax parviflora* (Syn. *S. macrophylla*)
Ranu	*Rice beer herbs*
Ratangaura	*Elaeodendron glaucum*
Reri	*Caseara graveolens*
Ritha	*Sapindus mukorossy*
Rohini	*Mallotus philippinensis*
Rola	*Terminalia chebula*
Roli	*Mallotus philippinensis*
Rori	*Mallotus philippinensis*
Ruga	*Lycoperdon spp.*
Rurungnani	*Bauhinia vahlii*
Sabai	*Eulaliopsis binata*
Sakhua	*Shorea robusta*
Sal	*Shorea robusta*
Salai	*Boswellia serrata*
Salga (buru)	*Boswellia serrata*
Sandan	*Ougeinia dalbergioides*
Sanko	*Anthocephalus cadamba*
Saparom	*Nyctanthes arbortristis*
Sarjom	*Shorea robusta*
Sarpgandha	*Rauwolfia serpentina*
Satawar	*Asparagus racemosus*
Sauna	*Oroxylum indicum*
Sauri	*Heteropogon contortus*
Semal	*Bombax ceiba*
Semul	*Salmalia malabaricum*
Sharifa	*Annona squamosa*

Continued overleaf /

Glossary (continued)

Common name	Latin name
Shekoky	*Acacia concina*
Shisum	*Dalbergia latifolia*
Siali	*Bauhinia valii*
Sidha	*Lagerstroemia parviflora*
Simuli cotton	*Bombax ceiba*
Sindhuri	*Mallotus philippinensis*
Sindwar	*Vitex negundo*
Singa	*Bauhinia purpurea*
Siris	*Albizzia odoratissima*
Siru	*Impereta arundinacea*
Sissoo	*Dalbergia sisoo*
Sona-chaal	*Oroxylum indicum*
Sonari	*Cassia fistula*
Soso	*Semecarpus anacardium*
Sunari	*Cassia fistula*
Tamarind	*Tamarindus indica*
Tamarind	*Tamarindus indica*
Tarob	*Buchanania latifolia* (Syn. *B. lanzan*)
Tassar	*Silk moth cocoons*
Tend	*Diospyros melanoxylon*
Tendu	*Diospyros melanoxylon*
Tewar	*Bauhinia retusa*
Thatch grass	*Heteropogon contortus*
Thingon	*Lannea grandis*
Tilia	*Wendlandia exsreta*
Tiril	*Diospyros melanoxylon*
Toon	*Cedrela toona*
Toot	
Turai-sing	*Cordia macleodii*
Uli	*Mangifera indica*
Ulu	*Impereta arundinacea*
Usangid-bo	*Sarraca indica*

Trade names/products	
Amchoor	Dried mango powder
Chiraunji, Chironji, Chironzi	Kernel of *Buchanania latifolia* seeds
Dhuna	Oleo- resin of *Shorea robusta*
Katira gum	Gum of *Sterculia urens*
Kamala dye	Red glands from the capsules of *Mallotus philippinensis*
Lac	Hardened secretion of the lac insect (*Lacifera lacca*)
Tola, Dori	Mahua seed oil

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1.0 BACKGROUND

1.1 INTRODUCTION: FORESTRY BEYOND TIMBER

The initiation of a new forest development strategy in India based in part on non-wood forest resources has attracted international attention (Campbell, 1993). It is now widely recognised that non-timber forest products (NTFPs) provide substantial inputs to the livelihoods of forest-dependent populations, many of whom have limited non-agricultural income earning opportunities (Chandrasekharan, 1994; FAO, 1991). These socio-economic concerns, together with a concern for forest loss and a decline in timber extraction potential, have necessitated changes in India's forest management systems. India is beginning to experiment with forest management strategies already in place in parts of the Amazon region (Gradwohl and Greenberg, 1988), and which place livelihood and ecological considerations before revenue maximisation concerns (Falconer, 1990; Hobley, 1996; Nepsted and Schwartzman, 1992; Peters *et al.* 1989; Schwartzman, 1989).

Although timber extraction and allied subjects have been extensively studied in the past, basic research on, and analysis of, NTFP systems has been limited. The subject of tropical forest management for NTFP use is a complex one, characterized by multiple objectives, multiple products and multiple users. The complex patterns of use and change created by human demands on forests add a further complicating element (Arnold and Perez, 1996), as does the interaction of timber and non-timber forest management objectives. This overview first considers the broader thematic literatures on NTFPs in tropical and sub-tropical forest areas. It then turns to Indian particularities and to the Bihar-Orissa region of eastern India. This is followed by a brief description of existing legal arrangements for, and impediments to, NTFP collection, trading and processing in Bihar and Orissa. The chapter concludes with a consideration of the demand for this research.

1.2 THEMATIC REVIEW

1.2.1 Sustainability of non-wood resources

A populist emphasis on the socio-economic potential of NTFPs can deflect attention away from the biological and ecological dimensions of NTFP management issues. This would be a mistake. Peters *et al.* (1989) argue that the ecology of NTFP extraction is ill understood. They further contend that the sustainability of NTFP management systems can be threatened by a lack of emphasis on the ecological dimensions of management and analysis. A cautious approach to NTFP extraction is recommended as excessive exploitation can make some species vulnerable. The common assumption that NTFP extraction is wholly free from the destructive impacts that accompany logging is erroneous. Regular extraction of flowers, fruits and nuts can have adverse ecological impacts and can influence natural regeneration (Bawa and Hall, 1992; Hall and Bawa, 1993). Neither can it be assumed that profitable collection and processing will always lead to sustainable harvesting practices. The genetic composition

of a species may be altered when selected trees are exploited for new or 'better' fruits or seeds. To ensure sustained NTFP yields a forest inventory must be accompanied by yield studies and regeneration surveys to limit the possible adverse impacts of excessive NTFP exploitation.

More broad-ranging studies of the sustainability of NTFP collection and marketing systems seek to integrate the biological and socio-economic dimensions of the sustainability issue (Anderson, 1990; Clay, 1990; Fearnside, 1989; Fox, 1995). Browder (1992) suggests that market-organised extractive systems are likely to conflict with sustainability concerns because of imperfections in information supply, and poor signals to and incentives for forest-user groups. Imperfections and distorted price signals may emerge because of implied or explicit subsidies, high transport and product development costs (Bourke, 1986), or political and social constraints (Dove, 1995). High market values and poorly considered technological interventions can also cause local extinctions (de Beer and McDermott, 1989).

Some critics concerned with equity issues find that the amount of forest land required per family for sustainable NTFP extraction is too large (Anderson, 1991), and that an inequitable flow of benefits is caused by exploitative patron-client relationships in rural markets. Bunker's major study in the Amazon region suggests that extractive economies show up badly in terms of the impoverishment of natural resources, economic stagnation, and exploitation of natives, but perform more positively where conservation and development are the fallout of non-wood extraction by way of income generation activities and reduced impacts on the forest ecosystem (Bunker, 1985; see also Allegreti, 1990; Anderson *et al*., 1991). In his review of the literature on 'extractivism' (collection for sale and consumption), Almeida (1996) notes that even good extractivism does not promise immediate deliveries or returns to extractors.

Although several studies have contributed data on the actual or potential economic efficiency of NTFP management regimes (Peters *et al*., 1989; Vantomme, 1990), further analyses of changes in the cultural and social systems of forest user groups are essential if we are to more fully integrate our understandings of equity and sustainability issues. There is evidence that the extraction of NTFPs can contribute significantly to local economies over the medium term and can improve life chances in terms of livelihood security and dietary risk minimisation (de Beer and McDermott, 1989, Godoy *et al.,* 1995). Several researchers have also documented patterns in particular geographical areas (Falconer, 1992). But rather little is known about the factors that determine the form and intensity of resource exploitation by local communities, or why resource extraction regimes change over time (Wilkie and Godoy, 1996). Similarly, while a good deal of research has been conducted on the economic valuation of different forest resources and regimes according to financial and other criteria (Balick and Mendelsohn, 1992; Godoy *et al*, 1993; Peters *et al*, 1989), rather less empirical work has been initiated on how extraction for sale affects household consumption of forest-based

goods, or how changes in household investment in labour, capital and land affect forest species composition and abundance (Nepstad and Schwartzman, 1992).

1.2.2 Management and marketing of NTFPs

In many countries there is no NTFP policy as such, or at least no effective and consistent NTFP policy. In order to develop appropriate management techniques, policy makers will need to understand the extractive practices being followed by forest-dependent populations and other forest user groups, the economic opportunities associated with different production systems, and the politico-economic-legal constraints on collection and use.

There are inherent complexities involved in managing a forest for NTFPs. The products are diverse, production is uncertain, and markets are imperfect. Where NTFPs have a high commercial value, overexploitation has often occurred and the product has become scarce (Plotkin, and Famolare 1992; Falconer, 1993); in many more cases, the underdevelopment of a commercial infrastructure is an obstacle to effective NTFP management (FAO, 1985). Most past researches on NTFPs have been site specific, and conducted with reference to either commodity markets or household needs or biological characteristics. Developing a sound policy requires careful analyses of all the above aspects as they relate to the forests which are typical of a region. To ensure an increasing percentage of the market share for NTFP gatherers and producers requires an understanding of how NTFP extraction and marketing systems have functioned in the past and how current systems can be adapted to the demands of the consumer market. One difficulty here, identified by Browder (1992), is that 'a major impediment to the development of a replicable model of an extractive system is a lack of single role model of extraction'. It is hard to know just how efficient an NTFP system is or might be. NTFPs are unlike timber production and management systems because there is no ‘global metric’ for purposes of comparison, either theoretically or empirically.

Notwithstanding these problems, it is widely and reasonably assumed that improvements in NTFP marketing systems will benefit collectors and create or expand a local stakeholding constituency for sustainable production. The problem is that the heterogeneity of tropical forests, and the dispersed nature of NTFP distribution over vast areas, has restricted private sector and even government interventions to exploit and market NTFPs in many developing countries, where the forest sector anyway suffers from insufficient or poorly trained technical personnel. Moreover, even where it is accepted that market expansion for non-wood products will help many rural inhabitants, expansion is often not possible on account of product perishability or poor transportation networks.

In the case of Amazonian extractive economies international transportation links are often critical (and sometimes in place), and these links tie the region into cycles of boom and bust in the global economy. This has been well documented by Anderson (1990), Browder (1992), Bunker (1985), Hecht (1985), Hecht and Cockburn (1989) and Homma (1992) amongst

others, and it is especially evident in the case of rubber, brazil nuts and cocoa. In many other geographical areas most NTFPs are traded locally and the major objective is to understand how the local market functions, and whether existing inefficiencies or inequities could be improved upon or diminished to benefit local forest-dependent user groups, and not least women. Padoch (1992) has shown that even where locally or regionally marketed goods account for the bulk of forest species extracted by indigenous communities, little is known about how these markets function. A realistic appraisal of potential market value or plans for expansion in tropical forest products must include an assessment of the possibilities and costs of bringing those products to market. Expanded sales of NTFPs could increase the value of forests and consequently help users to develop an interest in forest conservation. But an historical analysis of NTFP extraction does not suggest that increased local benefits automatically accrue to collectors as opposed to traders (local or non-local). It is not clear, either, that the supply of all or most NTFPs can be increased sharply in the short-run and maintained in the long-run.

Development of policies to remove such economic and social constraints is essential if NTFP management systems are to serve a large and diverse body of stakeholders. When the value of products accrues mainly to intermediaries the social objective of NTFP systems may not be maximised (Fearnside, 1989). Several existing studies show how collectors of NTFPs very often live under regimes of economic and social dependence where prices and markets are effectively controlled by land-owners, merchants and private companies. Other studies suggest that NTFP trading systems are often riven by monopsonistic arrangements (Clay, 1992; Peluso, 1992), and are shaped by unhelpful or unfair legal restrictions on the direct sale of NTFPs by collectors. The variability and unpredictability of traded prices has also been commented on, and is widely seen as an impediment to the design of improved NTFP management systems.

1.3 NTFPs IN INDIA

1.3.1 Forest policies in India

State-initiated forest management in India dates back to 1855 and the declaration of a Charter of Indian Forests. The Forest Policies of 1894, 1927, and 1952, all enacted since the first Forest Act of 1865, were largely directed towards timber production (Guha, 1983, 1989). Despite some cosmetic changes, the focus of the post-colonial state's forest policies has also been timber, and policies have been motivated by revenue and industrial concerns. While Reserved Forests (RF) were and often are managed for timber, firewood and bamboo production on mainly commercial grounds, other categories of state-controlled forest lands - variously, 'Protected Forests', 'Village forests', 'Zamindari forests' and 'Private forests' amounting to 34 million hectares - were left to meet the forest needs of local people, usually without the systems of scientific management practised in the Reserved Forests or investment to enrich the depleting stock. The contribution of the misleadingly named 'Minor

Forest Products' (MFPs, the umbrella term for forest products other than timber and firewood) was not yet appreciated in the forestry sector in India, and 'timber' continued to be the major tradeable forest item on which management relied to generate revenue. Although Community Forestry in India developed impressively in the 1980s, it was primarily structured around the production of small timber and fuelwood (Nesmith, 1991). It was only in the 1988 Forest Policy that definite guidelines for developing NTFPs were issued. These policy guidelines will not achieve their objectives unless they are translated into specific goal-oriented strategies at the State level forestry, where national forest policies are implemented and where many previous policy recommendations have not been pursued with vigour or success.

The forestry sector in India is part of the 'Concurrent List' of the Constitution, which is to say that it is a subject under the dual control of State and Central Government, where State forestry units control and manage the forests within the constraints of a National Forest Policy. Prior to 1970, very few States had procedures to govern the exploitation of NTFPs, although most had rules for timber extraction and marketing. There was plenty of official activity, or talk, about the importance of what are now called NTFPs. As early as 1961, the report of the Devar Commission urged State governments to make provision for intensive collection and local processing of MFPs. The Committee on Tribal Economy in Forest Areas (1967) also recommended the establishment of Forest Corporations and Tribal Development Co-operative Corporations for the collection, processing, and marketing of MFPs, and the National Commission on Development of Backward Areas (1981) emphasised the necessity of research on MPFs and the propagation of selected NTFP species. The National Report of the Committee on Forestry and Poverty Alleviation (1984) likewise recommended identification of new MFP resources, tapping techniques, refining chemical modification and the introduction of superior varieties of plants yielding so-called minor forest products (Tewari, 1993). But these recommendations had very little impact on forest planning and management in most States where, until recently, the priority was on accumulation of revenues through logging of natural and planted forests.

1.3.2 Management and economic significance of NTFPs in India

India possesses a rich bounty of NTFPs in its 64 Mha of State-managed forests. Over 50% of forest revenues and 70% of forest export income come from NTFPs (Shiva, 1994). In India, the major source of both self-employment and indirect employment in forestry is the collection, processing, and sale of a wide range of NTFPs. These include bamboo, cane, grasses, oilseeds, fibres, gums, and resins, dyes, medicinal plants, spices, honey and wax, nuts, sandalwood, leaves, and seeds for propagation. Although the designation ‘minor’ may give the impression that this subsector is of low value, in 1986 NTFPs accounted for almost 40% of Forest Department revenues, 75% of net export earnings from forest sector revenues, and 75% of net export earnings from forest produce. Small-scale forest-based enterprises, many of them reliant on NTFPs, provide up to 50% of income for 20-30% of the rural labour

force in India (Campbell, 1994; see also Appasamy, 1993; Chopra, 1993). Of the total wage employment in the forestry sector, NTFPs perhaps account for more than 70 per cent (Gupta and Guleria, 1982a). More important is the opportunity for self employment which these enterprises provide to the forest dwellers, recently estimated at 3.3 million person years. A recent study in West Bengal suggests that many village communities derive as much as 17% of their annual household incomes from NTFP collection and marketing activities (Malhotra *et al.,* 1991). A study in Bastar, Madhya Pradesh, found that while the maximum sustainable yield from 1 hectare of forest was about $10m^3$ every 20 years, yielding a net value of Rs. 20,000, non-wood products harvested every year produced a net income of Rs. 200,000 over the same period (Tewari, 1993). India's State governments earn roughly Rs. 2000 million per annum from the NTFP trade, in the form of royalty, fees, sales profit, licenses and so on.

About 70% of NTFP collection in India takes place in the central 'tribal belt' of the country, in the five States of Maharashtra, Madhya Pradesh, Bihar, Orissa and Andhra Pradesh. Women are the mainstay of most small-scale forest-based enterprises. Perhaps the largest employer of women in this sub-sector is the bidi industry, where women are employed to collect tendu leaves and to roll them. Estimated employment is of the order of 106 million person days in collecting activities and 675 million person days in the processing of products. According to the 1981 Census of India, bidi manufacture is the second largest employer of women, and the only industry in India employing more women (55%) than men.

Despite India's huge and diverse wealth in NTFPs (an estimated 3,000 plant species yield one or other NTFP), only about 150 non-medicinal plants are commercially exploited. In the absence of definite action plans at State and national levels, the modalities of extraction and marketing of many valuable products have been mostly local or 'traditional'. Monitoring of actual and potential production, use and marketing of NTFPs is lacking (Gupta and Guleria, 1982a and 1982b). With the exception of a 'minor forest produce plantation scheme' which has been operational since 1985 in various States, and which has not yielded much minor forest produce (because of degradation, poor choice of species, lack of usufruct sharing arrangement with collectors), systems of collection, processing, and marketing of NTFPs continue to operate in a traditional way in most parts of the country. In most States delineated MPF working circles in the Working Plans for Reserve Forests are managed to the extent of exploiting the demarcated coupe for non-timber forest produce, but without a concentrated effort of reinvestment in, or enrichment of, the exploited species. This may have contributed to a gradual loss in production and a reduction in the quality of the natural stock. State financial and infrastructural investment is inadequate to enhance output of NTFPs from the forest as things stand. The forestry sector commands only about 1% of budgeted Plan expenditure, even though growth in income from forestry in India doubled in the 1980s when total government incomes rose by only 45%.

In terms of collection and marketing arrangements for NTFPs in India, the dominant system has seen the Forest Department (or State Forest Corporation) purchase the gathered produce from the extractors, and then sell it back on the open market through auction to traders or industries after basic processing. Products in which the State Forest department has no real interest (usually because the outputs are small) have generally been leased out to forest contractors for exploitation. In most cases, the royalties paid by contractors are decided by crude methods of anticipated production, without any scientific study or resort to a detailed inventory of NTFPs on a local basis. Arrangements also change from year to year for administrative or political considerations. The Forest Research Institute in Dehradun has compiled information on NTFPs in India, but this information has rarely been used by State forestry organisations, or public or private sector enterprises, for developing or making value added products. There are few existing incentives for industries to use NTFPs as raw materials. In addition, it has been shown that the unregulated collection of NTFPs impacts adversely on the regeneration of some vulnerable species in India, that forest-dependent households are often exploited by intermediaries (Das, 1996), and that some NTFPs have been subjected to a recent but continual fall in production.

The brighter side of the Indian forest set-up is that most forest laws, and even forest policing activities, have not encroached on the tenurial rights of NTFP extractors. Interestingly, the environmental lobby in India, which has been quite vocal in its opposition to the employment of private contractors for timber exploitation, has said rather less about the involvement of middlemen in the marketing of non-wood forest products. It remains the case, however, that the management of NTFP-based activities in India is limited by problems relating to seasonality, storage, transportation, and low volumes of assured production. In this respect, NTFP systems in India are not unlike NTFP systems elsewhere (Campbell, 1994).

1.4 BACKGROUND TO EASTERN INDIA

Both Bihar and Orissa are situated in eastern India and have predominantly monsoonal climates which support dry and moist deciduous forests. Agriculture is the main occupation of local people, and it provides employment to 75% of the working population in both States.

1.4.1 Bihar

1.4.1.1 Physical Geography

The river Ganges flows in an easterly direction through Bihar dividing the state into a northern flood plain and an area of higher land to the south. This higher land can be further subdivided into the plains and low hills of Central Bihar and the higher Chotanagpur plateau and Santhal Pargana regions. The latter comprise South Bihar within which the research area is located. In response to demands for a separate Jharkhand province comprising the once tribal dominated districts of Chotanagpur and Santhal Pargana, South Bihar came under the jurisdiction of the Jharkhand Area Autonomous Council in 1995.

The Jharkhand region is situated between 22 and 23 degrees north, and has a mean maximum temperature of around 32^{o}C and a mean minimum temperature of around 17^{o}C. Most of the region has abundant rainfall (1250-1650 mm per year) which falls mainly during the monsoon months (June to September) and drains quickly along a series of small river valleys that give the plateau an undulating appearance. The Jharkhand's geology consists of a mixed metamorphic and sedimentary rock structure which contains 90% of Bihar's mineral wealth in the form of rich deposits of iron ore, manganese ore, mica, copper, coal and limestone. Reflecting the fact that around 90% of Bihar's forest resources also lie within the Jharkhand, most of these valleys and the hills or outliers that rise above the level of the main plateau were, until recently, blanketed with dense stands of sal (*Shorea robusta*) dominated forest.

1.4.1.2 Livelihoods

Bihar ranks as one of India's poorest and badly administered states and caste-related violence is increasingly widespread. The region is renowned for its corruption and state politics are dominated by the Janata Party government which has managed to generate a powerful alliance of the poor; notably dalits and Muslims.

The existence of a geographically very concentrated supply of minerals within the Jharkhand has provided the basis for large scale heavy industrial development in the region since the late nineteenth century and has offered an alternative source of employment for a significant (though declining) number of local people. Heavy mining, particularly of coal, bauxite, mica and iron, has had major environmental impacts, particularly on the region's forest resources.

Agriculture in Bihar is less obviously prosperous and Bihar's ratio of non-agricultural to agricultural population has increased only marginally from 0.1448 in 1981 to 0.2080 in 1987 (compared to shifts from 0.2929 to 0.3916 in West Bengal and 0.1864 to 0.3170 in Orissa during the same period). The state has a total cropped area of 10.52 million hectares and an average cropping intensity of only around 60%. The mean land holding size is about 0.9 hectares (which is amongst the lowest in India) and 76% of holdings are less than 1 hectare. The average income per agricultural worker is a mere Rs. 876 (compared to Rs. 3733 in Punjab and Rs 1131 in Orissa).

About 28% of the state's cultivated area receives some form of irrigation but almost all of this is in the North and Central Bihar. In the southern plateau region only about 8% of the cultivated land receives irrigation. The consequent reliance on rainfed agriculture coupled with rather poor quality red, sandy and occasionally loamy lateritic soils has resulted in only marginal agricultural productivity and limited adoption of 'green revolution' high yielding varieties of rice and wheat. As a result, many households in the Jharkhand can only grow

enough food to last them for eight or nine months of the year. Although some landed households close to urban areas have been able to diversify into commercial vegetable production, the options are significantly more limited for landless or female-headed households and those living in areas remote from major markets. Most subsistence-deficit households must therefore undertake wage labour of some form to enable them to buy in food for the remaining months. A common scenario in the region is for unmarried household members (but sometimes entire households) to undertake seasonal migration to the brick fields of Calcutta and Gorakpur in Uttar Pradesh.

1.4.1.3 Demography

With a population of 86.3 million in 1991 and a growth rate of 23.5% Bihar is one of the India's most populous and fast-growing states. Ethnically the state is quite diverse. North and Central Bihar are mostly inhabited by caste Hindus but the plains have a significant Muslim population of around 14% which is the result of five centuries of Muslim political dominance in the region. Small tribal populations are present in the southern part of Central Bihar (mainly Rohtas and Gaya districts), but more than 90% of the state's adivasis (and forests) can be found in the Jharkhand region. According to official listings, 30 Scheduled Tribes make up around 30% of the Jharkhand's population but this number was significantly higher prior to 1951 when de-Scheduling was undertaken by the Indian State.

In contrast to the peasants of the adjacent plains of Bihar and West Bengal, the Jharkhand tribes depend heavily upon and are intimately connected to forests and trees. Most adivasi villages have a sacred grove (sarna) which was left as an abode for village gods when the surrounding forest was cleared. In addition, small groves of trees can usually be found on homestead land, alongside pathways and at the village meeting ground.

Ethnically, the Jharkhand tribes form two main groups. One consists of the Kolarian aborigines (including Mundas, Santhals and Hos) who inhabited South Asia prior to Aryan invasion and probably moved south-eastwards from Central Bihar during the 6th century BC. to avoid local conflicts. The Santhals then moved eastwards, towards present day Santhal Pargana, Birbhum and Bhagalpur while the Mundas and Hos engaged in an extensive process of forest clearing in what today is Ranchi district. The second group consists of Dravidian tribes (Oraons) which are thought to have moved from South India. At some point, most tribal communities attracted a series of 'service castes' such as the kamars (blacksmiths), telis (oilmen), momins or tantis (weavers), kumhars (potters), mahalis (basket maker) and gwalas (cowherds). Usually, these groups (who are known by the generic name sadan) were allotted land by the village headman for maintenance purposes. Gradually they assimilated tribal culture and have now begun to identify themselves as participating in a common Jharkhand milieu.

1.4.2 Orissa

1.4.2.1 Physical Geography

The State of Orissa is situated between 17 degrees 31' to 22 degrees 29' north latitude and 81 degrees 27' to 87 degrees 30' east longitude. The Bay of Bengal runs along the south eastern boundary of the state. Orissa is an extensive plateau which slopes gently into the coastal plain along the Bay of Bengal but can be divided into four natural regions: (i) the coastal plain, (ii) the central table land (iii) the northern plateau and (iv) the eastern Ghats. The area inland from Bhubaneswar is made up of the ancient rocks of peninsular India, many of which contain important mineral deposits.

The State has a tropical monsoon climate with an erratic rainfall distribution which often results in floods, droughts and cyclones which in turn have a major impact on the agricultural economy. The average annual rainfall is 1500 mm with 75% of this falling between June-September. The climate is characterised by high seasonal variations in temperature from a maximum of about 38^{o}C to a minimum of around 12.8 ^{o}C. The total surface area of the state is 15.54 million hectares, about 40% of which is used for agriculture and about 36% is classed as forest land.

1.4.2.2 Livelihoods

Orissa is a predominantly agrarian economy with agriculture and allied sectors contributing about 50% of the state's domestic product and providing productive employment to about 75% of the work force. The average land parcel cultivated per family is small (0.6ha), however, and the distribution of land is very skewed. Marginal and small farmers account for 78 percent of operational holdings but have only 41% of the operated area. In addition, wide fluctuations in rainfall coupled with the fact that irrigation is available on only 37% of the net area sown makes rainfed paddy cropping a risky proposition: a situation that has limited the spread of “green revolution” agriculture. The alluvial soil of the coastal plain is the most important agriculturally: a situation reflected by the area's intensive cultivation and high population density (494/km^2).

Rice is the staple crop although in some highland areas, other cereal crops like ragi, maize and wheat are grown. In 1992-3, food grains accounted for 90% of the total area under cultivation of which 76% and 20% were rice and pulses respectively; only 7% of the cultivated area was used for oilseed cultivation.

Around 38% of the State's population is employed although the proportion of rural workers is greater than that of urban workers due to the agrarian nature of the economy (GOO, 1993). Women's participation in the urban labour force has remained stagnant (20%), but the rise in their rate of participation in the rural labour force is quite marked, increasing from 7% in 1971

to 21% in 1981. This increase is probably due to a combination of factors such as a deterioration in household income, absence of alternative employment opportunities and gradual easing of socio-cultural restrictions on women working outside the home.

The majority of the work force are cultivators (44%), followed by agricultural labourers 29%. 4% are engaged in household industries and 23% are classified as other workers. The relatively slow agricultural growth rate of 2% in recent years has been unable to keep pace with the 5% annual increase in the agricultural working population with the result that under-employment has become a major problem in rural areas. This has in turn contributed to forest decline as in the absence of alternative employment poor villagers have taken to cutting firewood and timber for sale.

A vast majority of Orissa's tribal population depend heavily upon the forest for their subsistence and nine tribal groups still practice slash-and-burn cultivation known locally as podu. This relationship has been acknowledged in the Orissa Forest Act, 1972 (Protection of Scheduled Castes' and Scheduled Tribes' Interest in Trees Act, 1981) which seeks to safeguard tribal interests and protect them from exploitation by timber contractors or traders. This Act also protects their rights to gather minor forest produce for consumption. In addition, institutional support has been provided to enable forest-dependent populations to make higher earnings from forest produce. This led some critics of forest policy to argue that, "the rights and privileges of the local inhabitants in Orissa are much less stringent than those in most other States". Others feel that tribals are used as wage labourers to maximise the state's revenue but receive few benefit for their efforts with the result that they have become alienated from forest development.

1.4.2.3 Demography

In 1991, the total population of the state was 31.6 million, some 3.7% of India's population. The state's urban population showed a slow rise, from 11.8% in 1981 to 13. 9% in 1991 and there has been a marked rise in population density from 169/km^2 in 1981 to 202/km^2 in 1991. The continual increase of the rural population coupled with an existing scarcity of agricultural land (exacerbated due to poor soil conditions) is putting significant pressure on forest lands.

The predominance of the agricultural sector creates a great deal of instability in the income growth rate due to fluctuations in production. The per-capita income of the state for 1991-2 was Rs. 3816 and the state's poverty ratio is high (42.8% according to the Planning Commission) based on calorie consumption levels. According to the 1991 census the literacy level in Orissa was 49% which is below the national average of 52%. Most revealing is the female literacy level which is only 34%, almost half the male literacy rate of 62.4 percent (GOO, 1993).

Ethnically, Orissa is rather unusual in that it has the third highest tribal concentration in India, with Scheduled Tribes making up around 25% of the State's population. Until recently, tribal groups were the only inhabitants of Orissa's dense inland forests were they practised shifting cultivation.

Nowadays, most of these forests have been thinned and cultivation has spread up into most of the more accessible valleys, but Koraput, Phulbani, Sundargarh and Mayurbanj districts still have significant tribal populations. The most numerous tribal group (about 100,000) are the Khonds who speak a Dravidian language and live mainly in the west of the state. The second most numerous group are the Santhals who come from Mayurbanj and Balasore and speak Santhali which belongs to the Mundari groups of Austro-Asiatic languages. Many Santhals have abandoned traditional forest-based lifestyles to work in the steel mills Orissa's north-western industrial belt. In the southern districts, particularly Koraput, there are around 6000 Bondas who are thought to be of Tibeto-Burmese origin but who speak a language belonging to the Mundari groups. They subsist mainly by shifting (rice) cultivation and keeping domesticated cows and goats. The hilly areas of Parlakhemundi (Gajapata District) and Gunupur (Rayagada District), meanwhile, are dominated by the Saoras.

1.5 FORESTS OF EASTERN INDIA (BIHAR AND ORISSA)

1.5.1 Climate and vegetation

With high Scheduled Tribal populations (22% in Orissa and 8% in Bihar), forests play a significant role in the socio-economic life of the region and many households depend on the collection or sale of NTFPs for their survival. The contribution of NTFPs to forest revenues has been significant in the past, even though forest policies in both States have been centred around the plantation and harvesting of timber species.

Official figures suggest that forests cover 36% (6 Mha) of the land area of Orissa, although recent satellite imagery suggests the area under effective forest cover is closer to 26% (FSI, 1991). The main types of forest are 'dry deciduous', which cover approximately 50% of the area, and 'moist deciduous' covering 30% of the forest area. The remaining 20% of forests consist of various forest types such as 'semi-evergreen', 'littoral' and 'tidal swamp' forests. Predominant vegetation types are dry and moist sal forests (Government of Orissa, 1994). The forests of Orissa can be broadly classified under Champion's climatic type system as: (a) Northern tropical Semi-evergreen forests, (b) Northern tropical moist-deciduous Sal, and (c) Northern tropical dry deciduous forests. Type (a) is usually found in or near the coastal plain and is represented in the forests of Puri, Nayagarh, Athagarh, Dhenkanal, and Baripada Forest Divisions. Key species are *Terminalia arjuna* (Arjun), *Mangifera indica* (Mango), *Diospyros embryopteris* (Marker tendu), *Michelia champaca*, *Dillenia pentagyna*, *Saraca indices*. The northern tropical moist deciduous Sal forests are more extensive, and are found further north and west in the State. This type is represented in the forests of Karanjia,

Keonjhar, Bonai and parts of Sambalpur Forest Divisions. Key species include *Shorea robusta*(Sal), *Terminalia tomentosa* (Asan), *Pterocarpus marsupium* (Bija), *Dendrocalamus strictus* (bamboo), *Adina cordifolia* (Haladu), *Xylia xylocarpa, and Anogeissus latifolia* (Dhaura). The North tropical dry deciduous forest occurs in western Orissa, where the major species are *Shorea robusta, Terminalia tomentosa, Diospyros melanoxylon* (Tendu), *Cliestanthus collinus (Karada), Adina cordifolia.* This type is found in parts of Kalahandi, Sambalpur, and in forests in Khariar and Padampur Divisions. In addition to the above main types, other seral and subtypes include coastal mangroves in Bhitarkanika and Rajnagar areas.

Orissa receives an annual forest revenue of Rupees 1,000 million, which constitutes the major non-tax revenue for the region. Investment in forestry is around 1.5 % of the State budget. The growth in NTFP revenue earning was 83% in 1980-85 and 200% in 1985-90, while the corresponding return from timber has grown by 10% since 1990, after declining by 43% between 1985 and 1990 (Mahapatra, 1994; Mahapatra & Mitchell, 1997). The downward overall trend in timber production reflects the poor state of forest health, which has affected forest productivity. Although commercial production of timber has been prohibited in eight Districts of Orissa since 1990, causing reduced timber out-turn, it has not affected production of non-timber materials. This suggests that sustainable forest management is feasible in tropical countries by means of a conservation-oriented forestry strategy, without significantly affecting the interests of local people (so long as their access to NTFPs is not affected).

Forests cover just under 17% of Bihar's total land area (10.8 Mha). Just over 90% of Bihar's forest area is classified as Tropical Dry Deciduous forest with the remainder being made up of Tropical Moist Deciduous forest. The Tropical Moist Deciduous forests are found predominantly in the southern part of the state and are characterised by species such as *Shorea robusta, Terminalia tomentosa, Pterocarpus marsupium, Dendrocalamus strictus, Adina cordifolia, Xylia xylocarpa,* and *Anogeissus latifolia.* The predominant Dry Deciduous forests are found throughout the northern and north-central areas of Bihar, and are characterised by species such as *Shorea robusta, Terminalia tomentosa, Diospyros melanoxylon, and Adina cordifolia.*

Bihar's experience with forest management has been different from some other provinces in India. Since the British colonial period, the state has followed a policy of managing Protected Forests (PF) primarily for the satisfaction of the needs of local right holding tenants of the village in which the PF is situated (Annual Administrative Reports 1911-12 to 1935-36, Forest Department, Govt. of Bihar and Orissa). Following an elaborate process of survey and settlement, the rights of different classes of tenants in common land (wasteland including forest land) were recorded in great detail in a revenue book known as the Khatiyan part-II, according to the procedure established by the Tenancy Acts applicable to individual areas.

With the abololition of the *zamindari* (landlord) system in 1950, the area of Protected forest increased dramatically when the privately held, ex-zamindari, Private Protected Forests (PPF) were vested in the state.

At present, PFs constitute almost 85% of Bihar's forest area. Since most of these PF are small in size (average size 100 hectares), are situated close to village boundaries, and are heavily burdened with rights to local people, the Forest Department adopted a different management strategy to that found in the larger and more commercially valuable Reserved Forests (including the Saranda forests of West Singhbhum District). Thus most new PFs, either in full or in part, were put under the 'right holding working circle' for meeting the bonafide domestic requirements of forest right-holders. These right holders were in turn expected to protect and assist in regenerating Protected Forests. Despite (or perhaps because of) these arrangments, severe degradation has taken place in Bihar's PF resource since the early-1970s, with many protected forests being treated as an open-access property resource (Jewitt, 1996)

1.5.2 Non-wood resources of Eastern India (Bihar and Orissa)

The dry deciduous and moist deciduous forests of eastern India produce a wide array of NTFPs which are extensively consumed as food, fuel, fodder and medicines by local people, besides being used for industrial purposes. About 60-65 products were recorded as being commercialised in the region, including sal seed, tendu leaf, resins, drugs, oil seeds, myrobalam, and fibres. The majority of the items collected are from inland Districts like Koraput, Sundergarh, Phulbani, Keonjhar and Mayurbhanj in Orissa, and Ranchi, Singhbhum and Palamau Districts in Bihar, which have a higher percentage of forest cover. Miscellaneous Sal forests *(Shorea robusta)* are the predominant forest type. The coastal Districts of Orissa have a forest cover of just 15% and a higher population density (494 km^{-1}). They make a smaller contribution towards non-wood production, but provide a marketing outlet for the products. A District-wise differentiation with regard to NTFP out-turn in Orissa or Bihar is difficult to make except for kendu leaves, which is dominated by Western Orissa (Sundergarh, Sambalpur Districts), the leading kendu leaf producing area in the country.

Bamboo *(Bambusa tuida, B. arundinacea),* kendu leaf *(Diospyos melanoxylon),* sal seed *(Shorea robusta),* mahua flower *(Madhuca latifolia)* and tamarind *(Tamarindus indica)* are the most economically valuable items in Orissa, contributing about 85 % of the total income from NTFPs. Bamboo is less significant in Bihar, where sal leaves are an important product. The contribution of NTFPs to the total revenue of Orissa is high, and increased from 28% in 1969-70 to 50% in 1987-88. The revenue from three important NTFPs - bamboo, sal seed, kendu leaves - constitutes 80% of the total revenue collected from the full range of non-timber items. The employment generation capacity of NTFPs is also significant in tribal areas of Bihar and Orissa (Saxena, 1997).

Official data sets reveal fluctuating trends in production for a majority of items. The main reasons for this are abrupt changes in collection arrangements for the products, changing marketing policies, and low procurement prices in the past which left traders guessing and made availability uncertain. Decreasing market demand and lack of a support price for local extractors adversely affected extraction of several products from the region. Rapid depredation of forest cover could be another reason for the steady decline in products such as bamboo, gums, lac, tassar *(*a silk producing cocoon) and honey, despite high market prices. In general, the rights of tribals and forest dwellers to collect and use NTFPs are protected in both Bihar and Orissa. They are free to gather NTFPs from all categories of forests, including the Reserved Forests, although there are restrictions on the marketing of products.

From the data available for the last decade or so, no regular patterns in the production of most NTFPs is observed, except in the case of Sal seeds and Kendu leaves. It seems likely that collection of tassar, lac, ganduli gum, patal garuda, and bamboo has declined on account of degradation and over-exploitation of forest resources. The production of bamboo in Orissa reached 91 million units in 83-84 against 125 million units in 80-81. However, intensive management increased the production of Sal seeds from 18783 MT in 1984 to 33375 MT in 1986 and that of kendu leaves from 391 lakh quintals in 1984 to 4.28 lakh quintals in 1987. The decision to nationalise Sal seed and kendu leaf collection paid dividends that are reflected in the substantial increase in the gross margin from those products and payment of higher prices to primary collectors. Sal seed collection rose to 33,375 tonnes in 1986 against 18,785 tonnes in 1984, and revenue from kendu leaf production increased about three fold (from Rs.6.7 million in 1985 to Rs. 16.7 million in 1992). Another noteworthy feature in Orissa is a recent increase in vegetable oilseed collection from forests and in prices paid for the commodity. There was a mixed trend as regards sal seed and mahua flower production, which seems to be largely influenced by the flowering cycle. Collection of the latter was severely hit in the 1990s due to a sudden change in official procurement policies. Low industrial demand for raw materials within both States hindered extraction of products such as sabai grass, medicinal plants, resins, myrobalans and gums. Small-scale enterprises producing furniture out of 'sabai grass rope' suffered when low priced polyvinyl-moulded plastic furniture came onto the market in the 1980s.

If trends in turnover for all products (standardised to uniform weighting) are examined, the growth of products can be divided into three phases (concentrating now on Orissa):

1. 1960-70 - Low collection due to limited area and product exploitation. Consumption was high compared to sales due to the low market price of products such as oil seed, myrobalans, mahua flowers. A small range of products was marketed.

2. 1970-80 - Growth in collection and processing due to market expansion, increase in demand and higher real prices for the products. Some growth in production due to industrial use of hitherto unexplored items like sal seed, mahua flower, resins, medicinal plants.

3. 1980-90 - Declines in collection and processing for a combination of reasons. Loss of forest areas (13, 733 ha of forest cleared for developmental work in 1980-90), lack of organised collection and marketing facilities, failure to augment production from forests and farms, and declining regeneration due to overexploitation, were some of the causes.

Officially recorded figures are considerably lower for products which are not harvested or leased out regularly. Even for the controlled (nationalised and leased) items the recorded statistics are usually underestimates, as some items are exported out of State illegally or consumed locally. About 45 items are commercially traded, for which some statistics are available from the forest departments of Bihar or Orissa. Some basic statistics on revenues from Timber and Non-Timber Products in Orissa are given in Table 1.1.

Table 1.1

Revenue from NTFPs in Orissa

Year	Revenue from Timber Products (in million Rs)	Revenue from Non-Timber Products (in million Rs)	NTFP revenue (as % of total forest revenue)
1980	22.6	13.1	36.69
1981	30.5	14.6	32.37
1982	26.1	19.1	42.26
1983	27.9	25.5	47.75
1984	24.4	24.3	49.90
1985	24.9	21.9	46.79
1986	23.8	23.6	49.79
1987	27.8	34.1	55.09
1988	24.9	32.5	56.62
1989	16.7	90.4	84.41

By way of comparison, it might be noted that in Orissa production of mahua seeds was about 3200 MT during 1985-1990, before slumping to 700 MT between 1990-95 (except in 1993 when the turn over was 5412 MT). In Bihar, production of Mahua seeds was 1846 MT in 1981 declining to 47 MT in 1989. The average annual turnover of kendu leaves in Orissa is 4,05,000 quintal, whereas in Bihar it is 807,000 standard bags.

1.6 NTFP EXTRACTIVE SYSTEMS IN EASTERN INDIA

1.6.1 Extraction agents and arrangements

Extraction of NTFPs is made by four main groups:

1. Right holders and free grantees
2. Private lessees
3. Government-owned corporations, including the Bihar and Orissa Forest Development Corporations
4. Private companies.

The past system of working of non-wood resources in Bihar and Orissa was to trade by way of public auction, negotiation sale, or by agent purchaser. The rights and privileges of people to collect NTFPs varies from District to District. Right holders were allowed to collect non-timber forest produce from protected forests, khesra forests and village forests for their own consumption and for local sale. Collection for sale from Reserved Forests is prohibited, but still occurs. Further restrictions are imposed by forest produce control of trade Acts, such as The Orissa Kendu Leaves Act of 1981 or the Supply of Bamboo to Artisans Rules of 1980.

For trading purposes, most NTFP items were auctioned on a forest Division basis for collection and trading of a particular NTFP on lease for a period of one to five years. Bamboo forests in Orissa were earlier leased to T.P.Mills and O.P. Mills. Departmental permits were issued in favour of local people to collect bamboo from adjoining forests to meet their annual requirement. A number of items (Sal seeds, Kendu leaves, bamboos) were later nationalised in both Bihar and Orissa, with exclusive rights being granted to the state to trade in the listed products. The major traded non-wood product in Orissa is the kendu leaf (tendu in Hindi-speaking areas), which is used as a wrapper in the manufacture of country cigarettes, or bidis. Trade in this product has been centred on Sambalpur in western Orissa. In the past, purchase rights were given to traders to collect leaves from the State forests through annual auctions. Some negotiated sales were also effected for the areas not sold off in auction. Collection, processing, employment (wages) and marketing arrangements were under the control of private bidi merchants and kendu leaf contractors.

With a view to traded volumes and worker protection, the Government of Orissa introduced controls over the trade in 1961. The Bihar State Government also passed legislation in 1971, creating a state monopoly in the trade of tendu leaves. The trade of tendu leaves in Bihar is now governed by the provisions of the Bihar Tendu Leaves Control of Trade Act, 1973. The act empowers the government to divide the tendu producing area into units, and provides that each unit will have several collection centres. An agent is appointed to look after the operations of a unit. One agent can be appointed for a maximum of three units. The trade of tendu leaves was partly handed over to the FDC in Palamau District, Bihar, in 1986. The

FDC was appointed as the sole agent of the government for the entire State in 1988. Trading activity is financed by nationalised banks.

Paper mills in Orissa were given cheap long-term leases for bamboo extraction from state forests until bamboo exploitation and trading was nationalised in 1988. Nationalisation ended the free removal of bamboo from forests granted to villagers, but local right holders were provided with their annual requirement from government depots. The system was changed again in 1996, and paper mills are now working some bamboo coupes as a 'raw material procurer'.

1.6.2 Politico-legal constraints on NTFP development

Among the various rules governing NTFP management in Orissa are the Orissa Forest Produce Control of Act, 1974, the Orissa Kendu Leaves Rule, 1964, the Orissa Mahua Flower Excise Rule, and the Orissa Bamboo Artisan Rule. These Acts empower the State government to notify any forest produce as a specified produce with respect to a specified area, thus creating a state monopoly in the trade of the produce. Such Acts recognise the customary rights of local people to gather and collect specified forest produce. The government is required to constitute advisory committees for the fixation of collection charges. Different prices may be fixed for different units. The collection price is determined after taking into account the following factors:

1. Prices in the three preceding years
2. Quality of the produce
3. Transport facilities
4. Wage levels for unskilled labour.

Every manufacturer who uses any specified produce as a raw material, and every trader or consumer whose annual use, requirement or consumption exceeds the specified quantity mentioned in the Act (e.g. mahua flowers, 5kg; tamarind, 100kg), has to register with the local forest authority. Transport permits are required for the transport of various items when they are exported out of State. Procurement and marketing of designated NTFPs in Orissa is done by the Orissa Forest Development Corporation (OFDC), the Tribal Development Cooperative Corporation (TDCC) and, recently, by a joint sector company, Utkal Forest Products (UFP). The TDCC was formed in 1973. It was established as an apex organisation for those co-operative societies in the State working in the tribal sub-plan area. The agency has around 200 Large Multi-Purpose Societies (LAMPS) and 47 panchayat samitis among its members. The collection of NTFPs by the TDCC is effected by forward sales, tie-up sales, or LAMPS. Forward sale involves selling the produce to the highest bidder after inviting tenders. The tender selection process is completed before commencement of the collection season. In tie up sales, the TDCC appoints agents who are responsible for the procurement of the

forest produce from the collectors. The agent pays some money as royalty to the TDCC. The TDCC also involves Lamps in the procurement process. LAMPS are paid a commission of 2% on the collection price.

The NTFP trade in Bihar is governed by the Bihar Forest Produce (Regulation and Trade) Act of 1984. The Act empowers the State government to regulate the trade of NTFPs in the State by the creation of a state monopoly in specified forest products. The Act empowers the State government to issue notices under clauses (3) and (4) of section I of the Act, restricting the purchase, transport, import, export, and retail sale of specified forest products to authorised agencies only. The government divides the specified areas into units for different specified forest products, and appoints agents on its behalf for the collection of specified produce. One agent can work in several units. These restrictions do not prohibit primary collectors from transporting goods within a unit, or transporting for family consumption.

All manufacturers and traders have to be registered with the Forest Department (in Bihar and Orissa). No person or agency is allowed to engage in the retail sale of specified forest produce except under a license from the government. The government is required to constitute an advisory committee under the Act for each calendar year. In Bihar, as in Orissa, the advisory committee has representatives from the trading community, the legislative assembly, and parliamentary members from the backward communities. In Bihar, the State government passed an ordinance in 1977 nationalising the trade in oil seeds of tree origin, and assigned the jobs of collecting and marketing to the Bihar State Forest Development Corporation (BSFDC). The fruits and seed of mahua, kusum, karanj, were added to the list of specified forest products in Bihar in 1978, with the BSFDC being made the sole agent. The fruits and seeds of aonla, harra, bahera, and palas were added to the list in 1980, with the BSFDC again being given the authority to work the products throughout Bihar. After the resolution of the Bihar Forest Produce Regulation of Trade Act, 1984, the BSFDC was made the sole agent for a few more species, including sal seeds and jongi. Finally, the State's Tribal Development Corporation has been made the sole agent for the purchase of tassar cocoons. This is a major source of income for the tribals of south Bihar.

The Kendu Leaves trade in Orissa is governed by the Orissa Kendu Leaves Control of Trade Act, 1961. Each District is divided into units and each unit has a number of collection centres. Different prices may be fixed for the purchase of kendu leaves from different units. The agent of the government is bound to purchase the leaves brought for sale at a predetermined rate, provided in the opinion of the agent the leaves are fit for wrapping bidis. The leaves purchased by the government shall be sold or otherwise disposed of in such a manner as the government may direct. The Act created a state monopoly in kendu trading, whereby purchase from primary collectors or growers and their subsequent sale came under the control of a government department or agents of government. This has affected free trading and stifled competition. But the government cannot create a monopoly in favour of third

parties from its own monopoly (Cuttack High Court judgement, ILR 1969 Cutt 841:3 5 [1969] CLT 479). Out of the net profit derived by the government, an amount not less than 50% of the total shall be paid to the samitis and gram panchayats. After the nationalisation of the kendu leaves trade in 1973, responsibilities relating to collection and marketing were given to the Forest Department and the Orissa Forest Development Corporation. Collection is done by the State Forest Department and the produce is handed over to the State Forest Corporation, which is a business company for the sale of the produce. The OFDC auctions off the entire stock of kendu leaves at the auction centres of Sambalpur and Bhubaneswar. Some of the unsold lots get auctioned off in Madras and Calcutta. The OFDC takes 7% of the aggregate sale value as commission (4%), for maintenance of the central godown (1%), and for marketing (2%). The rest of the sale proceeds are appropriated as government revenue.

As per the Bihar Tendu Leaves Act, a grower of tendu leaves has to get him or herself registered if his or her annual production is more than one standard bag. Every trader and exporter of tendu leaves, and every manufacture of bidi, has to get him or herself registered by paying fees, which depend on the size of the operation. Prior to nationalisation, the primary collectors used to get Rs 52 per standard bag. The rate was increased to Rs 65 per standard bag in the first year after nationalisation by the FDC and it has been revised a number of times since. The rate in 1997 was Rs 225 per standard bag, with the last revision taking place in 1994. The estimated employment generated from the collection transport and bagging of the leaves is around 6 million person-days. Following the nationalisation of trading in tendu leaves, there has been a significant rise in the out-turn of tendu leaves from 575,000 standard bags to 807,000 standard bags in 1996. Also significant is the increase in the share of incomes accruing to primary collectors as a percentage of the total revenue following state control of trading. It reached as high as 71% in 1992, according to official sources.

The sal seed trade in Orissa is governed by the Orissa Forest Produce Control of Trade Act, 1981. Section 2 (c) of the Act makes sal seeds a specified forest product, thereby creating a monopoly in the trade of sal seeds. The procurement of seeds was handed over to the OFDC and TDCC after the state monopoly was imposed in 1983. Subsequently, the OFDC was appointed as the sole agent in 1991. Now companies which extract sal oil - the solvent extraction plants - have been appointed as 'raw material procurers' for OFDC and TDCC. Collection charges are fixed on the advice of an advisory committee. The committee includes:

- Two members from amongst the traders of the produce, or manufacturers of the goods in which sal seeds are used as a raw material
- Two members of the growers of forest produce
- One Scheduled Tribe MP
- One Scheduled Caste MLA.

The principal costs borne by the raw material procurers are:

1. A minimum collection charge
2. A transportation charge
3. The cost of hiring a godown
4. A sal seed treatment charge.

Solvent extraction plants are not allowed to sell unprocessed sal seeds outside the State or engage in branch sales to evade the sales tax. All seeds must be processed within the State. If any industry fails to collect the quantity of sal seeds as per the contract with OFDC and TDCC, the industry must pay a penalty at the rate of Rs 50 per tonne. If the collection is greater than the quantity as agreed in the contract, the rate of royalty is reduced to Rs 25 per tonne for the quantity collected in excess.

The Bihar Forest Produce Control Act created a monopoly for the State in the trade of specified forest produce, and sal seeds were included in the list of specified forest products. The act was preceded by an ordinance in 1977. The Bihar FDC was made the sole agency for the purchase and sale of sal seeds in Bihar with effect from 1984. The collection charge (procurement rate given to the extractors) was 1500 during 1992-95, but was raised to 1700 in 1996. The share of the primary collectors is about 34-36% in Bihar. Barring a small portion sold to the Tribal Marketing Federation (TRIFED), the bulk goes to the Bihar Solvent and Chemicals Limited, a company under the management of the State's FDC. The Forest Development Corporation (FDC) does not pay any royalty to the State government; rather, the profits go directly to the State treasury.

There are significant discrepancies in the sale of sal seeds and kendu leaves in Bihar and Orissa (and indeed West Bengal). The disposal record suggests that in 1992 and 1993 Bihar was able to sell only 25% of its products, although the situation improved somewhat in 1994 and afterwards when the turnover was low. In Orissa, sales of collected amounts were about 95% of total. Trade in Mahua seeds was brought under the control of the State government of Orissa by an ordinance in 1978. Although mahua flowers were added to the list of specified forest products in Bihar in 1984, trading in this NTFP is not the exclusive domain of the BSFDC. Private trading is done alongside government collections. The main places of trading are Chakradharpur in Singhbhum District and Ranchi.

In Orissa, the rules regarding trade in mahua flowers are made under the Orissa Mahua Flower Excise rules, 1976. The right to collection is granted to any person, but storage, transport, import, export and sale are subjected to quantitative restrictions and registration requirements. Agencies or individuals interested in storing and transporting mahua flower have to take a licence from the District excise authority. The trader has to pay Rs 7.50 per kg as excise duty and further monies towards the forest royalty for storing and transporting. The restriction is enforced for the amount transported. Local trading and retail sale is often free

from restrictions in practice. The government of Orissa granted the TDCC an exclusive right to collect Mahua flowers in 1989. The revised order of March 1991 granted leases to the TDCC and the Orissa Forest Development Corporation (OFDC) for 11 and 16 forest Divisions respectively, with nationalisation of the trade following in 1991. The procurement rate was then increased suddenly to Rs.3000 per tonne. A bumper crop resulted in high local production of the flower, which was supplemented with imports from adjoining States where the purchase rate was as low as Rs 1500 per tonne. The agency failed to sell the accumulated stock. As a result the corporation suffered a heavy loss and trading was again denationalised and reverted to private agents.

1.6.3 Constraints on NTFP development

1.6.3.1 Trading monopolies

The gradual nationalisation of NTFP trading systems has created a system in which primary collectors are bound to sell their collections to government-appointed or authorised agents. The system was created with the intention of eliminating middlemen from the trade of these products, so that a greater share of the revenue realised from the trade could be passed to primary collectors. But replacing a free trade system with one in which there is only a single buyer has created its own adverse effects. The free flow of goods has been choked, and competition is absent. There is little or no impetus to increase profits or to redistribute returns from shares. The Acts also prevent processing of NTFPs by primary collectors and the sale of value-added products. Thus, broom grass cannot be made into brooms by female collectors. The creation of a quasi-monopoly brings back privatisation under the guise of nationalisation. In Orissa the collection of bamboo and sal seeds has been handed over to paper mills and oil extraction plants respectively, by making them raw material procurers for the principal lease holder, the OFDC. This has again left poor people at the mercy of private traders. In Orissa, government controls on NTFP collection and marketing, and the practice of settling a lease in favour of one enterpreneur, has come under criticism and legal challenge (OJC 1074 of 1991, Cuttack High Court, forcing the government to cancel a lease of mango kernels).

1.6.3.2 Procurement and sale prices

Procurement prices differ from District to District, and seemingly have no scientific basis for their determination. Committees have rarely reduced prices of any items, irrespective of levels of marketability or demand. Also of interest is the import and export of items to a State due to price differentials in adjoining States. In 1990, when the price of mahua flowers in Orissa was suddenly increased to Rs 3000 per MT from Rs 1500 per MT, there was a rapid inflow of flowers from Bihar and Madhya Pradesh.

1.6.3.3 Timing, seasonality, collection centres

Following nationalisation, government agencies or designated private parties take up collection and marketing for the entire State or specified areas. But this does not force them to collect from all the forest areas of the leased zone. They are often selective regarding areas of exploitation and the establishment of collection centres. Many areas of potential remain untapped. Some commercially valuable products remain uncollected, and the State loses revenue because the payment of royalty is often on the basis of actual collection. Similarly, a lessee, especially when it is a government organisation, will limit the timing of collection, or prescribe the condition in which the produce is to be purchased, to reduce overhead costs. In the Orissa kendu leaves trade agents accept only superior quality leaf, unlike contractors who have the flexibility of buying inferior quality by paying a lower rate. The old private contractor would extend procurement up to the onset of monsoons, but in the present system procurement must stop in a given period of time. This may affect the earnings of collectors adversely. Meanwhile, the TDCC and LAMPS have sometimes not been able to buy leaves regularly due to financial and logistical problems. Further, private traders have a tradition of operating from the weekly hat (market), as is prevalent in the case of mahua flowers, mahua seeds, karanj seeds and a host of other items. Nationalisation of produce restricts free marketing and collection from remote areas, because local merchants are excluded from doing business there by government actors and depots. In addition, while the State government acts as a market actor, it rarely sees itself as a market regulator in controlling the collection centre, modes of weighing, or purchase price regulation.

1.6.3.4 Arbitary and ad hoc leasing systems

Apart from nationalising many trades, government also indulges in fast-changing the rights of various market operators to collect from procurers and to sell on. In Orissa, for instance, there were as many as 10 different government resolutions in the five years from 1990 to 1995, alloting and cancelling leases of various items for political considerations. Forest departmental executives also feel constrained when good sal seed areas are settled in favour of private lessees, leaving inferior sal areas for working by the OFDC. It is felt that such restrictions will hurt the profits of the corporation and so promote further increases in the purchase price. Similarly, the extraction of many products (lodh, medha, phenphena, dantari bark) are leased out for some years, and then discontinued without any scientific justification or investigation as to the impact of extraction on the flora. The ayurvedic system of medicine prevalent in India depends on regular exploitation of forests for medicinal plants. Digging of frequently used plants like patalgaruda, pipali, sunthi, apamaranga and many others threatens the sustainability of many flora, and no system has evolved yet to control and manage medicinal forest products in Bihar or Orissa.

1.6.3.5 Product markets, industries, subsidies

Higher demand for NTFPs can improve prices paid, ultimately benefiting the extractors. Growth of NTFP-using industries has the potential to boost production and collection from forests. Due to the nature of the products (dispersed availability, seasonal production, yearly fluctuations), and the lack of a supporting forest policy, the development of NTFP-using industries in Bihar and Orissa is not satisfactory; indeed, most t/kendu leaves, sal seeds, mahua flowers, and mahua seeds are exported out of State. Rebates in excise duty and sales tax, along with a system of subsidies at the initial stages of industry establishment, could get things moving. As things stand, excise duties and sales taxes are higher in Orissa than in adjoining States. Marketing of agricultural products is free from such taxation, unlike NTFPs where the government agency has to pay the purchase tax (4%), the Octroi (1%) and the RMC (1%). Despite the potential for making oil and other finished products from NTFPs, such as aonla and bantulsi, these are not yet extracted by the TDCC for economic cost reasons. Another bottleneck relates to monopoly leasing in favour of one party which collects the products for use in its own factory, putting other enterprises at a disadvantage. Finally, a lack of infrastructure, inaccessibility of forests, and lack of information regarding production and demand for finished products, have all reduced the interest of enterpreneurs to set up NTFP- based industrial units. There is clearly a need for detailed empirical research on this topic, which is as yet poorly represented in the available literature.

1.7 Demand for the Research

This review has highlighted key areas of change and concern in the development of management systems for the production, collection, marketing and processing of NTFPs in eastern India. Although it is now widely accepted that the development of a non-wood (and participatory) approaches to forest management have much to commend them in terms of ecological and socio-economic considerations (Sarin, 1995; SPWD, 1994), it is also clear that much research remains to be done on these issues. In the specific case of eastern India (Bihar and Orissa), there is a pressing need for information on the following:

- Estimates of NTFP production and collection in different Districts and Blocks (to lessen dependence on government data sets, which may be inaccurate in several respects)
- Estimates of returns to collectors, traders and other agents in the commodity filieres that link the production of an NTFP to an end-user
- The medicinal and ethnobotanical properties of already exploited and more rarely exploited NTFPs
- The legal and other obstacles to income-earning and value-addition activities in respect of key NTFPs in the region.

The evidence for the demand or need for this research is outlined below:

- The proposed research is consistent with, and relevant to, government policy in India. The National Forest Policy highlights the need for a coherent NTFP strategy, although in practice government agencies have concentrated on the biology of a few NTFP species of use as raw materials for industry. According to the Indian Council of Forestry Research and Education (Dehradun), information is required on the ethnobotanical knowledges of local people and on local use of NTFPs for food, fuel, medicine and beverages.
- A recent report for ODA by Shepherd *et al*. notes that "an issue of particular concern is how to enable forest management that will have the support of local people and also preserve biodiversity, ideally at the gene, species and ecosystem levels". Forest management strategies that highlight the sustainable production and productive potential of NTFPs may preserve biodiversity and will gain the support of local people if their rights of access/gains from trade are respected and supported. Research providing an inventory of NTFP production, collection and exchange will also aid state and NGO actions in this respect.
- The constraints on NTFP development in India have been highlighted by National Forest Policy (1988), and identified in the "International NTFP" seminar in 1993 at Deharadun, and at an "International Seminar on forestry" in New Delhi, 1994, and in several research reports and studies.
- Discussion with Divisional Forest Office, Forest Resource Survey and State Silviculturalist in Orissa and DFO, Project Planning in Bihar has revealed the need to produce a database for NTFP harvesting and monitoring of productivity, as no information is presently available.
- CIFOR has an interest in the devolution of forest management to local communities as "a key aspect of sustainable development"; it also recognises that forest-dependent households are most likely to involve themselves in village forest protection and management committees where the production, collection and trading of NTFPs is emphasised. The FAO also now has an NTFP section within its Forestry Division and produces a newsletter to disseminate findings from and to interested parties and researchers.

2.0 PROJECT PURPOSE

Forest management policies in India have conventionally favoured the production of timber. Until recently, such policies failed to take proper account of the developmental and livelihood needs of forest-dependent communities and failed to involve local women and men as forest managers. In rural eastern India many households (and many tribal/*adivasi* households) depend upon the production, collection and marketing of non-timber forest products to supplement the meagre incomes they gain from rain-fed paddy production. Land alienation and rapid degradation of local forests have forced such households, or individual family members, to migrate in order to survive (or, more positively, to turn to commercial vegetable production where the opportunity arises). Joint Forest Management (JFM) systems afford an opportunity to increase stakeholder participation in local forest management, but here too an unconsidered timber emphasis is often apparent. The gestation periods associated with timber or pole production can be lengthy and may discourage sustained community involvement in JFM. New forest management systems also continue to be gender-blind in many cases. In the wake of largely male out-migration, the particular needs of female-headed households need to be taken into account when formulating development policies.

Forest management strategies highlighting the value of NTFPs can redress the imbalance noted above and can be sustainable in the long-run. Forest dwellers and small farmers throughout India, as elsewhere, depend heavily on NTFPs for food, medicine, fuel, drink and income. Production of many NTFPs under JFM can be increased in the short-run and the benefits could be shared according to [revised] JFM conventions; sizeable industrial markets also exist in eastern India for NTFPs like sal oil, sal cakes, fibre grass, bamboo and lac. To date, however, there is insufficient research and analysis on the collection, use and marketing of NTFPs by different groups of villagers (in terms of gender, literacy, landholdings, etc.), and little information, for eastern India, on the perceptions of forest users regarding market prices and market opportunities. Official Indian statistics suggest that NTFPs generate US$500 million per annum. However, these figures refer only to traded products and do not reflect the true situation or the potential of NTFPs. In Bihar and Orissa NTFP management systems are in place only for a handful of NTFP species, and less than 4% of potential NTFP species are exploited commercially. Villagers lose out as a consequence and environmental management systems continue to be sub-optimal.

The project therefore focused on the increased production, consumption and trading of NTFPs as a development strategy to improve the livelihoods of forest-dependent populations in eastern India, and women especially. Constraints on NTFP production, collection and trading were identified and improved management practices and development strategies promoted.

The outputs of the project provide stakeholders (including forest-dependent populations, local industry and government) with an inventory of current and potential NTFP availability, use and extraction (by community and gender) for two study areas in Bihar and Orissa. The inventory will aid development of NTFP management strategies designed for the dry-deciduous forests in eastern India. These sustainable management practices will give improved community production and use of NTFPs.

The major beneficiaries of the results of the project will be the poor forest-dependent people, particularly the women, in the project area of Bihar and Orissa and adjoining states (Madhya Pradesh and West Bengal) where similar NTFP management and marketing is practiced who are dependent on the collection and marketing of NTFPs to a significant extent, the Governments of Bihar and Orissa, and industrial units using NTFPs. New development strategies for the production and trading of NTFPs in eastern India will positively impact upon the livelihoods of forest-dependent households, and particularly poorer households and women.

Deforestation or unsympathetic timber production regimes have had a devastating impact on the livelihoods of many of these people, a majority of whom will be tribals and women. Constraints on NTFP production and marketing have forced many households (or household members, mainly men) to migrate in the dry season and to augment their meagre livelihoods in Calcutta or in the brickfields of Gorakhpur/eastern Uttar Pradesh. New management regimes for the sustainable exploitation of NTFPs (domestic and commercial) will significantly empower forest-dependent households and will offer them new livelihood capabilities and choices. To the extent that women are primarily responsible for the marketing of many NTFPs, improved marketing regimes and policies will benefit women especially. At present, women from Scheduled Caste and Scheduled Tribes and other marginalised communities are doubly disadvantaged. They often lack proper access to forest resources and the knowledge or power to participate actively in decision-making (economic and political). Changes in JFM regimes and regulations to increase incentives for NTFP production, use and trading will benefit women forest-users significantly (and in excess of possible declines in incomes from headloading). The Governments of Bihar and Orissa will also benefit financially from improved management methods in respect of NTFPs, as will industrial units using NTFPs. However, there are bound to be winners and losers when private traders in NTFPs face increased competition from tribal and village cooperatives.

3.0 RESEARCH ACTIVITIES

3.1 Introduction

There were three main strands to the methods used in the project:

- Socio-Economic Survey Work
- Determination of growing stock and NTFP yields
- Ethnobotanical Survey

3.2 Socio-Economic Survey Work

Data on the collection and use of NTFPs in eastern India were gathered by means of extensive and intensive research in 24 villages in 4 Districts of Bihar and Orissa: Ranchi and West Singhbum Districts in Bihar, and Keonjhar and Angul Districts in Orissa (Figure 3.1). The four Districts describe a north-south axis across the 'tribal belt' of eastern India; they also describe a range of forest types and non-timber forest activities. Half of the villages chosen for survey work were distant from urban centres, the other half were proximate to an urban trading centre. Efforts were made to select villages where forests of medium size (40 to 200 hectares) and of different legal status and management regimes were present in or near the settlement. It was not possible to select pairs of villages with and without Joint Forest Management systems, but the forests around the sample villages are under four different tenurial regimes: namely, protected forests (PF), reserved forests (RF), village forests (VF) and mundari-khuntkattidari forests (private protected forests owned by a tribal community [PPF]: see Table 3.1). The villages selected for study are of different size, but are not unrepresentative of their Blocks or Districts. The smallest villages in the sample, Lota in West Singhbhum District and Dangapal in Angul District, have less than 50 households, while Jariya in Ranchi District and Handapa in Angul District have 275 households (Table 3.2). The selected villages also vary in terms of their caste and community compositions. Members of the Scheduled Tribes dominate in the Ranchi, West Singhbhum and Keonjhar villages, but General Caste households are well represented in some of the Angul study villages.

Some 20 households in each village were chosen for in-depth analysis. These households were chosen randomly in proportion to the number of total households in each of 5 land-holding classes. The land-holding classes were: (a) landless; (b) marginal farms (< 1 ha); (c) small farms (1 – 2 ha); (d) medium farms (2 – 4 ha); and (e) large farms (>4 ha).

Figure 3.1

Map of study area

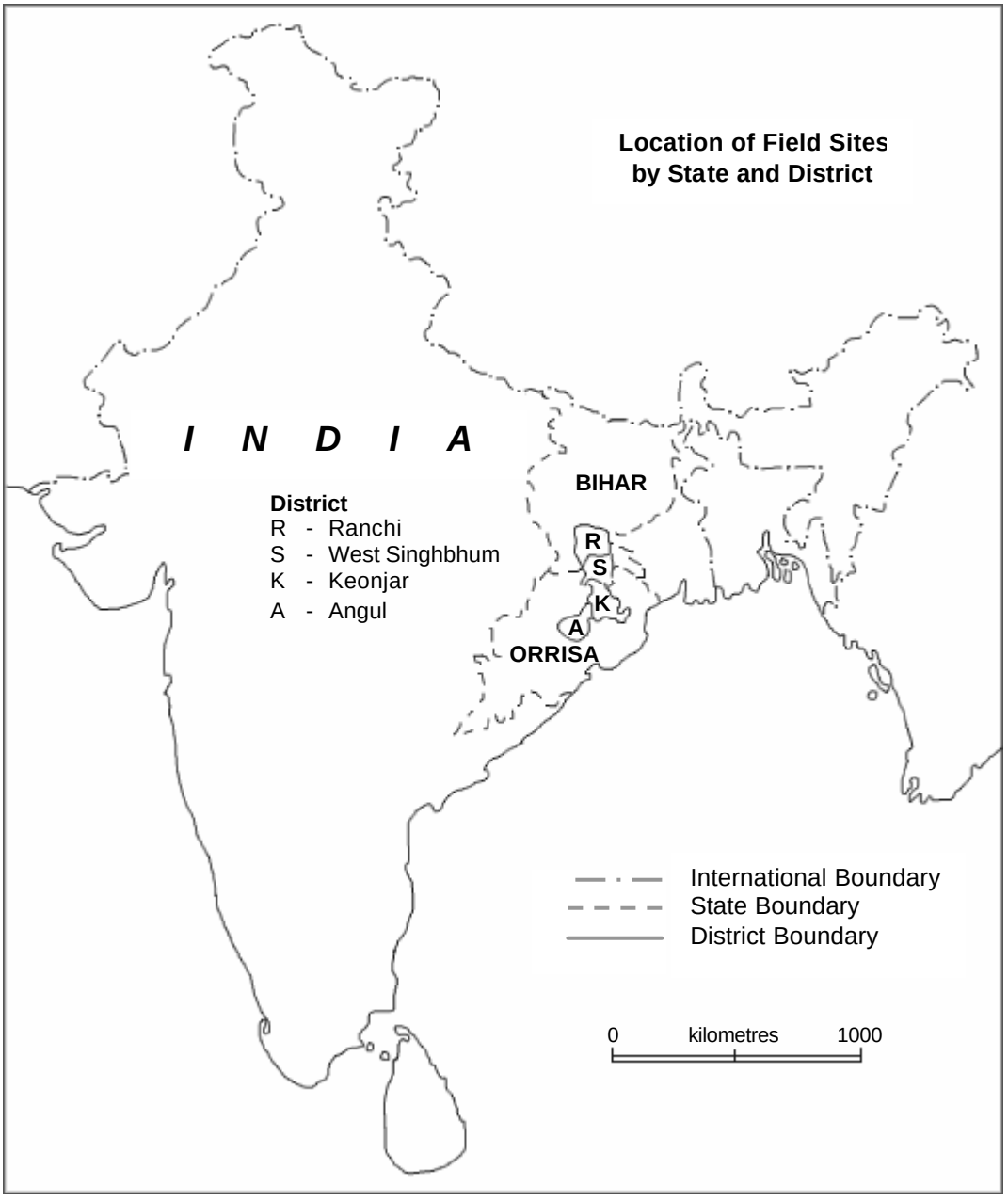


Table 3.1

Villages studied: distance to market and forest legal type

State	District	Village	Number HH sampled	Distance to market	Forest type*
Bihar	Ranchi	Baridih	20	Near	PF
		Jariya	20	Near	PF
		Tengariya	20	Near	PF
		Hulsi	20	Far	PF
		Jahanabaj	20	Far	PF
		Sarsa	20	Far	PF
	W. Singhbhum	Karudih	20	Near	MK
		Katwa	21	Near	MK.
		Hesadih	21	Near	Private forests + PF
		Lota	21	Far	Private forests + PF
		Khanda	20	Far	RF
		Sindribera	21	Far	RF
Orissa	Angul	Dangapal	22	Near	RF,PF
		Dhandatopa	19	Near	RF, PF
		Handapa	22	Near	RF
		Basudevpur	19	Far	RF
		Hinjirida	20	Far	RF, PF,VF
		Kutasingha	21	Far	RF, PF
	Keonjhar	Akul	20	Near	PF
		Chakradharpur	22	Near	RF, PF
		Samagiri	20	Near	RF
		Adakata	24	Far	RF, PF
		Barapada	20	Far	RF,PF
		Padang	20	Far	RF,PF,VF

* PF – protected forests; RF – reserved forests; MK - Mundari-khuntkattidari - a tribal land tenure system recognised by Government of Bihar in which the village common lands, including forests, is held by the village chief, Munda, for use by the village community; VF –village forests.

A first stage of socio-economic survey work involved the collection of baseline data on the sample households. This work was undertaken during June and July 1997. The sample households were named and given a code number, and information was collected on caste, family type, family size, amount of land operated, and livestock ownership. Further information was sought on rates of household participation in village committees, migration histories, use of named forests for the collection of NTFPs, and qualitative impressions of local vegetation changes and forest management activities. The data were collected by trained field surveyors. Interviews were conducted in Hindi or Oriya or a local tribal dialect, and the collected data were entered into MS Excel spreadsheets in Ranchi and Bhubaneshwar prior to data manipulation and analysis in the UK. Some of the baseline data

are reproduced here as Tables 3.3, 3.4 and 3.5. General profiles of the villages are given in Tables 3.6 and 3.7.

Table 3.2a

Demographic profile of study villages in Bihar

Village	Area (ha)	No. of HH	Population				
			Total	Schedule tribe	Literate	Workers	Cultivators
Ranchi District							
Baridih	228	91	833	600	477	173	70
Jariya	480	275	1578	986	595	692	632
Tengariya	345	126	807	486	198	358	345
Hulsi	698	67	313	311	31	110	110
Jahanabaj	498	150	727	451	150	310	262
Sarsa	624	94	682	675	106	222	217
W Singhbhum District							
Karudih	240	47	297	283	142	72	33
Katwa	511	131	655	631	150	188	181
Hesadih	230	55	203	201	57	54	44
Lota	478	37	171	147	16	87	87
Khanda	428	52	336	336	47	149	138
Sindribera	579	80	432	427	51	258	255

Source: 1991 Census

Table 3.2b

Demographic profile of study villages in Orissa

Village	Area (ha)	No. of HH	Number of Households			
			Total	General caste	Scheduled caste	Scheduled tribe
Angul District						
Basudevpur	303	77	500	0	5	72
Dhandatopa	289	85	291	17	1	67
Dangapal	637	34	154	25	0	8
Handapa	821	275	1680	216	57	2
Hinjrida	439	61	350	50	6	5
Kutasingha	586	43	256	38	0	5
Keonjhar District						
Adakata	359	81	449	12	6	65
Akul	400	211	1132	50	45	116
Barapada	55	40	189	0	0	40
Chakradharpur	610	174	883	52	8	114
Padang	350	159	1042	67	56	36
Samagiri	425	248	956	135	8	105

Source: Field survey

Table 3.3

Household information for sample villages

District	Village	Household members			Farm animals			Land Holding (acres)	
		Male	Female	Child	Cattle	Goats + Sheep	Other	Home	Farm
Ranchi Distict									
	Baridih	3.30	3.30	2.55	3.60	2.00	1.30	0.16	2.37
	Jariya	2.45	2.45	1.65	2.35	2.35	0.95	0.27	2.05
	Tengariya	3.80	3.25	2.40	2.50	1.65	2.20	0.34	5.16
	Hulsi	3.60	2.85	3.00	3.75	3.45	2.50	0.34	3.09
	Jahanabaj	2.85	3.20	2.05	3.80	4.15	0.00	0.35	3.39
	Sarsa	3.10	2.80	2.45	3.35	2.00	0.10	0.38	4.29
W Singhbhum District									
	Karudih	3.25	2.45	2.05	3.50	1.70	7.50	1.28	4.06
	Katwa	2.86	2.76	2.19	3.71	2.29	8.33	0.66	5.88
	Hesadih	2.33	3.14	1.95	2.48	2.29	6.71	0.34	5.75
	Sindribera	2.48	2.29	1.67	3.00	2.33	7.38	0.39	7.14
	Lota	2.95	2.10	1.67	2.29	3.71	7.90	0.29	1.80
	Khanda	3.05	2.70	1.65	2.65	2.15	5.00	0.33	6.95
Angul District									
	Basudevpur	1.86	1.79	2.00	2.86	1.78	0	0.07	2.23
	Dangapal	1.59	1.55	1.77	3.68	1.82	0	0.19	3.39
	Dhandatopa	2.21	1.86	2.14	2.00	1.57	0	0.54	3.94
	Handapa	2.05	2.18	2.41	2.90	3.73	0	0.08	3.56
	Hinjirida	2.55	2.30	3.30	4.15	1.35	0	0.25	4.61
	Kutasinga	1.44	1.44	3.21	3.38	1.13	0	0.04	1.94
Keonjha District									
	Adkata	1.87	2.09	2.59	4.18	4.22	1	0.58	3.15
	Akul	1.56	1.56	1.64	2.25	0.80	0	0.37	1.84
	Barapada	1.15	1.45	2.60	2.00	1.60	0	0.34	1.34
	Chakradh	2.20	2.35	1.80	3.20	3.35	0	5.08	3.17
	Padang	1.95	1.90	1.62	2.00	0.65	0	0.38	2.23
	Samagiri	1.47	1.26	2.74	1.79	1.58	0	0.58	1.94

Source: - field surveys

Table 3.4

Average annual agricultural production and income of sample populations

District	Village	Production (kg/ann)		Income (Rs/ann)		Labour loss (days)
		Agriculture	Horticulture	Agriculture	Off-farm	
Bihar						
Ranchi						
	Baridih	2256	8	6123	11130	7
	Jariya	2410	28	6057	13637	0
	Tengariya	905	60	2231	5095	1
	Hulsi	685	72	1536	4771	6
	Jahanabaj	1618	340	641	10267	20
	Sarsa	1897	528	2111	6734	21
West Singhbhum						
	Hesadih	1286*	50*	680*	10407*	0
	Karudih	1711	34	52	2482	69
	Katwa	2328	27	87	3022	66
	Lota	487	37	293	7769	0
	Khanda	2293	134	249	2964	111
	Sindribera	2080	129	208	2754	97
Orissa						
Angul						
	Basudevpur	557	139	524	6932	18
	Dangapal	964	31	949	5008	2
	Dhandatopa	307	52	100	2572	0
	Hinjrida	2575	241	2324	6760	0
	Handapa	3505	346	984	7440	0
	Kutasing	537	23	174	6173	14
Keonjhar						
	Adakata	1324	33	524	5885	0
	Akul	487	47	663	8276	55
	Barapada	452	2	15	3523	43
	Chakradh	1427	50	354	10080	0
	Padang	460	24	1210	6904	70
	Samagiri	1498	0	565	3840	*38*

Table 3.5

Average annual consumption patterns of sample population

District	Village	Carbohydrate (kg)	Protein (kg)	Pulses (kg)	Oil (l)
Bihar					
Ranchi	Baridih	1093	67	6	27
	Jariya	851	54	20	14
	Tengariya	1085	39	19	14
	Hulsi	959	32	15	25
	Jahanabaj	1357	9	23	14
	Sarsa	1291	4	21	13
W.Singhbhum	Hesadih	906	11	27	25
	Karudih	449	8	27	10
	Katwa	462	13	33	20
	Lota	721	8	23	3
	Khanda	845	8	28	13
	Sindribera	684	7	25	13
Orissa					
Angul	Basudevpur	925	30	77	15
	Dangapal	703	76	142	63
	Handapa	1105	21	25	17
	Hinjrida	1172	20	27	16
	Kutasingha	829	12	13	9
	Dhandatopa	878	24	56	12
Keonjhar	Adakata	1260	19	14	11
	Akul	950	13	14	22
	Barapada	760	10	5	5
	Chakradharpur	1156	20	20	15
	Padang	1022	13	9	26
	Samagiri	1031	11	10	6

Table 3.6

General profile of study villages in Bihar

Village	Status of Forests	Profile
Baridih	Degraded Dry Deciduous sal forests. Forests in sapling stage, except one well grown patch of about 10 acres. Forest area small. Voluntary forest protection has just begun.	Small village. Predominantly agricultural. Politically conscious. On the Ranchi-Gumla highway, very near to Bero market.
Jariya	Degraded Dry Deciduous sal forests. Forest area large. Forests in sapling and small pole stage. Official JFM committee in vogue.	Large village. Predominantly agricultural. Politically conscious. On the Ranchi-Gumla highway, very near to Bero market.
Tengariya	Degraded Dry Deciduous sal forests. Forest area small. Forests in small pole stage.	Small village. Predominantly agricultural, but not as advanced as the previous two. On the Ranchi-Gumla highway, somewhat away from Bero market, but access is quick and easy.
Hulsi	Degraded Dry Deciduous sal forests. Forest area large. Forests under tremendous biotic pressure, in pole stage, degrading.	Large village. Remote. Poor quality agriculture. Agricultural area small compared to forest area.
Jahanabaj	Degraded Dry Deciduous sal forests. Forest area large. Forests are regenerating due to voluntary protection by women-group.	Large village. Now linked with an all-weather road to the highway. Agricultural practices are advancing.
Sarsa	Young dry deciduous sal forest. Forest area large. Had active JFM committee a couple of years ago.	Large village. Now linked with an all-weather road to the highway. Agricultural practices are advancing due to the efforts of 'Sai-Baba Trust', a voluntary organisation.
Karudih	Young regenerating dry deciduous sal forest. Forest area small.	Small village. Very near to Bandgaon market. Munda tribal village.
Katwa	Young to middle age dry deciduous sal forest. Forest area large.	Moderate size village. Very near to Bandgaon market. Munda tribal village.
Hesadih	Private forests young sal regenerating crop. PF area degrading.	Small village. On the Ranchi -Chaibasa highway. Near to Bandgaon market, and very near to another market Chaki.
Lota	Private forests young sal regenerating crop. PF area degrading.	Small village with large area. Poor quality agriculture.
Khanda	Young sal and mixed deciduous forests. Intense biotic pressure for encroachment.	Large village. Very poor quality agriculture. Very remote. Agricultural area extending into freshly cleared Reserve Forest areas (Jharkhand felling).
Sindribera	Young sal and mixed deciduous forests. Intense biotic pressure for encroachment.	Large village. Very poor quality agriculture. Very remote. Agricultural area extending into freshly cleared Reserve Forest areas (Jharkhand felling).

Table 3.7

General profile of study villages in Orissa

Village	Status of Forests	Profile
Dangapal	Miscellaneous pole crops. Forests degraded.	Predominantly high caste groups, Active JFM group. Close to highway 6 and marketing centre.
Dhandatopa	Both RF and PF have good dry deciduous forests. Sal with Bamboo brakes. Mahul trees on farms. Kendu bushes predominate on fallow land.	Mixed ethnic group. Fewer tribal groups but the tribal size is big. Migration evident. JFM not active. NTFP trading high.
Handapa	Degraded Sal forests, pole crop dominant. Kendu and Khajuri bushes abundant in understory.	Mixed ethnic large sized village. More Schedule Castes than Tribals. Bidi leaf rolling is a household occupation. Modern agriculture practices.
Basudevpur	Moderately dense RF with Sal and miscellaneous crop. Biotic pressure is minimum.	Mixed ethnic group, small village, far from marketing centre, primarily farming community, active JFM group.
Hinjirida	Dense Sal growth. Biotic pressure is minimal.	Mixed ethnic groups.
Kutasingha	Dry deciduous mixed forests	Higher caste groups, few tribals. Mainly farmers. Traditional farming practices, predominantly forest dependent
Akul	Forests around the village are degraded. Vegetation in sapling stage.	Large sized village. Kolha and Gonds are the main tribes. JFM group has been formed but is inactive.
Chakradharpur	Forest is 2 km away from the village. Forest cover with 0.2-0.3 density.	Large village. Close to Harichandanpur market. Progressive farming community. Tassar rearing and Sal leaf plate making are secondary occupations.
Samagiri	Sal in bushy form and sapling stage. NTFP species are in pole crop stage. Kusum and Mahul trees are on farms.	Middle sized village, Mixed ethnic group of upper castes and tribals. No JFM group, Wide range of agricultural crops, progressive farming. Juang, Bhuniya and upper castes live in different hamlets.
Adakata	Young dry deciduous Sal forests. The forest is in continuous patches extending about 10 km on one side.	Remote village, nearest forest is 4 km away. Juang, Bathudi tribes predominate. Paddy and black gram are the main crops. Mostly illiterate
Barapada	Degraded dry deciduous mixed forests	Illiterate population. Remote village. Paddy is the main crop. NTFP collection is the secondary occupation.
Padang	Moderately dense dry deciduous forests.	Interior village, general, Schedule Caste and tribals in same proportion. Juang and Bhuinya tribes. Forest dependent farming community, traditional rice cultivation. Sal leaf plate making is a secondary occupation.

A second stage of socio-economic survey work involved the regular and repeated collection of data on NTFP collection, processing and marketing by all sample households. The work began in July 1997 and continued on a fortnightly basis in Bihar (monthly in Orissa) until June 1998. This removes the seasonal bias evident in many studies of NTFP use in poor countries. Respondents were encouraged to think about and report their NTFP collection and use activities in relation to their broader livelihood strategies (agriculture, migration, paid labour and so on). Sample households were also asked to provide information on any problems they faced in collecting and marketing NTFPs - including information on possible bribes to forest officials, the police or transporters, and on relations with other forest collectors or traders. This sort of information became more robust as the fieldwork season progressed. The collection of data on informal and possibly illegal economic transactions is never easy. Care was taken to train the surveyors in the art of 'open' as well as 'closed' questions, within a broad questionnaire format. The field surveyors were also encouraged to build relationships of trust with informants, and to collect data in situations other than the standard interviewer-meets-'head of household' setting. Interviews with groups of collectors (including men and women separately and together) were used for this purpose, along with other more participatory research methods.

A third component of the socio-economic survey work involved the collection of data on NTFP marketing and markets on a monthly basis. Data were collected on types and quantities of NTFPs brought for sale to village and urban markets, and on systems of weights and measures and payment. Interviews were also conducted with a sample of purchasers and traders. Data were also collected on market prices (and price/collection trends) from official sources (at Block, District and State levels). Market data from on NTFPs came from approximately 52 weekly surveys of local markets (locally called '*hat*') held near sample villages (Table 3.8). Information on the activities of higher-level traders and end-users of some NTFPs was collected on the basis of lengthy and semi-structured interviews with key informants. Key informants included major kendu leaf and sal seed traders in Bihar and Orissa; manufacturers of sal leaf plates and country cigarettes (bidis); officials from the Bihar State Forest Development Corporation, the Orissa Forest Development Corporation (OFDC), and the Tribal Marketing Federation (TRIFED); and representatives from the lac and tasar industries. Key informants at a local level included the Mukhiya and Sarpanch of a given Panchayat, the chairperson of the village forest protection committee (if present), prominent social workers and members of locally active NGOs, and lower level government officers. Given the confidential nature of some interviews (not least on the illegal trade of many NTFPs), not all of the key informants are identified in this report.

Table 3.8

Markets surveyed

State	District	Market
Bihar	Ranchi	Bero
		Kurgi
	West Singhbhum	Bandgaon
		Chaki
		Murhu
Orissa	Angul	Bamur
		Handopa
		Thakurgash
	Keonjhar	Akul
		Harichandanpur
		Janhira

3.3 Determination of growing stock and NTFP yields

Dry deciduous forests in the study districts were sampled. There were 23 sample plots in Bihar and 20 in Orissa (Table 9). Three types of forests were sampled: Reserve Forests (RF), Mundari-Khuntkatti Forests (PPF) and Protected Forests (PF). The location of the sample plots was selected at random using current 1:50000 scale Survey of India maps. Areas marked as forest were selected from which different points were fixed on the map. The corresponding areas were identified in the field with the help of the forest management plan held by the local forest range office and conspicuous geographical features. At each point sample plots (50m x 50m) were laid out on the ground.

All individual trees of 10cm or greater diameter at breast height (dbh) were enumerated in each plot. In addition, quadrants (10m x 10m) were laid out diagonally across the plot and herbs and bushes less than 10 cm at dbh were listed. Plots were demarcated marking the trees bordering the plot with a white ring and a small tin plate was fixed on a large tree giving the plot number. Five metre wide strips were marked with ropes within the plot and all the trees greater than 10cm at dbh measured. The process was repeated for each strip. One person measured the tree and another recorded the data.

Table 3.9

Location and number of plots for growing stock determination

Bihar		Orissa	
Location	**Number of plots**	**Location**	**Number of plots**
Ranchi District		**Angul District**	
Adar RF	1	Bhangamunda PF	2
Charima PF	3	Hatidhara RF	3
Kedly PF	2	Northern RF	3
Khaksitoli RF	1	Thakurgarh PF	2
Labsar PF	1		
Okba PF	1		
Pauri PF	1		
Serendag PF	1		
West Singhbhum District		***Keonjhar District***	
Hesadih PF	2	Bandhanjhari RF	3
Karika PF	1	Barabanka RF	3
Karudih PPF	3	Kalima PF	2
Katwa PPF	3	Namakani PF	2
Lota PF	1		
Tirla PF	2		

Key: RF – Reserve Forests; PPF – Mundari-Khuntkatti Forests; PF – Protected Forests

For each plot the following information was recorded:

- *Plot description* **-** a qualitative description in and around the plots. A brief description of the forest, distance from survey village, and condition of the vegetation. Information on legal status, land use, topography was taken from the forest working plan.

- *Plot enumeration* **-** all trees greater than 10cm dbh overbark were recorded by species. The information was used to compute the diameter range for each species. The growing stock was assessed in terms of the number of stems and the volume for each species in different diameter and forest type classes.

- *NTFP yield* **–** 10 - 15 sample trees of important NTFP species were chosen at random from the forests around the sample villages (Table 3.10). Detailed measurements (diameter at breast height, height, crown size) were taken. Fruits, flowers, and seeds were collected during the appropriate season in 1997-98 and the number and weight measured to estimate the yield. A few extractors were involved in this exercise. Selected villagers were contacted in advance and provided with gunny sacks. They collected the flowers and fruits from the marked trees and kept them in separate labelled bags until the surveyors came to weigh them. Production of harra (*Terminalis chebula*), bahera (*T.*

bellerica) and aonla (*Embilca officinalis*) was not measured because flowering and fruiting of these species was hit by bad weather conditions.

Table 3.10

Species sampled to determine yield of NTFPs

Bihar	Orissa
Bel (*Aegle marmelos*)	Amla (*Emblica officinalis*)
Ber (*Zizyphus jujuba*)	Bahada (*Terminalia bellerica*)
Bhelwa (*Semicarpus anacrdium*)	Char (*Buchnania lanzan*)
Karanj (*Pongamia pinnata*)	Mahul (*Madhuca indica*)
Kend (*Diospyros melanoxylon*)	Karanj (*Pongamia pinnata*)
Kusum (*Scheichera oleosa*)	Sal (*Shorea robusta*)
Mahua (*Madhuca indica*)	Tamarind (*Tamarindus indica)*
Piar (*Buchnania lanzan*)	
Sal (*Shorea robusta*)	
Tamarind (*Tamarindus indicus)*	

3.4.1 Volume estimation of growing stock

3.4.1.1 Bihar

Local volume tables developed for Ranchi District or the adjoining Raigarh District of Madhya Pradesh (MP) were used to calculate the growing stock volumes (Table 3.11).

Table 3.11

Local volume tables used for Bihar

Species	Equation
Adina cordifolia (Karam)*	$V/D^2 = (0.4472/D^2)–(1.3257/D)+13.437$
Anoegissus latifolia (Dwatha)*	$V = 0.028653–0.97687D+11.024D^2$
Pterocarpus marsupium (Bijasal)**	$V/D^2 = (-0.04659/D^2)+8.06901$
Syzigium cumuni (Jamun)*	$V/D^2 = (0.016042/D^2)–(0.49647/D)+6.2214$
Shorea robusta (Sal)*	$V/D^2 = (0.022585/D2)–(0.70158/D)+8.174$
Terminalia tomentosa (Asan)**	$V/D^2 = (0.17367/D2)–(2.9171/D)+19.940708–16.01855D$
Miscellaneous spp*	$V/D^2 = (0.025584/D^2)-0.89224/D)+9.5879$

(Where D= diameter in metres, overbark diameter at breast height

V= volume in cubic metres, underbark volume of tree inclusive of branches)

* Ranchi; ** Raigarh

The volumes of 6 major species, namely sal, asan, karam, dhawtha, bijasal and jamun were calculated separately. All the other species were classified as “miscellaneous species” and the local volume equation for this group developed for Ranchi district used.

3.4.1.2 Orissa

Local volume equations derived by Central Zone, Forest Survey of India, Nagpur for the adjoining district of Mayurbhanj (Orissa) were used to estimate the growing stock. No allowance was made for site quality in developing the equations. For the estimation of stand volume only those trees with dbh greater than 10 cm were considered. The local volume equations given in Table 3.12 were used. The plot volume for each species was computed by taking the mean diameter of each diameter range for each species and multiplying by the total number of trees in that range. The volumes for all the species in each plot were totalled to give the plot volume. The volumes for the 7 major species (sal, mahua, char, tamarind, tendu, dhaura, jamun) were calculated separately. The miscellaneous species equation was used for all the other trees. The mean volume per hectare was multiplied by the total forest area to give the total volume of the growing stock.

Table 3.12

Local volume tables used for Orissa

Species	Volume equation
Anogeissus latifolia (Dhauara)	$v = 0.13928 - 2.87067\ D + 20.22404\ D^2 - 13.80572\ D^3$
Bridelia retusa (Kasi)	$\sqrt{v} = 0.11620 + 4.12711\ D - 1.08508\ \sqrt{D}$
Diospyros melanoxylon (Tendu)	$\sqrt{v} = 0.06728 + 4.06351\ D - 0.99816\ \sqrt{D}$
Madhuca latifolia (Mahua)	$v = 0.10423 - 1.38429\ D + 8.39379\ D^2$
Shorea robusta (Sal)	$\sqrt{v} = 0.19994 + 4.57179\ D - 1.56823\ \sqrt{D}$
Syzigium cumini (Jamun)	$\sqrt{v} = 0.30706 + 512731\ D - 209870\ \sqrt{D}$
Terminalia tomentosa (Asan)	$v = 0.05061 - 1.11994\ D + 8.77839 D^2$
Miscellaneous species	$\sqrt{v} = 0.06063 + 3.43666\ D - 0.75571\ \sqrt{D}$

(Where D= diameter in metres, overbark diameter at breast height

V= volume in cubic metres, underbark volume of tree inclusive of branches)

3.4 Ethnobotanical Survey

A list of the rural clusters around major forest areas of the 4 sample districts was first prepared in consultation with local forest staff. Preliminary enquiries were made in these villages about the forest areas where medicinal plants are collected and used. A lst of potential survey sites was then prepared for each of the forest ranges in the sample Districts. Some 32 villages in Bihar and 40 in Orissa were surveyed.

A list of medicinal plants in use was prepared by the surveyors in group discussions and by PRA. Informal discussions with groups of villagers and the local headman identified households who regularly use medicinal plants from the forest. Five households in each village were interviewed in depth with respect to how the medicines are prepared, dose rates

and frequency of application. In addition, healers, Ayurveda practitioners and drug makers in the locality were interviewed to record the use of medicinal plants. The exercise took about 8 days per village, on average. Village traditions, and uses of medicinal plants which had fallen into disuse recently, were observed and discussed. Users helped to locate plants for making herbarium specimens. For those species that could not be identified on the spot, herbarium specimens were taken to Bhubaneswar for identification.

4.0 OUTPUTS

The outputs from the project are described in the following chapters:

- Collection and consumption patterns
- Markets and manufacturers
- Yields of NTFPs
- Ethnobotanical studies
- Development strategies

The projected outputs i.e. the inventory, manual and financial model have been embodied in this final technical report rather than individual outputs as it was felt more appropriate to keep the body of information together in one document.

The results of the work need to be treated with some caution. This is because, despite the fact that a whole year was examined rather than a few weeks as is more normal, the season studied 1997-98 was a poor seed year. Hence yield of most NTFPs were lower than might be expected although the general flows of NTFPs through the local economy are not likely to be radically different from normal in relative terms although they will differ in absolute terms. These aspects are treated further within section 7, development strategies.

5.0 NTFP COLLECTION AND CONSUMPTION

5.1 Introduction

The reliance of sample households on NTFPs for both subsistence use and sale has been found to be substantial and pervasive across Eastern India. Section 5.2 will outline the major NTFPs collected in Eastern India with basic information on the most important NTFPs collected by sample households in the study area being provided in Section 5.2.1. Section 5,3 will explore the extent of NTFP dependence in the study area with reference to a number of different variables relating to NTFP collection and consumption. Section 5.3.1 provides information on the times during which different NTFPs are available for collection and Section 5.3.2 examines the numbers of NTFPs collected in the sample villages. Section 5.3.3 investigates the proportion of households in the study area that were engaged in the collection of different NTFPs during 1997-8 and Section 5.3.4 will examine the quantities of NTFPs that they collected. Section 5.3.5 draws attention to the amounts of time that villagers in different areas spent in the collection and processing of NTFPs. In Section 5.3.6, attention shifts away from the collection of forest products towards an analysis of the amounts of NTFPs consumed domestically by sample households across the study area. Sections 5.3.7, meanwhile, attempts to analyse intra-household divisions of responsibility in NTFP collection and processing while Section 5.3.8 focuses on ethnic variations in the collection and consumption of NTFPs amongst households in Orissa. Finally, Section 5.4 takes a closer look at the collection and consumption of the most widely gathered NTFPs, drawing attention to any significant variations between Bihar and Orissa and between the different sample districts of these states. The NTFPs examined in this Section are divided up into the different use categories of food-based NTFPs (Section 5.4.1), household NTFPs (Section 5.4.2), oilseeds (Section 5.4.3) and commercially valuable NTFPs (Section 5.4.4).

5.2 Major NTFPs of Eastern India

Forest Department annual statistical reports record the extraction of 62 different NTFPs from Orissa and 30 from Bihar (Government of India. 1998[1]). These statistics refer only to items that are commercially exploited. Other items such as khajur leaves, mushrooms and chiraita are extracted for fibre, food and medicines in several districts yet are not mentioned in government statistics. As the classification of NTFPs in bihar and Orissa is not exactly the same, the inventories carried out for the survey were slightly different in the two study areas. As a result, data on the collection and consumption of mango, ber and jamun (which are not classed as NTFPs in Orissa) plus tamarind, piar, karanj and lac (which are primarily grown on homestead rather than forest land in the Orissa sample villages) are only available for Bihar.

[1] Government of India. 1998. "Expert Committee Report on Conferring Ownership Rights of MFP on Panchayats/Gram Sabha" Department of Environment and Forests". January 1998.

The items collected in the sample villages are listed in Tables 5.1 and 5.2 although only a few of them were collected by all sample households.

Table 5.1

Frequently Collected NTFPs in Bihar

Plant part	Use	Common name
Leaves & grasses	Food	Beng-saag*, Bhadali-saag, Buru-saag, Chakor-saag, Dawna-saag, Dudhia-saag, Karmi-saag, Katai-saag, Katwa-saag, Koinar-saag, Mata-saag, Nonia-saag, Putri-saag, Putkal-saag, Semali-saag, Serali-saag
	Oil	
	Medicine	Bhelwa-leaf, Jurbi-leaf
	Fodder	Doob-grass, Churat-grass
	Mat/Plate	Mahulan-leaf, Sal-leaf, Khijur leaf, Sabai grass
	Other	Ranu, Kendu leaves
Flowers	Food	Jirhul, Kachnar, Koinar, Mahua
	Oil	
	Medicine	
	Fodder	
	Mat/Plate	
	Other	Mahua
Fruit	Food	Mango, Amra, Aonla, Ban-kheksa, Ban-kundri, Barhar, Bel, Ber, Gular, Jackfruit, Jamun, Kend, Karonda, Piar, Pithor, Tamarind, Toot
	Oil	Bhelwa, Dori, Karanj, Kusum
	Medicine	Aonla, Bahera, Bel, Harra, Jamun, Matasura
	Fodder	
	Mat/Plate	
	Other	
Roots & Tubers	Food	Genthi-kand, Neel-kanth, Patal-kohra, Satawar (Asparagus), Buru-sanga
	Oil	
	Medicine	Hajam (Ghorbaj), Satawar
	Fodder	
	Mat/Plate	
	Other	
Bark	Food	
	Oil	
	Medicine	Koreya, Arjun
	Fodder	
	Mat/Plate	
	Other	Mahulan, Pojo
Seed	Food	Chironji, Kathal
	Oil	Sal, Kusum, Palas, Mahua, Karanj, Neem
	Medicine	Kujri, Pendi
	Fodder	
	Mat/Plate	
	Other	
Shoots & Twigs	Food	Kareel,
	Oil	
	Medicine	
	Fodder	
	Mat/Plate	
	Other	Sal-chewstick, Karanj-chewstick, Ram-datwan, Phool-jharu (Broom)
Whole plant	Food	Mushroom, Puffball
	Oil	
	Medicine	Chiraita
	Fodder	
	Mat/Plate	
	Other	

** Saag means leafy vegetables*

Table 5.2

Frequently Collected NTFPs in Orissa

Plant part	Use	Common name
Leaves & grasses	Food	Kanisiri saag, Bana saag
	Oil	
	Medicine	
	Fodder	
	Mat/Plate	Broom grass, Khajur leaf, Mahulan-leaf, Mat reed, Sabai grass, Sal-leaf, Thatch grass
	Other	Kendu leaves
Flowers	Food	Giliri flower, Mahua
	Oil	
	Medicine	Dhatki
	Fodder	
	Mat/Plate	
	Other	
Fruit	Food	Tamarind, Jamun, Jackfruit, Kend, Mango, Piar, Amla
	Oil	Mahua, Karanj, Kusum
	Medicine	Bel, Harra
	Fodder	
	Mat/Plate	
	Other	
Roots & Tubers	Food	Masia Kanda, Pitalu, Pani-alu
	Oil	
	Medicine	Patal garuda
	Fodder	
	Mat/Plate	
	Other	
Bark	Food	Dantari
	Oil	
	Medicine	Indrajab, Arjun
	Fodder	
	Mat/Plate	Siali
	Other	Sunari, Arjun, Phenphena, Medha, Lodha, Simuli
Seed	Food	Piar, Cashew
	Oil	Bana tulsi, Bana kulthi, Baigoba, Baghanakhi, Marda, Mahua, Karanj, Neem, Mango, Sal
	Medicine	Bana tulsi, Harra, Bahara
	Fodder	
	Mat/Plate	
	Other	
Shoots & Twigs	Food	Bamboo
	Oil	
	Medicine	
	Fodder	
	Mat/Plate	
	Other	Sal-chewstick
Whole plant	Food	Bana sag, Kanisiri sag, mushroom
	Oil	
	Medicine	Chiraita, Nux vomica
	Fodder	
	Mat/Plate	
	Other	Bana chera, Shokokoy
Gums & Resins	Food	
	Oil	
	Medicine	Dhaura gum, Genduli
	Fodder	
	Mat/Plate	
	Other	Sal

** Saag means leafy vegetables*

5.2.1 Major NTFPs Collected in the Study Area

The forests of the study area are typically multi-layered comprising of a top canopy, lower canopy, shrub layer and lower grass and herb layer. They yield a rich and diverse crop of forest products. For the sake of convenience, the major NTFPs collected in the study areas will be examined initially according to the plant part from which they originate but in later sections by the by the use to which they are put.

5.2.1.1 Grasses and Fibres

The most widely collected grass species in the study area is sabai (*Eulaliopsis binata*) which is also commonly known as bhabar or baia grass (Mundari – baichom). It is a perennial species found on the bare slopes and forest blanks of sub-Himalayan tracts and plains of Bihar, Orissa and West Bengal. In Orissa, sabai grass is particularly abundant in Mayurbhanj, Keonjhar, Sundargarh and Angul districts. A number of handicraft industries manufacture a range of household articles such as sofas, beds and chairs. It is a good raw material for paper and rope making: products that are exported mainly to Uttar Pradesh, Haryana, West Bengal and Gujarat.

The average annual production of sabai grass in India was estimated at about 50,000 to 60,000 tonnes (Sharma, 1978). The highest recorded out turn in Orissa was 872 tonnes in 1987 but the current annual average is some 250 tonnes. The grass is cultivated extensively on dry farmland in Mayurbhanj but is collected from forests, river banks and open fallow land in other districts.

The other major grasses and fibres collected from the study area are jhadu grass which is used for making brooms and siali fibre which is harvested from a climber (*Bauhinia vahlli*) and is used primarily for binding bidi leaves. The collection of lodh, medha and phenphena bark in Bihar was stopped in 1986, but in spite of the official ban, the illegal removal of these items for commercial use has been reported from forests in Ranchi district although not from the study villages. Their primary use is for making agarbati (fragrance sticks) and medicines.

5.2.1.2 Twigs and Branches

The most widely collected NTFP is the sal twig (known as 'dantun' in Bihar and 'dantakathi' in Orissa) which is used as a 'chew stick' for cleaning and brushing teeth throughout eastern India The young tender branches of sal (and occasionally karanj) are collected from forests throughout the year, because if they are stored for more than 7 days, they become very hard and unsuitable for chewing. Villagers close to forest areas collect them regularly whereas those who live further away tend to buy them from weekly markets or village shops. Indeed, the sale of these sal twigs is an important source of income for the poorest households of the

study area. Although in many rural areas, sal twigs are being replaced by toothbrushes, they are still the only means of dental care in a majority of rural households. Old people in semi-urban areas still prefer to use sal twigs but the younger ones use toothbrushes. Sal twigs are collected by almost all of the sample households throughout the year at weekly or sometimes at monthly intervals.

5.2.1.3 Leaves

The leaves of *Diospyros melanoxylon*, popularly known as kendu or tendu, are of high economic value because of their use in rolling bidi (country cigarettes). Kendu is a slow growing plant of tree habit, but for ease of collection, the plants are pruned to retain them in the bush stage. They are abundant in degraded sal and miscellaneous forests and also occur on wasteland adjoining forests. Kendu bushes are usually coppiced in February. The leaves then sprout and become ready for collection after about 45 days. Semi-mature leaves are collected from the first week of April to June.

The sal tree ('sarjom' in the Mundari and Nagpuri local languages of Bihar) holds a special position in the socio-economic life of tribals in India as each part of the tree (wood, seed, leaves, young shoots) is used every day by forest dwellers. For many poor households, sal leaves are the only utensil used for serving food. This forest product is distinctive in that it is extracted throughout the year for both domestic consumption and sale. Almost all of the sample households in both Bihar and Orissa gathered sal leaves throughout the year. Although many sal trees are retained on farmland, leaves are mainly collected from Reserved and Protected forests. Coppice forests, which result mainly from the over-exploitation of forests by local people, provide better quality leaves. In addition to being used for domestic consumption, many sal leaves are nowadays mechanically manufactured into sal leaf plates and cups for sale in urban markets. Many of the poorest families are also involved in the collection of sal leaves for sale at local markets.

The collection of siali (mahualan) leaves from many districts in Orissa and Bihar has been drastically curtailed as continuous extraction has reduced the density of this climber in the forest. Also, during cleaning and other silvicultural operations, many climbers are uprooted or cut. No management system is yet in place to improve the productivity of this plant. Siali leaves are much in demand for making good quality leaf plates, but these are used domestically rather than by industries which prefer sal plates. Most of the siali leaves that are exported go to southern India where they are preferred for serving food.

Khajur (Khijur) leaves come from bushes which are found in abundance in open forests and on dry land with moderate tree cover. In Orissa, they are more common on the plains than in the hills of Angul and Keonjhar. In Angul, the branches are used for fences and the leaves for

roofing. Sleeping mats made from khajur leaves are used in most rural areas of Orissa and are also exported to Bihar and West Bengal.

5.2.1.4 Vegetables and Flowers

People living close to the forest supplement their food intake by hunting and collecting forest-based food. Strict wild life laws in India have controlled game hunting but the gathering of plants for food still continues. In both states, villagers collect a number of different wild vegetables, tubers and flowers which they are sometimes unable to differentiate between. For convenience, therefore, these are referred to in the report as 'wild vegetables' unless they are collected in large enough quantities to merit a separate category. Examples of vegetables and flowers collected in large quantities by the Orissa sample households include pitalu (known as genthikand in Bihar), masia kanda and bamboo shoots (kardi) which are particularly favoured in Angul and the western districts of Sambalpur, Sundargarh and Bolangir. Other than mahua flower, the main flower eaten is urguna.

In the Bihar study districts at least seven types of wild and leafy vegetables are regularly collected from local forest areas; many being gathered by women when they return from the fields during the agricultural season. Although most wild vegetables are of herb and shrub origin (including beng-sag, bhadali-sag, chakor-sag, katai-sag, katwa-sag and mata-sag), a few such as futkal and koinar sag are from trees. Items that the sample households collected in large enough quantities to merit separate categories included asparagus, bamboo shoots, pitalu and patalkohra tubers, and jirhul, kachnar and koinar flowers. Collection levels varied significantly within the study area with certain villages specialising in the gathering of particular NTFPs.

In both states, wild tubers of *Dioscorea* species (pitalu and masia kanda) tend to be collected from the forests by poorer households. After quite a skilled but laborious digging out process, the tubers are kept in running water for 2-4 days to allow bitter toxins to wash out. They are then boiled, dried and powdered for eating. The collection and primary processing of wild tubers is highly labour intensive and time consuming, but a significant amount of them are nevertheless consumed and sold in many sample villages.

The Mahua tree has a very important place in the socio-economic and cultural life of tribals in eastern India as it has a variety of uses including the provision of timber, food, liquor and shade. Mahua flowers are eaten fried, powdered and as cake and are also used as cattle feed. They are usually stored in the homestead after being properly dried and are often consumed in times of distress. Their main use, however, is for making country liquor and many villagers now prefer to sell the flowers rather than storing them for home consumption. In both Bihar and Orissa, mahua trees are found on homestead and farm land as well as in the forests and on government wastelands. This is because they are usually retained during times of land clearing when most other perennials are removed. Nevertheless, they are

becoming relatively rare in parts of the study area because of illegal timber felling. In forests where voluntary or official JFM has been established, however, mahua saplings are increasingly rapidly in number and size.

5.2.1.5 Fruits

One of the most important fruit-based NTFP in India is the mango. Mango trees are abundant in forests throughout the study area as a natural associate of sal, and many are planted along the road sides and village wastelands. Ripe mango fruits are both consumed domestically and sold in local markets. In Bihar, a number of NGOs including the Mahila Samakhya in Murhu block of Ranchi district, have recently started encouraging villagers to add value to their mango sales by undertaking the manufacture of dried mango powder (amchoor) at the household level. Dried mango powder is very marketable throughout India and is used as a souring agent in food preparation.

There is also a lot of market demand for both the fruit and seeds of the tamarind tree. Whereas tamarind fruit has a very good market in south India, tamarind seed is locally used by millers to produce tamarind flour. Almost all tribal households, especially in West Singhbhum villages, have tamarind trees on their homestead land. The sale of tamarind fruit and seeds is major source of income in West Singhbhum district. In Orissa, the extent of tamarind production in central and western Orissa is small. The major tamarind areas are Koraput, Kalahandi and Ganjam districts of southern Orissa.

5.2.1.6 Mushrooms

A variety of mushrooms, puffballs and toadstools are collected in the rainy season from late June to October in Reserved and Protected Forests, farmland and wasteland in Bihar and Orissa. The gradual opening of the canopy and the advent of drier conditions in deciduous forests has resulted in the reduced growth and a subsequent fall in the collection of mushrooms. Nevertheless, at least seven varieties of edible mushrooms are collected in the Bihar study area. For ease of analysis the mushroom varieties have been classified into:

(a) puffballs which are subterranean varieties of the genus *Lycoperdon* (known locally as 'rugra') and which require some skill to locate in sal forests
(b) common mushrooms (known locally as 'khukri') which are umbrella shaped varieties of mushroom and toadstool that occur abundantly in fields as well as in forests
(c) *gende* mushroom which are sleeker fungal fruiting bodies. These are found mostly in moister forest localities and occur quite late (August-September).

In Orissa, common mushrooms are collected in much greater quantities than puffballs and other varieties of mushroom. For convenience, therefore, all of the edible fungi collected by

the Orissa sample households were classified as 'mushrooms'. Significantly, the large scale export of mushrooms from Angul and Keonjhar to Calcutta and other urban centres, which was a common feature ten years, now no longer exists.

5.2.1.7 Oil seeds

The demand for vegetable oil seeds in India exceeds the supply available from cultivated oil seeds. This gap is accentuated by the gradual reduction in the availability of oil seeds from forests. India produces nearly 100 varieties of tree-borne oil seeds which are used mainly for cooking and the manufacture of soap, paints, varnishes, lubricants and fertilisers (Gupta and Guleria, 1982). The main tree borne oil seeds in Bihar and Orissa are sal, kusum, karanj, and mahua. Other important forest oilseeds include kusum and piar although the out turn of these is quite low.

Oil-seeds of tree origin are quite important for the income needs of households in remoter locations of the study area. Although 1998 was a very bad seed year and the returns on income (particularly for sal seed collection and primary processing) were quite low, sample households in Sarsa, Khanda and Sindribera villages in Bihar as well as Dhandatopa, Handapa, Hijrida and Samagiri villages in Orissa collected significant amounts of major oil seeds.

The oil content of mahua seed (known locally as 'tola' in Orissa and 'dori' in Bihar) varies from 33-43 % which is higher than for most other oil seeds. The oil yield depends on the efficiency of the equipment used. Most tribals obtain mahua oil using rather inefficient home made wooden crushers which often extract as little as 12% of the seed oil content. Mahua oil is used for good quality soaps as well as edible oil and mahua seed cake is used as a fertiliser. On average, 2500 tonnes of mahua seed are collected in Orissa each year. The largest collection (4642 tonnes) was recorded in 1980. In the Bihar study area, mahua seeds are one of the main sources of income and subsistence during the lean summer months (April-July) for many poor families.

The seed of the karanj *(Pongamia pinnata)* tree is linked strongly with local tribal culture and no tribal homestead is complete without a karanj tree. In Orissa, it was widely planted as a road side plantation tree and in woodlots under the Orissa Social Forestry program. It is a medium sized tree which bears white flowers during April-July and seed pods which ripen during February-May the following year. The oil from these seeds is used in lamps, as a body oil, and may at times also be used for edible purposes. Commercially, karanj oil is valued for the manufacture of soaps, so it can be a good source of income for local people. De-oiled karanj seed cake has a high manurial value as it is very good source of nitrogen. It is also used as an insecticide and a termite deterrent. Indeed, young karanj twigs are sometimes preferred to sal twigs as tooth brushes because of their insecticidal property. The out-turn of

karanj is about 350 tonnes in Orissa. In Bihar, the Bihar State Forest Development Corporation had monopoly collection rights over karanj until 1994 when it purchased 26 million tonnes of karanj seeds; a significant reduction from the 2830 million tonnes it purchased in 1983.

Kusum is a large deciduous tree, the fruit of which contains one or two seeds which contain nearly 33% oil. This oil is often combined with sal, mahua and karanj oils in the manufacture of various types of soap. The potential production of kusum seed oil in India is around 90,000 tonnes, of which only around a third is actually harvested. In Bihar, almost all of the kusum seeds collected are sold to local traders. Kusum trees are particularly abundant in forests and on farm and homestead land in West Singhbhum.

Sal seed is major source of cheap fatty oil in India and is used in the manufacture of low grade soaps and also, when fresh, in the hydrogenation of vegetable oils. The pre-sale processing of sal seeds by primary collectors is a laborious and time consuming process, but despite the low return on labour, a large number of households in the study area are involved in sal seed collection. The market price of sal seeds has fallen in real terms in recent years because of its replacement by cheap imported palm-based fatty oil.

The seed is collected during June following kendu leaf extraction. The amount collected varies from year to year depending on the weather and market demand. Although the returns to labour for sal seed extraction are low compared to other products, it is still collected when there is a demand. In 1997, sal seed collection in Orissa was badly hit due to a change in the marketing policy of the Government of Orissa. The low production of 1998 was due to unfavourable climatic conditions.

Piar (chironji) is a berry-like fruit which can be eaten raw. Often, the fruit is dried and its hard seed coat is removed to expose the seed kernel which is known as chironji. This is used in Indian cuisine in the same way as cashew nuts. Oil from piar seed (known as 'char' in Orissa) is one of the most highly priced seed oils in India with an average retail price of Rs. 100-110 per kg of seed kernels. It is used in condiments and as a flavouring agent. The quantity of piar seed collected in Orissa forests is relatively small compared to other oil seeds and also to collection levels in Madhya Pradesh and Uttar Pradesh. In Bihar, by contrast, it is collected in rather larger quantities and provides an important source of income in some villages.

Although mango seed is readily available, its collection depends mainly on market demand for the kernel and is significantly more pronounced in Orissa than Bihar. People in Angul collected mango kernels in 1997 because traders were buying them but demand (and therefore gathering) has fluctuated since 1998. Collection depends solely on the requirement of a few industries in Madhya Pradesh which use the kernel to extract non edible oil. When the supply of alternative oils like karanj and kusum is good, the demand for mango kernel goes down.

5.2.1.8 Myrobalans

Myrobalan is the commercial name for the harra fruit (*Terminalia chebula*) which is used for tanning. Two other myrobalans, namely belleric myrobalan (*Terminalia bellerica*, known locally as amla) and embellic myrobalan (*Emblica officinalis*, known locally as bahera) are also valuable NTFPs. They are typical species of dry and moist deciduous forests of eastern India. The largest concentration of these species can be found in Madhya Pradesh.

For the purposes of this report, the quantities of amla (*Terminalia officinalis*), harra (*Terminalia chebula*), and bahara (*Terminalia bellerica*) collected are grouped together under the category 'myrobalans' as the villagers collect only a small amount of each and store them together. In Orissa, myrobalans are collected mainly from Koraput, Sundergarh, Phulbani and Keonjhar Districts. In the sample villages, however, only 7% of households in Angul and 25% in Keonjhar collected myrobalans in 1997-8 and the total quantity of collection was a meagre 68.8kg. Sparse distribution, poor growth, harmful over-exploitation, lack of market demand and a decline in traditional medicine are the main reasons why the extraction of myrobalans has been so low in recent years.

In Bihar, myrobalan collection has declined to negligible quantities in recent times. This is mainly because the selective girdling of these trees for bark tannin in the past has reduced the availability of mature myrobalan trees in the study area although young saplings still occur in significant numbers. Because the production of herbal medicines ('trifala' and 'chyawanprash') from myrobalans has significantly increased, the apparent decline in their collection is somewhat baffling and points to the secretive nature of herbal medicine trade in India.

5.2.1.9 Gums and Resins

The major gums produced from Orissan forests are dhaura (*Anogeissus latifolia*), karaya (*Sterculia urens*), semul (*Bauhinia retusa*), babul (*Acacia nilotica*) and bahada *(Terminalia bellerica).* Dhaura and karaya gums are the most widely collected and are usually gathered by hand. The lumps of gum exuded from the tree are collected and dried during the summer. There is no established market demand for the products although they are traded at weekly *hats*. In Bihar, by contrast, an executive order in 1986 banned the extraction or collection of gums and resins from forests for commercial purposes.

5.2.1.10 Tassar and Lac

Sericulture is an important economic activity and four types of silk are commercially produced in India; namely mulberry, muga, eri, and tassar. Tassar silk-producing insects are wild, so

tassar cultivation is considered to be a forestry activity. Orissa, Bihar and Madhya Pradesh are the three main states producing wild tassar and in Bihar and Orissa, the Forest Department considers tassar to be an NTFP as it is produced in forests and forest areas are leased out to tassar rearers for cocoon production. In Bihar, the large scale plantation of arjun (*Terminalia arjuna*) trees (a tassar host species) was promoted in the past under the Tassar Development Scheme, but this was discontinued in the early 1990s and the plantations were not maintained. Nowadays, support for tassar rearers is available from the Tassar Raw Material Bank in Chaibasa, Singhbhum District and the Central Tassar Research and Training Institute in Ranchi District, although none of the Bihar sample households undertook this activity. The worms are usually reared on *Terminalia tomentosa, Terminalia arjuna,* and *Shorea robusta* trees.

Lac is the resinous protective secretion of lac insects. The commonest lac insect species occurring on forest trees is *Laccifer lacca* and it produces two types of lac: kusumi and rangini. The kusumi strain is of better quality and is commonly cultivated on *Scleicheria oleoresa* (kusum) trees. The rangini strain is grown on *Zizyphus jujuba* (ber) or *Butea monosperma* (palas) trees. The mature adult is the source of stick lac. Commercial seed lac is obtained after removing the insect bodies, twigs, lac dye and dirt from the seed lac. Shellac, which is the most commonly used product, is obtained by melting or extracting the resins from the seed lac with the help of solvents.

Financially speaking, lac is the most important NTFP in the study area, and this is especially so in the sample villages of West Singhbhum district, Bihar. A large number of lac processing and export units are located within the District. Lac farmers also benefit from institutional and technical support from the Bihar State Co-operative Lac Marketing Federation (BISCOLAMPF) and the Indian Lac Research Institute (ILRI), both of which are located in Ranchi. In the Bihar study villages, the ber (*Zizyphus zuzuba*) tree is the referred lac-host tree and is favoured over kusum (*Schliechera oleosa*) which, although a better known lac host, has a larger crown size and is more difficult to cultivate alongside agricultural crops. Small kusum trees are sometimes used for rearing better quality 'kusumi-lac' (kataki lac) which not only sells at almost one and half-times the price of ber and palas (*Butea monosperma*) lac (known as *baisakhi* lac) but the yield per tree is also significantly higher. Lac production in Orissa averaged 770 tonnes per year during 1960-70, falling to about 110 tonnes by end of 1980 and to 15 tonnes between 1980-90. 1985 was an unusual year with a production of 270 tonnes. Both the price and the demand for lac have fluctuated widely over the last twenty years.

5.2.1.11 Medicinal plants

The region does not have a large trade in medicinal plants. The chief species entering local markets in Bihar are chiraita (*Swertia chiraita*) which is used to reduce fever and skin

complaints and matasura (*Antidesma diandrum*) fruit which is not used locally. Indeed, the medicinal and trade value of the latter was not known to local people until the winter of 1997 when its collection was first promoted by a few local agents on behalf of pharmacy-related traders in north India. As a result, the hitherto untraded fruit was sold at the very high price of Rs. 65/kg. Villagers and local agents are unsure, however, whether the fruit will be purchased again in the coming season.

Apart from these items, only a few other items such as bhelwa (*Semicarpus anacardium*) leaf and fruit (used as a painkiller and wound disinfectant), pendi and sarpangandha (used as an antidote for snake bits and as a cure for insommnia, hysteria and hypertension) are collected primarily for sale. In addition, a few medicinal plants including kujri (*Celastrus paniculata*) seed which is used as a wound disinfectant and bahera (*Terminalia bellerica*) which is used for coughs and colds are collected mainly for domestic consumption. More specialist herbal medicine is performed by traditional village doctors who collect various medicinal plant ingredients as and when the need arises.

Interestingly, a large number of commonly occurring medicinal plants that are marketed widely in adjoining districts of Madhya Pradesh are not collected at all in the Bihar study area. Examples include chirota fruit (*Casia tora*), dhawai-phool (*Woodfordia floribunda*), baibirang seed (*Embelia tsjeriam-cottam*) and ban-tulsi (*Eranthemum pulchellum*) which are officially traded in large quantities in Madhya Pradesh with support from the Madhya Pradesh Minor Forest Produce Federation. Chirota and ban tulsi are collected in Orissa but are not marketed in the sample districts. In 1996, however, ban-tulsi seed was collected in Angul by Utkal Forest Products Limited (UFPL) which had the monopoly lease for oil seed collection in Orissa.

5.2.1.12 Liquor

As already mentioned, the most important liquor-making NTFP is the mahua flower which is collected widely in Bihar and Orissa. In addition to this, many villages throughout Bihar and Orissa collect rice beer herbs (popularly known as *ranu* in Bihar and *akana* in Orissa), which are a concoction of forest herbs which are processed into pellet form and used in the fermentation of rice beer (*haria*). A couple of decades ago, most tribal households in the study area used to ferment rice-beer for their own domestic consumption and the sale of *ranu* and *akana* was therefore negligible. In the last decade, however, the sale of rice-beer in and around local markets has become quite common because of its high profitability. The steeply increasing demand for rice beer pellets is reflected in the fact that their sale has become an important source of income for some of the Bihar sample villages. This trend was not so apparent in the Orissa sample villages as this activity tends to be carried out by just a few local experts.

5.3 The collection and consumption of NTFPs in the Study Area

5.3.1 Seasonal calendar of common NTFPs in the Study Area

The following seasonal calendar (Table 5.3) gives general details on the collection times for the major domestically consumed and traded NTFPs in the study area. Sal leaves, sal twigs and wild vegetables are the only items that are collected throughout the year, although lac is collected for nine months of the year. Most of the tree-based fruits are available in the early part of the year (January to June) whereas mushrooms and puffballs are available in the food-deficit monsoon period between July and September. Tree-based oilseeds are more staggered in their availability, with sal and mahua seeds being collected mainly in June and July, kusum seeds in July and August and karanj seeds in March and April.

Table 5.3

Calendar of NTFP collection in the study area

NTFP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Amra								■	■			
Aonla	■									■	■	■
Asparagus						■						
Bahera fruit							■					
Bamboo shoot								■	■	■		
Ber fruit	■	■										
Bhelwa		■	■									
Chiraita	■	■									■	■
Dahu					■	■	■	■				
Gende mushroom								■	■			
Gum	■	■	■	■								
Pitalu							■	■	■	■	■	
Jackfruit			■	■								
Jirhul flower	■	■										
Jhadu grass	■	■								■	■	■
Jhuna			■	■	■	■						
Kachnar flower		■										
Karanj seed			■	■								
Karonda fruit	■											■
Kend fruit				■	■							
Kendu leaves				■	■							
Khajur leaves	■									■	■	■
Koinar flower									■	■	■	
Kujri seeds									■	■	■	
Kunsum seed				■	■							
Kusum seeds							■	■				
Lac	■	■			■	■	■	■		■	■	■
Mahua flower			■	■								
Mahua seed					■	■						
Mango fruit				■	■	■	■					
Mango kernel				■	■	■	■					
Masia kanda	■	■								■	■	■
Matasura	■											■
Mulberry			■									
Mushroom							■	■	■	■		
Myrobalans	■	■	■									■
Piar (Chironji)					■	■						
Pitalu							■	■	■	■	■	
Puffball							■	■				
Sabai grass	■									■	■	■
Sal seed						■	■					
Sal leaves	■	■	■	■	■	■	■	■	■	■	■	■
Sal twig	■	■	■	■	■	■	■	■	■	■	■	■
Sarpgandha											■	
Siali leaves	■	■										■
Siali fibre			■	■								
Tamarind fruit		■	■									
Tassar										■		
Urguna	■											■
Wild vegetables	■	■	■	■	■	■	■	■	■	■	■	■

5.3.2 Numbers of NTFPs collected in the sample villages

5.3.2.1 Bihar

In the 1997-8 collection season, forty seven different NTFPs were regularly collected from forest, farm and homestead land by the Bihar sample households and all twelve villages were engaged in the collection of at least fifteen types of NTFP. Five NTFPs (sal twigs, sal leaves, mushrooms, wild vegetables and mahua flowers) were collected in all twelve sample villages and a further six (puffball, pitalu, piar, ber, mahua seed and tamarind) were collected in at least nine villages. The rest all displayed some inter-village and inter-district variation in their collection pattern.

The villages which collected the smallest numbers of NTFPs were the near-to-market villages of Karudih and Katwa in West Singhbhum district and the agriculturally advanced, market-oriented village of Baridih in Ranchi district (Table 5.4). All of these villages collected sixteen or less NTFPs. At the other end of the spectrum were the more remote and forest-dependent villages of Sindribera and Khanda which both collected twenty two different NTFPs, the market-oriented[2] and well-forested village of Hesadih which collected twenty six NTFPs and the rather agriculturally backward and well forested village of Hulsi which collected twenty nine NTFPs.

Table 5.4
Number of Collected NTFPs in Different Bihar Sample Villages

District	Village	Number of NTFPs Collected
Ranchi	Baridih	16
	Jariya	19
	Tengariya	22
	Hulsi	29
	Jahanabaj	20
	Sarsa	19
West Singhbhum	Karudih	15
	Katwa	15
	Hesadih	26
	Lota	20
	Khanda	22
	Sindribera	22

[2] Hesadih is situated close to the main Ranchi Chaibasa road where a weekly market is held and has access to large chunks of both private and well-protected government forest.

5.3.2.2 Orissa

Some 27 different forest-based NTFPs were collected in 1997-8 by the Orissa sample households with a wide range (10-19) of products being collected by each household. Most villagers collected about 10 different products and sal leaves, sal twigs, mahua flowers and kendu leaves were gathered in all villages. In contrast to the situation in Bihar, there was relatively little variation in the numbers of NTFPs collected in different villages (Table 5.5).

Table 5.5

Number of Collected NTFPs in Different Orissa Sample Villages

District	Village	Number of NTFPs collected
Angul	Handapa	10
	Hinjrida	11
	Dhandatopa	10
	Dangapal	18
	Basudevpur	11
	Kutasingha	17
Keonjhar	Akul	11
	Padang	11
	Chakradharpur	13
	Barapada	12
	Samagiri	11
	Adakata	13

5.3.3 The proportion of households engaged in the collection of different NTFPs

5.3.3.1 Bihar

Out of the forty-seven NTFPs regularly collected in the Bihar sample villages in 1997-8, some came from different plant parts of the same species and several were used for more than one purpose. Broadly speaking, twenty five NTFPs were used for food (including cattle food), two were used to make liquor, six were used for household products, five were used for oil, seven were used for medicinal purposes and two were used primarily for commercial purposes (Table 5.6). When these forty seven NTFPs are ranked according to the percentage of all sample households in Ranchi and West Singhbhum District collecting them, it can be seen that twelve were collected by over forty percent of households and a further eight were collected by almost twenty percent of households. The remaining twenty seven NTFPs were all found in less than half of the sample villages and were collected by less than twenty percent of the sample households.

Table 5.6

Percentage of Bihar Sample Households collecting NTFPs

NTFP	Primary use	Collecting HH as a % of sample HH in the villages of collection	Collecting HH as a % of all sample HH	Number of villages in which collected
Amla fruit	Food	60	10	2
Aonla fruit	Food/medicine	35	12	3
Asparagus plant	Food	5	<1	1
Bahera fruit	Medicine	5	<1	1
Bamboo shoot	Food	39	23	8
Ber fruit	Food	58	48	10
Bhelwa fruit	Oil	34	6	3
Chiraita plant	Medicine	35	6	2
Dahu fruit	Food	38	16	5
Fodder grass	Cattle food	0	0	1
Gende mushroom	Food	48	12	4
Honey	Food	15	1	1
Jackfruit	Food	41	17	5
Jamun fruit	Food	43	21	5
Jhadu grass	Brooms	10	1	1
Jirhul flower	Food	34	23	7
Kachnar flower	Food	10	1	1
Karanj seed	Oil	53	40	9
Karonda fruit	Food	55	9	2
Kend fruit	Food	39	20	6
Kendu leaves	Biri making	45	8	2
Khajur leaves	Mat making	19	2	1
Koinar flower/leaf	Food	83	27	4
Kujri seed	Oil/medicine	30	13	5
Kusum seed	Oil	26	9	4
Lac	Shellac	69	40	7
Mahua flower	Liquor/food	75	75	12
Mahua seed	Oil	60	45	12
Mango fruit	Food	61	30	6
Matasura fruit	Medicine	26	7	3
Mulberry fruit	Food	46	15	4
Mushroom	Food	92	92	12
Patalkohra tuber	Food	45	4	1
Pendi seed	Medicine	27	5	2
Piar seed	Oil	59	50	10
Pitalu tuber	Food		5	9
Puffball	Food	72	66	11
Ranu herbs	Liquor	35	15	5
Sal leaves	Leaf plates	100	100	12
Sal seed	Oil	63	32	6
Sal twigs	Chew sticks	100	100	12
Sarpangandha tuber	Medicine	5	<1	1
Sharifa fruit	Food	24	6	3
Siali fibre	Rope making	25	2	1
Siali leaves	Mats/plates	23	6	2
Tamarind fruit	Food	43	43	12
Wild vegetables	Food	90	90	12

Inter-district and inter-village variations in collection and consumption trends for the most important NTFPs within the different use categories are detailed in Sections 5.3.4 and 5.3.6.

Broadly speaking, the most widely collected of the food-based NTFPs were mushrooms, wild vegetables and mahua flowers which were gathered by over 75% of the sample households. Other important food-based NTFPs included puffball, pitalu, piar, ber and tamarind, which were all collected by over 40% of the sample households. The most important household NTFPs were sal twigs which were collected by all of the Bihar sample households for use as tooth brushes. Sal leaves were collected by all of the Bihar sample households; mostly for use as disposable plates and bowls for both domestic use and sale.

The most important oil seeds collected by the Bihar sample population were mahua seed, karanj seed and sal seed which were all collected by over 30% of the sample population. Medicinal plants were not very widely collected as consumption levels were quite small and trade in these products was relatively limited. The most important medicinal species collected in 1997-8 was Matasura, which has become a recently traded item in local markets and which was collected by 7% of sample households in 1997-8. Other significant species were bhelwa, chiraita and pendi which were collected by around 5% of the sample households. In addition, jamun and aonla fruits were occasionally used for medicinal purposes, but were collected primarily for their food value. The main NTFP that has commercial value is lac which is used to make shellac. This was collected by over 40% of the sample households.

From these data it can be concluded that even in very agriculturally advanced and market oriented villages, there is a high level of dependence on NTFPs and tree-based fruits for food as well as for subsistence use more generally. In addition, almost half of the Bihar sample households combined their agricultural income with income from individually-owned trees on their homestead or farm land.

5.3.3.2 Orissa

Of the twenty three forest-based NTFPs regularly collected by the Orissa sample households (Table 5.7), seven were used as food, nine for making household products, four for oil and three for primarily commercial purposes. The most widely collected NTFPs were sal leaves and sal twigs which were gathered in all of the sample villages by almost all households. Other very important NTFPs in terms of the percentage of households collecting them were mahua flowers and kendu leaves which were collected in all of the sample villages by 93% and 87% of the sample households respectively.

Table 5.7

Percentage of Orissa households collecting NTFPs

NTFP	Primary use	Collecting HH as % of sample HH in the villages of collection	Collecting HH as % of all sample HH	Number of villages in which collected
Bamboo shoots	Food	4	2	3
Gums		80	6	1
Jhadu grass	Brooms	18	6	4
Jhuna gum		17	6	4
Kendu leaf	Biri making	87	87	12
Khajur leaves	Thatch/mats	63	58	11
Kusum seed	Oil	28	4	2
Mahua flower	Food/liquor	101	93	12
Mahua seed	Oil	62	51	10
Mango kernel	Oil	81	14	2
Masia kanda tuber	Food	90	15	2
Mushroom	Food	81	81	12
Myobalans	Tanning	40	21	6
Piar seed	Oil	32	8	3
Pitalu tuber	Food	40	37	11
Sabai grass	Rope making	56	14	3
Sal leaf	Leaf plates	100	100	12
Sal seed	Oil	28	23	9
Sal twig	Chew sticks	99	99	12
Siali fibre	Rope making	67	25	4
Siali leaf	Mats/plates	62	21	4
Tassar cocoons	Silk cloth	35	3	1
Urguna	Food	44	7	2
Wild vegetables	Food	66	40	7

Other than mahua flowers which were collected primarily for making liquor, the most important of the food-based NTFPs were mushrooms which were collected by over 80% of the Orissa sample households with collection levels being greater in Angul than in Keonjhar. Vegetable gathering was also very significant with 37% of the sample households collecting pitalu, 15% collecting masia kanda, 7% collecting urguna and 40% collecting other wild vegetables.

The collection of items for household use was slightly more widespread in Orissa than in Bihar with 58% of the sample households collecting khajur leaves, 25% collecting siali fibre, 21% collecting siali leaves, 14% collecting sabai grass and 6% collecting jhuna (sal resin). Out of the oil seeds, mahua seed was by far the most widely collected (by over half the sample households and in ten villages), followed by sal seed (23%), mango kernel (14%) and kusum seed (4%). Interestingly, mango kernels were collected by 45% of the sample villagers in Angul but were not collected at all in Keonjhar because of a lack of traders purchasing this NTFP there. By far the most important commercially valuable NTFP in Orissa is the kendu

leaf which in 1997-8 was collected by 91% of the sample households in Angul and 63% in Keonjhar. Myrobalans were collected by 21% of the sample households but the other main commercially-valuable NTFP, tassar, was cultivated by only seven households in one village in Keonjhar. Similarly, kusum seed, bamboo, gum and sal resin were extracted by only a few households.

5.3.4 Quantities of NTFPs collected by the sample households

5.3.4.1 Bihar

In terms of quantities gathered, the most important NTFPs collected by the Bihar sample households were mahua flowers and wild vegetables (Table 5.8) of which a mean of 42.5kg and 20.3kg per year respectively were collected per household. Of the tree-based fruits, tamarind was the most important with a mean of 20.1kg being collected per household per year. Mango and piar were also very important with mean collection levels of 10.5kg and 8.5kg respectively. Puffballs, mushrooms and pitalu were all gathered in large quantities (14.5kg, 8.5kg and 7.7kg mean per household per year): a situation that indicates their importance in the pre-harvest food deficit period. Of the household NTFPs, sal twigs and sal leaves were collected in the largest quantities with mean collection levels of 36.3kg and 4.4kg per household per year. Sal seed was the most important oilseed collected by the Bihar sample households (15.6kg/household/year), but this was followed closely by mahua seed and karanj seed (11.0kg and 7.4kg).

Table 5.8

Total and average NTFP collection in Bihar

(kg, unless otherwise indicated)

NTFP	Ranchi		W. Singhbhum		Bihar	
	Total	Average	Total	Average	Total	Average
Amla	295	12	0		295	12
Aonla	189	7	45	15	234	8
Asparagus	1	1	0	0	1	1
Bahera	0	0	16	16	16	16
Bamboo	592	16	120	7	712	13
Ber	779	10	922	26	1751	15
Bhelwa	200	100	158	13	358	26
Chiraita	225	16	0	0	225	16
Dahu	153	4	0	0	153	4
Fodder grass	10	10	0	0	10	10
Gende	0	0	158	5	158	5
Honey	3	1	0	0	3	1
Jackfruit	640	16	0	0	640	16
Jamun	146	3	0	0	146	3
Jhadu grass	0	0	351	176	351	176
Jirhul	24	1	226	6	250	4
Kachnar	0	0	5	3	5	3
Karanj	477	10	1322	26	1799	19
Karonda	10	0	0	0.00	10	0
Kend	259	6	72	14	331	6.89
Kendu leaves*	0	0	21100	1111	21100	1111
Khajur	0	0	151	38	151	38
Koinar	461	7	0	0	461	7
Kujri	0	0	282	9	282	9
Kusum	4	4	987	49	991	47
Lac	229	7	1008	16	1237	13
Mahua flower	1985	25	8385	79	10370	56
Mahua seed	1455	23	1227	27	2682	25
Mango	2380	34	179	45	2559	35
Matasura	0	0	45	3	45	3
Mulberry	58	2	0	0	58	2
Mushroom	520	5	1507	13	2027	9
Patalkohra	26	3	0	0	26	3
Pendi	0	0	355	32	355	32
Piar	23	1	2048	22	2071	17
Pitalu	255	8	1622	16	1877	14
Puffball	556	6	2975	40	3530	22
Ranu	75	15	272	9	347	10
Sal leaves	434	4	631	5	1064	4
Sal seed	959	24	2847	75	3806	49
Sal twigs	5686	47	3178	26	8864	36
Sarpangandha	1	1	0	0	1	1
Sharifa	0	0	374	25	371	25
Siali fibre	260	52	0	0	260	52
Siali leaves	870	174	39	4	909	65
Tamarind	868	18	4039	70	4906.50	47
Wild vegetables	2504	25	2456	21	4960	23

* kerries

Intra-village variations in the amounts of NTFP collected were not very significant. Most households gathered similar quantities of NTFPs and spent similar amounts of time in

collection. By contrast, inter-village variations in NTFP collection were quite high (Table 5.9). This was primarily a reflection of NTFP availability in the different forests of the study area, but there was also a certain amount of cultural specificity with some villagers specialising in the collection of particular NTFPs. Bamboo shoot collection in Sarsa and Hulsi, for example, was significantly higher than in other villages despite the fact that the villagers of Hesadih, Lota, Khanda and Sindribera have access to better bamboo forest areas. In addition, the quantity of NTFPs collected is significantly linked to agricultural productivity as well as to local food preferences. In the remote and relatively less agriculturally developed villages of Khanda and Sindribera, for example, the collection of food-based NTFPs like pitalu, mahua flowers, mushrooms, puffballs, jirhul and tamarind was significantly higher than elsewhere

Table 5.9a

Amounts of NTFPs collected in Bihar sample villages – Ranchi District

(kg, unless otherwise indicated)

NTFP	Ranchi					
	Near			Far		
	Baridih	Jariya	Teng-ariya	Hulsi	Janahabaj	Sarsa
Amra	0	0	104	191	0	0
Aonla	0	0	70	119	0	0
Asparagus	0	0	0	0	1	0
Bahera	0	0	0	0	0	0
Bamboo	0	19	124	145	0	304
Ber	5	3	144	232	156	239
Bhelwa	0	200	0	0	0	0
Chiraita	0	0	180	45	0	0
Dahu	14	3	70	59	7	0
Fodder grass	0	0	0	10	0	0
Gende	0	0	0	0	0	0
Honey	0	0	0	3	0	0
Jackfruit	158	314	15	0	77	76
Jamun	22	4	75	30	16	0
Jhadu grass	0	0	0	0	0	0
Jirhul	0	1	0	0	0	23
Kachnar	0	0	0	0	0	0
Karanj	7	0	126	117	0	227
Karonda	0	0	5	5	0	0
Kend	0	0	66	34	6	153
Kendu leaves*	0	0	0	0	0	0
Khajur	0	0	0	0	0	0
Koinar	21	40	0	0	164	236
Kujri	0	0	0	0	0	0
Kusum	0	0	0	4	0	0
Lac	0	0	90	139	0	0
Mahua flower	4	130	313	351	637	550

Continued overleaf /

Table 5.9a (continued)

Mahua seed	0	234	108	235	231	557
Mango	158	69	0	30	1265	858
Matasura	0	0	0	0	0	0
Mulberry	4	1	0	0	33.8	19.3
Mushroom	39	70	64	110	149	88
Patalkohra	0	0	0	26	0	0
Pendi	0	0	0	0	0	0
Piar	0	1.5	1	3.75	0	17
Pitalu	0	0	48	191	16	0
Puffball	63	32	12	25	295	129
Ranu	53	0	0	0	22	0
Sal leaves	86	41	103	103	57	44
Sal seed	0	0	0	0	239	720
Sal twigs	1334	617	989	956	913	878
Sarpanganda	0	0	0	1	0	0
Sharifa	0	0	0	0	0	0
Siali fibre	0	0	0	260	0	0
Siali leaves	0	0	0	870	0	0
Tamarind	16	14	290	213	220	115
Wild vegetables	30	339	439	420	615	661

* kerries

Table 5.9b

Amounts of NTFPs collected in Bihar sample villages – West Singhbhum District (kg, unless otherwise indicated)

NTFP	West Singhbhum					
	Near			Far		
	Karadih	Katwa	Hesadih	Lota	Khanda	Sindri-bera
Amra	0	0	0	0	0	0
Aonla	0	0	0	45	0	0
Asparagus	0	0	0	0	0	0
Bahera	0	16	0	0	0	0
Bamboo	0	0	19	71	13	17
Ber	360	298	0	0	144	170
Bhelwa	0	0	58	100	0	0
Chiraita	0	0	0	0	0	0
Dahu	0	0	0	0	0	0
Fodder grass	0	0	0	0	0	0
Gende	16	46	87	9	0	0
Honey	0	0	0	0	0	0
Jackfruit	0	0	0	0	0	0
Jamun	0	0	0	0	0	0
Jhadu grass	0	0	0	351	0	0
Jirhul	16	31	14	12	153	0

Continued overleaf /

Table 5.9b (continued)

Kachnar	0	0	0	0	5	0
Karanj	55	120	45	0	508	594
Karonda	0	0	0	0	0	0
Kend	0	0	54	18	0	0
Kendu leaves*	0	0	2900	0	0	18200
Khajur	0	0	151	0	0	0
Koinar	0	0	0	0	0	0
Kujri	10	0	114	108	29	21
Kusum	0	0	97	0	620	270
Lac	69	41	5	0	457	436
Mahua flower	422	346	1788	342	2676	2811
Mahua seed	0	0	85	66.5	605	470
Mango	0	0	179	0	0	0
Matasura	0	0	31	0	10	4
Mulberry	0	0	0	0	0	0
Mushroom	130	183	61	72	424	637
Patalkohra	0	0	0	0	0	0
Pendi	0	0	0	0	250	105
Piar	131	72	400	135	651	659
Pitalu	89	131	246	387	365	404
Puffball	24	0	90	15.5	571	2274
Ranu	0	233	14	25	0	0
Sal leaves	131	136	169	91	53	52
Sal seed	0	0	71	81	1360	1335
Sal twigs	205	195	494	440	967	878
Sarpanganda	0	0	0	0	0	0
Sharifa	0	0	83.5	0	180	110
Siali fibre	0	0	0	0	0	0
Siali leaves	0	0	0	0	0	39
Tamarind	246	211	36	130	1430	1986
Wild vegetables	133	125	904	585	246	463

* kerries

5.3.4.2 Orissa

Amongst the Orissan sample households, kendu leaves were by far the most important NTFP in terms of quantities gathered (Table 5.10) with collection levels amounting to a total of 818164 kerries and a mean of 3299 kerries. Collection levels were higher in Angul (535511 kerries total, 4913 kerries mean) than in Keonjhar (282653 kerries total, 2642 mean). Sal leaves (17655kg total, 71kg mean) and khajur leaves (15225kg total, 106kg mean) were also collected in large quantities, although sal leaves were collected in significantly larger quantities in Keonjhar (12037kg) than in Angul (5618kg) as many villagers in Keonjhar undertake sal leaf plate making. Other household items that were collected in large quantities include sal twigs (7383kg total, 30kg mean) and siali fibre (2327kg total, 38kg mean) although the latter was collected in significantly greater quantities in Angul (2211kg) than in Keonjhar (116.0kg). Siali leaves, by contrast, were collected in greater quantities in Keonjhar (447.0kg)

than in Angul (69.0kg) whereas jhadu grass (225.0kg total, 15.0kg mean) was collected exclusively in Angul.

Table 5.10

Total and average NTFP collection in Orissa

(kg, unless otherwise indicated)

NTFP	Angul		Keonjhar		Orissa	
	Total	Average	Total	Average	Total	Average
Bamboo	552	184	0	0	552	138
Gum	0	0	15	1	15	1
Jhadu grass	225	15	0		225	15
Jhuna	18	2	68	34	86	6
Kendu leaves*	535511	4913	282653	2642	818164	3788
Khajur	14776	157	449	92	15225	107
Kusum seed	0	0	92	8	92	8
Mahua flower	5447	50	11709	96	17156	74
Mahua seed	1222	19	1903	31	3124	25
Mango kernel	689	20	0	0	689	20
Masia kanda	592	16	0	0	592	16
Mushroom	743	8	548	5	1291	6
Myobalans	10	1	59	2	68	1
Piar seed	13	2	404	7	417	5
Pitalu	423	14	367	6	790	9
Sabai grass	73	5	7	1	80	4
Sal leaf	5618	46	12037	96	17655	72
Sal seed	1291	39	995	38	2286	39
Sal twig	4038	33	3346	27	7383	30
Siali fibre	2211	54	116	3	2327	38
Siali leaves	69	17	447	9	516	10
Tassar	0	0	14200	2029	14200	2029
Urguna	182	11	0	0	182	11
Wild vegetables	118	8	120	1	238	2

* kerries

Out of the food-related NTFPs, mahua flowers were collected in the greatest quantities (17156.0kg total, 74.0kg mean), followed by mushrooms (1291.0kg total, 6.0kg mean), pitalu (790.0kg total, 9.0kg mean), masia kanda (592.0kg total, 16.0kg mean), bamboo shoots (552.0kg total, 16.0kg mean), wild vegetables (238.0kg total, 2.0kg mean) and urguna (182.0kg total, 11.0kg mean). Interestingly, masia kanda, bamboo shoots and urguna were collected only in Angul; a situation that reflects the larger area of bamboo forest (and better forest composition) in Anugul and the food preferences of the district more generally. Of the oil seeds, mahua seeds were the most important (3124.0kg total, 25.0kg mean), followed by sal seeds (2286.0kg total, 39.0kg mean) and mango kernels (689.0kg total, 20.0kg mean). Kusum seeds were collected in quite small quantities (92.0kg total, 8.0kg mean) and only by sample households in Keonjhar district due to the scarcity of kusum trees in Anugul.

Table 5.11a

Amounts of NTFPs collected in Orissa sample villages - Angul District

(kg, unless otherwise indicated)

NTFP	Angul					
	Near			Far		
	Handapa	Dhandtopa	Dangapal	Hinjrida	Basudevpur	Kutasingha
Bamboo	0	0	16	536	0	0
Gum	0	0	0	0	0	0
Jhadu grass	210	0	5	7	0	3
Jhuna	0	0	18	0	0	0
Kendu leaves*	119236	35290	128600	98230	59760	94395
Khajur	7785	86	58	2647	62	4139
Kusum seed	0	0	0	0	0	0
Mahua flower	1062	916	624	988	1303	554
Mahua seed	472	119	52	86	433	60
Mango kernel	0	0	167	0	522	0
Masia kanda	0	0	204	0	0	389
Mushroom	354	29	69	266	22	4
Myobalans	4	0	5	0	0	0
Piar seed	0	0	0	0	0	0
Pitalu	0	83	43	259	7	31
Sabai grass	0	0	32	0	0	41
Sal leaf	1546	848	443	1279	907	596
Sal seed	208	175	33	747	97	31
Sal twig	1170	774	86	1133	831	45
Siali fibre	0	180	548	0	0	1483
Siali leaves	0	0	0	0	0	69
Tassar	0	0	0	0	0	0
Urguna	0	0	0	0	2	180
Wild vegetable	0	0	118	0	0	0

* kerries

Table 5.11b

Amounts of NTFPs collected in Orissa sample villages - Keonjhar District

(kg, unless otherwise indicated)

NTFP	Keonjhar					
	Near			Far		
	Akul	Chakradharpur	Samgiri	Padang	Barapada	Adakata
Bamboo	0	0	0	0	0	0
Gum	0	0	0	0	15	0
Jhadu grass	0	0	0	0	0	0
Jhuna	3	0	0	65	0	0
Kendu leaves*	71350	19159	55555	53600	44030	38959
Khajur	10	20	0	163	185	71
Kusum seed	0	0	47	0	45	0
Mahua flower	2917	1855	509	3074	831	2523
Mahua seed	477	0	151	1252	24	0
Mango kernel	0	0	0	0	0	0
Masia kanda	0	0	0	0	0	0
Mushroom	75	193	9	51	79	141
Myobalans	7	35	0	0	0	16
Piar seed	0	48	12	0	38	0
Pitalu	55	81	41	12	36	142
Sabai grass	0	7	0	0	0	0
Sal leaf	500	3869	3711	1618	1860	480
Sal seed	0	60	876	0	57	2
Sal twig	401	616	678	485	558	608
Siali fibre	0	61	0	0	0	55
Siali leaf	0	52	373	0	0	22
Tassar	0	0	0	14200	0	0
Urguna	0	0	0	0	0	0
Wild vegetable	3	16	47	5	32	18

* kerries

As is the case in Bihar, significant inter village variations in the quantities of different NTFPs collected can be observed from the Orissa sample data (Table 5.11). Much of the variation relates primarily to the availability of different NTFP species in nearby forests although local consumption preferences and existing market demand also influence gathering patterns. The higher levels of sal seed collection in Angul (1291.0kg) compared to Keonjhar (995.0kg), for example, reflects the failure of lease holders to purchase sal seeds in Keonjhar in 1997-8 rather than a difference in sal seed production per se. In contrast, the difference in the quantities of mahua seed gathered in the two districts is more a reflection of differences in the distribution of mahua trees on farms and in nearby forests. There was no particular evidence to link levels of NTFP collection with agricultural productivity, but there were indications that villagers from the higher socio-economic strata do not collect gum, siali leaf, siali fibre or cultivate tassar. In contrast, however, household income status seemed to have no effect on the collection of tendu and mahua.

5.3.5 Time analysis of NTFP collection and processing

In terms of the areas from which forest products are harvested and the amounts of time needed to gather and process them, significant variations were found both between the different NTFPs and also between the sample villages in which they were collected. While it is not particularly easy to differentiate NTFPs on the basis of where they are collected, the most important factor seemed to be the type of forest situated near to the collecting village. As there are no legal restrictions on the extraction of NTFPs, however, the most important limitation on harvesting was that of availability. With respect to the amount of time taken to gather and process different NTFPs, significant variations were found between localities reflecting factors such as distance from the forest, the actual quantities of NTFPs harvested and the number of household members engaged in collection. It was often the case that several products were collected during the same trip which made the estimation of the time taken to collect individual products very difficult. It is for this reason that Tables 5.12 and 5.13 provide details on travelling times rather than collection times.

5.3.5.1 Bihar

As can be seen from Table 5.12, the NTFP which involved the greatest amount of travelling was khajur leaves; the collection of which necessitated an average journey of three hours per trip because khajur bushes are quite few and far between. Other items that involved relatively long travelling times include jhadu grass which required an average of 2 hours per trip because of its scarcity and kendu leaves which required an average of 1.8 hours per trip. For the latter, only around 8-10 leaves are plucked from each bush so collectors have to visit an average of 4-500 bushes each trip. As a result of forest degradation, the availability of large tree-borne NTFPs such as bhelwa, aonla, piar, kusum seeds, kendu fruit, mango and mahua flowers and seeds has declined and the travel times needed to collect these items have increased as a consequence. The collection of bhelwa and aonla, for example, involved an average trip of 1.5 hours with journey times in West Singhbhum being significantly longer than in Ranchi. This is because the sample villages in Ranchi district have smaller forests that are closer to the villages than their West Singhbhum counterparts. Piar and kusum required an average of 1.3 hours (with travel times for piar being longer in Ranchi and near-to-market villages) and mango required an average of 0.8 hours. Certain non-tree items such as bamboo shoots and mushrooms have also become more difficult to obtain in recent years as a result of over-exploitation and forest decline more generally. Average travelling times for these items were 1.1 hours and 1 hour respectively with villagers in Ranchi having slightly shorter journeys. At the opposite end of the spectrum, jackfruit, mulberry, koinar, tamarind, ber, dahu, karanj, wild vegetables, sal leaves and sal twigs are all readily available and required journeys of less than 0.7 hours for collection, with most having shorter travel times in Ranchi and in near-to market villages.

Table 5.12

Average travel, drying and processing times for major NTFPs in Bihar (hours)

NTFP	Travel					Drying	Processing
	Ranchi	Singhbhum	Near	Far	Bihar		
Aonla	1.1	2.0	1.5	1.5	1.5	0.5	3.7
Bamboo-shoot	0.9	1.4	1.0	1.2	1.1	12.5	12.6
Ber	0.4	0.6	0.4	0.7	0.5	0	0.5
Bhelwa fruit	0.5	2.1	1.3	2.1	1.5	95	0.7
Sal twig	0.4	1.0	0.6	0.8	0.7	1.4	0.3
Chiraita	0.8	nc	0.8	0.8	0.8	0.5	0.5
Dahu	0.5	nc	0.3	0.7	0.5	0	0.1
Mahua seed	0.5	1.3	0.7	1.0	0.9	24.6	4.4
Gende	nc	1.2	1.0	1.8	1.2	0	0.6
Jackfruit	0.2	nc	0.2	nc	0.2	0	0
Jirhul flower	0.5	2.1	2.0	1.2	1.6	43.4	0.7
Jhadu grass	nc	2.0	nc	2.0	2.0	50	4.5
Karanj	0.7	0.5	0.4	0.8	0.6	24.2	3.8
Kend	0.8	1.8	1.2	1.1	1.1	0	37.6
Kendu leaves	nc	1.8	1.8	nc	1.8	0	3
Khajur leaves	nc	3.0	3.0	nc	3.0	48	10
Koinar sag	0.3	nc	0.3	0.4	0.3	0	0.3
Kujari	nc	1.2	1.1	1.2	1.2	57.6	18.7
Kusum	nc	1.3	1.9	1.0	1.3	0	3.4
Lac	0.8	0.6	0.6	0.7	0.7	0.8	2.9
Wild vegetables	0.4	0.8	0.5	0.8	0.6	31.4	0.9
Mahua	0.6	1.0	0.7	0.9	0.8	39.6	0.9
Siali leaves	1.3	1.0	nc	1.2	1.2	72	1.9
Mango	0.7	1.6	1.0	0.7	0.8	0	0.3
Matasura	nc	1.5	2.4	1.0	1.5	0	0
Mulberry	0.3	nc	0.3	nc	0.3	0	0.1
Mushroom	0.7	1.2	1.0	1.0	1.0	0	0.4
Patalkohra	0.9	nc	nc	0.9	0.9	0	0.5
Piar	1.6	1.1	1.5	1.2	1.3	46.4	3
Puffball	0.5	1.4	0.9	1.0	0.9	0	0.5
Rice-beer herb	1.0	1.2	1.1	1.2	1.2	50.2	5.1
Root-tuber	1.1	1.2	1.0	1.2	1.1	6.2	7.5
Sal leaves	0.4	1.0	0.6	0.8	0.7	0.3	0.4
Sal seed	1.0	1.5	2.0	1.2	1.3	24	5.2
Tamarind	0.5	0.4	0.3	0.6	0.4	24.1	1.3

The last column in Table 5.12 details the amounts of time different NTFPs require for drying and processing in Bihar. The most time-consuming products were bhelwa, kujari and siali leaves which all required over 73 hours of processing. The processing of kujri seed for oil extraction, in particular, was found to be very time consuming and laborious and its collection has also become very difficult because of a scarcity of plants in the forests. Quite a number of items (including khajur leaves, rice beer herbs, jhadu grass, piar seeds, jirhul flowers and

mahua flowers) required processing times of over 40 hours. The only NTFPs that required no drying or processing were matasura and jackfruit, although there were a number which required only minimal processing. These included fruits like mango, mulberry, dahu and ber; mushrooms and puffballs; and household items like sal leaves and twigs. Oilseeds such as mahua seed, karanj seed, and sal seed all required drying and processing times of between 28-30 hours.

When the Bihar sample households were asked during the questionnaire survey to rank difficulties in the collection, processing, transport and sale of NTFPs, their responses were all quite similar. Sal twigs, rice beer herbs, gende mushroom and sal leaves were identified as being the least difficult to collect and process as they are still abundantly available despite the general degradation of forests in recent years. In contrast, the difficulty of collecting mahua seeds and flowers, kusum, bamboo shoots, pitalu, mushrooms and puffballs has increased substantially in recent years owing to the extra time and labour that has to be expended on the collection of these items nowadays.

5.3.5.2 Orissa

As can be seen from Table 5.13, the NTFPs that involved the greatest travelling times in Orissa were siali fibre, jhadu grass, sabai grass, siali leaves, mushrooms and khajur. Those that involved the lowest collection times, meanwhile, were kusum seeds, bamboo shoots, masia kanda and sal seed. In a number of cases, however, the all Orissa collection times concealed important differences between the two sample districts. This was particularly true of siali fibre, sabai grass, pitalu, myrobalans and khajur.

Table 5.13

Average travel, drying and processing times for major NTFPs in Orissa (Hours)

NTFP	Travel			Drying and processing
	Angul	Keonjhar	Orissa	
Bamboo	1.6	nc	1.6	nd
Gum	nc	nd	nd	nd
Jhadu grass	4.0	nc	4.0	0.5
Jhuna	nd	nd	nd	nd
Kendu leaf	1.5	2.2	1.9	5.3
Khajur	1.3	3.4	24	4.5
Kusum seed	nc	1.6	1.6	0
Mahua flower	1.6	1.0	1.3	0.5
Mahua seed	1.7	2.0	1.9	0
Mango kernel	1.5	nc	1.5	0
Masia kanda	1.6	nc	1.6	1.0
Mushroom	2.4	2.9	2.7	1.4
Myobalans	1.5	2.2	1.9	5.3
Pitalu	1.4	2.7	2.1	9.4
Sabai grass	4.8	1.5	3.2	1.5
Sal leaf	1.6	2.2	1.9	1.2
Sal seed	1.8	1.7	1.8	5.0
Sal twig	1.8	2.1	2.0	0.5
Siali fibre	8.0	2.6	5.3	1.5
Siali leaves	nc	2.7	2.7	3.7
Tassar	nc	nd	nd	nd
Urguna	nd	nc	nd	nd
Wild vegetables	nd	nd	nd	nd

nc – not collected; nd – no data

The main reason for these differences in NTFP collection times between Keonjhar and Angul is that the Keonjhar sample villages are located on plateaus and foothills with rather scattered forests and local people have to travel significant distances uphill to collect many of their NTFPs. The Angul sample villagers, by contrast, have access to two major patches of contiguous forest from which they can obtain their NTFPs easily. This accounts for the fact that travel times for the collection of sal leaves, sal twigs, mushrooms, pitalu and myrobalans were all greater in Keonjhar than in Angul (Table 5.13). The collection of siali fibre meanwhile, took longer in Angul due to the greater distances villagers had to travel to reach the hill tops where this NTFP is available.

The abundance of khajur grass in Angul probably accounts for the lower collection times there compared to Keonjhar. Kusum and mahua seeds were collected from trees growing on farmland in Keonjhar, so the travel times associated with their extraction were quite short. The very long travel time associated with the collection of siali fibre in Angul reflects the fact that villagers (often tribals) from the poorest socio-economic groups often make quite lengthy

(three to four day) trips to the forest where they survive on wild tubers and berries. In addition to collecting siali, honey and jhuna (sal resin), they also spend time catching parrots and mynah birds.

In terms of drying and processing, the most time-consuming NTFP was pitalu which requires peeling, drying and then boiling for 5-6 hours before being made into a hard cake which can be stored. Myrobalans, khajur leaves and siali leaves are also quite time consuming to process. Harra, bahera and amla are dried for several days and then ground into a powder which is used for medicinal purposes. Siali and khajur leaves are stripped, washed and dried for several days and are then woven into mats. Those items that require the least amount of drying and processing (0.5 hours each) include mahua flowers and jhadu grass.

5.3.6 Consumption of NTFPs by collecting households

For many households in the study area, NTFPs make important contributions to household subsistence. In addition to boosting household calorific intake, many domestically consumed NTFPs substitute for items that would otherwise have to be bought for cash. Good examples of this are the use of sal twigs instead of plastic toothbrushes and toothpaste and sal leaf plates instead of crockery purchased from market.

5.3.6.1 Bihar

In Bihar, the most important NTFPs in terms of the percentage of households consuming them domestically were asparagus, kachnar, karonda, bahera and fodder grass which were all self-consumed by 100% of households (Table 5.14). Other items that were collected primarily for domestic use include khajur, koinar, puffball, mulberry, jirhul, mushroom, mango, sal leaves and twigs, wild vegetables, patalkohra, jamun, kend fruit and chiraita. At least 70% of these items were self-consumed. In calorific terms, the most important domestically-consumed NTFPs were wild vegetables (leafy vegetables, flowers and wild tubers) which made a very significant contribution to household food budgets throughout the year. Consumption levels were particularly high in villages that have been least affected by agricultural development.

Table 5.14

Percentages of NTFPs consumed domestically by Bihar sample villagers

NTFP	Ranchi	Singhbhum	Near	Far	Bihar
Amla	20	nc	13	34	20
Aonla	15	53	23	19	22
Asparagus	100	nc	100	nc	100
Bahera	nc	100	nc	100	100
Bamboo	19	57	20	42	25
Ber	72	0	52	9	32
Bhelwa	0	35	23	13	16
Chiraita	68	nc	0	85	68
Dahu	57	nc	40	70	57
Fodder grass	100	nc	100	nc	100
Gende	0	22	100	17	22
Honey	27	nc	27	nc	27
Jackfruit	30	nc	100	8	30
Jamun	76	nc	57	86	76
Jhadu grass	nc	3	3	nc	3
Jirhul	100	88	88	90	89
Kachnar	nc	100	100	nc	100
Karanj	54	24	36	14	32
Karonda	100	nc	100	100	100
Kend	74	61	88	41	71
Kendu leaves	nc	0	0	0	0
Khajur	nc	99	nc	99	99
Koinar	96	nc	100	70	96
Kujri	nc	54	32	83	54
Kusum	25	1	<1	8	1
Lac	0	0	0	0	0
Mahua flower	31	6	13	8	11
Mahua seed	53	0	36	0	29
Mango	92	19	99	24	87
Matasura	nc	0	0	0	0
Mulberry	89	nc	91	70	89
Mushroom	73	93	96	66	88
Patalkohra	77	nc	77	nc	77
Pendi	nc	1	1	nc	1
Piar	82	22	1	75	23
Pitalu	94	59	67	53	63
Puffball	86	96	97	46	94
Ranu	43	19	69	17	24
Sal leaves	71	97	83	88	86
Sal seed	0	<1	<1	0	<1
Sal twig	86	80	86	80	83
Sarpangandha	0	nc	0	nc	0
Sharifa	nc	7	0	31	7
Siali fibre	52	nc	52	nc	52
Siali leaves	37	100	39	nc	39
Tamarind	10	9	8	15	9
Wild veg	86	75	90	66	80

nc = not collected

The importance of forest-based vegetables for local subsistence in the Bihar study villages is exemplified by the following table (Table 5.15) which illustrates that approximately 30 percent of the sample households' vegetable consumption in 1997-8 was made up of wild vegetables collected from forests. Excluding Baridih village which is agriculturally and economically quite advanced, there were only 2 villages in which wild vegetables made up less than 20% of the sample households' total vegetable consumption. In Khanda and Sindribera villages the proportion was as high as 66% which shows that in remoter areas, forest-based vegetables still constitute a very important source of food.

Table 5.15

Household collection and consumption of wild vegetables in Bihar

Village	Amount collected/hh/yr (kg)	Amount consumed/hh/yr (kg)	Amount consumed of that collected (%)
Baridih	175	8	4
Jariya	166	24	15
Tengariya	182	28	15
Hulsi	157	37	24
Jahanabaj	219	62	28
Sarsa	200	57	28
Karudih	85	22	26
Katwa	84	25	29
Hesadih	209	67	32
Lota	189	52	27
Khanda	139	88	63
Sindribera	129	85	66

In addition to these NTFPs that were primarily self-consumed, there were a large number of items including gende mushroom, chiraita, ber, dahu, kujri seeds, karanj seeds and jackfruit which were collected for sale as well as for self consumption. Others, including mahua flowers and seeds, kusum seeds, karanj seeds, sal seeds, piar fruit, jhadu grass, ranu and bhelwa were collected primarily for sale although small quantities were consumed domestically. The only items that were collected exclusively for sale purposes were lac, kendu leaves and matasura.

In terms of the quantities of NTFPs consumed domestically by Bihar sample households, sal twigs and wild vegetables headed the list with each household consuming a mean of 20.3kg and 16.3kg per year respectively (Table 5.16). Other important food-based NTFPs in terms of mean quantities consumed per annum by sample households were wild puffballs (13.6kg), mangos (9.1kg), mushrooms (7.3kg), pitalu (4.9kg) and mahua flowers (4.7kg) although ber,

piar, tamarind, koinar, kend, jirhul, jackfruit and bamboo shoots were also consumed in significant quantities. The most important domestically used oilseeds were mahua and karanj of which the mean consumption per year was 3.2kg and 2.4kg respectively. Sal leaves were the most important household NTFP (3.8kg/year), followed by siali leaves (1.5kg/year) and siali fibre (0.6kg/year). Medicinal herbs tended, for obvious reasons, to be consumed in rather small quantities, but the most significant ones for domestic consumption were chiraita, bhelwa and kujri.

Table 5.16 Total and average NTFP consumption in Bihar
(kg, unless otherwise stated)

NTFP	Ranchi		W. Singhbhum		Bihar	
	Total	Average	Total	Average	Total	Average
Amla	59	2	nc	nc	59	2
Aonla	28	1	24	8	52	2
Asparagus	1	1	nc	nc	1	1
Bahera	nc	nc	16	16	16	16
Bamboo	110	3	68	4	178	3
Ber	557	7	0	0	558	5
Bhelwa	0	0	56	5	56	4
Chiraita	153	11	nc	nc	153	11
Dahu	87	2	nc	nc	87	2
Fodder grass	10	10	nc	nc	10	10
Gende	0	0	35	1	35	1
Honey	1	<1	nc	nc	1	<1
Jackfruit	192	5	nc	nc	192	5
Jamun	112	2	nc	nc	112	2
Jhadu grass	nc	nc	90	5	9	5
Jirhul	24	1	1980	5	222	4
Kachnar	nc	nc	5	3	5	3
Karanj	256	5	321	6	577	6
Karonda	10	<1	nc	nc	10	<1
Kend	192	4	44	9	236	5
Kendu leaves*	nc	nc	0	0	0	0
Khajur	nc	nc	149	37	149	37
Koinar	443	7	nc	nc	443	7
Kujri	nc	nc	153	5	153	5
Kusum	1	1	8	<1	9	<1
Lac	0	0	0	0	0	0
Mahua flower	612	8	541	5	1153	6
Mahua seed	768	12	0	0	768	7
Mango	2193	31	34	9	2227	30
Matasura	nc	nc	0	0	0	0
Mulberry	52	1	nc	nc	52	1
Mushroom	381	3	1400	12	1781	8
Patalkohra	20	2	nc	nc	20	2
Pendi	nc	nc	5	<1	5	<1
Piar	19	1	451	5	470	4
Pitalu	239	8	950	10	1189	9
Puffball	480	6	2846	38	3326	21
Ranu	33	7	51	2	83	2
Sal leaves	306	3	610	5	916	4
Sal seed	0	0	5	<1	5	<1
Sal twigs	4853	40	2532	20	7384	30
Sarpangandha	0	0	nc	nc	0	0
Sharifa	nc	nc	26	2	26.00	2
Siali fibre	135	27	nc	nc	135	27
Siali leaves	320	64	39	4	359	26
Tamarind	83	2	383	7	466	4
Wild vegetables	2147	21	1839	16	3986	18

nc = not collected
* kerries

5.3.6.2 Orissa

As was the case in Bihar, a few of the NTFPs collected by the Orissa sample households were gathered exclusively for domestic consumption or sale, but most were used for both purposes (Table 5.17). In percentage terms, the most important items for domestic consumption were kusum seeds, sabai grass and sal twigs, of which over 95% was consumed domestically. The most important food for domestic use was pitalu, of which 90% was self-consumed by collector households, although this trend was more pronounced in Angul (100% consumption) and in near-to-market villages (99% consumption) than in Keonjhar (78% consumption) and far-from-market villages (84% consumption). Masia kanda (86% consumption), mushrooms (77% consumption) and wild vegetables (50% consumption) were also important items in domestic food budgets, although there were some interesting inter- and intra-district variations which will be analysed in more detail in section 5.4. Interestingly, less than 10% of the bamboo shoots, mahua flowers and urguna that were collected were used for domestical consumption.

Table 5.17

Percentages of NTFPs consumed domestically in Orissa

NTFP	Angul	Keonjhar	Near	Far	Orissa
Bamboo	8	100	0	9	8
Gum	0	0	0	0	0
Jhadu grass	87	0	3	100	87
Jhuna	18	15	14	16	15
Kendu leaf	25	0	19	14	16
Khajur	44	63	81	73	44
Kusum seed	0	100	100	100	100
Mahua flower	3	2	14	3	3
Mahua seed	63	95	19	84	82
Mango kernel	0	0	0	0	0
Masia kanda	86	0	74	93	86
Mushroom	69	89	88	63	77
Myobalans	56	85	76	96	81
Piar	0	12	20	0	12
Pitalu	100	78	99	84	90
Sabai grass	87	183	115	77	96
Sal leaf	91	25	38	59	46
Sal seed	<1	<1	0	1	<1
Sal twig	95	96	95	96	95
Siali fibre	16	85	17	21	20
Siali leaf	36	16	12	51	19
Tassar	0	0	0	0	0
Urguna	3	0	0	3	3
Vegetable	43	57	36	99	50

The most important household items that were collected for domestic use rather than sale were jhadu grass (87% consumed, but only in Angul district), sal leaves (46% consumed) and

khajur leaves (44% consumed). Less than 20% of the siali fibre, siali leaves and jhuna that was collected was self-consumed while gum was collected exclusively for sale purposes along with mango kernels, sal seeds and tassar. Mahua seed was the most widely collected oil seed for domestic use (82% consumed) and quite a large proportion of myrobalans (81%) were also retained for home consumption. 16% of the kendu leaves collected were consumed domestically, but this trend was only apparent in the Angul sample villages.

The NTFPs that were self-consumed in the greatest quantities by the Orissa sample villagers were khajur leaves, sal leaves and sal twigs of which each household consumed a mean of 53.0kg, 36.6kg and29.2kg respectively (Table 5.18). Also very important were mahua seeds (24.8kg/household). Out of the food-based NTFPs, mushrooms (5.2kg/household) were the most important item for domestic consumption, followed by mahua flowers (4.0kg/household), sal seeds (2.7kg/household) and wild vegetables (1.5kg/household). Another household-based NTFP that was consumed domestically in significant quantities was siali fibre (9.4kg/household). Kendu leaves were self-consumed in quite significant quantities in Angul (3432 kerries/household), but not in Keonjhar (26 kerries/household). Most other items were either consumed domestically in very small quantities (less than 1.0kg/household) or, as in the case of tassar and mango kernels, collected exclusively for sale.

Table 5.18

Total and average NTFP consumption in Orissa (kg)

NTFP	Angul		Keonjhar		Orissa	
	Total	Average	Total	Average	Total	Average
Bamboo	46	23	<1	<1	46	1
Gum	0	0	92	8	103	9
Jhadu grass	183	3	292	28	410	5
Jhuna	3	<1	10	1	13	1
Kendu leaf*	133530	3424	513	26	134043	2272
Khajur	6497	77	283	6	6779	53
Kusum seed	0	0	92	0	92	0
Mahua flower	183	3	292	6	475	4
Mahua seed	784	19	1800	29	2583	25
Mango kernel	0	0	0	0	0	0
Masia kanda	510	13	0	0	510	13
Mushroom	517	6	487	5	1004	5
Myobalans	6	1	50	2	56	1
Piar	0	0	12	<1	12	<1
Pitalu	423	14	287	20	710	18
Sabai grass	64	4	13	2	77	3
Sal leaves	5206	43	3032	24	8237	37
Sal seed	5	3	3	1	8	3
Sal twigs	3911	33	3203	26	7114	29
Siali fibre	362	28	98	3	460	9
Siali leaf	25	18	71	27	96	17
Tassar	0	0	0	0	0	0
Urguna	5	2	0	0	5	1
Vegetable	51	4	68	1	119	2

*kerries

5.3.7 Intra-household division of responsibilities for NTFP collection

Amongst the Bihar sample households, the most obvious division of labour in NTFP collection was found to be in the gathering of herbaceous or shrub-based NTFPs and items that are used primarily for domestic consumption (such as rice beer herbs, wild vegetables and mushrooms): activities that are carried out largely by women, often accompanied by younger household members. The gathering of such items tended to be carried out when the women were returning home after undertaking field-based agricultural work. The collection of pitalu, which is a very laborious process, was usually undertaken by husband-wife teams. The gathering of commercially valuable tree-based NTFPs such as sal seed, mahua flowers, mahua seeds and karanj seeds, meanwhile, was carried out by all family members but the marketing of these NTFPS was done exclusively by men. Table 5.19 illustrates the general pattern of gender differences in NTFP collection in the Bihar study area.

Table 5.19

Gender differences in collection of NTFPs in Bihar

NTFP item	Collected by
Amra	M
Aonla	MF
Bamboo-shoot	M (Rarely F)
Bhelwa	F
Dori	A
Genthi-kand	MF
Imli	A
Karanj	A
Khijur leaves	F
Koinar sag	F
Kujari	MF
Kusum seeds	A
Lac	A
Mahua	F
Mango	A
Mango	M
Matasura	A
Mushroom	FC
Puffball	F
Rice beer herb	F
Sabai grass	F
Sal leaves	FC
Sal seeds	M
Sal twigs	FC
Wild vegetables	F

M: Male, F: Female, C: Child, A: All

In Orissa, it was not possible to identify any strict gender divisions of labour for the collection of NTFPs although mahua flowers, kendu leaves, mahua seeds and sal seeds were gathered by all household members whereas siali fibre, lac, tassar and gum were collected only by men (Table 5.20). The collection of sal leaves, sal twigs, khajur leaves and mushrooms was carried out primarily by women, as was the binding and selling of kendu leaves, although there were some variations between districts and localities within the same district.

Table 5.20

Gender differences in the collection of NTFPs in Orissa

NTFP item	Collected by
Bamboo (no.)	M
Chew stick	F,M,C
Gum	M
Karanj seed	F
Khajur leaf	F
Mahua flower	M,F,C
Mahua seed	M,F
Mango seed	M,F
Mushroom	M,F
Myrobalans	M
Sabai grass	M,F
Sal leaf	F,C
Sal resin	M
Sal seed	M,F,C
Siali fibre	M
Siali leaf	MF
Tassar	M
Tendu leaf	F,C
Wild tubers	F
Wild vegetable	F,M

M: Male, F: Female, C: Child, A: All

5.3.8 Variations in NTFP collection and consumption between tribal and non-tribal households

It is becoming clear that tribals and other indigenous people depend on forests for a significant proportion of their food as well as their income; a situation that makes them vulnerable to inappropriate forest management decisions. Although data were not available for the Bihar sample households, a comparison of the NTFPs collected and consumed by sample households in Orissa suggested that there was not much difference in the percentage

of wild vegetables (pitalu, masia kanda and other wild vegetables and tubers) consumed by tribal (74%) and non-tribal (75%) households (Table 5.21). A greater proportion of the mushrooms collected, by contrast, were consumed by tribal (83%) compared to non-tribal (75%) households. The most likely reason for this difference was the influence of the market on consumption patterns rather than any intrinsic tribal/non-tribal differences. In Angul, for example, there was a strong demand for mushrooms in local markets with the result that prices sometimes reached Rs 20/kg when the usual rate was only Rs 10/kg. Not surprisingly, this provided a strong incentive for households in Angul to sell a greater proportion of the mushrooms that they collected.

Table 5.21

NTFPs collected by Tribal and non tribal groups in Orissa

(kg, unless stated otherwise)

NTFP	Non tribal (n = 133)			Tribal (n = 107)		
	Collection	Consumption	% consumed	Collection	Consumption	% consumed
Bamboo	16	0	0	536	46	9
Broom	42	12	29	183	183	100
Gum	nc	nc	nc	15	0	0
Jhuna	68	10	15	15	3	19
Kendu leaf	425048	115830	27	372296	18213	5
Khajur	13123	5548	72	1886	1066	57
Kusum seed	nc	nc	nc	92	92	100
Mahua flower	7117	202	3	9325	258	3
Mahua seed	1427	1221	86	1581	1316	83
Mango kernel	167	0	0	419	0	0
Masia kanda	288	259	90	252	199	79
Mushroom	796	593	75	478	478	100
Myobalans	33	23	70	35	32	91
Pitalu	350	343	98	425	352	83
Sabai grass	54	47	87	26	30	113
Sal leaf	5309	3874	73	12060	4096	34
Sal seed	785	8	1	1457	0	0
Sal twig	3099	2940	95	4035	3928	97
Siali fibre	1335	328	25	870	133	15
Siali leaf	142	57	40	374	39	11
Tassar*	nc	nc	nc	14200	0	0
Uruguna	134	3	2	21	1	5
Vegetables	127	52	41	109	66	60

* - number

Both tribal and non-tribal households undertook the collection of mahua flowers primarily for sale with both groups consuming only around 3% of their harvest domestically. Previously, mahua flower consumption used to be a common occurrence, but nowadays, they tend to be used only as a distress food, if the crops fail.

The gathering of sal seeds also displayed little ethnic variation with both groups collecting similar quantities (around 9.0kg/household) and selling almost all of the seeds that they harvested. This was also the case for mango kernels. Mahua seeds, by contrast, tended to be collected to meet domestic oil requirements as other cooking oils are expensive for both tribal

and non-tribal groups. Interestingly, non-tribal households sold around 89% of the piar seeds that they collected whereas none were sold by tribal households: a situation that probably reflects the lack of knowledge amongst tribals about the marketability of piar seed. This was not the case in Bihar where most of the piar seeds collected were traded by tribal households in Singhbhum district. Until recently it was common for local villagers to exchange a sack of piar kernels for a sack of salt from local traders who would then export the piar to Delhi and the cities of western Uttar Pradesh where it is in great demand. In the Bero area, where the population is relatively low and the demand for piar seeds is limited, it was more common to see fresh piar fruit being sold in the markets.

The rolling of bidis was dominated by non-tribal households which kept only 5% of the kendu leaves that they collected for domestic use whereas tribals kept around 25%. Similarly, tribals self-consumed a greater proportion of the siali fibre that they collected compared to non-tribals who sold 22% of their harvest.

Some ethnic specialisation was apparent in the different types of NTFPs collected and processed by different groups (Table 5.22). Although high value items like kendu leaves, sal seed, mahua flower and piar seed were collected by all castes and classes, some items such as khajur, tassar, siali fibre, sabai grass and myrobalans were collected by specific tribal groups. No such ethnic specialisation was found in Bihar except perhaps in the case of pitalu (*Dioscorea* tuber) collection which was usually done by poor tribal households.

Table 5.22

Ethnic specialisations in NTFP collection and processing in Orissa

NTFP	Ethnic group
Bamboo products	Juang, Ghasi
Honey, Sal resins	Kolha, Malhar, Mankadia
Khajur, jhadu grass	Juang, Mankadia
Lac	Juang
Myrobalans, Asan bark	Gonds, Juang, Bathudi
Sabai rope	Mochi, Gonds, Sabar
Sal plate	Ghasi, Mahar
Siali basket	Kharia
Tassar	Bathudi, Kurumi, Juang

5.4 A detailed analysis of the consumption and collection of some of the most important NTFPs in the study area

In this Section, an attempt is made to look closely at the collection and consumption of some of the most widely gathered NTFPs in the study area. In particular, attention is drawn to micro-level variations between individual sample villages as well as to more macro-level

variations between Bihar and Orissa and the sample districts within these states. For ease of analysis and presentation, this section is divided up into the categories of food-based NTFPs (5.4.1), household NTFPs (5.4.2), oilseeds (5.4.3) and commercially valuable NTFPs (5.4.4).

5.4.1 Food-based NTFPs

Out of the twenty eight NTFPs that were used for food in Bihar, eight were collected in nine or more sample villages by over forty percent of the sample households. A further twelve were collected in at least three villages and by over ten percent of the sample households. The remaining eight NTFPs were all collected in three or less villages and by less than ten percent of the sample households.

In the Orissa sample villages, just seven forest-based NTFPs were collected primarily for food and of these, mahua flowers and mushrooms were the most important, being collected in all sample villages by 93% and 81% respectively of the sample households. Wild vegetables were collected by over 40% of the sample households and pitalu by 37% of the sample households. The other three food-based NTFPs (masia kanda, urguna and bamboo shoots) were collected by less than 15% of sample households.

5.4.1.1 Mushrooms

Given that their main collection season is during the July to September pre-harvest food deficit period, mushrooms are a very important source of additional food (and often cash, too) in the research area. They are not a particularly difficult NTFP to collect, although the amount of time taken to gather mushrooms has increased in recent years as deforestation has reduced their availability. In 1997-8, the average journey for mushroom collection took 0.7 hours in Ranchi District and 1.2 hours in West Singhbhum (Table 5.12); the shorter journey times in Ranchi mainly reflecting the proximity of mushroom-bearing forests to the agricultural fields from which women travel to undertake mushroom collection. In Orissa, mushrooms were collected from an average area of 4.2km^2 in Keonjhar and 3.8 km^2 in Angul and the average journey time to the collection area was 2.4 hours. The processing of mushrooms is a relatively quick and simple task which took sample villagers an average of 0.43 hours and involved cleaning or washing and sometimes drying for future use.

Mushroom collection in Bihar

Almost all households (92%) in the Bihar sample villages collected mushrooms and little variation in the percentage of collecting households could be identified between Ranchi and West Singhbhum or between villages close to or far from local markets (Table 5.23). During the 1997-8 season, a total of 2027.0kg of mushrooms were collected by the Bihar sample villagers and the average consumption per collector household was 9.1kg. Both the total and average collection figures were almost three times higher in West Singhbhum District than in Ranchi District; probably because the Ho and Munda tribes who are dominant in this area do

not eat much meat and are averse to milk and therefore consume more mushrooms as a source of protein. Significant variations were also apparent between villages close to and far from local markets with the far-from-market villages showing higher total as well as average mushroom collection figures. The far-from-market villages of Khanda and Sindribera in West Singhbhum district had particularly high total levels of collection (424.0kg and 637.0kg respectively) as well as mean levels of collection per collector household (21.2kg and 30.3kg). This is due primarily to the fact that they are remote and agriculturally underdeveloped and therefore depend heavily on forest-based food resources. All other villages had total collection levels of less than 183.0kg and mean collection levels of less than 8.7kg, the lowest levels (39kg total, 2.4kg mean) being found in the more agriculturally developed village of Baridih which grows a greater variety of foodstuffs.

Table 5.23

Mushroom collection and consumption in Bihar

	Bihar	Ranchi	West Singhbhum	Near	Far
Collection					
HHs collecting (%)	92	91	93	92	92
No. of villages collecting	12	6	6	6	6
Total (kg)	2027	520	1507	547	1480
Mean per collector HH (kg)	9.1	4.8	13.1	4.9	13.2
Consumption					
Total (kg)	1780.0	380.5	1400.0	360.0	1420.5
Amount (%)	88	73	93	66	96
Mean per collector HH (kg)	8.0	3.5	12.2	3.2	12.7

Mushroom Consumption in Bihar

Although significant incomes can be earned from the sale of mushrooms in local markets, domestic consumption levels were, on the whole, quite high in the sample villages with 88% of the mushrooms collected being consumed domestically. Consumption levels were higher in West Singhbhum than in Ranchi and in far-from-market villages compared to near-to-market villages; the latter trend being explained by the tendency for near-market-villages to sell a greater proportion of the mushrooms that they collected at local *hats*. The greatest proportions of consumption were found in the far-from-market villages of Khanda, Sarsa, Sindribera, Jahanabaj and Lota which consumed over 90% of the mushrooms collected.

The data for the total and average quantity of mushrooms consumed per collector household displayed similar trends. Total and mean domestic consumption of mushrooms in Ranchi (380.5kg, 3.5kg respectively) was just over a quarter the amount of domestic consumption in West Singhbhum households (1400.0kg total, 12.2kg mean) and near-to-market villagers (360.0kg total, 3.2kg mean) consumed around a quarter of the amount consumed by far-from-market villagers (1420.5kg total, 12.7kg mean). The highest total and mean quantities of

consumption were in the villages of Khanda (424.0kg total, 21.2kg mean per collector household) and Sindribera (630.0kg total, 30.0kg mean per collector household). All other villages had total consumption figures of less than 148.0kg and mean consumption figures of less than 7.8kg per collector household, with the lowest total consumption figure being in Baridih (23.5kg) and the lowest mean being in Tengariya (1.4kg per collector household).

Mushroom collection in Orissa

Although mushroom collection took place in all of the Orissan sample villages (Table 5.24), slightly fewer (81%) of the sample households in Orissa collected mushrooms than was the case in Bihar, and the proportion of collectors was higher in Keonjhar district (84%) than in Angul (78%). Despite the use of a generic 'mushroom' category in Orissa rather than the separate categorisation of mushrooms, puffballs and gende mushrooms that was carried out in Bihar, the total quantity of mushrooms collected by the Orissa sample households was still significantly less (1291.0kg total, 6.4kg mean) than in Bihar. Collection levels were higher in Angul (743.0kg total, 7.7kg mean) than in Keonjhar (548.0kg total, 5.2kg mean) and in near-to-market villages (728.0kg total, 7.1kg mean) compared to far-from-market villages (562.0kg total, 5.7kg mean). The greatest quantities of mushrooms were collected in the villages of Handapa (354.0kg) and Hinjrida (266.0kg) in Angul district where villagers have easy access to dense forest areas. The lowest quantities of collection took place in Samagiri (9.0kg) and Kutasingha (4.0kg) which have rather degraded forest areas.

Table 5.24

Mushroom collection and consumption in Orissa

	Orissa	Keonjhar	Angul	Near	Far
Collection					
HHs collecting (%)	81	84	78	82	80
No. of villages collecting	12	6	6	6	6
Total (kg)	1291	548	743	728	562
Mean per collector HH (kg)	6.4	5.2	7.7	7.1	5.7
Consumption					
Total (kg)	1004.0	487.0	517.0	643.0	361.0
Amount (%)	78	89	70	88	64
Mean per collector HH (kg)	5.2	4.7	5.7	6.3	3.9

Mushroom consumption in Orissa.

The proportion of mushrooms consumed in Orissa (78%) was slightly lower than in Bihar and was particularly low in Angul (70%) compared to Keonjhar (89%): a situation that reflects the high market prices (up to Rs 20/kg) that have been offered for mushrooms in Angul markets in recent years. Similarly, the quantity of mushrooms consumed by sample households in Orissa (1004.0 kg total and 5.2 kg mean) was significantly less than in Bihar, although

interestingly, sample villagers in Angul consumed slightly more mushrooms (517.0kg total, 5.7kg mean) than villagers in Keonjhar (487.0kg total, 4.7kg mean): a situation that reflects the better quality forests in Angul district.

5.4.1.2 Puffballs

Although puffballs were not collected in sufficient quantities by the Orissa sample households to merit a separate category (they are grouped under the general category of mushroom), they are a very important dietary item in the Bihar study villages and are available for collection during the crucial pre-harvest food shortfall period (June-July). In recent years, deforestation has caused a decline in their abundance with the result that villagers now require some skill to locate them in the forests and the average travel times associated with puffball collection have increased to around 0.9 hours. The processing of puffballs seemed to be neither time-consuming nor labour-intensive, taking an average of 0.5 hours and consisting mainly of cleaning and washing.

Puffball collection in Bihar

As can be seen from Table 5.25, puffball collection was undertaken by just under 66% of the Bihar sample households and was more pronounced in Ranchi (73%) than in West Singhbhum (60%) and in far-from-market villages (76%) compared to near-to-market villages (56%). Eleven sample villages collected puffballs and they were gathered by all households in Baridih, Sarsa, Khanda and Sindribera and by over 85% of households in Jariya, Jahanabaj and Hesadih.

The actual amount of puffballs collected was greatest in Sindribera (2274.0kg), followed, at a distance, by Khanda (571.0kg), Jahanabaj (295.0kg), Sarsa (129.0kg) and Hesadih (90.2kg). The other villages all collected less than 65.0kg of puffballs. The high levels of collection in Sindribera and Khanda inflated the total collection figures for both far-from-market villages and for West Singhbhum. Similarly, the mean collection figures in West Singhbhum and far-from-market villages were inflated by the high average collection figures in Sindribera (108.3kg per collector household). With the exception of Khanda (28.6kg per collector household), mean collection levels were all less than 16.0kg per household.

Table 5.25

Puffball collection and consumption in Bihar

	Bihar	Ranchi	West Singhbhum	Near	Far
Collection					
HHs collecting (%)	66	73	60	56	76
No. of villages collecting	11	6	5	5	6
Total (kg)	3530.2	555.5	2974.7	221.2	3309.0
Mean per collector HH (kg)	21.9	6.4	40.2	3.2	35.6
Consumption					
Total (kg)	3326.2	480.0	2846.2	102.7	3223.5
Amount (%)	94	86	96	46	97
Mean per collector HH (kg)	20.7	5.5	38.5	1.5	34.7

Puffball consumption in Bihar

The percentage of puffballs consumed in Bihar as a whole was quite high (94%), with the villages of Jahanabaj, Sarsa, Lota and Sindribera all consuming over 99% of the puffballs that they gathered and Karudih and Khanda both consuming over 89%. The sale of puffballs was more pronounced in the remaining six villages which all consumed less than 50% of their collection: a situation that reduced the proportion of puffball self-consumption in near-to-market villages and in Ranchi district compared to West Singhbhum.

In terms of the actual quantities of puffball consumed, the villagers of Sindribera led the field with a consumption figure of 2262.0kg, followed by Khanda (510.0kg), Jahanabaj (295.0kg) and Sarsa (129.0kg). The other villagers all consumed less than 37.0kg. The average consumption figures showed a similar pattern with the villagers of Sindribera consuming a mean of 107.7kg per collector household. The next largest average puffball consumers were the villagers of Khanda (25.5kg) and Jahanabaj (15.5kg). All other villages consumed less than 6.0kg per collector household. The extremely high total and average consumption figures in Sindribera were the main factors contributing to the high average level of puffball consumption in West Singhbhum compared to Ranchi and in far-from-market compared to near-to-market villages.

5.4.1.3 Wild vegetables

The term 'wild vegetables' includes tree-based flowers and leaves as well as herbaceous plants and tubers that were not collected in sufficient quantities to merit a separate category. Together, this group of items was found to make an important contribution to household food budgets in the study area throughout the year with consumption levels being particularly high in villages least affected by agricultural development. The average time spent travelling to collect wild vegetables in Bihar was 0.6 hours although travel times were generally shorter in

Ranchi (0.4 hours) than in West Singhbhum (0.8 hours); possibly due to the tendency for villagers in Ranchi district to undertake leafy vegetable collection when returning home from their fields rather than making special trips to collect large quantities of wild vegetables, as was common in West Singhbhum. In Orissa, sample households spent about 12 person days per year gathering wild vegetables, with the average journey taking almost 2 hours. Villagers stated that masia kanda tuber was particularly hard to extract as a pit with a circumference and depth of 1.2 – 1.5 m had to be dug around the bush. The processing of wild vegetables more generally was fund to be quite time consuming with drying taking an average of 31.4 hours and cleaning, peeling, cutting and drying taking a further 0.9 hours or so.

Wild vegetable collection in Bihar

As can be seen from Table 5.26, a large proportion of households (90%) in the Bihar sample villages collected wild vegetables. Collection levels were slightly higher in West Singhbhum (94%) than in Ranchi District (85%): a situation that reflects the more developed nature of agriculture in Ranchi district and the preference of local people there for cultivated vegetables. Variations were also found in the percentage of sample households collecting wild vegetables in the more remote sample villages (97%) compared to villages close-to-markets (83%). The higher proportion of collection in far-from-market villages can be attributed to their relatively underdeveloped agricultural status which makes vegetable cultivation more difficult and encourages villagers to rely more heavily on wild vegetables.

During the 1997-8 season, 4960.0kg of wild vegetables were collected by the Bihar sample villagers and the average harvest per collector household was 22.7kg. Relatively few differences in either total or average collection levels were identified between the West Singhbhum and Ranchi sample households. More significant variations were found between villages close to and far from local markets with total collection levels in the near-to-market villages (1970.0kg) being around two thirds of those found in far-from-market villages (2990.0kg). The lowest levels of collection were found in the agriculturally more advanced and market-oriented villages of Baridih (30.0kg), Karudih (133.0kg) and Katwa (125.0kg). Interestingly, however, the near-market village of Hesadih had the highest wild vegetable collection of all (904.0kg); a situation that reflects the tendency of households in this village to sell wild vegetables at the local market.

There was a similar, although slightly less pronounced variation in mean collection figures per collector household with near-to-market villagers gathering an average of around three quarters of the amounts collected by far-from-market villagers. Again, it was the near-to-market villages of Baridih (2.3kg), Karudih (6.7kg) and Katwa (6.6kg) which had the lowest average levels of wild vegetable collection per household and Hesadih which had the highest average collection (47.6kg).

Table 5.26

Wild vegetable collection and consumption in Bihar

	Bihar	Ranchi	West Singhbhum	Near	Far
Collection					
HHs collecting (%)	90	85	94	83	97
No. of villages collecting	12	6	6	6	6
Total (kg)	4960.0	2504.0	2456.0	1970.0	2990.0
Mean per collector HH (kg)	22.7	24.6	21.0	19.5	25.3
Consumption					
Total (kg)	3986.0	2147.0	1839.0	1302.0	2684.0
Amount (%)	80	86	75	66	90
Mean per collector HH (kg)	18.2	21.1	15.7	12.9	22.8

Wild vegetable consumption in Bihar

Contrary to popular belief, wild vegetables are still an important item of domestic consumption in villages where commercial vegetable growing is the main profession of farmers. Out of all the wild vegetables collected by the Bihar sample households during the 1997-8 collection season, over 80% were consumed domestically. Consumption levels were slightly higher in Ranchi than in West Singhbhum district, but significantly higher in far-from-market villages than in near-to-market villages. Sample households in the villages of Jariya, Jahanabaj, Sarsa, Karudih, Katwa and Khanda consumed all of the vegetables that they collected while villagers in Tengariya and Hesadih sold a significant proportion (54% and 47% respectively) of their wild vegetables.

These trends were echoed in the data on the total and average amounts of wild vegetables consumed by collector households in the Bihar study area with villagers in West Singhbhum consuming less than villagers in Ranchi and households in near-to-market villages consuming around 49% of the total (and 56% of the mean) quantities consumed in far-from-market villages. The lowest total (26.0kg) and average (2.0kg) quantities of wild vegetables consumed were in Hesadih: a situation that reflects the market-oriented nature of agriculture in this village and its inhabitants' preference for eating cultivated rather than wild vegetables. Echoing the overall collection figures, the highest consumption levels were found in Jariya (339.0kg total, 33.9kg mean), Sarsa (661.0kg total, 33.1kg mean) and Jahanabaj (615.0kg total, 30.8kg mean). As one would expect, the rather poorer and agriculturally less developed villages of Lota and Sindribera showed quite significant levels of wild vegetable consumption (29.3kg and 22.1kg per collector household respectively) reflecting their high level of dependence on these forest-based foods.

Wild vegetable collection in Orissa

Although pitalu and masia kanda tubers were collected in fairly large quantities by the Orissa sample households[3], wild vegetable gathering was far less significant than in Bihar (Table 5.27). Only seven villages and 40% of the sample households collected wild vegetables with most collectors coming from Keonjhar (six villages and 67% of collectors) rather than Angul (one village and 11% of collectors). In many ways, these data conformed to the expectation that more households in the tribal-dominated district of Keonjhar would be involved in the collection of wild tubers and vegetables than in the less tribal-dominated district of Angul.

The total quantities of wild vegetables collected in Orissa (238.0kg) were much smaller than in Bihar, although the difference between the two sample districts was much less pronounced than would be expected from the percentage of collectors data as a result of very high collection levels (118.0kg total and 8.4kg mean) in the village of Dangapal in Angul. Within Keonjhar, the villages gathering the largest amounts of wild vegetables were Samgiri (47.0kg), and Barapada (32.0kg) and those collecting the smallest amounts were Padang (5.0kg) and Akul (3.0kg).

Table 5.27

Wild vegetable collection and consumption in Orissa

	Orissa	Keonjhar	Angul	Near	Far
Collection					
HHs collecting (%)	40	67	11	45	34
No. of villages collecting	7	6	1	4	3
Total (kg)	238.0	120.0	118.0	183.0	54.0
Mean per collector HH (kg)	2.4	1.4	8.4	3.3	1.3
Consumption					
Total (kg)	119	68	51	65	54
Amount (%)	50	57	43	36	100
Mean per collector HH (kg)	1.5	1.0	3.6	1.9	1.3

Wild vegetable consumption in Orissa

The proportion of wild vegetables consumed by the Orissa sample households was quite low (50%) compared to their Bihari counterparts, although significant differences were found in the proportion consumed in near-to-market villages (65%) compared to far-from-market villages (100%): a situation that points to market proximity as a major influence on the sale of wild vegetables in near-to-market villages. The slightly higher percentage of wild vegetables

[3] Extractors in the Angul sample households collected an average of 16.0kg of masia kanda and 14.0kg of pitalu while sample households in Keonjhar collected 6.0kg of pitalu and no masia kanda.

consumed in Keonjhar (57%) compared to Angul (43%) reflect the greater proportion of tribal households in Keonjhar.

As one would expect, given the rather low collection figures, the amounts of wild vegetables actually consumed by the Orissan sample households were significantly lower (119.0kg total and 1.5kg mean) than for the Bihar sample households. Interestingly, however, the collector households in Dangapal village, Angul district (51.0kg), consumed almost as much as all of the households from the six collecting villages in Keonjhar (68.0kg): a situation that generated significantly higher mean consumption figures (3.6kg per collector household) in Dangapal and Angul more generally than in the Keonjhar sample villages (1.0kg per collector household). Again, the widespread nature of wild vegetable consumption in Keonjhar compared to Angul reflects the higher number of tribal households in Keonjhar.

5.4.1.4 Tamarind

Most households in the study area have tamarind trees on their homestead or farm land and there is a lot of domestic and market demand for tamarind fruits which are used as a source of food. Tamarind collection takes place primarily in February and March, although the pods may be left on the trees for later collection. Unfortunately, data on tamarind collection by the Orissa sample households is not available as tamarind trees are found primarily on homestead land in the study villages rather than in forests. Nevertheless, the data from the Bihar sample villages gives an indication of its importance for household subsistence and cash income.

The average journey time for tamarind collection in Bihar was quite short (0.4 hours) as a result of the widespread availability of tamarind trees on homestead land. Tamarind processing, meanwhile, was found to be a relatively time-consuming task involving over 24 hours of drying and ripening and around 1.3 hours of cleaning and bagging.

Tamarind collection in Bihar

Tamarind was collected in all of the Bihar sample villages by 43% of the sample households (Table 5.28). There were slightly more (47%) tamarind collectors in West Singhbhum than in Ranchi (39%) and significantly more in near-to-market villages than in far-from-market villages. The highest percentage of collectors was found in the villages of Tengariya, (85%), Katwa (80.95%), Karudih (80%) and Hulsi (75%) and the lowest percentages of collectors were in Hesadih (9.52%) and Sarsa (5%).

Somewhat surprisingly, given the relatively small number of collector households (13 and 7 respectively), by far the largest collections of tamarind were made in the far-from-market villages of Sindribera (1986.0kg) and Khanda (1430.0kg): a situation which accounts for the high average figures for West Singhbhum (4039.0kg) and far-from-market villages (4094.0kg).

The other villages all collected less than 290.0kg with the bottom end of the scale being made up of Baridih (16.0kg) and Jariya (13.5kg). These trends were reflected in the mean collection figures with 7 households in Khanda and 13 households in Sindribera collecting averages of 204.3kg and 152.8kg respectively. In addition, the one collector household in Sarsa gathered a total of 115.0kg; primarily for commercial purposes. At the other end of the spectrum, the 6 collector households in Baridih and the 5 collector households in Jariya collected just 2.7kg and 2.7kg respectively.

Table 5.28

Tamarind collection and consumption in Bihar

	Bihar	Ranchi	West Singhbhum	Near	Far
Collection					
HHs collecting (%)	43	39	47	52	34
No. of villages collecting	12	6	6	6	6
Total (kg)	4906.5	867.5	4039.0	812.5	4094.0
Mean per collector HH (kg)	46.7	18.5	69.6	12.9	97.5
Consumption					
Total (kg)	464.5	82.5	383	121.0	344.5
Amount (%)	9	9	9	15	8
Mean per collector HH (kg)	4.4	1.8	9.5	1.9	8.2

Tamarind consumption in Bihar

Quite a low proportion (9%) of the tamarind collected in the Bihar sample villages was consumed domestically and the proportion was slightly higher in the near-to-market villages (15%) than in the far-from-market villages (8%). This was largely a reflection of the relatively high proportion of domestic consumption in the near-to-market villages of Jariya (48%), Baridih (41%), Katwa (20%) and Karudih (18%) compared to the far-from-market villages of Hulsi (6%), Khanda (6%), Jahanabaj (10%), Sindribera (10%) and Lota (12%).

Variations in the quantities of tamarind consumed reflected the collection trends discussed above with consumption levels being higher in West Singhbhum (383.0kg) than in Ranchi (82.5kg) and in far-from-market villages (344.5kg) compared to near-to-market villages (121.0kg). Total and mean consumption levels were highest in Sindribera (195.0kg total and 15.0kg mean) and Khanda (86.0kg total and 12.3kg mean) although the one collector household in Sarsa self-consumed 15.0kg of tamarind in the 1997-8 season and sold the remaining 100.0kg. With the exception of Hesadih where all of the tamarind collected was sold, the lowest domestic consumption levels were found in Baridih and Jariya (6.5kg total for both and 1.1kg and 1.3kg mean respectively).

5.4.1.5 Mango

The mango is one of the most popular tree-borne fruits in India and is eaten both raw (often being made into a chutney) and when ripe. Mango trees are abundant in the study area as natural associates of sal and also as planted trees on homestead, farm and village wasteland. Their fruit is available primarily in June and July, although the raw fruits are often picked from as early as March. Unfortunately, no collection data on mango fruit is available for Orissa as most villagers collect this fruit from homestead rather than forest trees. As the Bihar data indicate, however, it can make a very important contribution to household food and income budgets.

The travelling and processing times associated with mango collection in Bihar were moderate (0.8 hours on average) as most trees are situated on homestead and farm land and most fruits were not processed but simply peeled and eaten. In recent years, however, a number of NGOs in Bihar have encouraged villagers to manufacture dried mango powder (amchoor) as this is very marketable throughout India.

Mango collection in Bihar

Perhaps surprisingly, given the national popularity of mango fruit, less than a third of households in the Bihar study villages actually collected it (Table 5.29). The proportion of collectors was significantly higher in Ranchi (58%) than in West Singhbhum (3%) and slightly higher in far-from (34%) compared to near-to-market villages (25%). Mango collection took place in a total of six villages, only one of which was in West Singhbhum district. All households in the far-from-market villages of Jahanabaj and Sarsa collected mangos while 90% collected in Baridih, 50% collected in Jariya, 20% collected in Hesadih and 10% collected in Hulsi.

The largest quantity of mango collection took place in Jahanabaj (1265.0kg), followed by Sarsa (858.0kg), Hesadih (179.0kg) and Baridih (158.0kg). Collection levels in Jariya (69.0kg) and Hulsi (30.0kg) were both quite small by comparison. The dominance of mango gathering in Jahanabaj and Sarsa raised the collection figures for Ranchi (2380.0kg) compared to West Singhbhum (179.0kg) and far-from-market villages (2153.0kg) compared to near-to-market villages (406.0kg). Interestingly, the mean collection figure for West Singhbhum (44.8kg per household) was higher than that for Ranchi (34.0kg), reflecting the fact that the four households in Hesadih that did collect mangos gathered a large amount each. The low mean collection per household in near-to-market villages (12.7kg) compared to far-from-market villages (51.3 kg per household) was a reflection on the large average collection figures in Jahanabaj (63.3kg) and Sarsa (42.9kg). The other three villages all collected less than 15.0kg per collector household.

Table 5.29

Mango collection and consumption in Bihar

	Bihar	Ranchi	West Singhbhum	Near	Far
Collection					
HHs collecting (%)	30	58	3	26	34
No. of villages collecting	6	5	1	3	3
Total (kg)	2559.0	2380.0	179.0	406.0	2153.0
Mean per collector HH (kg)	34.6	34.0	448.0	12.7	51.3
Consumption					
Total (kg)	2226.5	2192.5	34.0	89.5	213.0
Amount (%)	89	92	19	24	99
Mean per collector HH (kg)	30.1	31.3	8.5	3.1	50.7

Mango consumption in Bihar

Overall, 89% of the mangos collected in Bihar were consumed domestically, although the proportion of domestic consumption was much greater in Ranchi (92%) than in West Singhbhum (19%) suggesting that the four collecting households in Hesadih gathered mangos primarily for commercial purposes. The percentage of self-consumption was significantly greater in far-from-market villages (99%) compared to near-to-market villages (24%): a situation that reflects the fact that villagers in Jahanabaj and Sarsa consumed all of the mangos that they collected whereas households in the near-to-market villages of Hesadih, Baridih and Jariya sold a significant proportion of their collection (81%, 74% and 65%).

These trends were reflected in the figures for the quantities of mangos consumed with over 98% (2192.5kg) of all the total mango consumption taking place in Ranchi district and over 95% (2128.0kg) being consumed in far-from-market villages. As mentioned earlier, the villagers in Jahanabaj and Sarsa consumed their entire collection of mangos which worked out at a mean consumption of 63.3kg and 42.9kg per collector household respectively. The next largest consumer village was Baridih (40.5kg total, 2.3kg mean), followed by Hesadih (34.0kg total, 8.5kg mean), Jariya (24.0kg total, 2.4kg mean) and Hulsi (5.0kg total, 2.5kg mean). Clearly, then, the all Bihar, Ranchi and far-from-market average figures were inflated by the particularly high total and mean mango consumption in Jahanabaj and Sarsa.

5.4.1.6 Ber

Ber is another tree-borne fruit that is widely collected and traded in the Bihar study villages but for which collection data is not available for Orissa as ber is not classed as an NTFP in Orissa. Ber fruit is harvested in January-February and then dried to enable it to be sold throughout the year. Due to the proximity of most ber trees to villagers' homes, the amount of travelling associated with ber fruit collection was low (0.5 hours per trip in Bihar).

Ber collection in Bihar

Ber fruit was collected by 48% of the collector households in Bihar (Table 5.30) although the percentage of collectors was significantly higher in Ranchi than in West Singhbhum as collection took place in all of the Ranchi sample villages compared to only 4 in West Singhbhum. Over 95% of the sample households in Tengariya, Hulsi, Jahanabaj and Sarsa were engaged in ber collection compared to less than 15% in Baridih and Jariya. In terms of quantities collected, however, the West Singhbhum total (922.0kg) exceeded that of Ranchi (779.0kg) reflecting the high levels of collection in the West Singhbhum villages of Karudih (360.0kg) and Katwa (298.0kg). Two of the four Ranchi villages (Baridih and Jariya), by contrast, had very low levels of collection (5.0kg and 3.0kg respectively): a situation that helped to reduce the overall collection figure for near-to-market villages (810.0kg) compared to far-from-market villages (941.0kg). Mean quantities collected per collector household were particularly high in the villages of Katwa (33.1kg), Sindribera (28.3kg), Karudih (27.7kg) and Khanda (20.6kg).

Table 5.30

Ber collection and consumption in Bihar

	Bihar	Ranchi	West Singhbhum	Near	Far
Collection					
HHs collecting (%)	48	68	28	38	58
No. of villages collecting	10	6	4	5	5
Total (kg)	1751.0	779.0	922.0	810.0	941.0
Mean per collector HH (kg)	15.0	9.5	26.3	17.6	13.3
Consumption					
Total (kg)	557.3	557.3	0	70.5	486.8
Amount (%)	32	72	0	9	52
Mean per collector HH (kg)	4.8	6.8	0	1.5	6.9

Ber consumption in Bihar

Quite a low proportion (32%) of the ber fruit collected was consumed domestically, with the entire harvest in West Singhbhum being sold at market. In Ranchi, a greater proportion as well as quantity of ber was consumed domestically in far-from-market villages (52% and 486.8 kg) compared to near-to-market villages (9% and 70.5kg) with the villagers of Jahanabaj (156.0kg) and Sarsa (239.0kg) self-consuming their entire harvest. The villagers of Tengariya and Hulsi all sold over half of their ber harvest and self-consumed 65.5kg and 91.8kg respectively. In the Bero area, fresh ber fruit was mostly sold in the hats rather than in the villages as people with access to ber trees preferred to collect their own fruit rather than buying it. In this regard, therefore, near-to-market villagers had more opportunity to sell ber

than far-from-market villagers. In addition, the small amounts of ber collected per collector trip in far-from-market villages did not provide enough of an incentive to travel long distances to the market to sell the fruit.

5.4.1.7 Mahua flowers

The flowers of *Madhuca indica* are mainly used for the distillation of country liquor, but in lean months they are also used as a staple food both for humans and cattle. Mahua trees occur abundantly throughout the study area, although large mahua trees have become rare because of illegal timber felling. In addition, the amount of flowers extracted varies significantly from year to year as a result of climatic conditions which affect flower formation. Because mahua trees are found on farmland as well as in forests, the amount of time villagers spent travelling to collect mahua flowers was less than for many other large tree-borne NTFPs. The overall average for Bihar was 0.8 hours per trip compared to 1.3 hours in Orissa, although villagers often covered a wide area to collect mahua flowers from all available trees. Villagers in Angul, for example, covered an average of 5.1 square kilometers and villagers in Keonjhar covered an average of 4.8 km^2. Within Bihar, travel times were shorter in Ranchi (0.6 hours) than in West Singhbhum (1 hour): a situation that reflects the smaller geographical size of the villages and the proximity of common or 'gairmazarua' land (on which many mahua trees are located), to villagers' homes in Ranchi district. During the collection season (March-April) there is a period of 30-40 days when all household members participate in the collection of mahua flowers. Most flowers are gathered from trees on homestead, farm and gairmazarua land as they are easier to collect from scattered trees than from trees growing in forest areas with a dense canopy and ground foliage. The processing of mahua flowers is quite time-consuming (over 41 hours on average), with drying and cleaning being the major component of this.

Mahua flower collection in Bihar:

As can be seen from Table 5.31, mahua flower collection was undertaken in all of the Bihar sample villages by 75% of the sample households, although the proportion of collecting households was greater in West Singhbhum district (85%) and in far-from-market villages (89%) than was the case in Ranchi District (65%) and near-to-market villages (64%). The proportion of collector households was particularly low in Baridih (5%) although the average figures for Ranchi and near-to-market villages were reduced by the relatively low percentage of collecting households in Jariya (35%) and Tengariya (65%). In the six sample villages of Jahanabaj, Sarsa, Karudih, Katwa, Khanda and Sindribera, mahua flower collection was carried out by all sample households.

In terms of the quantity of Mahua flowers collected, similar variations were found between the two sample districts and the near-to- and far-from-market villages. Out of a total collection of 10379.0 kg in the 1997-8 season, the quantity of flowers gathered in Ranchi District (1985.0kg) was less than a quarter of the quantity collected in West Singhbhum (8385.0kg).

The largest collections were made in the far-from-market villages of Khanda (2676.0kg) and Sindribera (2811.0kg) in West Singhbhum whereas the smallest collections were made in the near-to-market villages of Baridih (4.0kg) and Jariya (130.0kg) in Ranchi. This trend was also reflected in the data on average collection levels per collector household which were both higher in West Singhbhum and in far-from-market villages. The highest average collection figures per sample household were found in Khanda (133.8kg) and Sindribera (133.9kg), although the near-market village of Hesadih also displayed a high average level of collection (111.8kg). In all other villages, the average collection levels were less than 35.0kg per collector household, with the lowest average level of collection being found in Baridih (4.0kg) because there are very few mahua trees in this village.

Table 5.31

Mahua flower collection and consumption in Bihar

	Bihar	Ranchi	West Singhbhum	Near	Far
Collection					
HHs collecting (%)	75	65	86	64	89
No. of villages collecting	12	6	6	6	6
Total (kg)	10370.0	1985.0	8385.0	3003.0	7367.0
Mean per collector HH (kg)	56.4	25.5	79.1	38.5	68.2
Consumption					
Total (kg)	1152.0	611.5	541.0	230.0	922.0
Amount (%)	11	31	6	8	13
Mean per collector HH (kg)	6.26	7.8	5.1	3.0	8.5

Mahua flower consumption in Bihar

The high commercial value of mahua flowers was reflected in the relatively low percentage of flowers consumed domestically by the Bihar sample households (11%). Consumption percentages, total and mean quantities collected were all higher in Ranchi than in West Singhbhum and near-to-market villages consumed only 8% of the flowers collected compared to 13% in far-from-market villages: a situation that reflects the increase in mahua sales in recent years. This trend was replicated in terms of the quantities of mahua flowers consumed with near-to-market villages self-consuming less than a quarter of the total amount (and just over a third of the average quantity per household) consumed in far-from market villages. The only village displaying particularly high levels of mahua flower consumption was Sarsa where 96% of the 530.0kg of mahua flowers collected in 1997-8 were consumed, giving a mean consumption figure per collector household of 26.5kg. The main reason for this relates to the high level of liquor brewing and drinking in this village.

Mahua flower collection in Orissa

As can be seen from Table 32, mahua flower collection is undertaken in all of the Orissa sample villages by a higher proportion (93%) of sample households than in Bihar. Collection was particularly widespread in Keonjhar where 98% of households (compared to 89% in Angul) collected this NTFP. The quantity of mahua flowers collected in Orissa (17156.0kg total, 74.3kg mean) was also greater than in Bihar, although much of the difference resulted from the particularly large amounts collected in Keonjhar (11709.0kg total, 96.0kg mean). The villages with the highest levels of collection in 1997-8 were Padang (3074.0kg), Akul (2917.0kg), and Adakata (2523.0kg): a situation that reflects the commercial orientation of mahua flower collection in these villages. In addition, these variations reflect the higher percentage of tribal households (who have a tendency to self-consume greater quantities of mahua liquor) in these villages coupled with differential mahua flower production (resulting from seasonal and microclimatic effects) throughout the region. The rather low collection levels in Samagiri (509.0kg) and Kutasingha (554.0kg) reflect the relatively small farm size and fewer farm trees in these villages.

Table 5.32

Mahua flower collection and consumption in Orissa

	Orissa	Keonjhar	Angul	Near	Far
Collection					
HHs collecting (%)	93	98	89	88	98
No. of villages collecting	12	6	6	6	6
Total (kg)	17156.0	11709.0	5447.0	7883.0	9273.0
Mean per collector HH (kg)	74.3	96.0	50.0	71.7	76.6
Consumption					
Total (kg)	475.0	292.0	183.0	207.0	268.0
Amount (%)	3	2	3	3	3
Mean per collector HH (kg)	4.0	6.2	2.6	3.8	4.2

Mahua flower consumption in Orissa

The proportion of mahua flowers consumed domestically by sample households in Orissa was very small (3%) and reflects the fact that villagers from all socio-economic and ethnic categories collected mahua flowers primarily for sale. The variation in consumption patterns between Keonjhar (292.0kg total, 6.2kg mean) and Angul (183.0kg total, 2.6kg mean) was primarily a reflection of the higher levels of mahua flower collection by tribal households in Keonjhar.

5.4.1.8 Rice-beer herbs

Popularly known as 'ranu', these are a collection of different forest-based herbs that are used in the fermentation of rice beer (locally known as hadia). Although rice-beer herbs were not actually collected by any of the Orissa sample villagers, they were collected in significant quantities by some of the Bihar sample households. Indeed, although rice beer brewing was traditionally a domestic affair in most tribal villages, a number of households in close-to-market villages have started, in recent years, to make rice beer pellets for sale as well as for domestic use: a shift that has proved to be very profitable for those villagers involved. The average collection time for ranu in Bihar as a whole was 1.2 hours, although trips were generally slightly shorter in Ranchi than in West Singhbhum. Villagers stated that ranu processing was quite a prolonged and labour-intensive process with drying taking an average of 50.2 hours and the processing of ranu herbs into tablet form taking a further five or so hours.

Rice beer herb collection in Bihar

Ranu was collected by some 15% of the Bihar sample households with collection levels being significantly higher in West Singhbhum district than in Ranchi and slightly higher in near-to-market villages than in far-from-market villages (Table 5.33). Out of the five villages in which ranu collection took place (Baridih, Jahanabaj, Katwa, Hesadih and Lota), the percentages of households participating in collection were highest in Lota (71%) and Hesadih (62%).

With respect to the quantity of ranu collected in the Bihar sample villages, district-level and near-far variations were even more pronounced. Out of the total collection of 346.5kg, over 78% was gathered in West Singhbhum district and over 86% was collected in near-to-market villages: the latter trend reflecting the fact that ranu sales have increased significantly in the last decade. Total collection levels were much higher in Katwa village (233.0kg) than the other four collecting villages where the total quantities collected were all less than 53.0kg. Interestingly, however, the high mean collection figures in Katwa (77.7kg), Jahanabaj (22.0kg) and Baridih (13.5kg) revealed that ranu gathering in these villages was concentrated within just a few households. In Hesadih and Lota, meanwhile, mean collection figures were lower (1.0kg and 1.7kg) but more households participated in ranu collection.

Table 5.33

Rice beer herb collection and consumption in Bihar

	Bihar	Ranchi	West Singhbhum	Near	Far
Collection					
HHs collecting (%)	15	4	25	16	13
No. of villages collecting	5	2	3	3	2
Total (kg)	346.5	75.0	271.5	299.0	47.0
Mean per collector HH (kg)	9.6	15.0	8.8	15.0	3.0
Consumption					
Total (kg)	83.0	32.5	50.5	50.5	32.5
Amount (%)	24	43	19	17	69
Mean per collector HH (kg)	2.3	6.5	1.6	2.5	2.0

Rice beer herb consumption in Bihar

The recent increase in ranu sales confirmed the general feeling in the sample area that there has been a significant recent increase in the sale of rice beer herbs. Consumption data showed that only 24% of the ranu collected was consumed domestically. Significantly greater quantities were self-consumed in Ranchi than in West Singhbhum and in far-from-market villages compared to close-to-market villages: a situation that reflects the large amounts of ranu (221.0kg) sold by villagers in Katwa. The percentage of domestic consumption was lowest (5%) in the near-market village of Karudih and highest in Hesadih and Lota where all of the ranu collected was consumed domestically. Hulsi and Baridih both consumed less than half (34% and 47%) of the ranu they collected.

In terms of the actual amounts of ranu consumed, there were some important variations from the trends suggested by the percentage figures. Although the Ranchi figure was significantly lower (32.5kg) than the West Singhbhum figure (50.5kg), the amount consumed domestically was rather higher in near-to-market villages than far-from-market villages. This was mainly because the near-to-market villages of Baridih, Katwa and Hesadih self-consumed a total of 25.0kg, 12.0kg and 13.5kg of ranu respectively and both of the far-from-market villages (Jahanabaj and Lota) self-consumed most of the ranu they collected. Assumptions about the concentrated nature of ranu collection were borne out by data on the mean amounts of ranu consumed, with the five collector households in Baridih and Jahanabaj consuming an average of 6.3kg and 7.5kg of ranu each and the three collector households in Katwa consuming 4.0kg each. The thirteen collector households in Hesadih and the fifteen in Lota, by contrast, consumed a mean of only 1.0kg and 1.7kg of ranu each.

The main reasons for these inter-village variations in the incidence of ranu collection and rice beer brewing for sale relate to the overall economic situation of the village, its proximity to

markets where rice beer is consumed in large quantities, the wider cultural environment of the village (in some villages, opposition to drinking is quite strong) and the number of households which remain unemployed for a large part of the year.

5.4.2 Household NTFPs

Seven NTFPs in the study area were collected primarily for household use (sal twigs, sal leaves, siali leaves, siali fibre, khajur leaves, jhadu grass and sabai grass). Two (sal twigs and sal leaves) of these were collected by almost all sample households in both states. The other five were all more important in Orissa than Bihar. Khajur leaves were collected in 11 of the Orissa sample villages (compared to 1 in Bihar), siali leaves in 4 Orissan villages (compared to 2 in Bihar), siali fibre in 5 Orissan villages (compared to 1 in Bihar), jhadu grass in 4 Orissan villages (compared to 1 in Bihar) and sabai grass in 3 Orissan villages (but none in Bihar). The following household-based NTFPs were the most important in the 1997-8 collection season.

5.4.2.1 Sal twigs

Sal twigs are widely used throughout the study area as 'chew sticks' for cleaning and brushing teeth. Although sal bushes are available close to areas of settlement, most villagers prefer to bring fresh leaves and twigs from local forests. On average, one family member from each household makes weekly trips throughout the year to collect sal twigs which are locally known as 'dantun'. Indeed, the sale of these sal twigs is an important source of income for the poorest households in the study area. In 1997-8, the average journey time for the collection of sal twigs in Bihar was 0.7 hours (1 hour in West Singhbhum and 0.4 hours in Ranchi) and 1.95 hours in Orissa. In Orissa, villagers (mostly women) typically spent 48-50 person days per year collecting sal twigs which were usually gathered along with sal leaves while on the way back home from the fields or from cattle grazing. Drying and processing times were fairly minimal, taking around 1.7 hours and involving defoliating, cleaning and cutting the twigs into handy-sized pieces.

Sal twig collection in Bihar

Sal twigs were collected by all households in all of the Bihar sample villages (Table 5.34). The total amount collected for Bihar as a whole was 8864.0kg, with just over 64% of these being collected in Ranchi district and 56% being collected in far-from-market villages. The largest collection was made in the village of Baridih (1333.8kg) and the smallest in the village of Katwa (194.9kg). The rest varied between collections of 988.6kg (Tengariya) and 204.6kg (Karudih). As all sample households were involved in sal twig collection, mean collection patterns varied in line with these trends with an average of 36.3kg being collected for Bihar as a whole, 47.4kg for Ranchi and 25.6kg for West Singhbhum.

Table 5.34

Sal twig collection and consumption in Bihar

	Bihar	Ranchi	West Singhbhum	Near	Far
Collection					
HHs collecting (%)	100	100	100	100	100
No. of villages collecting	12	6	6	6	6
Total (kg)	8864.0	5685.8	3178.2	3833.3	5030.7
Mean per collector HH (kg)	36.3	47.4	25.6	31.4	41.2
Consumption					
Total (kg)	7384.4	4852.7	2531.7	3077.5	4306.9
Amount (%)	83	85	77	80	86
Mean per collector HH (kg)	30.3	40.4	20.4	25.2	35.3

Sal twig consumption in Bihar

A large proportion (83%) of the sal twigs collected in Bihar were consumed domestically, although self-consumption was slightly higher in Ranchi (85%) than in West Singhbhum (77%) and in far-from-market (80%) compared to near-to-market villages (86%). These variations were explained by the fact that three villages in Ranchi district (Jariya, Jahanabaj, Sarsa) consumed all of the sal twigs that they collected compared to only one village (Katwa) in West Singhbhum. The villages with the lowest proportions of domestic consumption were Hesadih (61%), Lota (66%), Baridih (67%) and Hulsi (70%). This was because some households in these villages were dependent on the sale of sal twigs as a source of income.

The data on the quantities of sal twigs consumed in the different villages indicated higher levels of domestic consumption in Ranchi (4852.7kg) compared to West Singhbhum (2531.7kg) and in far-from-market villages (4306.9kg) compared to near-to-market villages (3077.5kg). These variations were due, in large part, to the high levels of domestic consumption in the Ranchi villages of Jahanabaj (912.6kg total, 45.6kg mean), Tengariya (890.7kg total, 44.5kg mean), Baridih (887.4kg total, 44.4kg mean) and Sarsa (877. 6kg total, 43.9kg mean). The lowest levels of domestic consumption, by contrast, were in the West Singhbhum near-to-market villages of Karudih (186.1kg total, 9.3kg mean) and Katwa (194.9kg total, 9.3kg mean).

Sal twig collection in Orissa.

As is the case in Bihar, the gathering of sal twigs in Orissa is very important for local subsistence although slightly smaller total and mean quantities of this NTFP were collected by the Orissa sample households compared to the Bihar sample households (Table 5.35). In the 1997-8 collection season, almost all (99%) of the sample households were involved in

collecting sal twigs with villagers in Angul collecting slightly greater quantities (4038.0 kg total, 33.4kg mean) than villagers in Keonjhar (3346.0kg total, 26.8kg mean). The largest collections of sal twigs were made in the villages of Handapa (1170.0kg) and Hinjirida (1133.0kg), while the smallest collections were made in Kutasingha (45.0kg) and Dangapal (86.0kg).

Table 5.35

Sal twig collection and consumption in Orissa

	Orissa	Keonjhar	Angul	Near	Far
Collection					
HHs collecting (%)	99	100	98	98	100
No. of villages collecting	12	6	6	6	6
Total (kg)	7383.0	3346.0	4038.0	3724.0	3659.0
Mean per collector HH (kg)	30.0	26.8	33.4	30.3	29.7
Consumption					
Total (kg)	7114.0	3203.0	3911.0	3520.0	3594.0
Amount (%)	96	96	97	95	98
Mean per collector HH (kg)	29.2	25.6	32.9	28.6	29.7

Sal twig consumption in Orissa

Although sal twig sales were quite an important source of income for some of the Bihar sample households, the vast majority (96%) of the sal twigs collected by the Orissa sample households were used domestically. Nevertheless, the total and mean quantities consumed in the two states were quite similar for the 1997-8 collection season. As would be expected from the collection figures, villagers in Angul consumed slightly more sal twigs (3911.0kg total, 32.9kg mean) than villagers in Keonjhar (3203.0kg total, 25.6kg mean). There were no significant variations between near-to and far-from-market villages.

5.4.2.2 Sal leaves

Sal leaves are used for domestic consumption and increasingly (amongst the poorest families) for the manufacture of sal leaf plates for sale in urban markets. While legal cases have been filed in court to protect the rights of tribals to gather and sell sal leaves, a number of foresters consider that their continued commercial exploitation will result in long term adverse effects on sal forests. Sal leaves are collected throughout the year at weekly or sometimes at monthly intervals and generally speaking, it is women and children who undertake the lion's share of sal leaf collection. In the 1997-8, the average travelling time for sal leaf collection in Bihar was around 0.7 hours (1 hour in West Singhbhum and 0.4 hours in

Ranchi) and villagers in Orissa spent an average of 45-50 person days per year collecting sal leaves.

Sal leaf collection in Bihar

Almost all households in all of the twelve Bihar sample villages collected sal leaves (Table 5.36); the only exception being Jariya village where 95% of households collected this NTFP. The highest quantities of sal leaves were collected in the West Singhbhum near-to-market villages of Hesadih (168.5kg total, 8.0kg mean), Katwa (135.7kg total, 6.5kg mean) and Karudih (130.8kg total, 6.5kg mean): a situation that inflated the total collection figures for West Singhbhum (630.5kg total, 5.1kg mean) compared to Ranchi (433.9kg total, 3.7kg mean) and near-to-market villages (665.0kg total, 5.5kg mean) relative to far-from-market villages (399.4kg total, 3.3kg mean). The villages with the lowest levels of collection were Jariya (41.2kg total 2.2kg mean), Sarsa (44.2kg total, 2.2kg mean), Sindribera (52.3kg total, 2.5kg mean) and Khanda (52.6kg total, 2.6kg mean).

Table 5.36

Sal leaf collection and consumption in Bihar

	Bihar	Ranchi	West Singhbhum	Near	Far
Collection					
HHs collecting (%)	100	99	100	99.	100
No. of villages collecting	12	6	6	6	6
Total (kg)	1064.4	433.9	630.5	665	399.4
Mean per collector HH (kg)	4.38	3.65	5.1	5.5	3.3
Consumption					
Total (kg)	915.9	305.9	610.1	584.2	331.8
Amount (%)	86	71	97	88	83
Mean per collector HH (kg)	3.8	2.6	4.9	4.8	2.7

Sal leaf consumption in Bihar

Consumption levels for sal leaves in the Bihar sample villages were quite high (86%), although a greater proportion of leaves were consumed domestically in West Singhbhum (97%) than in Ranchi (71%) and in near-to-market villages (88%) compared to far-from-market villages (83%). The Ranchi - West Singhbhum variations were explained by the higher proportion of sal leaf sales in the Ranchi villages of Hulsi, Tengariya and Baridih which self-consumed only 45%, 52% and 74% of the sal leaves that they collected. The particularly low level of domestic consumption in Hulsi accounted for the slightly lower average percentage of consumption in the 'far-from-market' category, although this was compensated to some extent by the fact that four far-from-market villages (Jahanabaj, Sarsa, Khanda and Sindribera) and only one near-to-market village (Jariya) consumed all the sal leaves that they collected.

The actual quantities of sal leaves consumed reflected these broader trends with villagers in Ranchi (305.9kg) consuming around a third of the leaves consumed by villagers in West Singhbhum (610.1kg) and villagers in far-from-market villages (331.8kg) consuming just over 36% of the quantity of leaves consumed in near-to-market villages (584.2kg). As was the case for sal leaf collection, the largest consumers were the West Singhbhum near-to-market villages of Hesadih (164.9kg total, 7.9kg mean), Katwa (135.2kg total, 6.4kg mean) and Karudih (125.6kg total, 6.3kg mean) while the smallest consumers were Sarsa (44.2kg total, 2.2kg mean) and Jariya (41.2kg total, 2.2kg mean).

Sal leaf collection in Orissa

Sal leaf collection is an extremely important activity in Orissa and the quantity of sal leaves collected by the Orissa sample households was significantly greater than was the case in Bihar. In 1997-8, almost all households in all of the Orissa sample villages collected sal leaves (Table 5.37) with collection levels being significantly higher in Keonjhar (12037.0kg total, 96.3kg mean) than in Angul (5618.0kg total, 46.1kg mean). There were also significant variations between near-to-market villages (10916.0kg total, 99.0kg mean) compared to far-from-market villages (6739.0kg total, 54.8kg mean). Both sets of variations were explained by the very high levels of collection in the villages of Chakradharpur (3869.0kg), Samagiri (3711.0kg), Barapada (1619.0kg) and Padang (1618.0kg) in Keonjhar district which were due to the fact that many households in these villages undertook sal leaf plate making and collected large quantities of leaves for sale purposes. The highest level of collection in Angul, by contrast, took place in Handapa (1546.0kg) while the villages of Kutasingha and Dangapal collected only 596.0kg and 443.0kg respectively.

Table 5.37

Sal leaf collection and consumption in Orissa

	Orissa	Keonjhar	Angul	Near	Far
Collection					
HHs collecting (%)	100	100	99	99	100
No. of villages collecting	12	6	6	6	6
Total (kg)	17655.0	12037.0	5618.0	10916.0	6739.0
Mean per collector HH (kg)	71.5	96.3	46.1	88.0	54.8
Consumption					
Total (kg)	8237.0	3032.0	5206.0	4138.0	4104.0
Amount (%)	47	25	93	38	61
Mean per collector HH (kg)	36.6	24.3	43.4	33.3	33.9

Sal leaf consumption in Orissa

Although the percentage of sal leaves consumed domestically by the Orissa sample households was significantly less (47%) than in Bihar, the actual quantities consumed were significantly greater. Within Orissa, some important variations were apparent between the sample districts. The overall consumption figures for Angul district and far-from-market villages, for example, were significantly greater (93% and 61% respectively) than for Keonjhar and near-to-market villages (25% and 38% respectively). These differences were due mainly to the high levels of domestic consumption in Angul compared to Keonjhar where the sale of sal leaves for sal leaf plate making is very important. The main villages in which this takes place are Chakradharpur, Samagiri, Padang, and Barapada.

5.4.2.3 Siali fibre

Of all the different fibres extracted from forests, siali is the strongest and ropes made out of it can withstand extreme climatic conditions. Siali fibre is sought after for use in thatching, binding bidi leaves, making fences and roofing and is collected mainly between February and April. The fibre is extracted mainly from Reserved Forest in Orissa as these tend to be found in the moister and cooler regions where climber growth is better. The extraction of siali fibre is both labour intensive and time consuming and is taken up mainly by very poor farmers and landless forest dwellers. In Bihar, the average travel time taken for siali fibre collection was 1.2 hours (1.3 hours in Ranchi and 1 hour in West Singhbhum) whereas in Orissa, collectors travelled for an average of 5.3 hours per day and spent 3 or more hours extracting the fibres from siali climbers. During their gathering activities, collectors often covered 6-7 square kilometres to collect these widely dispersed vines.

Siali fibre collection and consumption in Bihar

In Bihar, siali fibre collection was undertaken by only 5 sample households in the village of Hulsi. The total amount collected was 260.0kg (an average of 52.0kg per collector household) and of this, 135.0kg (27.0kg per collector household) was consumed domestically for tying wooden poles, lac stick bundles, grain baskets and cot making (Table 5.38).

Table 5.38

Siali fibre collection and consumption in Bihar

	Bihar	Ranchi	West Singhbhum	Near	Far
Collection					
HHs collecting (%)	2	4	0	0	4
No. of villages collecting	1	1	0	0	1
Total (kg)	260.0	260.0	0	0	260.0
Mean per collector HH (kg)	52.0	52.0	0	0	52.0
Consumption					
Total (kg)	135.0	135.0	0	0	135.0
Amount (%)	52	52	0	0	52
Mean per collector HH (kg)	27.0	27.0	0	0	27.0

Siali fibre collection in Orissa

As can be seen from Table 5.39, siali fibre collection in 1997-8 was a far more widespread activity in the Orissa sample districts than in Bihar, and was carried out by a higher proportion of households in Keonjhar (33%) than in Angul (17%): a situation that reflects the greater willingness of tribal households in Keonjhar to undertake the arduous collection process and tolerate the meagre return that it brings. The quantities of siali fibre collected in Orissa were much greater than in Bihar, and, contrary to what the district level data on the proportion of households gathering this NTFP suggest, villagers in Angul collected significantly greater quantities (2211.0kg total, 53.9kg mean) than villagers in Keonjhar (116.0kg total, 5.5kg mean). This coincided with the higher levels of kendu leaf extraction in Angul, reflecting the fact that large quantities of siali fibre are sold to the Forest Department for fastening kendu leaf bundles before auction. The villages with the highest collection levels were Kutasingha (1483.0kg) and Dangapal (458.0kg) in Angul whereas the two collecting villages in Keonjhar (Chakradharpur: 61.0kg; Adakata: 55.0kg) gathered significantly smaller quantities. One of the main reasons for the district-level differences in collection is that the terrain and forest proximity in Angul encourages villagers to collect more siali fibre. In addition, the market demand for siali fibre is greater in Angul than in Keonjhar because large quantities are sold to the Forest Department which uses it to tie kendu leaf bundles before auction.

Table 5.39

Siali fibre collection and consumption in Orissa

	Orissa	Keonjhar	Angul	Near	Far
Collection					
HHs collecting (%)	25	33	17	24	26
No. of villages collecting	5	2	3	3	2
Total (kg)	2327.0	116.0	2211.0	789.0	1537.0
Mean per collector HH (kg)	37.5	5.5	53.9	26.3	48.0
Consumption					
Total (kg)	460.0	98.0	362.0	131.0	329.0
Amount	20	84	16	17	21
Mean per collector HH (kg)	9.4	2.7	27.8	4.5	16.5

Siali fibre consumption in Orissa

In total, 20% if the siali fibre collected was used domestically, although villagers in Keonjhar self-consumed a much greater proportion of this NTFP (84%) than villagers in Angul (16%) who sold most of the siali fibre that they gathered. Reflecting the higher levels of siali fibre collection in Angul, the actual quantities used domestically were greater there (362.0kg total) than in Keonjhar (98.0kg total), although the mean collection figures indicated that self-consumption in Angul (27.8kg per collector household) was restricted to a much smaller number of households than in Keonjhar (2.7kg per collector household). The higher total and mean consumption figures in the far-from-market villages (329.0kg total, 16.5kg mean) compared to near-to-market villages (121.0kg total, 4.5kg mean) result from both the greater siali fibre sales made from near-to-market villages and the greater use of thatched roofs (secured with siali fibre) on houses in interior villages.

5.4.2.4 Khajur leaves

Khajur leaves are used primarily for thatching roofs, making fences and weaving mats. In Orissa, they are collected primarily in winter to enable villagers to repair their thatched roofs before the rains start. In Bihar, by contrast, collection is more regular as the leaves are mainly woven into sleeping mats: an activity that is usually undertaken by women. In 1997-8, travelling times for the collection of khajur leaves were quite long (3 hours on average in Bihar and 2.35 hours in Orissa) as a result of the scarcity of khajur bushes. Processing also proved to be quite a time consuming process, with the leaves requiring around 48 hours of drying and a further 10 hours of sorting, cutting and bundling.

Khajur leaf collection and consumption in Bihar

Khajur leaves were collected by only 4 households in the village of Hesadih. Their total collection amounted to 151kg (an average of 37.8kg/household) and of this the sample households consumed 149.0kg (37.3kg/household) domestically (Table 5.40). The leaves were used (or sold) primarily for mat making.

Table 5.40

Khajur leaf collection and consumption in Bihar

	Bihar	Ranchi	West Singhbhum	Near	Far
Collection					
HHs collecting (%)	2	0	3	3.	0
No. of villages collecting	1	0	1	1	0
Total (kg)	151.0	0	151.0	151.0	0
Mean per collector HH (kg)	37.8	0	37.8	37.8	0
Consumption					
Total (kg)	149.0	0	149.0	149.0	0
Amount (%)	99	0	99	99	0
Mean per collector HH (kg)	37.3	0	37.3	37.3	0

Khajur leaf collection in Orissa

In contrast to the situation in Bihar, khajur leaf collection was undertaken in eleven villages and by 58% of the Orissa sample households (Table 5.41). The proportion of collectors was greater in Angul (76%) than in Keonjhar (39%) although there was no difference between near-to and far-from market villages. These patterns were reflected in the data on the actual quantities collected with sample villages in Angul collecting a total of 14776.0kg (157.2kg mean per collector household) and villagers in Keonjhar collecting only 449.0kg (91.6kg mean per collector household). In part, this reflects the fact that in some of the Angul sample villages (Handapa, Hinjirida and Kutasingha), khajur is used extensively as a thatching material. During the 1997-8 collecting season, the largest amounts of khajur leaves were gathered in the villages of Handapa (7785.0kg), Kutasingha (4139.0kg) and Hinjirida (2647.0kg). Collection levels in the Keonjhar sample villages, by contrast, were all less than 185.0kg.

Table 5.41

Khajur leaf collection and consumption in Orissa

	Orissa	Keonjhar	Angul	Near	Far
Collection					
HHs collecting (%)	58	39	76	58	58
No. of villages collecting	11	5	6	5	6
Total (kg)	15225.0	449.0	14776.0	7958.0	7266.0
Mean per collector HH (kg)	106.5	91.6	157.2	110.5	102.3
Consumption					
Total (kg)	6779.0	283.0	6497.0	1488.0	5291.0
Amount (%)	45	63	44	17	73
Mean per collector HH (kg)	53.0	6.4	77.3	22.9	84.0

Khajur leaf consumption in Orissa

Quite a large proportion (45%) of the khajur leaves that were collected were consumed domestically by the Orissa sample households with villagers in Keonjhar consuming a slightly higher proportion (63%) than villagers in Angul (44%) and near-to-market villagers consuming significantly less (17%) than far-from-market villagers (73%). Reflecting the overall collection figures and the use of khajur as a thatching material in some of the Angul sample villages, the actual quantities of khajur leaf that were used domestically were much greater in Angul (6497.0kg total, 77.3kg mean per collector household) than in Keonjhar (283.0kg total, 6.4kg mean per collector household).

5.4.2.5 Sabai grass

Sabai grass has a number of uses and after being dried, it is usually woven into ropes which are then used to prepare mats and other items of furniture. It is not a major NTFP in Bihar (and was not collected by any of the Bihar sample households), although in Orissa sabai grass collection is quite a widespread activity. It is usually collected from forests, river banks and open fallow land, although in Mayurbhanj it has been cultivated on dry farmland as an annual crop for sale to the paper mills. In the sample villages, sabai grass collection is usually carried out by men who also undertake the task of sabai rope and mat making in their spare time. In Harichandanpur and Janghira markets, sabai is sold almost every week with the amount going up in winter when the traditional markets for sabai grass are held. In Telkoi region (Akul market), by contrast, the amount of sabai sold is very small and villagers buy it for mainly for their own use.

Sabai grass collection in Orissa

The collection of sabai grass took place in three of the Orissa sample villages and was undertaken by 14% of the sample households (Table 5.42). Although there was no great difference in the proportion of Angul households undertaking sabai grass collection (12%) compared to Keonjhar households (16%), the proportion of collectors was significantly higher in near-to-market villages (22%) compared to far-from-market villages (7%): a situation that reflects the greater number of collectors in the near-to-market villages of Chakradharpur and Dangapal. The total amount of sabai grass collected was quite small (80.0kg) and the villagers from Dangapal (32.0kg) and Kutasingha (41.3kg) in Angul gathered far more than their counterparts in Chakradharpur village in Keonjhar (7.0kg): a situation that reflects the reduced availability of sabai grass in Keonjhar as a result of grazing pressure.

Table 5.42

Sabai grass collection and consumption in Orissa

	Orissa	Keonjhar	Angul	Near	Far
Collection					
HHs collecting (%)	9	6	13	12	6
No. of villages collecting	3	1	2	2	1
Total (kg)	80	7	73	48	32
Mean per collector HH (kg)	3.5	0.9	4.9	3.0	4.6
Consumption					
Total (kg)	77	13	64	45	32
Amount (%)	96	186	88	94	100
Mean per collector HH (kg)	3.3	1.6	4.3	2.0	4.6

Sabai grass consumption in Orissa

The mean consumption of sabai grass per household in Keonjhar was 1.6kg whereas in Angul it was 4.3kg. Almost all the sabai grass collected was consumed, with more being consumed than collected in Keonjhar and the villages near to markets. Collector households in Chakradharpur stated that they used sabai grass to make furniture with and supplemented the 7kg of sabai grass that they gathered themselves with grass bought at local markets.

5.4.3 Oilseeds

Tables 5.43 and 5.44 show the amounts of different tree-based oil seeds collected by sample villagers in Bihar and Orissa. In Orissa, the most important oilseed was mahua, followed by sal, mango and piar, whereas in Bihar, sal seed was the most widely collected oilseed, followed by mahua, piar, karanj and kusum. There were considerable inter-village variations

in the collection of oil seeds with mahua seed being collected by 9 villages in Bihar and 10 in Orissa, while sal seed was collected by only 6 villages in Bihar and 10 in Orissa. Piar and kusum were both more widely collected in Bihar (11 villages compared to 6 in Orissa for piar and 4 villages in Bihar as opposed to 2 in Orissa for kusum) and the production of kusum in Orissa is unlikely to improve unless specific silvicultural management coupled with the plantation of kusum trees is carried out. Karanj was not collected by the Orissa sample households, although the fact that it was collected in 9 of the Bihar sample villages indicates its importance in parts of the study area. Mango kernel, on the other hand, was not collected at all in Bihar but was gathered in 2 of the Orissa sample villages.

Table 5.43

Collection of forest tree oil seeds in Bihar

(kg)

Village	Piar	Sal	Mahua	Kusum	Karanj
Baridih	nc	nc	nc	nc	7.0
Jariya	1.5	nc	324.0	nc	nc
Tengariya	1.0	nc	108.0	nc	126.0
Hulsi	3.8	nc	235.0	4.0	117.0
Jahanabaj	nc	239.0	231.0	nc	nc
Sarsa	17.0	720.0	557.0	nc	227.0
Karudih	131.0	nc	nc	nc	55.0
Katwa	72.0	nc	nc	nc	120.0
Hesadih	400.0	71.0	85.0	97.0	45.0
Lota	135.0	81.0	67.0	nc	nc
Khanda	651.0	1360.0	605.0	620.0	508.0
Sindribera	659.0	1335.0	47v0	270.0	594.0
Total	2071.0	3806.0	2682.0	991.0	1799.0

Table 5.44

Collection of forest tree oil seeds in Orissa

(kg)

Village	Piar	Sal	Mahua	Kusum	Mango
Adakata	38.0	2.0	nc	nc	nc
Akul	nc	nc	476.5	nc	nc
Barapada	nc	57.0	23.5	45.0	v
Basudevpur	nc	97.0	433.0	nc	522.0
Chakradharpur	48	60.0	nc	nc	nc
Dangapal	nc	33.0	51.5	nc	167.0
Dhandatopa	nc	175.0	119.0	nc	nc
Handapa	nc	208.0	472.0	nc	nc
Hinjirida	nc	747.0	86.0	nc	nc
Kutasingha	nc	31.0	60.0	nc	nc
Padang	nc	nc	1252.0	nc	nc
Samagiri	12.0	876.0	150.8	47.0	nc
Total	98.0	2286.0	3124.0	92.0	689.0

5.4.3.1 Piar (Chironji)

Piar is one of the most expensive oil seeds in India and is used as a flavouring agent. The most important states for piar harvesting are Madhya Pradesh and Uttar Pradesh. In Orissa and Bihar, the quantities collected are small compared to other oil seeds. The average amount of time spent travelling to collect piar in Bihar was 1.3 hours (1.6 hours in Ranchi and 1.1 hours in West Singhbhum). In Orissa, piar trees are quite sparse and are now confined to upper hill slopes in many districts, which makes the collection of piar seeds time-consuming and difficult**:** a situation that may account for the lack of piar collection amongst the Orissa sample households. Preparing the seed for sale is quite a lengthy operation which involves around 46 hours of drying and a further three hours of processing to extract the kernels.

Piar collection in Bihar

Almost half of the Bihar sample households collected piar in 1997-8 (Table 5.45) and in only two of the twelve sample villages (Baridih and Jahanabaj) was this NTFP not collected at all; mainly because there are few seed bearing trees in nearby forests. In five villages (Sindribera, Khanda, Karudih, Sarsa and Hesadih), over 90% of the sample households collected piar: a situation that inflated the proportion of collecting households in West Singhbhum compared to Ranchi and in far-from-market compared to near-to-market villages.

The highest levels of piar collection were found in the villages of Sindribera (659.0kg) and Khanda (651.0kg), although villagers in Hesadih (400.0kg), Lota (135.0kg) and Karudih

(131.0kg) also collected significant amounts of this NTFP. All of the Ranchi villages, by contrast, collected rather small amounts; the highest being Sarsa (17.0kg) and the lowest Tengariya (1.0kg). This trend was echoed with respect to the average amounts of piar collected per household with Sindribera leading the field (108.3kg per collector household), followed at a distance by Khanda (28.6kg) and Jahanabaj (15.3kg). The others all collected less than 7.0kg per household. These disparities between piar collection levels in the Ranchi and West Singhbhum sample villages coupled with the extremely high quantities of collection in Sindribera and Khanda were the main reasons for the wide variation in collection figures between the two districts and the 'near' and 'far' villages.

Table 5.45

Piar collection and consumption in Bihar

	Bihar	Ranchi	West Singhbhum	Near	Far
Collection					
HHs collecting (%)	50	22	77	43	56
No. of villages collecting	10	4	6	5	5
Total (kg)	2071.3	23.3	2048.0	605.5	1465.8
Mean per collector HH (kg)	17.1	0.9	21.6	11.4	21.6
Consumption					
Total (kg)	470.0	19.0	451.0	452.0	18.0
Amount (%)	23	82	22	75	1
Mean per collector HH (kg)	3.9	0.7	4.8	8.5	0.3

Piar consumption in Bihar

Only a relatively small proportion (23%) of the piar collected in the Bihar sample villages was consumed domestically and most of this was consumed in Ranchi (82%) rather than in West Singhbhum (22%). Significantly, the two villages which collected the largest amounts of piar (Sindribera and Khanda) both sold their entire stock of this NTFP, as did the villages of Lota and Jariya. Tengariya, Sarsa and Hesadih, by contrast, consumed their entire stock of piar domestically. The villagers of Hulsi, Karudih and Katwa, meanwhile, consumed between a third and a fifth of the piar that they collected and sold the rest.

In terms of the actual quantities of piar used domestically, the villagers of Hesadih led the field, consuming all of the 400.0kg (21.1kg per collector household) that they collected. Karudih, Katwa and Sarsa consumed fairly small amounts both in total (27.0kg, 24.0kg and 17.0kg respectively) and per collector household (1.6kg, 1.9kg and 0.9kg respectively) while collector households in Hulsi and Tengariya only consumed 1.0kg each (0.3kg per household). Again, the disparities in consumption patterns between Ranchi (19.0kg total 0.7kg mean) compared to West Singhbhum (451.0kg total, 4.8kg mean) and near-to-market (452.0kg total, 8.5kg mean) and far-from-market (18.0 kg total, 0.3kg mean) villages were

accounted for by the high levels of piar sales in West Singhbhum compared to Ranchi, and particularly in the far-from-market villages of Sindribera and Khanda.

Piar collection in Orissa

A much smaller percentage (8%) of the sample households in Orissa collected piar seeds than was the case in Bihar (Table 5.46). Collection took place in three of the sample villages (Samagiri, Barapada and Chakradharpur), all of which are in Keonjhar. The amount of piar seed collected was significantly lower in Orissa (98.0kg) compared to Bihar (2071.0kg) with collection levels being highest in Chakradharpur (48.0kg total, 16.0kg mean), followed by Barapada (38.0kg total, 3.2kg mean) and Samagiri (12.0kg total, 3.0kg mean).

Table 5.46

Piar collection and consumption in Orissa

	Orissa	Keonjhar	Angul	Near	Far
Collection					
HHs collecting (%)	8	15	0	6	10
No. of villages collecting	3	3	0	2	1
Total (kg)	98.0	98.0	0	60.0	38.0
Mean per collector HH (kg)	5.2	5.2	0	8.6	3.2
Consumption					
Total (kg)	12	12	0	12	0
Amount (%)	12	12	0	20	0
Mean per collector HH (kg)	0.6	0.6	0	1.7	0

Piar consumption in Orissa

Compared to Bihar, a larger proportion (12%) of the piar collected in Orissa was consumed by the sample households. Sample villagers in Samagiri consumed all of their piar harvest domestically, whereas sample villages in Barapada and Chakradharpur sold almost of all of the piar that they collected: a situation that reflects the high market price of this NTFP (Rs 100kg). Interestingly, however, not everyone was aware of the commercial value of this product. Villagers in Dangapal, for example, collected piar frui but threw away the kernels.

5.4.3.2 Sal seed

Sal seed contains a fatty oil which is used primarily in the manufacture of low grade soaps. The collection of sal seed has declined in recent years reflecting a fall in its market price as a result of competition from cheap imported palm oil. Sal seed is collected primarily in June and July and in 1997-8, sample households made journeys of around 1.3 hours in Bihar and between 1 and 4 hours in Orissa depending on whether villagers had easy access to sal trees on their farm land**.** The pre-sale processing of sal seeds by primary collectors was found to be

a laborious and time consuming process involving around 24 hours of drying followed by a further 5.2 hours of burning, de-winging, cleaning and crushing to extract the seed kernels. In spite of the low return to labour, however, a large number of households in the study area still collected sal seeds.

Sal seed collection in Bihar

Some 32% of the Bihar sample households in 6 villages (Jahanabaj, Sarsa, Hesadih, Lota, Khanda and Sindribera) undertook sal seed collection (Table 5.47). All households in Jahanabaj and Sarsa collected this NTFP (a situation that accounts for the relatively high percentage of collectors in Ranchi, despite the fewer collecting villages) while 70% of households collected in Khanda, 57% collected in Sindribera and less than 29% collected in the other two villages. Out of the all-Bihar collection of 3906.0kg, over 72% (2847.0kg) came from West Singhbhum district and over 95% (3735.0kg) from far-from-market villages. The biggest collections occurred in the villages of Khanda (1360.0kg total, 97.0kg mean) and Sindribera (1335.0kg total, 111.0kg mean), followed by Sarsa (720.0kg total, 36.0kg mean), Jahanabaj (239.0kg total, 12.0kg mean), Lota (81.0kg total, 13.5kg mean) and Hesadih (71.0kg total, 11.8kg mean).

Table 5.47

Sal seed collection and consumption in Bihar

	Bihar	Ranchi	W Singhbhum	Near	Far
Collection					
HHs collecting (%)	32	33	31	5	59
No. of villages collecting	6	2	4	1	5
Total (kg)	3906.0	959.0	2847.0	71.0	3735.0
Mean per collector HH (kg)	48.8	24.0	75.0	11.8	51.9
Consumption					
Total (kg)	5.0	0	5.0	0	5.0
Amount (%)	0.1	0	0.2	0	0.1
Mean per collector HH (kg)	0.1	0	0.1	0	0.1

Sal seed consumption in Bihar

Almost all of the sal seeds collected in Bihar were sold rather than being used domestically; the main exception being Hesadih village where 5.0kg of sal seed was self-consumed (it was crushed into a flour and used as a cooking ingredient).

Sal seed collection in Orissa

A slightly smaller percentage of the Orissa sample households (24%) collected sal seed than was the case in Bihar (Table 5.48) although the collection of this NTFP was undertaken in a greater number of villages. The proportion of collectors was slightly higher in Angul (27%) than in Keonjhar (21%) and in near-to-market villages (28%) compared to far-from-market villages (20%). The actual quantities collected in Orissa were less (2286.0kg total, 38.7kg mean) than in Bihar, with the six Angul villages collecting more in total and mean terms (1291.0 and 39.1kg respectively) than the four collecting villages in Keonjhar (995.0 and 38.3kg respectively). The highest levels of collection took place in the villages of Samagiri (876.0kg) in Keonjhar and Hinjirida in Angul (747.0kg), with the other villages all collecting less than 208.0kg. The inter-village variations in collection were linked to the relationship between village size and sal tree density on neighbouring farmland with collections being lowest in villages with large populations and limited numbers of sal trees on farmland.

Table 5.48

Sal seed collection and consumption in Orissa

	Orissa	Keonjhar	Angul	Near	Far
Collection					
HHs collecting (%)	24	21	27	28	20
No. of villages collecting	10	4	6	5	5
Total collected (kg)	2286.0	995.0	1291.0	1352.0	934.0
Mean per collector HH (kg)	38.7	38.3	39.1	38.6	38.9
Consumption					
Total (kg)	8	3	5	0	8
Amount (%)	<1	<1	<1	0	1
Mean per collector HH (kg)	2.7	3.0	2.5	0	2.7

Sal seed consumption in Orissa

As was the case in Bihar, only very small amounts (less than 1% or 8.0 kg in total) of sal seed were used domestically by the Orissa sample households although at one time sal oil used to be used for cooking purposes in many households.

5.4.3.3 Karanj seed

Although no data are available on karanj seed collection by the Orissa sample households, it is used widely in Bihar as a source of oil for lamps, body massage and occasionally for cooking and medicinal purposes. The oil is also used commercially in the manufacture of soap. Collection takes place primarily in March and April and the sample villagers did not have to spend long travelling to collect karanj seeds (0.7 hours in Ranchi and 0.5 hours in West Singhbhum) as most karanj trees are situated on homestead and farm field land rather than in the forest. The processing of karanj seeds was found to be quite a time consuming job with drying taking an average of 24 hours and oil extraction taking a further 3.8 hours.

Karanj seed collection in Bihar

Karanj seed was collected by a total of 40% of the Bihar sample households in nine villages with the proportion of collectors being highest is far-from-market villages, but relatively equal between Ranchi and West Singhbhum (Table 5.49). Khanda and Sindribera had the highest proportion of karanj seed collectors (95% and 81% respectively), followed by Sarsa (90%), Tengariya (70%) and Hulsi (65%). In the other four collecting villages (Karudih, Katwa, Baridih and Hesadih), the proportion of collectors was less than 30%.

In terms of quantity, the largest collectors were Sindribera (594.0kg total, 34.9kg mean) and Khanda (508.0kg total, 26.7kg mean): a situation that accounts for the high average collection figures for West Singhbhum and far-from market villages. The lowest levels of collection took

place in Baridih (7.0kg total, 3.5kg mean) with the other villages collecting totals of between 45.0kg (Hesadih) and 227.0kg (Sarsa). In spite of their moderate total collections, however, Hesadih and Katwa had quite high average collection levels (22.5kg, 20kg respectively), indicating a concentration of karanj seed collection amongst a few households. In the case of Katwa, this reflected a strong commercial orientation on behalf of the collector households who sold all of the karanj seeds that they gathered.

Table 5.49

Karanj seed collection and consumption in Bihar

	Bihar	Ranchi	West Singhbhum	Near	Far
Collection					
HHs collecting (%)	40	39	40	25	55
No. of villages Collecting	9	4	5	5	4
Total (kg)	1799.0	477.0	1322.0	353.0	1445.0
Mean per collector HH (kg)	18.7	10.3	26.4	11.8	21.6
Consumption					
Total (kg)	576.5	255.5	321	50.5	526.0
Amount (%)	32	54	24	14	36
Mean per collector HH (kg)	5.9	5.4	6.4	1.7	7.9

Karanj seed consumption in Bihar

Just under a third of the karanj seeds collected by sample households in Bihar were consumed domestically, with Ranchi and far-from-market villages showing the highest consumption levels. The sample villagers in Baridih and Sarsa consumed all of the karanj seeds that they collected, whereas in Karudih and Katwa, collector households sold their entire stock. The latter villages are located quite close to the Bandgaon market (which is one of the biggest markets for selling karanj) and were able to sell their karanj seeds for a good price and buy in alternative oils to use in their lamps. The other villages consumed between 10% and 69% of their karanj seeds domestically. These trends were largely reflected in the data on the actual quantities consumed, with Sarsa consuming the greatest amounts of karanj seeds (227.0kg total, 12.6kg mean), followed by Sindribera (155.0kg total, 9.1kg mean) and Khanda (135.0kg total, 7.1kg mean) which both retained just over a quarter of their karanj seed collection for domestic use.

5.4.3.4 Mahua seed

The other important tree-borne oil seed in the study area is mahua seed which is a rich source of edible oil that can also be used in the manufacture of good quality soap. The seed is collected between June and July and as there are a large number of mahua trees on

homestead and farm land, the average travelling time required to collect mahua seeds tends to be relatively short (0.9 hours in Bihar and 2.2 hours in Orissa). The processing of mahua seeds, by contrast was found to be quite labour intensive and time consuming with drying taking an average of just under 25 hours and oil extraction taking around 4.4 hours. 1997-8 was a very bad year for the collection of mahua seed, however, so the data listed below should not be taken as representative of an average collection season.

Mahua seed collection in Bihar

The collection of mahua seeds was undertaken by a total of 45% of the Bihar sample households in 9 villages: 5 in Ranchi and 4 in West Singhbhum (Table 5.50). The proportion of collectors was significantly higher in far-from-market villages (72%) compared to near-to-market villages (17%); mainly because mahua seed collection took place in all 6 far-from market villages compared to only 3 near-to-market villages (Jariya, Tengariya and Hesadih). Sarsa was the only village in which all households collected mahua seeds, but over 75% of households collected this NTFP in Hulsi, Jahanabaj, and Khanda. The quantities of mahua seed collected were greatest in the far-from-market villages of Khanda (605.0kg total, 40.3kg mean), Sarsa (557.0kg total, 27.9kg mean) and Sindribera (470.0kg total, 39.2kg mean) and smallest in Lota (66.5kg total, 7.4kg mean) and Hesadih (85.0kg total, 8.5kg mean). The other four villages had total collections of between 108.0kg (Tengariya) and 235.0kg (Hulsi). Interestingly, however, Jariya, which had a total collection of 234.0kg had a very high average collection figure of 58.5kg per collector household which indicates that mahua seed collection was undertaken primarily for commercial purposes in this village.

Table 5.50

Mahua seed collection and consumption in Bihar

	Bihar	Ranchi	West Singhbhum	Near	Far
Collection					
HHs collecting (%)	45	53	37	17	72
No. of villages collecting	9	5	4	3	6
Total (kg)	2681.5	1455.0	1226.5	427.0	2164.0
Mean per collector HH (kg)	24.6	23.1	26.7	20.3	24.6
Consumption					
Total (kg)	768.0	768.0	0	0	768.0
Amount (%)	29	53	0	0	35
Mean per collector HH (kg)	7.1	12.2	0	0	8.7

Mahua seed consumption in Bihar

Although 29% of the mahua seed collected by the Bihar sample households was consumed domestically, this figure conceals the fact that the entire 1997-8 collection of mahua seeds in West Singhbhum district and in the near-to-market villages of Jariya, Tengariya and Hesadih was sold. The only villagers who consumed mahua seed domestically were the 20 sample households of Jahanabaj who consumed their entire collection and the 20 sample households in Sarsa who consumed 96% of their mahua seed harvest. In terms of actual quantities, this amounted to a total consumption of 321.0kg for Jahanabaj and 537.0kg for Sarsa and a mean consumption of 14.4kg and 26.9kg respectively. These inter-village variations in consumption patterns may be explained primarily by the different eating preferences prevalent in different areas/villages.

Mahua seed collection in Orissa

As can be seen from Table 5.51, the collection of mahua seeds was carried out by a slightly higher proportion of sample households in Orissa (51%) than in Bihar and was undertaken in 10 of the 12 sample villages. The actual quantities collected were also slightly higher in Orissa (3124.0kg), although the inter-district variations were less with villagers in Keonjhar collecting a total of 1903.0kg and villagers in Angul collecting a total of 1222.0kg. The mean collection figures, however, were rather higher in Keonjhar (30.7kg) than in Angul (19.1kg) and in far-from-market villages (33.1kg) compared to near-to-market villages (18.1kg). In large part, these variations resulted from the extremely large amounts of mahua seeds harvested in the village of Padang (1252.0kg) which inflated the mean collection figures for Keonjhar and for far-from-market villages. All of the other villages collected less than 472.0kg of mahua seed.

Table 5.51

Mahua seed collection and consumption in Orissa

	Orissa	Keonjhar	Angul	Near	Far
Collection					
HHs collecting (%)	51	50	52	56	46
No. of villages collecting	10	4	6	5	5
Total (kg)	3124.0	1903.0	1222.0	1270.0	1855.0
Mean per collector HH (kg)	24.8	30.7	19.1	18.1	33.1
Consumption					
Total (kg)	2583.0	1800.0	784.0	1023.0	1561.0
Amount (%)	83	95	64	81	84
Mean per collector HH (kg)	24.8	29.0	18.7	16.2	38.1

Mahua seed consumption in Orissa

A much higher proportion (83%) of mahua seeds were consumed domestically in Orissa than was the case in Bihar although self-consumption was rather higher in Keonjhar (95%) than in Angul (64%): a situation that reflects the predominance of mahua seed sales by villagers in Basudevpur and Kutasingha in Angul. The actual amounts consumed reflected these trends with villagers in Keonjhar consuming significantly larger amounts (1800.0kg total, 29.0kg mean) of mahua seed compared to villagers in Angul (784.0kg total, 18.7kg mean): a situation that reflects the greater percentage of tribal households in Keonjhar.

5.4.4 Commercially valuable NTFPs

The most important commercially valuable NTFPs gathered in 1997-8 by sample households in the study area were lac and kendu leaves, both of which were collected exclusively for sale purposes and are discussed in more detail later. Kendu leaf collection is a far more important activity in Orissa than in Bihar, but for lac the opposite case is true and none of the Orissan sample households undertook lac cultivation while the sample survey was taking place. Tassar, meanwhile, was cultivated by several households in the Orissa sample villages but not by any of the Bihar sample households.

5.4.4.1 Kendu leaves

Economically speaking, kendu leaves are extremely valuable because of their use in making bidis (country cigarettes). Kendu trees are abundant in degraded sal forests and are pruned to maintain them as bushes. Kendu leaf collection is much more significant in Orissa than in Bihar where there is less of a tradition of kendu leaf collection because of the poor quality of the leaves. The collection that does occur in Bihar takes place in West Singhbhum because the leaves there are of a better quality and the farmers there do not have the same alternative income sources (notably vegetable cultivation) as farmers in Ranchi district. The 1997-8 collection season for kendu leaves in Bihar was particularly poor.

Kendu leaf quality in Orissa is amongst the best in India, and kendu leaf collection is, as a result, an important economic activity in the Orissa study villages. The main season for kendu leaf collection is April, occasionally extending to the first week of May. Household members from all socio-economic groups usually participate in kendu leaf collection; the main unit of collection being the 'kerry' which contains 20 leaves. The collection period varies from a minimum of 7 to a maximum of around 25 days. In 1997-8, the average household in Angul gathered kendu for 17 days in contrast to 16 days in Keonjhar; the difference being due to the fact that Angul is drier with more fallow land and produces more leaves than Keonjhar.

Kendu leaf collection in Bihar

Kendu leaf collection was undertaken by only 7.8% of the Bihar sample households (3 households in Hesadih and 16 households in Sindribera). The total number of kerries collected in 1997-8 was 21100, of which 2900 were collected in Hesadih and 18200 in Sindribera. The mean collection figures in these villages were 966.7 kerries in Hesadih and 1137.5 kerries in Sindribera. None of the kendu leaves collected by the Bihar sample households were consumed domestically (Table 5.52).

Table 5.52

Kendu leaf collection in Bihar

	Bihar	Ranchi	West Singhbhum	Near	Far
Collection					
HHs collecting (%)	8	0	8	1	7
No. of villages Collecting	2	0	2	1	1
Total (kerries)	21100	0	21100	2900	18200
Mean per collector HH(kerries)	1110.5	0	1110.5	966.7	1137.5
Consumption (kerries)					
Total(kerries)	0	0	0	0	0
Amount (%)	0	0	0	0	0
Mean per collector HH(kerries)	0	0	0	0	0

Kendu leaf collection in Orissa

As can be seen from Table 5.53, kendu leaf collection took place in all of the Orissa sample villages and was carried out by 87% of the sample households although the proportion of collecting households was lower in Keonjhar (65%) than in Angul (91%): the latter being higher as a result of a more favourable climate plus the presence of bidi rollers in several villages within Angul district. The existence of a good network of collection centres maintained by the Orissa Forest Department accounts for the limited variation in the percentage of collectors in near and far villages. In addition, a stabilised collection system and guarantees of government purchase have contributed to local peoples' confidence in the continued extraction of this NTFP and have enabled this area to rank as one the highest kendu leaf producing areas of India.

The total amount of kendu leaf kerries collected during the 1997-8 season was 818164, of which a significantly larger proportion was collected in Angul district (535511 kerries total, 4912.9 kerries mean) than in Keonjhar (282653 kerries total, 2641.6 kerries mean). It is important to note, however, that the collection range per household in any given month varied significantly between 270 and 10,101 kerries in Angul.

Table 5.53

Kendu leaf collection in Orissa

	Orissa	Keonjhar	Angul	Near	Far
Collection					
% HHs collecting	87	86	89	91	83
No. of villages collecting	12	6	6	6	6
Total (kerries)	818164	282653	535511	429190	388974
Mean per collecting HH (kerries)	3787.8	2641.6	4912.9	3764.8	3813.5
Consumption					
Total (kerries)	134043	513	133530	79808	54235
% consumed	16	<1	25	19	14
Mean per collector HH (kerries)	2271.9	25.7	3423.8	1946.5	3013.1

Kendu leaf consumption in Orissa

Although villagers are required under the Orissa Kendu Leaf Trade Act to sell all the kendu leaves that they collect to the government, some villagers retain some leaves for rolling their own bidis. In 1997-8, villagers in Angul kept 25% of the kendu leaves that they harvested for household bidi making whereas in Keonjhar villagers retained less than 1% of the leaves for their own use. In actual quantities, this amounted to a total domestic consumption of 133530 kerries (3423.4 kerries mean per collector household) in Angul and 513 kerries (25.7 kerries mean per collector household) in Keonjhar.

5.4.4.2 Lac

Lac is one of the most commercially valuable NTFPs in the study area and is particularly important in West Singhbhum district where there are a number of lac processing and export units. Ber and kusum are the most important lac host trees in the region, although palas may also be used. The main collection seasons for lac are between October and January and again between May and June. As most lac is grown on homestead trees in the study area, the travel times associated with its collection were not found to be particularly great (0.7 hours on average in Bihar). Processing was more time consuming and involved 0.8 hours of drying and a further 2.9 hours of scraping, cleaning, and aeration during storage before the lac was ready to be sold. Lac was collected exclusively for commercial purposes and was not consumed domestically.

Lac collection in Bihar

Some 40% of the Bihar sample households from seven villages (Tengariya, Hulsi, Karudih, Katwa, Hesadih, Khanda and Sindribera) were involved in lac collection in 1997-8 (Table 5.54). The availability of institutional support for lac production in West Singhbhum accounts for the greater number of villages and households involved in the collection of this NTFP in

this district (90% of the households in Khanda and Sindribera, 57% of the households in Katwa and 5% of the households in Hesadih collect lac). The high proportion of collectors in Tengariya (90%) and Hulsi (80%), meanwhile, was attributable to the fact that farmers have traditionally cultivated lac in these villages and so there are more ber (lac-host) trees on private farmland. Also, lac cultivation tends to be more successful when carried out on a large scale. With respect to the quantities of lac collected, the most important villages were Khanda (457.0kg total, 25.4kg mean) and Sindribera (436.0kg total, 21.8kg mean), followed at a distance by Hulsi (139.0kg total, 87kg mean). The other four villages all collected totals of less than 89.5kg.

Table 5.54

Lac collection and consumption in Bihar

	Bihar	Ranchi	West Singhbhum	Near	Far
Collection					
HHs collecting (%)	40	28	52	36	44
No. of villages Collecting	7	2	5	4	3
Total (kg)	1236.5	228.5	1008	204.5	1032
Mean per collector HH (kg)	12.6	6.7	15.8	4.7	19.1
Consumption					
Total (kg)	0	0	0	0	0
Amount (%)	0	0	0	0	0
Mean per collector HH (kg)	0	0	0	0	0

5.4.4.3 Tassar

Although Mayurbhanj, Keonjhar, Koraput and Angul are some of the most important wild tassar rearing areas in Orissa, this activity was undertaken by only seven of the Orissa sample households in the village of Padang where the average annual number of tassar cocoons reared per household was 2029. Although tassar rearing can be a very profitable enterprise for the rural community, its adoption has been limited to just a few areas. Indeed, tassar rearing has declined in many parts of Angul while in Keonjhar it is done mainly in Telkoi and Harichandanpur revenue blocks. This is in spite of the existence of a very organised tassar co-operative that has been in operation since 1965.

6.0 MARKETS AND MANUFACTURERS

6.1 Introduction

The marketing of NTFPs in Bihar and Orissa links primary collectors to end-users via networks that are by turns localised or stretched, subject to indirect government regulations or fully nationalised, legal or clandestine, and more or less competitive. The second part of this chapter describes the marketing of NTFPs that remain largely within the domestic or local economies. NTFPs including ber, chewsticks, dahu, jackfruit, jamun fruit, koinar flower, mango, mulberry, mushroom, puffballs and rice beer fall into this category. They are mainly traded in village bazaars *(hats)* for cash income or bartered products. Both men and women are involved in these collection and trading systems. The degree of their involvement in the exchange economy of the study areas is described, together with an account of the problems they face in dealing with traders in more extended systems of exchange.

Seven of these extended circuits of exchange are described in the third part of the chapter. Trade in kendu leaves, sal seeds, mahua seeds, mahua flowers, lac, tassar silk, and sal leaves links the plateau areas of Bihar and Orissa to national and international markets. Trade in kendu leaves, sal seeds and mahua seeds is nationalised in both States, although there are important differences in the marketing of these 'major' NTFPs in Bihar and Orissa. The third part of the chapter also describes the processing of major NTFPs in Bihar and Orissa, and elsewhere. The manufacture of products using NTFPs as a raw material is poorly developed in the study area. The fourth part of the chapter considers the prospects for further employment generation in NTFP collection, marketing and processing systems in Bihar and Orissa. It highlights legal, training and other obstacles to the realisation of this development agenda.

6.2 The Bazaar Economy

6.2.1 Selling Households

Almost all of the households which are involved in the collection of NTFPs in eastern India are involved in the sale or marketing of NTFPs. The sale of NTFPs is a major source of income for men and women throughout the study area, although patterns of NTFP collection and sale vary widely between households and products and across space.

Information was gathered on patterns of NTFP collection for sale or for self-consumption at the household level. Tables 5.16 and 5.17 provide data on patterns of household self-consumption by product for Bihar and Orissa respectively.

It is clear that chewsticks and leafy or wild vegetables are more likely to be collected for domestic consumption than, say, mahua flowers or sal leaves (although sales of sal leaves

are proportionately higher amongst collecting households in Bihar than in Orissa). In Orissa, too, there are significant variations in sale-consumption patterns for the same product by area or geographical location. For example, collecting households in Keonjhar District are less likely to sell mahua flowers than are collectors in Angul District (Table 5.17), a difference which cannot be explained in terms of the ethnic (tribal/non-tribal) make up of these two Districts (Table 5.21).

In the case of myrobalans and sal seeds there are significant differences in the consumption-sale patterns of tribal and non-tribal collectors. Non-tribal collectors are more likely than their tribal counterparts to bring myrobalans to market, whereas the pattern is reversed for sal seeds.

Most of the NTFPs which are offered for sale in villages or in the weekly hat are collected from trees grown on private lands. Table 6.1 provides data on 46 traded NTFPs in the Bihar study area. The Table shows that 58 of the 244 sample households were selling chewsticks in 1997-98, and that almost 74,000 pieces were sold by these households (17% of the total number of chewsticks collected). Households selling chewsticks sold, on average, 1275.5 chewstick pieces, which amounts to a sale of 303.2 pieces for all sample households (collecting and non-collecting) in the study area. The returns to collecting households from these sales can be considerable. The incomes received from 39 traded NTFPs in the Bihar study villages are listed in Table 6.2. The total income accruing to all 244 households in 1997-98 was Rs 227,837, of which almost one-third came from the sale of lac (fetching high prices at that time) and rice beer herbs. Other major income-earning NTFPs were tamarind, mahua flowers and piar fruit (chironji). In the Orissa study areas, the total income accruing to 243 sample households from the sale of 27 NTFPs was Rs 281,226 (Table 6.3). Although kendu leaves are collected and sold in both Keonjhar and Angul Districts, it is only amongst the non-tribal populations of Angul District that the rolling of bidis (country cigarettes) fetches a considerable income for some households. The sale of sal plates is an important activity amongst the tribals of Keonjhar, and the sale of mahua flowers is of economic significance in both Keonjhar and Angul.

Table 6.1

Sale of NTFPs by Sample Households, Bihar

NTFP name	Unit	No .of Sample HHs making sale	Total amount sold	Sale as percent of collection	Av. sale per seller HHs	Av. sale by all sample HHs (#244)
Amra	kg	19	236	80	12.4	1.0
Aonla	kg	27	182	78	6.7	0.7
Asparagus	kg	0	0	0	0	0
Bahera	kg	0	0	0	0	0
Bamboo shoot	kg	36	534	75	14.8	2.2
Ber	kg	49	1194	68	24.4	4.9
Bhelwa	kg	9	302	84	33.6	1.2
Broom grass	kg	2	342	97	171.0	1.4
Chewstic k	pc	58	73980	17	1275.5	303.2
Chiraita	kg	9	72	32	8.0	0.3
Dahu fruit	kg	15	67	43	4.4	0.3
Dori	kg	74	1914	71	25.9	7.8
Mahulan fibre	kg	3	125	48	41.7	0.5
Fodder grass	kg	0	0	0	0	0
Gende mushroom	kg	18	123	78	6.8	0.5
Genthikand	kg	80	688	37	8.6	2.8
Honey	kg	3	2	75	0.8	0
Jackfruit	kg	10	448	70	44.8	1.8
Jamun	kg	9	35	24	3.8	0.1
Jirhul flower	kg	5	28	11	5.6	0.1
Kachnar flower	kg	0	0	0	0	0
Karanj seeds	kg	75	1223	68	16.3	5.0
Karonda	kg	0	0	0	0	0
Kend	kg	12	95	29	7.9	0.4
Khajur leaves	kg	1	2	1	2.0	0
Koinar flower & leaves	kg	3	18	4	6.0	0.1
Kujri seeds	kg	6	129	46	21.5	0.5
Kusum seeds	kg	20	982	99	49.1	4.0
Lac	kg	98	1237	100	12.6	5.1
Leafy vegetables	kg	61	974	20	16.0	4.0
Mahua flower	kg	163	9218	89	56.5	37.8
Mango	kg	12	333	13	27.7	1.4
Matasura fruit	kg	16	45	100	2.8	0.2
Mulberry	kg	2	7	11	3.3	0
Mushrooms	kg	66	247	12	3.7	1.0
Patal-kohra	kg	2	6	23	3.0	0
Pendi (oal)	kg	11	350	99	31.8	1.4
Piar fruit	kg	71	1601	77	22.6	6.6
Puffball mushrooms	kg	30	204	6	6.8	0.8
Ranu (ricebeer herb)	kg	17	264	76	15.5	1.1
Sal leaves	pc	31	148468	14	4789.3	608.5
Sal seeds	kg	78	3801	100	48.7	15.6
Sarpgandha	kg	1	1	100	1.0	0
Sharifa	kg	28	348	93	23.2	1.4
Mahulan leaves (Siali)	kg	3	550	61	183.3	2.3
Tamarind fruit	kg	95	4441	91	46.7	18.2

Source: field s urveys

Table 6.2

Income from the Sale of Different NTFPs, Bihar (all 244 households)

NTFP Name	Income (Rupees)	NTFP Name	Income (Rupees)
Amra Fruit	782	Kendu Leaf	4260
Aonla	890	Khajur Leaves	50
Bamboo Shoot	2011	Koinar Flower	72
Bark Rope	41	Kusum Seed	4932
Ber Fruit	2359	Lac	36837
Bhelwa Fruit	765	Leafy Vegetables	3567
Broom Grass	645	Mahua Flower	29607
Chewsticks	5590	Mahulan Leaves	218
Common Mushroom	3886	Mango	781
Dahu (Barhar fruit)	72	Matasura Fruit	1722
Dori (Mahua Seed)	8363	Pendi (Oal)	448
Fodder Grass	20	Piar Fruit (Chironji)	35811
Gende Mushroom	704	Puffball Mushroom	2516
Honey	68	Rice Beer Herbs	34651
Jackfruit	1515	Root Tubers	5841
Jamun	72	Sal Leaves	2712
Jirhul Fruit	2073	Sal Seed	5621
Karanj Seed	6024	Sharifa	414
Kend Fruit	683	Tamarind	20702
		Total	Rs 227837

Source: field surveys

Table 6.3

Incomes from the Sale of NTFPs, Orissa (Rupees)

NTFP	Angul (collectors only)		Keonjhar (collectors only)		Orissa (collectors only)		Mean of all 243 households
	Total	Mean	Total	Mean	Total	Mean	
Bamboo	4253	2084	420		4673	1042	19.
Bidi	78528	4966			78528	2483	323
Broom					0	0	0
Char seed		0	864	193	864	97	4
Chew stick					0	0	0
Gum		0	70	10	70	5	<1
Khajur grass					0	0	0
Khajur mat	562	232	1043	227	1605	229	7
Kusum seed					0	0	0
Mahua flower	11227	417	15159	354	26386	386	109
Mahua seed	1022	151	1821	315	2843	233	12
Mango seed	1585	76	0		1585	38	7
Masia kanda			0		0	0	0
Mushroom	1859	356	606	165	2465	260	10
Myrobalans		0	15	15	15	8	<1
Pitalu		0	345	130	345	65	1
Sabai grass			0		0	0	0
Sal leave					0	0	0
Sal plate	1036	675	32742	1149	33778	912	139
Sal resin			465	233	465	116	2
Salseed	2621	77	1910	73	4531	75	19
Siali fibre	1618	376	10	10	1628	193	7
Siali leave		0	2728	161	2728	81	11
Tamarind		0	620	30	620	15	3
Tassar			12,500	1785	12500	893	51
Tendu leave	68648	1000	36045	636	104693	818	431
Wild vegetable	665	166	239	56	904	111	4
Total	173624	10576	107602	5542	281226	8059	1157

Source: field surveys

Tables 6.4 and 6.5 give a better impression of how important the sale of NTFPs can be to the formation of household incomes in the study region. In Bihar, the sale of NTFPs is generally more important in the villages of West Singhbhum than in Ranchi District (Table 6.4). In West Singhbhum District the sale of NTFPs is contributing, on average, 25% of total household incomes, with almost 50% of total incomes in the (distant) villages of Khanda and Sindribera accruing from this source. NTFPs also make up the principal 'forest sale' items in this District. Only in Hesadih (48%) and Lota (24%) are NTFPs less important to the incomes of collecting households than other forest incomes (mainly timber). In the Ranchi District villages which we surveyed only 3% of household incomes, on average, came from the sale of NTFPs, and only the villagers of Hulsi (a village located close to Bero market) approached a ratio of 10% in terms of NTFP sales to total household incomes. (The sale of NTFPs accounted for almost all forest sale incomes in Ranchi District, except in Sarsa (26%) where sales of timber had recently been important). This difference between West Singhbhum and Ranchi may reflect the limited development of agricultural and non-forest/off-farm employment or income-earning opportunities in the former, as compared to the latter. It may also reflect the greater number of trees of seed-bearing age in West Singhbhum, and the generally better quality of the forest stock there. In Orissa, the range of incomes to villages (from the sale of NTFPs) is similar to that in Bihar, but the lowest and highest income-earning villages (Dhandatopa and Handapa) are each to be found in Angul District (Tables 6.5a and 6.5b). The Orissa tables also give a sense of the importance of NTFPs sales for collecting households only. Thus, if only collector households in Keonjhar are considered, the mean annual income from NTFP sales is Rs. 5541, or 53.6% of total houshold incomes. When all 243 sample households are considered (collecting and non-collecting households), the mean annual income from the sale of NTFPs dips to Rs 1157, or just 19.3% of average total household incomes.

Table 6.4

Village Annual Incomes from Sale of NTFPs in Bihar

	Income from sale of NTFPs (rupees)	NTFP income as % of total HH income		Income from sale of NTFPs (rupees)	NTFP income as % of total HH income
Ranchi District			W. Singhbhum District		
Baridih	13431	4	Karudih	8202	16
Jariya	3415	1	Katwa	11382	17
Tengariya	8905	6	Hesadih	35116	16
Hulsi	11204	9	Lota	18532	11
Jahanabaj	3320	2	Khanda	53230	45
Sarsa	3190	2	Sindribera	57911	48

Source: field surveys

Table 6.5a

Income Sources for Rural Households, Orissa

Income	Keonjhar (collecting households only)	Angul (collecting households only)	Average for 243 households
Householder's total Annual Income	10,327	15,418	5971
Agricultural income	221 (2.1%)	225 (1.4%)	223 (3.7%)
Income from off-farm wage	4565 (44.2%)	4617 (29.9%)	4591 (76.8%)
Income from NTFP	5541 (53.6%)	10576 (68.5%)	1157 (19.3%)

(% Indicates extent of income of the total annual income)

Table 6.5b

Village Incomes from the Sale of NTFPs, Orissa

Angul District	Income (Rs)	Keonjhar	Income (Rs)
Handapa	77209	Akul	12450
Dhandatopa	6744	Chakradharpur	29632
Dangapal	31975	Samagiri	17500
Hinjirida	29845	Padang	28753
Basudevpur	13344	Barapada	11264
Kutasingha	14896	Adakata	7988

* 243 sample households only

Source: field surveys

Table 6.6 plots the income returns to households from NTFP sales in Bihar in relation to landholding units and proximity to local market centres. The Table suggests that marginal farming households are more likely to be involved in the sale of NTFPs than landless labourers, and to earn slightly more from these sales. It also suggests that the households with the most land are earning the highest average incomes from the sale of NTFPs. These findings are at odds with the conventional wisdom, but it is important not to take them out of context. The positive correlation between landholding size and incomes from NTFPs can be explained in part by the importance of lac sales in West Singhbhum (lac being cultivated on privately owned trees), and by the prominent role played by three 'large' landowning households in Hesadih in the rice beer and piar fruit trades. It should also be noted that in five of the seven study villages where there is a landless population, the landless households were earning more from the sale of NTFP items than were the marginal farming households. In terms of household livelihoods, it is clear that the landless and marginal farming households are more dependent on the sale of NTFP products than are many 'richer'

households (although few of our sample households are well off). It is also significant that more than seventy per cent of the proceeds of NTFP sales is being spent on food purchases in three of the West Singhbhum survey villages: Hesadih and Lota (from which there is no recorded labour outflow) and Khanda. In these villages - and especially where migration for work appears not to be an option - the dependence of villagers on NTFP sales is especially marked, and most obviously so in the summer or dry (lean) season. In the (somewhat) more affluent survey villages close to the small market town of Bero in Ranchi District (Baridih, Jariya and Tengariya), the reliance of local people on the collection and sale of NTFPs is much less marked, and less than one quarter of the incomes earned from this source is spent on basic foodstuffs. In Orissa, meanwhile (Table 6.7), the apparent positive correlation between landholding size and NTFP sale incomes is heavily - though importantly - distorted by one commodity. In the case of non-timber forest products other than bidi, the relationship between landholding size and sale incomes is an inverse relationship, although not to a significant degree.

Table 6.6

Average annual household incomes (rupees) from the sale of NTFPs in Bihar: by landholding size and proximity to market

District	Village	Nearness to Market	Landholding Class					
			Landless	Marginal	Small	Medium	Large	All
W Singhbhum								
	Karudih	Near		432	358	243	602	410
	Katwa	Near	780	437	556	559	616	542
	Hesadih	Near		1310	1078	2422	3030	1765
	Lota	Far	1028	892	690			883
	Sindribera	Far		3466	4117	2260	2772	2756
	Khanda	Far		2500	3294	2704	1807	2651
Ranchi								
	Jariya	Near	218	79	419	280		171
	Baridih	Near	1106	537	146	1963		668
	Tengariya	Near		449	394	571	215	439
	Jahanabaj	Far	125	197	78	245	270	166
	Sarsa	Far	80	128	173	191	225	160
	Hulsi	Far	611	588	507	426	929	565

Source: field surveys

Table 6.7

Landholding Size and Incomes from sale of NTFPs, Orissa

	Landless	Marginal	Small	Medium	Large
Bamboo	142	1	6	4	0
Broom	0	0	0	0	0
Bidi	154	230	674	13	834
Char seed	7	3	4	0	0
Chew stick	0	0	0	0	0
Gum	0	<1	<1	0	0
Khajur mat	0	0	0	0	0
Khajur grass	5	9	2	1	16
Mahua flower	116	131	81	52	106
Mahua seed	15	12	8	21	0
Mango seed	6	9	3	2	12
Masia kanda	139	65	52	12	50
Mushroom	43	8	3	1	6
Myrobalans	0	<1	0	0	0
Pitalu	0	2	<1	2	0
Sabai grass	0	0	0	0	0
Sal plate	71	166	126	175	0
Sal leaf	0	0	0	0	0
Sal resin	0	4	0	0	0
Sal seed	23	19	22	5	26
Siali fibre	14	7	0	5	17
Siali leaf	5	11	13	19	0
Tamarind	1	3	5	1	0
Tendu leaf	449	466	329	478	468
Wild vegetable	0	3	5	10	0
Total	1049	1084	1281	790	1484

Source: field surveys; definitions as for Table 6.6

The returns to labour from the processing and sale of NTFPs appear to be low (see Tables 6.8 and 6.9). With the exception of an estimated daily rate of return of Rs 50.82 on chironji (piar fruit) in Bihar, and of Rs. 89.76 for char kernels [chironji] in Orissa, the rates of return on major NTFPs like sal seeds, mahua flowers, kusum seeds, or harra ruts are less than the daily rate of Rs 39.70 which the government of Bihar claimed to pay in 1997-8 for forestry work. These low returns, however, very often accrue to household members (the unemployed, old people, some women and children) who would not always gain paid employment in the formal sector of the economy. Finally, it is worth noting that, in Orissa, those villages which are located near to local markets generated almost twice the incomes that accrued to villages further away (Table 6.10). This reflects the importance of the kendu leaf-bidi trade in Orissa (see later). In Bihar this expected relationship holds only in Ranchi District (Table 6.11). In West Singhbhum District the proximity effect was outweighed by questions of forest quality and income need or opportunity. (In Ranchi District, too, it is likely

that forest quality and income opportunity factors would have weighed more heavily were it not for the fact that villagers from Baridih were taking advantage of their proximity to Bero market to sell large quantities of rice beer herbs for a good price). [Data sets on ethnicity and incomes from NTFPs proved inconclusive: see Table 6.12. The mean income earned by sample non-tribal collector-sellers in the Orissa study area was Rs 1472.13 in 1997-8, which is considerably more than the mean incomes earned by tribal collectors-sellers (Rs 813.98). This discrepancy can be explained by the monopoly which non-tribal households in Orissa exercise over the bidi trade].

Table 6.8

Returns to Labour from NTFP collection and processing, Bihar

NTFP finished item	Raw item	Finished item as % of raw item	Raw item unit (kg)	Time consumed in collection, processing and marketing (hours)							Rate of finished item (Rs/kg)	Return on labour (Rs/day)
				Collect	Dry	Clean	Crush	Work	Market	Total time		
Sal seed	Sal fruit	55	40.0	8	1	1	4	4	8	26	1.50	10.15
Chironji	Piar fruit	8	15.0	8			8	16	2	34	180.0	50.82
Karanj seed	Karanj fruit	35	20.0	8			6	6	2	22	2.75	7.00
Mahua flower	Mahua flower	30	20.0	8	4				4	16	5.50	16.50
Dori	Mahua fruit	30	40.0	8				16	8	32	7.00	21.00
Kusum seed	Kusum fruit	60	60.0	8			2	3	8	21	2.00	27.43
Harra ruts	Harra fruit	50	20.0	8					2	10	1.50	12.00
Bahera nuts	Bahera fruit	50	20.0	8					2	10	0.70	5.60

Source: field surveys (see Appendix 6.1 for assumptions and methods of calculation)

Table 6.9

Returns to Labour from NTFP collection and processing, Orissa

NTFP finished item	Raw item	Finished item as % of raw item	Raw item unit (kg)	Time consumed in collection, processing and marketing (hours)					Rate of finished item (Rs/kg)	Return on labour (Rs/day)
				Collect	Drying and/or cleaning	Crushing, working, working	Marketing	Total time		
Sal seed	Sal fruit	55	28.0	8.5	1 1	11	3	24	1.50	5.60
Char kernel	Char fruit	11	15.0	10		12	3	25	170.0	89.76
Kusum seed	Kusum fruit	60	30.0	8.25		2	4	14.25	3.00	18.00
Mahua flower	Mahua flower	30	25.0	8.5	2		2	12.5	5.00	23.00
Mahua seed	Mahua seed	30	38.0	8.8	2	8	3	21.8	6.50	24.70
Kendu leaf	Kendu leaf	100	600	8.5	2		4	14.5	Rs 15 per 100 keri	48.00
Sal plate	Sal leaf	95	1000	5	2	12	2	21	Rs.50 per 1000	19.04

Source: field surveys (see Appendix 6.1)

Table 6.12

Income differences in near and far market villages, Orissa

	Income (Rs)		Amount Sold (kg)	
	Far	**Near**	**Far**	**Near**
Bamboo	4105	568		
Bidi	14078	64803	471160	2251900
Char seed	380	484	38	60
Gum	70		6	
Khajur mat			92	3
Khajur grass	1373	232	8	
Mahua flower	13340	13046	2347	2572
Mahua seed	1353	1490	389	311
Mango seed	1353	232	1054	
Masia kanda				
Mushroom	1343	1122	50	84
Myrobalans	15			
Pitalu	345		50	
Sal plate	6958	26820	92940	465580
Sal resin	465			
Salseed	2070	2461	1013	1449
Siali fibre	1020	608	96	108
Siali leave	37	2691		
Tamarind		620		140
Tendu leave	45273	59460	357124	342085
Wild vegetable	30	874	8	48
Total	93607	175511		

Source: field surveys

Table 6.11

Sale Incomes from NTFPs: Proximity to Markets, Bihar

District	Location	Income (Rupees)
Ranchi	Near	25751
Ranchi	Far	17714
West Singhbhum	Near	54700
West Singhbhum	Far	129673
Ranchi and West Singhbhum	Near	80450
Ranchi and West Singhbhum	Far	147387
Ranchi District		43464
West Singhbhum District		184373

Source: field surveys

Table 6.12

NTFP incomes (Rs) of Tribal and Non-Tribal Collectors, Orissa

	Non Tribal		Tribal	
	Total	**Mean**	**Total**	**Mean**
Bamboo	248	2	4425	34
Broom		0		0
Bidi	76992	706	1889	15
Char Seed		0	732	6
Chew Stick		0		0
Gum		0	70	1
Khajur Grass	60.	1	1545	12
Kusum Seed		0		0
Mahua Flower	11395	105	14480	112
Mahua Seed	1008	9	1600	12
Mango Seed	336	3	1249	10
Masia Kanda		0		0
Mushroom	1463	13	962	7
Myrobalans	15	<1		0
Pitalu	173	2	172	1
Sabai Grass		0		0
Sal Plate	10687	98	21932	170
Sal Leave		0		0
Sal Resin	465	4		0
Salseed	2709	25	1796	14
Siali Fibre	856	8	710	6
Siali Leave	1021	9	1600	12
Tamarind	295	3	310	2
Tendu Leave	51985	477	51382	398
Wild Vegetable	755	7	149	1
Total	160462	1472	105003	814

Source: field surveys

6.2.2 Local Markets

Only a minority of the NTFPs collected and marketed in Bihar and Orissa find their way to distant States, or give rise to significant opportunities for processing or value addition. Seven such products are described in the next section. The purchase and sale of most NTFPs is organised through the weekly *hats* that serve as the marketing hubs of rural India. Some products are also sold directly to government agents or to the depots of designated lessees.

The village *hats* of eastern India serve on average some 15-20 villages across an area with a radius of 10-20km^2. Data were collected on NTFP sales from 13 weekly village markets,

seven in Bihar (at 5 different sites) and six in Orissa. As expected, the number and quantities of NTFPs traded at different markets varies widely, both as between market-places and over the collecting year.

Table 6.13 provides an overview of local market operations in Bihar. 37 NTFPs are listed here and data are provided on gender relations, quantities brought to market, unit prices, and on the possibility that purchasers might consider paying a higher price. In the case of ber, the field enumerators in Bihar recorded a total of 1543 female sellers and 401 male sellers of the fruit during the course of the year. Ber was traded in all 52 weeks of the year, and female sellers were present on 51 occasions (male sellers were counted on 24 occasions). The number of female sellers per market ranged from 2 to 300, with 30 women being the average attendance. Roughly 45,000kg of ber were brought to the 7 markets in Bihar which were studied throughout one year. The fruit was always available for sale, even though buyers were counted by the enumerators on only 28 (of 52) occasions. [The data column which records the number of buyers is unreliable. It proved impossible to measure this in the field, except as an order of magnitude]. The main buyers of ber were villagers and small traders, although agents and shop-keepers also purchased the fruit. In the case of ber, but not in the cases of aonla or broom or many other traded NTFPs, agents and traders were able to purchase the fruit at a lower average price (Rs. 1.6-1.8 per kg.) than shopkeepers or villagers (no home sellers were recorded). Demand for ber was sufficiently high on occasions that all purchasing groups declared a willingness to pay a higher price (perhaps 5 per cent more). The most common (or modal) price paid by a trader for ber was Rs. 1.5 per kg.; for villagers it was Rs 5.0 per kg.

For all the factual data in Table 6.13, it is hard to establish consistent or significant patterns in the local marketing of NTFPs in Bihar. More often than not, it is women who are most actively involved in the sale of NTFPs. This is the case for ber, bhelwa, broom, chewsticks, wild tubers, fodder grass, jirhul flowers, kachnar flowers, bamboo shoots, kend fruit, bamboo splints, mushrooms, koinar flowers and leaf vegetables, piar, phutkal leaf vegetables, rice beer herbs, puffballs, sal leaves and sal seeds. But men are active sellers of dori, karanj oil, kusum seed, ber lac, kusum lac, palas lac and matasura fruit, and they share the selling of products like tamarind, khijur leaves and sabai grass with women. For most NTFPs it is not the case that local agents and traders (many of whom are small in scale and not geared up to enforcing local monopsonies) are able to purchase traded products at prices that are significantly below the prices paid by other villagers or shopkeepers. Shopkeepers, indeed, are often able to drive a good bargain with sellers, a fact that was explained to us in terms of their consistent appearance in the market-place. In terms of quantities traded, it is clear that mahua flowers, tamarind, karanj seeds and ber lac are ‘major’ NTFPs, with piar kernels (chironji), broom, chewsticks, ber and sal leaves also being important. These NTFPs are

sometimes traded in markets like Bero or Murhu en route from the village *hat* to larger market-places like Chakradharpur or Calcutta.

In Orissa, the quantities traded in 6 weekly markets are listed in Table 6.14. 48 traded NTFPs were identified in these six markets; Harichandanpur market in Keonjhar District offered the most NTFPs (21) for sale, and Bamur *hat* in Angul District the lowest number. In terms of the amounts sold, mahua flowers proved to be the most important in Orissa (46 tonnes in 1997-8), followed by sal seeds (15.8 tonnes), and tamarind (15 tonnes).

Table 6.14

Variety and amount of NTFPs trading in 6 weekly village markets in Orissa (kg, nearest whole number, unless stated)

NTFP	Amount	NTFP	Amount
Akana (in bundle)	20624	Kendu	195
Amba sada	30	Kula	112
Ambula	1245	Kusum oil	705
Amla	600	Lac	2
Bahera	100	Mahua cake	247
Bambo basket	2539	Mahua flower	46425
Bhalia	314	Mahua oil	257
Binchana	25	Mahua seed	2965
Broom	3178	Mushroom	100
Bamboo	20.	Medicinal plant	454
Bidi	2500	Pitalu	535
Bojha (no.)	125	Patalgaruda	7
Cashew nut	15	Resins	383
Charseed	1421	Sabai grass	1483
Dala (no.)	54	Sal leaf (bundle)	3161
Gandua (no.)	61	Sal seed	10633
Gum	248	Saltwig	993
Harra	548	Siali fibre	722
Bamboo shoot	170	Siali leaf	786
Khajur broom	1476	Sabairope	38
Khajur mat	2469	Tamarind	15872
Karanjseed	290	Vegetable	30.
Kusum seed	865	Mango kernel	2431

Source: field surveys

There are clear seasonal trends in the quantities of NTFPs sold (Table 6.15) as well as in the prices paid for them. Myrobalans are mainly traded in winter, or in the January-February production season. In Orissa, myrobalans are sold by the collectors to the lessee in the market-place. Mahua flowers, in contrast, are traded throughout the year and in quantities

that broadly reflect market prices. Many poorer collectors are forced to dispose of their stocks in May-June as the mahua flowers are gathered. Better off villagers and small traders are able to store the product and sell it later in the year at a higher price. Sal leaves and mahua seeds are traded throughout the year, while most of the oil seeds (kusum, sal, mango and char) are traded during the summer only.

Table 6.15

Seasonal fluctuations in the sale of major NTFPs in 6 weekly markets, Orissa (nearest kg)

NTFP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Amla	167	164	123	146								
Akana root	5910	3700	2656	4822	3168	68						
Bamboo basket	191	81	75	127	1514			54	100	152	216	29
Broom	305	340	230	730	586	330		70	116	214	157	100
Char seed				72	991	358						
Gum	412	324	382	489	320					4	520	28
Harida	115		165	53	173							
Khajur mat	174	416	368	668	335	323	72				2	
Karanj seed				90	210	30						
Mahuaflower	189	354	803	14056	22971	4210	670	274	1416	987	181	245
Kusum seed			61	286	16	444			51			7
Kusum oil	18	105	1523	2459	2786	75	13		31	15	10	17
Mahua oil	19	9	27	17	80	81	4		20			
Mahua seed	94	50	97	71	653	145	74	114	1090	307	115	155
Resins		59	127	102	65							
Sabai grass	231	214	254	391	46					330	7	10
Sal leaf	36	92	58	2043	203	80			140	150	149	210
Sal seed	20	50	360	24	2854	7275			50			81
Saltwig	132	139	234	109	92	182					24	
Siali fibre	448	21	136	69	45				48			
Siali leaf	5	22	20	739								

Source: field surveys

The prices paid to primary collectors vary widely as between products and market-places, and during the course of the calendar year. Tables 6.16 and 6.17 capture some aspects of this price seasonality for a selection of NTFPs in Orissa. There is no reason to suppose that the data from Bihar would tell a different story of price fluctuations, whether this be across the calendar year or in terms of maximum and minimum prices for a selection of NTFPs sold by primary collectors in the weekly markets.

Table 6.16

Seasonal fluctuations in NTFP prices (Rupees) in weekly *hats*, Orissa

NTFP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Amla	1.00	3.00										
Akana	2.50	2.75		4.00								
Char seed					170.00	180.00						
Gum	9.00	10.00	12.00	12.00						7.50	7.00	
Harida	0.75	1.00			1.25							
Karanj seed									2	2.5		
Mahua flower	5.70	6.00	7.50	9.00	7.50				4.50	4.00	5.50	6.00
Kusum seed									3.00	3.25		
Kusum oil	35.00	35.00	40.00	40.00	42.00	41.00						
Mahua oil	30.00		35.00	35.00	40.00		43.00		30.00			
Mahua seed	6.00	6.50	6.50	6.50				5.00	550.00	6.20	6.50	7.00
Resins	25.00	30.00	35.00	40.00	35.00							
Sabai grass (per bundle)										4.00	4.50	5.00
Sal seed						1.50	1.75					
Sal twig (per bundle)	1.00	1.00	1.50	1.00	1.00	1.00						
Siali fibre (per bundle)		0.75	1.00	1.00								
Tassar (per cocoon)									1	0.8	0.7	1
Mahua cake										0.75	0.6	0.7
Marking nut		0.75	1		0.8							
Tamarind		2.5	3	3.25								

(Price is per kg except when mentioned separately in col.1).

Source: field surveys

Table 6.17

Purchase price given to collectors in weekly markets, Orissa

NTFP	Minimum price (Rupees)	Maximum price (Rupees)	Most common price (Rupees)
Akana root (bundle)	2.5	5	
Amla	1	1.50	1
Char kernel	170	190	175
Chew stick (bundle)	1	1.25	1
Gum	5	13	10
Harida	0.75	1.25	1
Karanj seed	3	3.50	3
Khajur mat	30	40	32
Kusum oil	35	42	35
Mahua cake	0.75	1.2	1
Mahua flower	3	9.5	5.5
Mahua oil	30	45	35
Mahua seed	5	6.50	5.5
Mango seed	0.75	1.5	1
Marking nut	0.75	1.5	0.80
Mushroom	10	27	11.5
Sabai grass (bundle)	4	6	4.5
Sal leaf (bundle; 250 gm)	1	1.50	1.25
Sal resin	20	40	30
Sal seed	1	1.5	1.5
Siali fibre (bundle; 160 gm)	0.8	1	1
Tassar (per 100)	40	150	80

Source: field surveys

These price fluctuations correspond in part to supply and demand pressures, and to local ratios of buyers to sellers (see Table 6.18 for further evidence from Orissa). But this is by no means the full story. Primary collectors are sometimes disadvantaged in the market place by a lack of knowledge about market conditions elsewhere, or by the actions of unscrupulous agents, traders and merchants. Several of the people interviewed felt they had been cheated in terms of weights and measures; others complained about being paid for high quality products as if they were low-quality goods. But the agents or traders who are operating in the four study Districts are not able to distort market conditions to any great degree, and there is little evidence to suggest that excessive trading profits are being reaped at the expense of primary collectors. Most of the respondents felt they had a fair understanding of the operation of local NTFP markets, and of patterns of price formation. Local men or women know very well that market prices will be high when agents or traders are keen to buy their products by the roadside, or as they make an approach to the market area. They also glean information from friends and relatives about the prices that prevailed in the market-place a day or two

before, or in a nearby location. Some villagers close to Bero in Ranchi District, Bihar, have even made telephone calls to traders in Calcutta to see what the price there might be for 200kg. of peas. The analysis provided in Table 6.19 (for Orissa) further suggests that rates of profit of less than 15% are quite common for both traders and merchants in the study area. The main exceptions to this would seem to lie with those major NTFPs which are effectively monopolised by public or private traders, or which are significantly affected by political pressures (whether from organised political parties or extreme Left - Naxalite - groupings). Some of these NTFPs also support processing or value-addition activities which may or may not provide employment opportunities for primary collecting households.

Table 6.18

Number of buyers and sellers involved in trading major NTFPs: activity in weekly markets, Orissa

	Number of Buyers		Number of Male Sellers		Number of Female Sellers	
	Annual	Weekly Per Hat	Total	Weekly Per Hat	Total	Weekly Per Hat
Akana Root	657.0	19.3	316.0	15.8	114.0	6.0
Bahad	16.0	5.3	9.0	3.0	16.0	5.3
Char Seed	356.0	22.3	34.0	6.8	48.0	8.0
Harida	107.0	4.5	149.0	6.5	49.0	2.1
Khajur broom	61.0	4.7	12.0		41.0	2.0
Khajur mat	266.0	11.6	29.0	1.4	216.0	8.3
Karanj Seed	15.0	7.0	22.0	2.0	21.0	2.5
Kusum Seed	59.0	5.4	43.0	7.2	49.0	4.5
Kusum Oil	141.0	7.1	339.0	14.1	238.0	6.8
Mahua Cake	28.0	7.0	33.0	2.5	22.0	2.0
Mahua Flower	680.5	5.6	741.0	8.1	578.0	7.0
Mahua Oil	108.0	7.2	21.0	1.1	98.0	3.8
Mahua Seed	246.0	5.0	261.0	6.1	250.0	7.1
Medicine plant	32.0	3.6	38.0	4.8	8.0	1.6
Resins	28.0	3.1	24.0	3.0	52.0	5.8
Sabai Grass	71.0	5.5	208.0	9.9	125.0	5.7
Sal Leaf	400.0	23.5	60.0	5.0	151.0	3.1
Sal Seed	44.0	3.7	61.0	8.7	52.0	4.7
Tamarind	383.0	12.5	254.0	14.1	106.0	7.6
Tassar	480.0	13.0	251.0	11.4	98.0	14.0

Source: field surveys

Table 6.19

NTFP purchase prices for different levels of buyer, Orissa

(Rs/kg)

	Agent price	Trader price	% profit to agent	Merchant price	% profit to trader
Akana	2.5	3.5	40	4	14
Amla	3	3.5	17	4	14
Char Seed	170	175	3	175	0
Gum	10	10.5	5	12	14
Harida	0.75	0.9	20	1	11
Karanj Seed	2	2.5	25	2.5	0
Kusum Seed	3	3.25	8	3.25	0
Mahua Cake	0.75	0.85	13	0.85	0
Mahua Flower	5.5	5.75	5	6	4
Mahua Seed	6	6.5	8	6.5	0
Marking Nut	0.75	0.85	13	0.85	0
Resins	25	27	8	30	11
sabai grass (Per Bundle)	4	4.2	5	4.5	7
Sal Seed	1	1.5	50	1.5	0
Tamarind	3.25	3.5	8	3.75	7
Tassar (Per Cocoon)	1	1.25	25	1.5	20

Source: field surveys

6.3 Seven Major NTFPs

6.3.1 Kendu

The most important traded NTFP in Bihar and Orissa is the kendu leaf, which is used as a wrapper in the manufacture of country cigarettes or bidis. High quality kendu leaves can be plucked from bushes throughout the interior of Orissa (but especially in Bolangir, Sambalpur and Sundergarh Districts), and leaves of medium or high quality can be found in Palamau and Gumla Districts in Bihar. The quality of kendu (or tendu: Hindi) leaves in Bihar falls off in Ranchi and Hazaribagh Districts and in Santal Parganas.

Trade in kendu leaves is nationalised in both States. In Orissa, the kendu leaves trade is governed by the Orissa Kendu Leaves (Control of Trade) Act, 1961. This Act was passed in order to provide a measure of protection to collectors (vis-a-vis traders and manufacturers) and to regulate traded volumes. Nationalisation dates from 1973, when responsibilities for the collection and marketing of kendu leaves in Orissa was handed over to the Forest Department and the Orissa Forest Development Corporation (OFDC). The collection of kendu leaves is organised by the Forest Department. The FD divides each District into units and each unit contains a number of collection centres. Different prices can be fixed for the purchase of kendu leaves from different units, but the agent of the government is required to purchase all leaves brought for sale at the pre-determined rate (provided they meet the standard required for wrapping bidis). The collected produce is later handed over to the

OFDC. The OFDC sells its stock of kendu leaves at auctions in Sambalpur and Bhubaneshwar. Unsold lots are sometimes forwarded to Madras and Calcutta for auction there. The OFDC takes 7% of the aggregate sale value - 4% as commission, 2% for marketing costs and 1% for the maintenance of the central godown. The rest of the sale proceeds are appropriated as government revenues, or to cover collection costs. In Bihar, trade in kendu leaves is subject to the provisions of the Bihar Tendu Leaves (Control of Trade) Act, 1973, and is monitored by a Business Advisory Committee. The collection and marketing of kendu leaves in Bihar is organised by the Bihar State Forest Development Corporation (BSFDC). All traders and exporters of kendu leaves, and all manufacturers of bidis, are required to register themselves with the corporation. Registration requires the payment of a fee, the size of which is meant to depend on the scale of the collecting operation. The BSFDC in turn is meant to pay "royalties" to the GOB in lieu of a sole right of collection and marketing. (In practice it often fails to do so, for reasons which are explained in section IV). The royalty is fixed by the Government of Bihar each year in advance of the collecting season. There is no division of responsibilities between the Forest Department and the Forest Development Corporation, as there is in Orissa.

Although government plays a leading role in the kendu leaf trade in both States, private traders are heavily involved in the kendu leaf economy. Trade in kendu leaves begins at the village level. In Bihar, in the period from 1987 to 1994, the BSFDC set up temporary centres during the collection season (April-June) in designated collection villages. At this time, only the state or its authorised agent (BSFDC) was supposed to purchase kendu leaves from local primary collectors and private growers (right holders and non-right holders). But this system ran into difficulties. The BSFDC had problems in raising sufficient finance at the right time from the banks. Although the BSFDC worked at first with government seed money, in time it was forced to behave as a quasi-private agent, albeit one with limited credibility and a poor credit rating. The BSFDC had to pay a high rate of interest on the monies it borrowed. In addition, the organisation of the BSFDC at local level was weak. The Corporation found it hard to make regular payments to collectors at agreed wage rates, and its staff found it hard to maintain a proper system of coppicing in January and February. Quality controls were lacking and the quality of the product deteriorated. Merchants preferred to buy from other sources, most obviously in Orissa and Madhya Pradesh. The BSFDC faced particular problems in Chattra, Lohardaga, Palamau and Hazaribagh, where left-wing groups (Naxalites, including the Maoist Communist Centre [MCC]) put pressure on primary collectors not to deal with the state.

From 1994 the primary trading system in Bihar reverted back to an advance auction system not unlike the system that was in place before 1987. The advance auction system continues to vest control in the kendu leaf trade with the BSFDC. In practice, however, the BSFDC sells

off various collection areas, or 'units', to private traders, and it is the latter who are responsible for employing quality checks (on leaf size, drying arrangements, bundling, and so on) and for dealing with Naxalite groups.

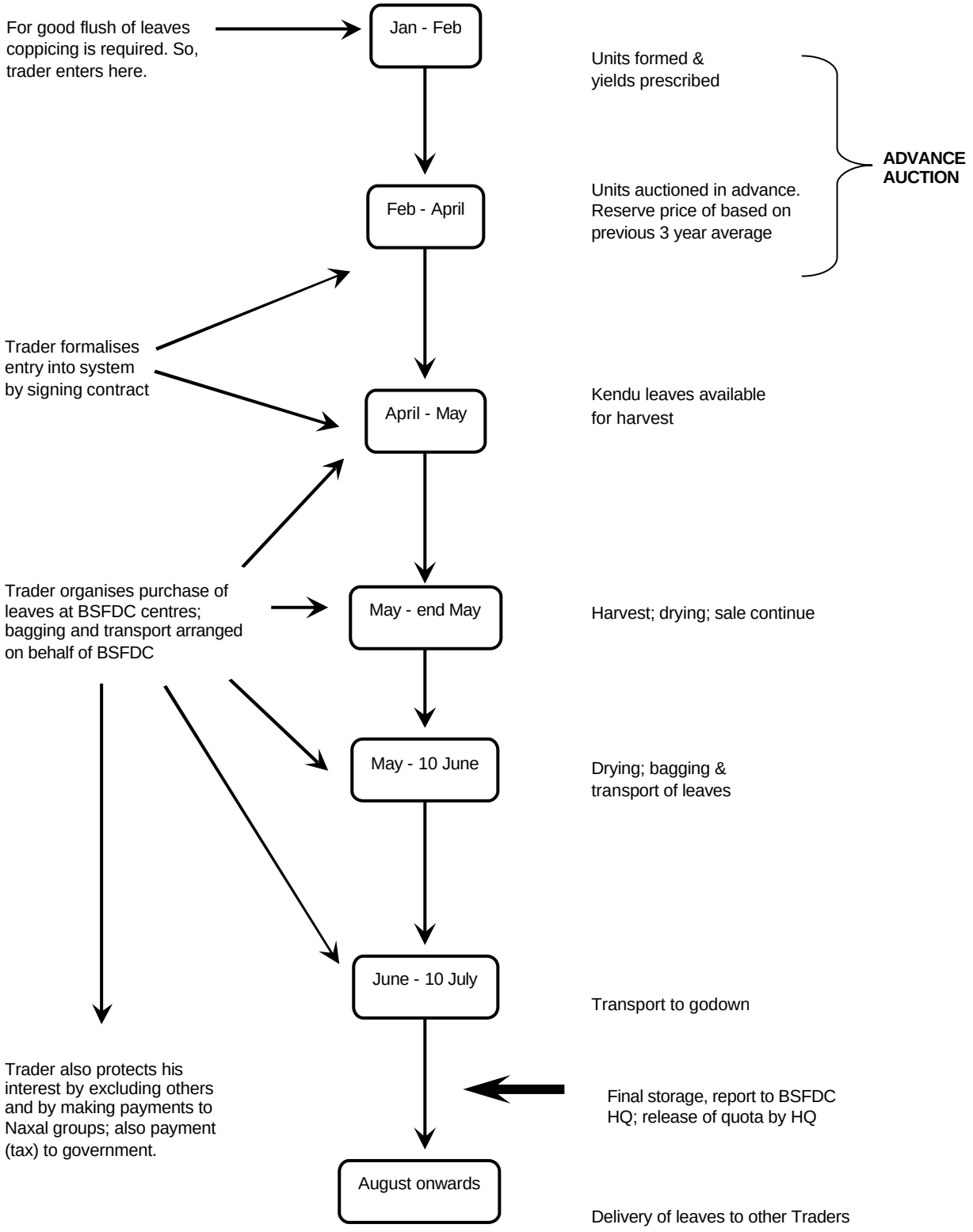
One of Bihar's main traders in NTFPs was interviewed near his Ranchi base. His family has been involved in the kendu leaf trade since 1985. He works mainly in Palamau and in Orissa. In Palamau it is common for this trader to take 20 or more Units at auction in one Block. Within each Unit, the trader establishes a working system during the collection season, and this is placed under the supervision of a Munshi (clerk) and his mate. Two or three further clerk-mate pairings are established in the Unit and one person will be employed in quality control. A decent Unit will provide 1000 standard bags of kendu leaf. (A standard bag is made up of 50,000 leaves, or 1000 bundles of 50 leaves). This trader aims to collect 30,000 standard bags per annum; 20,000 from Bihar and 10,000 from Orissa. His preference, increasingly, is for lower and lower-medium grades of leaves from Orissa. (In Bihar there is no grading of leaves; in Orissa, he may find some better leaves amongst his haul). Orissa offers him the advantage of bigger markets and more rapid turnover. In addition, he is not faced with the Naxalite problem that he identified in Palamau. Naxalites in Palamau have been seeking to fund their operations in part by a 'tax' on NTFP operations and the NTFP trade. In 1997 the Naxalites tried to impose a minimum wage of Rs 45 per 100 bundles, or Rs 450 per standard bag. This can be compared with an established minimum wage in 1997 of Rs 25(0).

It is significant that this trader is continuing to take Units on auction in areas of intense Naxalite activity. In part this reflects the contacts he has built up with local Naxalite members. He has also made a substantial investment in local networks of social capital, in terms of clerks employed, trucks rented and officials bribed. Just as important, however, are the profits that can still be made in the later phases of kendu leaf trading and even manufacture. The trader reported his costs as follows. Although the official rate of purchase of 100 bundles of leaves is meant to be Rs 25, the trader suggested that the true rate in Bihar was nearer to Rs 80 in 1997 because of Naxalite activity. (This sum is made up of Rs. 25 as official wages to the primary collectors, Rs. 45 as a payoff to Leftist groups, and Rs. 10 for staff salaries and other costs). The trader is then required to pay his clerks and mates at an official rate of Rs 15 per standard bag, although the actual wage rate he reported was Rs 30. The quality checkers in turn were paid in 1997 at the rate of Rs 3000-5000 per season (a sum which he could not recover from the BSFDC). By this stage his costs were running at close to Rs 500 per standard bag. His remaining costs included truck charges (15-20 trucks from different sources), loading and unloading, office establishment charges, the hire of village storage rooms, stitching and so on. The trader aims to adjust his costs to below Rs 21 per kg (1997 prices: the final price of traded kendu leaves is always quoted in kilograms) in order to make a profit. In Bihar, his deliveries are made to godowns registered with the BSFDC in towns like

Daltongang, Garhwa and Chakradharpur. In 1997, he was able to sell his leaves in Bihar at the rate of Rs. 1200-1250 per standard bag (or, more properly, at the rate of Rs 30-32 per kg: a standard bag of dry leaves will weigh between 35 and 40kg.: see also Figure 1).

Figure 6.1

Schematic Representation of the kendu leaf collection and trading system in the naxalite-affected areas of Bihar



Thus described, the collection and marketing of kendu leaves is a profitable business in Bihar for the few big traders (or trader-collectors) who dominate there. The advance auction system can lend itself to collusive behaviour among trader-collectors and government revenues are sometimes reduced as a result. Set against this, the advance auction system does impose a degree of risk on private agents, and removes this risk from government (see next section). Even if no collections are made from an auctioned Unit, the lessee is faced with a loss of non-refundable security monies (although this has led to a challenge in the Bihar High Court) and a 75% minimum guarantee of the estimated output. The private trader-collector also has to spend time filling out forms (for example, Transit Permits 1 – 3 which govern transport within Bihar, Transit Permit 4 which governs out-of-State transport), dealing with Naxalites, guarding against leakages, and so on: these are all issues for the trading community, elements of which also condemn the Forest Department for not recognising the higher collection payments that must be made over in 'liberated areas'.

These are legitimate areas of concern (although the higher payments to primary collectors in 'liberated areas' might be welcomed from a developmental point of view). It is clear that major kendu leaf traders in Bihar have other trading interests, and any attempt to exercise these options would impact on present-day patterns of employment in the kendu leaf economy. In the case of the principal respondent, his family has an interest in the (mahua) liquor trade, and he spends one week a year in Sambalpur, Orissa, acting as a kendu leaf trader. The leaves that he purchases in Orissa are sold to factories in West Bengal, including at least one owned by his extended family.

This example of integration in the kendu leaf trading and manufacturing system is not uncommon. In 1997, all nine lots (Units) in the Simdega East and West ranges were taken on lease by traders from Madhya Pradesh. Kendu leaves from Simdega are on a par with the best leaves from Orissa. Traders from Madhya Pradesh may face certain problems in terms of start-up costs, but they do not pay the Bihar Sales Tax at 12%; rather, they pay at the MP rate of 4%. The largest lessee in 1997 was BK Enterprises, which contracted for 19,540 standard bags.

It is in Orissa, however, that the kendu leaves trade is most important, both in terms of volumes of leaves collected and traded and in terms of revenues earned and shared between different economic agents (including government). In Orissa, the government earns about Rs 100 crores per annum from kendu leaves, although this figure is beginning to decline after two decades of steady growth. In Orissa, too, the government (through the Forest Department) is more intimately involved in the kendu leaf economy than is its counterpart in Bihar.

The standard unit of collection of kendu leaves in Orissa is the *keri.* One *keri* of leaves comprises 20 green leaves with two cover leaves. In 1973 the fixed price for one *keri* was 1 paise; in 1998 it was 13-14 paise. Prices are fixed by a government advisory committee. The committee must take account of prices in the three preceeding years, the quality of the produce in a given unit or area, transport facilities, and wage levels for unskilled labour.

In Orissa all kendu leaves are sold to the OFDC, but it is the Forest Department which is responsible for cutting, collecting, processing and storing kendu leaves. The season starts in late-February when kendu leaf bushes are pruned. 45 days after cutting collectors start to pluck the ripe leaves. Pluckers are recruited from designated or nearby villagers and are supervised by a Munshi-Chaprasi pairing (as in Bihar). The Mushis and Chaprasis are recruited and trained by a Forest Department range official and his staff (unlike in Bihar). Most plucking is carried out in days 45-50 and between 8 and 10 in the morning. The leaves are bundled up in local houses and the *kerries* are brought to a designated drying place for sale in the late afternoon. The initial trade is conducted by means of a book entry system. Cash is paid to the primary collector at the end of the plucking season (or by arrangement), and there is often a gap between purchase and payment by the OFDC. In Orissa, unlike in Bihar, kendu leaves are separated into four grades or qualities. This operation is carried out by specialist families who live at the storage sites while they carry out their work. In 1997 they were paid at the rate of Rs 5 per bundle (5 kgs). Twelve bundles are combined to make a bag (60 kg) and 100 bags are sent on to the OFDC. The OFDC auctions lots of 100 bags in Sambalpur (mainly); bags can be of single quality or mixed quality.

These initial 'trades' provide a useful wage to primary collectors in the agricultural off-season. Couples (or families) involved in grading and bundling earn on average Rs 60-80 per day (1997), which is just in excess of the Rs 30 per day offered for unskilled manual labour. This wage rate is improved by the offer of Rs 20-30 of grain from the Kendu Leaves Division of the Forest Department (via the World Food Programme) in exchange for a Rs 10 decline in cash salary; an effective daily family wage rate of about Rs 90 is not uncommon. Families involved in the grading and bundling of leaves face greater health hazards than primary collectors. The threat comes from insecticides and from the powder that is put on stored leaves to guard against white ants.

As ever, the big money is made elsewhere in the kendu leaf trading and manufacturing economy. Once the kendu leaves have been bound into bags (and the binding season lasts from May to January), they are taken by the FD to central godowns where they are handed over to the OFDC for sale. The OFDC holds auctions in Sambalpur every 45 days. Lots of 100 bags (weight: 60 quintals) are sold according to published notices and in four grades. The leaves remain in godowns throughout the major collection zones; sales are conducted on the

basis of trust, precedence, inspections elsewhere and an established right of appeal which allows for the cancellation of a contract. All bags are given serial numbers and a list of serial numbers is circulated from the OFDC's head office in Bhubaneshwar to all registered kendu leaf traders. The auctions are conducted by General Managers of the OFDC. Interested parties have to pay a lump sum registration fee of Rs 10,000 to take part. The General Manager has a certain degree of freedom when it comes to accepting offers below the minimum declared price at auction. He can authorise sales up to 10% below the stated minimum price if the market is poor, or he can keep all sales provisional and refer back to the OFDC's head office. A Director of the OFDC in Bhubaneshwar can authorise sales at up to 15% below the stated price; the Managing Director has authority to allow sales up to 20% below the designated price. Price falls in excess of 20% have to be authorised by a committee of the OFDC sitting in Bhubaneshwar.

About 200 traders will attend an auction, including perhaps 80 major traders. One major end-user of kendu leaves is Kerala Dineshbidi, which needs 40-50,000 quintals (4-5,000 metric tonnes) of leaves annually and which buys mainly or exclusively from Orissa. This company buys, directly or through its trading agents, almost one tenth of the total sale of 500,000 quintals of kendu leaves which the OFDC oversees each year (and which in theory comprises the total production of kendu leaves in Orissa). In 1997, the average sale price of a quintal of kendu leaves was Rs 3000, which suggests a total traded value of £25 million in the State of Orissa. Of this sum, 20% is supposed to be returned to Community Development Blocks as 'Kendu Leaf Grant Welfare'.

The market for kendu leaves in Orissa is by no means unitary, nor is its future rosy. Three main groups contend for leaves at auction: exporters, large manufacturers, and intermediaries (traders and some smaller manufacturers). The latter are well organised politically in Orissa and seek to keep prices low through the Kendu Leaf Purchasers' Association. Some of their members come from Gujarat (mainly Marwaris) and West Bengal, as well as from Bihar, Orissa and Madhya Pradesh. The major manufacturers are also keen to cap raw material prices, and there is some evidence that they have set up cartels of registered traders to keep prices low. Their incentive to behave in this way has been heightened by the substitution of cigarettes for bidis across India, and by government campaigns against smoking. The employment of men and women in bidi production in Orissa is in any case rather low. West Bengal, Kerala and Tamil Nadu have each stolen a march on Orissa (and Bihar) in establishing a bidi industry, and these States (or their major companies) have refused requests from OFDC for training in wrapping bidis to be provided for kendu leaf collectors in Orissa. In Kerala, strong labour unions protect local workers against the export of jobs to kendu leaf producing States.

The major bidi manufacturers in Orissa are the Meghna Bidi Industry and CJ Patel (both in Sambalpur). Neither company is as large as Mangalore Ganesh Bidi or Kerala Dineshbid, and Meghna is a subsidiary of a company founded in present-day Bangladesh in 1945 or 1946. Its head office is in Calcutta. Meghna (Sambalpur) has an annual turnover of about Rs 160 crores, against a total company turnover of perhaps Rs 450 crores. Although Meghna factories are supplied only with leaves from Orissa, the company keeps factories in West Bengal and Bihar "because skilled bidi rollers are at a premium and can be found there" (interview). The company would consider using leaves from Madhya Pradesh if they were properly graded and of high quality. As regards the production process in Orissa, Meghna obtains its tobacco from a sister company, provides the tobacco to its rollers in Sambalpur and nearby villagers (homeworkers), and then buys the bidis back from its contractors. In its Sambalpur factory, men and women are employed to dry the still moist bidis in cupboards heated by charcoal, to toast the bidis for about five minutes over a coke oven, and to pack and box the bidis (for which they are paid about Rs 80 per day, including a bonus and a contribution to a Provident Fund). The company in Sambalpur buys about 35-45,000 bags of leaves per annum, mainly from Balangir. In early 1998, bidis were sold by the company at Rs. 108 per 1000 to wholesalers (or 40 packs of 25 bidis); the open market (retail) price was upwards of Rs 120 per 1000 depending on quality. Conditions for workers in the Sambalpur factory are generally good.

6.3.2 Sal Seeds

Trading in Sal seeds is also nationalised in Bihar and Orissa, and these two States are joined by Madhya Pradesh as major producing regions (followed by Assam, Uttar Pradesh and West Bengal). The trade in sal seeds in Bihar was nationalised in 1984. Under the Bihar Forest Produce (Regulation of Trade) Act, 1984, the BSFDC is the sole collection agent in the State. The BSFDC began trading in sal seeds in 1977. The collection charge (or procurement rate given to the extractors) was Rs 1.30 per kg in the early 1990s, and this was raised to Rs 1.5/kg in 1995. The share of revenues that ends up with Bihar's primary collectors is estimated officially at 34-36%. This study suggests a rather lower share, and it remains the case that the BSFDC has a poor record of disposing of its products (and not least when compared to Orissa).

In Orissa the sal seed trade is governed by the Orissa Forest Produce Control of Trade Act, 1981. Section 2 (c) of the Act makes sal seeds a specified forest product, thereby creating a state monopoly in the trading of sal seeds. The procurement of sal seeds was vested in the OFDC and the TDCC in 1983. The OFDC was appointed the sole agent in 1991. Since 1996 private companies which extract sal oil, Orissa's solvent extraction plants, have also been appointed as 'raw material producers' for the OFDC and TDCC. Collection charges in Orissa are fixed on the advice of an advisory committee. The committee includes: (a) two members

from amongst the traders of the product, or manufacturers of the goods in which sal seeds are used as a raw material; (b) two members of the growers of forest produce; and (c) one Scheduled Tribe MP, one Scheduled Caste MLA. In 1997, the minimum collection price was fixed at Rs 1.75 per kg. The principal costs borne by raw material processors are: (a) a minimum collection charge; (b) a transportation charge; (c) the cost of hiring a godown; and (d) a sal seed treatment charge. Solvent extraction plants are not supposed to sell unprocessed sal seeds outside the State, or to engage in branch sales to evade sales tax. All seeds must be processed within Orissa. If any industry fails to collect the quantity of sal seeds as per the contract with the OFDC or TDCC, the industry must pay a penalty at the rate of Rs 50 per tonne. If the collection is greater than the quantity agreed in the contract, the rate of royalty is reduced to Rs 25 per tonne for the quantity collected in excess.

This is the official story. What is of more interest in Bihar and Orissa is the unofficial story of the sal seeds trade. In Orissa, this story is bound up with the links between major solvent extractors and the government. The major extractors are also linked to the primary collectors through an agency system which allocates particular areas to the OFDC, the TDCC or particular manufacturers at collection time (May-June). In Orissa about 50,000 metric tonnes of sal seeds are collected each year (albeit with significant yearly variations). Some basic processing is also done by the primary collectors. This is mainly the work of drying and removing the wings from the seed. The collected seeds are then sold by the OFDC to local manufacturing units, or, just as likely, sold back to the same manufacturing concerns that were involved in organising the collection of sal seeds.

The state earns its money from the differential it charges on purchased and onward prices for the sal seeds. This could be as much as Rs 2.25 per kg if the onward price is Rs 4 per kg (as it often was in 1997). But the differential could be lower. In practice, the OFDC is now trusting the bulk of its collection activites to Utkal Forest Products. This is formally described as a joint sector venture, but it is mainly in the hands of Mr Lath, the owner of Orissa Oil Mills, which in turn is the company charged with solvent extraction activities in Orissa. It is widely believed that Mr Lath made his fortune in the 1970s selling sal fats abroad through a front organisation in Bombay. It is further alleged that Orissa Oil Mills' monopoly on sal seed extraction was bought by Mr Lath from the Congress government of Orissa in the 1990s. This monopoly will probably survive the incorporation of Utkal Forest Products into TRIFED (a central government undertaking) in 1998. Even if it does not, the damage has been done. Rival companies, including Saraswati Oil Mills, have had to shut down some of their oil processing capacity for want of sal seeds to process. Saraswati Oil Mills finds itself in the strange position of challenging UFP in the High Court of Orissa even as it depends on UFP for the bulk of its sal seed needs. Unsurprisingly, Saraswati Oil Mills has faced difficulties in meeting the needs of its major customer, Hindustan Lever in Bombay, and much of its

present energies are being directed to the collection of mahua seeds and the production of medicines for Himalayan Drugs (Dehra Dun) from tree bark. The production of sal seed oil, whether for soap making, as an input to animal feeds, or as a substitute for cocoa butter, has been hit by the importation of palm oil substitutes from Malaysia, Nigeria and Japan. The decline in traditional markets for sal seed oils is being addressed nationally by the Solvent Extractors' Association of India, which has its own website (http://www.seaindia.com) and which is exploring possible link-ups with major foreign firms like Cargill and Louis Dreyfus. Orissa's solvent extractors maintain some links with this national association and are active in the Eastern India Oil Industry and Trade Association, which is based in Calcutta.

In Bihar, the gap between the official and unofficial stories of the sal seed economy opens up first at the village level. In theory, the BSFDC is supposed to open collection centres at all those village *hats* where villagers sell sal seeds. In practice, this doesn't happen. BSFDC is short-staffed at the best of times, and the peak period of sal seed collection coincides with the end of the kendu leaf season. In recent years administrative delays at the BSDFC's headquarters, and at the regional level, have extended the kendu leaf season well beyond June, which has impacted on the capacity of the BSFDC to fix targets for sal seed purchases in the same season. In this context, unsurprisingly, the clerks appointed for collection purposes by the BSFDC very often go into business on their account as traders, buying sal seeds in 1997 at a market rate of Rs 1.20 per kg instead of at the official rate of Rs 1.50 per kg. The clerk-trader then returns his seeds to the BSFDC's office/godown up to the target amount, and sells any excess, directly and illegally, to seed oil extraction or pressing units.

Some idea of the scale of this illegal trade can be gained from Tables 6.20 and 6.21. Table 6.20 compares the recorded (official) collections of sal seeds (metric tonnes) in the Bandgaon study area with the quantities which were estimated in this study were brought for sale in the 1997-98 season. The figures are very rough and ready, and they remain incomplete. It has been calculated, even so, that about 6.7 metric tonnes of sal seed were brought for sale in just one of the seven major market-places in Bandgaon block in the 1997 season. If it is assumed that this particular (surveyed) market-place is not unrepresentative (a fair assumption), and if it is assumed that no more than fifty per cent of the unofficial trade in sal seeds is carried out in the market-place, it can be estimated that the total sale of sal seeds in Bandgaon block was of the order of 80-90 metric tonnes (or nearly ten times the official collection figure). This figure tallies with information collected from 122 sample households in the Bandgaon study area. These 122 households generated 3801 kg of sal seed for sale. If there are 60 villages in the Block, and that a typical village has 60 households, this suggests a total collection-for-sale figure of about 100 metric tonnes. It also tallies with information on sal seed production levels in Bihar (Table 6.21), even allowing for the fact that annual

production and collection totals vary significantly (see Table 6.22 for official collection estimates) and that yields in 1998 were very low.

Table 6.20

The Official and Unofficial Trade in Sal Seeds in Bihar, 1997 Season

1997 Season	Collection by BSFDC (metric tonnes)*	Quantity brought for sale in weekly markets**
Bandgaon	9.0	6.7
Tebo	1.3	
Gowal	0.6	
Rogod	1.0	
Lodhai	0.4	
Chakradharpur	2.0	
Sonua	4.0	
Total	18.3***	

* BSFDC
** Survey data (metric tonnes)data
*** Purchased by Hanuman Minor-Oil Mills Limited, Raipur, Madhya Pradesh

Table 6.21

Estimates of Sal Seed Production in Bihar

Average number of sal trees per hectare in sal stratum *	Area of seed bearing sal stratum per hectare **	Average yield per tree of Sal seed in 1998 (Kg)***	Estimated Production (metric tonnes)
224.6	1,050,000	11.5	0.82 million

* Source: FSI (1979-81) [assume that 30% of sal trees are fruit bearing]

** Approximately *50%* of sal stratum bears dense vegetation (density in excess of 0.40. Sal area in Bihar is approximately 2.1 million hectares. Potential seed bearing sal areas is thus 1.05 million hectares.

*** Project's sample plot survey, 1998. Yields in 1998 were very low.

Nationalisation has worked very imperfectly (a point taken up later). Despite official rhetoric which maintains that: "In order to put an end to exploitation of tribals and raise their economic condition, the State Government nationalised the trade of sal seeds in 1977" (Government of Bihar, 1995, 83), it was the case in 1997 that tribals in Ranchi and Singhbhum Districts could sometimes earn as much as Rs 2.00-2.50 per kg. In the open market against an official collection rate of Rs 1.50 per kg and a 'distorted- official' rate of Rs 1.20 per kg. [The Board of Directors of BSFDC was considering in 1998 a proposal for increasing the official collection rate to Rs 2.5 per kg, which would bring it into line with Madhya Pradesh, where the official rate was Rs 2.00 per kg in 1997. It still remains to be seen whether the Government of Bihar will sanction this price rise. It also remains to be seen whether the BSFDC can increase its capacity for sal seed purchases in July, when it is carrying a large inventory of kendu leaves. As things stand, the BSFDC prefers to set low targets for sal seed purchases, precisely

because it is cash-strapped at collection time. The BSFDC is also hamstrung by high administrative costs, as Tables 6.23 and 6.24 begin to suggest].

Table 6.22

Collection of sal seeds in Bihar, 1977-1997

Year	Rate paid to collector (Rs/kg)	Collection of Sal seds by BSFDC (metric tonnes)	Year	Rate paid to collector (Rs/kg)	Collection of Sal seds by BSFDC (metric tonnes)
1977	0.40	14,948	1988	1.20	20,564
1978	0.40	390	1989	1.20	25,158
1979	0.40	6,888	1990	1.30	548
1980	0.45	1,542	191	1.30	6,248
1981	0.55	11,519	1992	1.30	6,109
1982	0.75	2,630	1993	1.30	4,659
1983	0.90	21,186	1994	1.30	1,200
1984	0.90	2,842	1995	1.50	4,600
1985	1.00	21,537	1996	1.50	1,000
1986	1.20	13,554	1997	1.50	4,700
1987	1.20	13,934			

Source: BSFDC

* In 1995-6 the rates paid (Rs-kg.) in Orissa, West Bengal and Madhya Pradesh were 1.75, 1.70 and 1.60 respectively.

Table 6.23

Operational expenses of BSFDC on sal seed collection and marketing as a percentage of total operational expenses (1986-7 to 1991-2)

Expense head	1986 - 87	1987 - 89	1990 - 91	1991 - 92
Wages	80.0%	79.0%	59.4%	77.6%
Cost of bags	8.7%	10.0%	8.1%	13.0%
Insecticide	0.8%	0.6%	0.0%	0.0%
Transport	5.3%	6.4%	13.9%	5.2%
Storage	0.6%	1.1%	9.3%	0.8%
Contingencies	0.9%	0.4%	5.3%	0.7%
Payments to Munshis and LAMPS	3.7%	2.6%	4.0%	2.5%
Total	100.0%	100.0%	100.0%	100.0%
Quantity collected during the period (metric tonnes)	13,554	19,139	548	6,248

Source: Bihar State Forest Development Corporation: Annual Reports, 1986-7 and 1991-2

Table 6.24

Total Expenses of BSFDC on Sal Seed Collection and Marketing

Season	Quantity collected (tonnes)	Wages per tonne collected (A) (Rs)	Other costs (B)* (Rs)	Total Costs (A + B) (Rs)	Sale Rate (Rs/tonne)
1994	1,200	1,500	717	2,217	2,300
1995	4,600	1,500	717	2,217	2,350
1996	1,000	1,500	717	2,217	1,800
1997	4,700	1,500	717	2,217	2,765
Average	2,267	1,500 (67.7%)	717 (32.3%)	2,217 (100%)	2,304 (103.9%)

Source: Interview with Deputy Director (Marketing), BSFDC, Patna, 1997

* includes handling, transport, storage, contingencies, establishment expenditure, etc.

The secondary circuit of the sal seed trade in Bihar connects sal seed traders (legal and illegal) to the extraction plants which produce oils for use in the manufacture of soaps. As in Orissa, sal seed oils are mixed with mahua oil and a measure of kusum and karanj seed oils to produce an oil product that is used to make better quality soaps; poorer quality soaps use an oil product which contains less mahua oil. The de-oiled contents of the sal seed can be used as compounded cattle and poultry feed after the tannin has been removed. Oil yields from the solvent extraction process run at between 11 and 17 per cent in Bihar. Only one solvent extraction plant remains in operation in South Bihar: the Ranchi Solvent Oil Industry (a private Sector enterprise). Its capacity is 45 metric tonnes of raw material processing per day, but in 1997-98 it was running at about 40% of full capacity for just ten months in a year. Its owner blamed under-production on frequent power failures and on the difficulty of securing sal seeds on time and in sufficient quantity (something he blamed on nationalisation). The miller also reported shortfalls in mahua stocks or deliveries. The milling he is now engaged in is demand-driven, with his main customers being located in North Bihar, Assam and Delhi. Traders from Calcutta connect him to North Bihar and Assam; traders from Delhi arrange the Delhi supply routes. The miller also blamed the recent closure of two other enterprises - Bihar Solvents Limited, a public sector subsidiary of the BSDFC which closed in 1997, and Hariharganj Solvents Limited which closed in 1987 - on the inability of BSFDC to meet demands for sal seeds at peak periods. He further suggested that the BSFDC's preference for putting its entire stock of sal seeds on sale in one auction had damaged those millers (a majority of millers) who hold only small stocks of revolving capital. Millers have been forced to turn to 'unofficial' sources of supply, but here too they have faced supply difficulties in part because of the risks involved in this clandestine trade. For its part, the BSFDC has been forced to turn to non-Bihar purchasers of its sal seed stock. In 1997, for the first time, the main purchaser of BSFDC stocks was MIS Hanuman Minor-Oil Mills of Raipur in Madhya Pradesh. Bihar's remaining producer(s) are losing out to the much larger and more efficient firms which can be found in Raipur (Hanuman and M/S Sal Udyog Private Limited) and

Jagdalpur (M/S Bastar Oil Mills); firms which pay sales tax at 4% and turnover tax at 1% (as compared to 10% and 1% in Bihar). These firms are better placed than is the Ranchi Solvent Oil Industry to ward off the threat from imported palm oils (although both sets of enterprises are pushing for higher import duties on palm oil). They are also better placed to explore possible industrial uses for deoiled cakes of sal. The manurial value of these cakes is low (as compared to mahua and karanj deoiled cakes), but it is a sad commentary on the sal seed economy in Bihar that de-oiled cakes of sal are at present being burned in the mill(s) as fuel, a very uneconomic use.

6.3.3 Mahua Seeds

The mahua seeds trade is another example of nationalisation policies promising one thing on paper and delivering something rather different in practice. In Bihar, the trade in mahua seeds was nationalised in 1984, under the Bihar Forest Produce (Regulation of Trade) Act, 1984. The trade is supposedly entrusted to the BSFDC, which has been a player in the mahua seeds market since 1978. BSFDC'S own figures on collection rates and purchase prices in the (Bihar) mahua seeds trade are set out in Table 6.25 (for 1978-1997). In Bihar the declared price (Rs per kg) for mahua seeds is set by an advisory committee to the BSFDC. Once again, the recorded collection of mahua seeds in Bihar shows considerable variation year on year. The fruit of the mahua tree is collected in May-June. The mahua seed is recovered from the fruit once the outer rind (used as feed for cattle and goats) is peeled back and the seed coat is removed. The main uses of mahua oil (from the mahua seed) are as edible oils (usually low grade), soap manufacture (with other oils), medicines (for migraine relief, in antiseptics) and as an input to grease and polish (as at Waxpol Industries in Ranchi, where the consumption of mahua oil is about 1 metric tonne per month)

Table 6.25

Collection Rate and Purchase Prices, 1978-1997 for Mahua seeds in Bihar

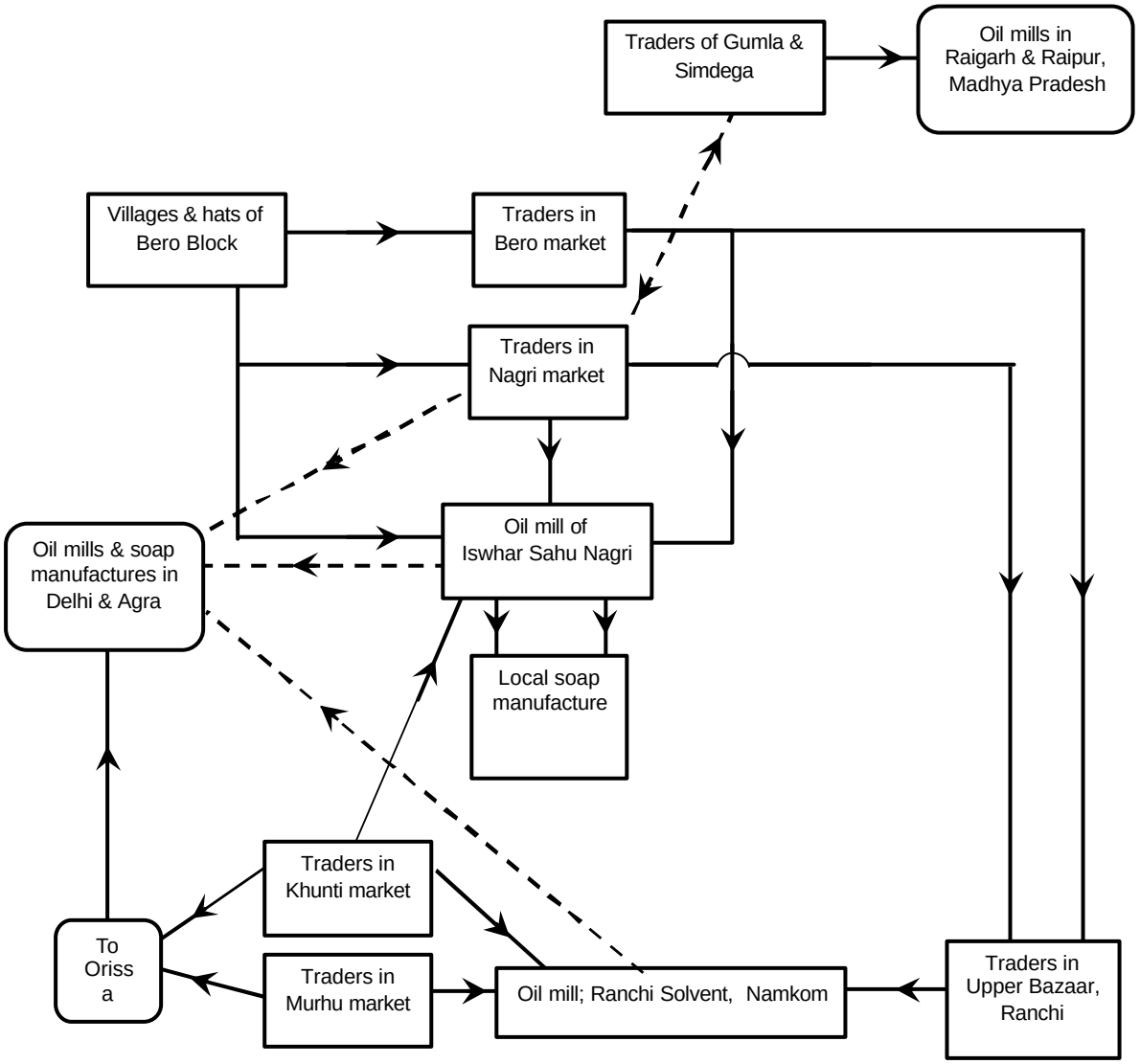
Year	Collection (tonnes)	Purchase Price (Rupees/kg)	Year	Collection (tonnes)	Purchase Price (Rupees/kg)
1978	757	2.50	1989	64	5.75
1981	1,646	2.25	1990	16	5.75
1982	470	2.25	1991	139	5.75
1983	110	2.25	1992	136	5.75
1984	714	2.75	1993	1,261	5.75
1985	2,153	3.50	1994	93	5.75
1986	907	3.50	1995	705	7.00
1987	34	3.25	1996	-	7.00
1988	27	3.25	1997	-	7.00

Source: BSFDC data

In Bihar, however, trade in mahua seeds is only loosely nationalised. Mahua seeds are sold more or less openly in village *hats* to local traders, and more or less clandestinely at subsequent points in the marketing system (as from storage or milling points to end-users). The organisation of the mahua seeds trade in Bero Block is roughly described in Figure 2. Typical prices paid in 1997 would be as follows: Rs 5-6.00 per kg to the villagers/primary collectors; Rs 6-7.00 to village petty traders; Rs 7-7.50 to the small traders of Bero town; and Rs 7.50-10.00 to stockists in Upper Bazaar, Ranchi.

Figure 6.2

Schematic representation of the Mahua seeds trade in Bero Bock, Ranchi District, Bihar 1997-98.



The stockists in Upper Bazaar and the oil millers of Ranchi and Nagri maintain that they are not involved in the mahua seed (oil) trade; at any rate, that there is their official line. Off the record, some millers will admit that they produce mahua seed-oil, and that they are forced to

buy their stocks of seeds from private traders precisely because the BSFDC is making too few purchases in the market-place. Some millers expressed a preference for a more effective monopoly of the mahua seed trade by the BSFDC. The larger millers pointed out that they could buy seeds from the BSFDC at Rs 7.50/kg when the BSFDC had stocks to sell; at other times they had to pay Rs 9-10.00 to private traders in order to meet their orders from end-users. It seems likely that the milling of mahua seeds is not especially profitable (nor very predictable in terms of seeds supplied). The rate of oil extraction is 32% oil from mechanical pressing, and 40% from solvent extraction processes. The price of a kilo of mahua seeds, however, inclines some millers to mix sal oil with the mahua oil, such is the low rate of return on the milling of mahua seeds. (It is estimated that the cost of 100 kg of mahua seeds would be around Rs 900 in 1998, including tax and transport costs. If the cost of milling is Rs 50 per 100kg, the total cost per 100 kg is Rs 950. The income stream is estimated as follows: 40kg of oil at Rs 24/kg (Rs 960), plus 55kg of de-oiled cakes at Rs 1.50kg (Rs 82) = Rs 1042 per 100kg of seed).

The situation in Orissa is somewhat different. Prior to 1991 mahua seeds were procured by the TDCC or by traders who had taken leases to marketing rights for specific forest divisions in an open auction system. In addition to paying a royalty, the traders had to pay a minimum price to the collectors (this price being fixed by the government). The system was abandoned in 1991 when a monopoly lease in mahua seed trading was given to Utkal Forest Products Limited. The company was given an exclusive right to purchase mahua seeds in Orissa - mainly from local *hats* - on condition that the raw materials would be processed within the State. The oil was then earmarked for sale to TRIFED and other industrial users. The company was also required to pay a minimum royalty to the government regardless of the levels of seed production or collection that obtained in a given year. This clause was meant to give the government an assured stream of incomes, but the new policy has not been successful. UFP's monopoly on purchases has kept prices low. In 1998 the price for mahua seeds reached Rs 8500 per metric tonne in Madhya Pradesh, when the price in Orissa was only Rs 6500 per metric tonne.

6.3.4 Mahua Flowers

The mahua flower is a major traded NTFP in Orissa, where the flowers are collected from both forest farm and homestead trees in inland Districts. The annual turnover of mahua flowers in Orissa is of the order of 55-60,000 metric tonnes per annum, with two-thirds of the flowers coming from Angul, Sambalpur, Sundargarh and Keonjhar Districts. The trade is mainly organised by Marwari businessmen who work with teams of permanent labourers to organise the production, procurement and transportation of the flowers. The traders are located in the District or sub-divisional towns of the main production areas. Merchants in the mahua flower trade generally give advances to local agents in the harvest season. These

advances are used to buy mahua flowers from local *hats*. Most of the flowers collected in Orissa are exported to Bihar, Uttar Pradesh or Madhya Pradesh, with just a few being kept for home consumption or use. Mahua traders need to procure an export license prior to trading, and this license is given in the name of cattle feed. In practice, of course, mahua flowers are mainly used for making country liquor. Until 1990, private traders in Orissa were able to purchase mahua flowers from local collectors without paying a royalty or other taxes to the government. This changed in 1991, when the Government of Orissa decided to enter the collection business itself. The government first moved to set a minimum support price for collectors, which had the effect of doubling the purchase price in the short run. The increase in prices paid, together with a good flowering year in 1991, ensured that collection was boosted to about 90,000 metric tonnes, or more than double the previous average annual collection of 40,000 metric tonnes. In the medium-term, however, the government's stated intention of removing the 'middlemen' from the mahua flowers production and trading system was not a success. As with the sal seeds trade in Bihar, the government in Orissa proved unable to operate an effective collection-centre system in all the key areas of mahua flower production. Local collectors had to sell their flowers to the remaining middlemen at a low rate. The middlemen then sold their accumulated stocks of flowers to functioning government purchase centres in urban areas. The traders sold their stocks at the scheduled or official rate, in the process making profits in excess of those which government policy was seeking to restrain. The government also lost out with its own forward sales of flowers. Government officers over-estimated the likely final demand for mahua flowers, particularly so at a time when other government agencies were aiming to abolish the outstill liquor system in Orissa. In the absence of (legal) mahua-based distilleries, and with larger traders working hard to keep market prices low, the government-managed mahua trade system lost an estimated Rs 100 million in its first year of operation. Not surprisingly, the trade in mahua flowers in Orissa reverted to the contractor system in the following year.

6.3.5 Lac

The trade in lac is unusual in that a majority of the product (about 75% of the total in India as a whole) is exported to countries including the USA, the UK, Germany, Singapore, Italy, Indonesia, Egypt and New Zealand. Lac is the hardened secretion of the lac insect, an insect which thrives on trees known as lac hosts. Bihar is the major producer of lac in India (over 55% of the total), followed by Madhya Pradesh (23%), West Bengal (12%) and Uttar Pradesh (5%). Orissa is not a major producer of lac. The main lac hosts in Bihar are palas (*Butea monosperma*), ber (*Zizyphus jujuba*) and kusum (*Schleichera oleorosa*). According to The Bihar State Cooperative Lac-Marketing Federation Limited (BISCOLAMF): "There are two distinct strains of the lac insect and they give in a year four lac crops: Aghani and Jewthi crops from the Kusmi strain, and Baisakhi and Katki from the Rangeeni strain. Baisakhi is the largest crop, accounting for nearly 56% of the annual production" (no date).

The main lac producing areas in Bihar are in Ranchi and (more so) Singhbhum Districts. In five of the Bihar survey villages lac is the single main source of NTFP incomes (Khanda, Karudih, Hulsi and Tengariya), and in Sindribera it is a close second behind the sale of piar fruit. Palamau was a major producing area, but the Managing Director of BISCOLAMF (based in Ranchi) blames the "activities" [Naxalism] for a recent decline in production there. BISCOLAMF was set up in 1963 under the Bihar Cooperative Societies Act. It is charged with assisting tribal lac growers, and others from 'the lower strata', by the setting of support prices for farmers and primary collectors. BISCOLAMF is meant to purchase raw lac (stick lac) from growers through local cooperative societies (LAMPS) and voluntary groups. (BISCOLAMF describes itself as "an apex State-level Cooperative body with an infrastructure consisting of 169 cooperatives – LAMPS/PACS/VMSS/Lac growers cooperative societies with a total share capital of Rs. 605.85 lakhs as on 33 1.1.95" [no date]. In fact, most of its LAMPS are defunct). The raw lac is then brought to a processing unit on the outskirts of Ranchi city. The unit produces different types of shellac (orange shellac, lemon shellac, TN shellac) and thence sheets of shellac veneer from heating and pressing machines. The company also sells semi-finished seed lac.

Support prices for growers are set by a Business Advisory Committee of BISCOLAMF. Open market prices fluctuate on a weekly or fortnightly basis and by location, and support prices reflect this reality temporally if not spatially (there is one support price for the region). Growers can also sell to private traders in the two main collection seasons: April-July and October-January. BISCOLAMF maintains that one positive effect of government intervention in the market is to raise the average price per kilogram; thus, if the government price is Rs 23 per kg in January 1998, private traders might be willing to pay Rs 25 per kg. The state can also help producers when prices crash, as they did in Palamau in 1987-88 with a buffer stock scheme. Price fluctuations are common, and this is a problem for the grower. In June 1996 raw stick lac commanded Rs 50-60 per kg, while semi-finished seedlac sold for Rs 75-80/kg and shellac for Rs 100-110/kg. By March 1997 these prices had tumbled to Rs 10-15 for raw stick lac and Rs 45-50 for shellac.

Price fluctuations are inherent in the lac growing industry, in part because of climatic considerations. But a good deal of the variation in prices is caused by the structure of the lac trade. Notwithstanding the activities of BISCOLAMF, more than 90% of sales of stick lac are from growers to private traders in local hats. The market for lac in India (and in Bihar) is dominated by a small number of traders and their agents, and these traders are able to dictate prices to a considerable degree. The Marwari traders who dominated India's lac economy in turn are connected to a small number of foreign buyers through offices and exchanges in Calcutta. These traders face a certain amount of competition from producers

and traders in Thailand (where the quality of shellac is poorer and where there is only one growing season) and, latterly, China. But the main problems that the traders face - as does the industry as a whole in India - is a lack of buoyant demand for lac-based products in global markets. In Germany and Japan, the main demand is for very high grade shellac for use in paints and as a varnish for the binding of insulation wires in electrical or electro-magnetic goods. It is possible that the domestic market for lac could be improved - it is mainly used for boot polish and in toys and furniture in India - but there is a dearth of large-scale units in Bihar to exploit the State's primacy in lac production. Employment multipliers are low and are mainly confined to a few trader-manufacturer units in or near Khunti and Murhu (Ranchi District). BISCOLAMF itself employs 51 people in its manufacturing operations and had a capacity in 1998 of 3.40 tonnes per annum. As ever in Bihar, an organisation such as this, which is funded directly from the Tribal Sub-Plan, is ill-equipped to establish a robust alternative to the trading and manufacturing systems which exist in Bihar today, and which funnel raw materials out of the State. BISCOLAMF has only patchy relations with end users of shellac in Europe, North America and East or South-East Asia.

6.3.6 Tassar

The forests of Bihar and Orissa, along with forests in Madhya Pradesh, are the major producers of tassar silk fibres in India. The fibre comes from the insect *Antheraea mylitta* D., which feeds mainly on *Shorea robusta* (sal), *Terminalia arjuna* (arjun) and *Terminalia tomentosa* (asan). (Fibres from the oak tassar are a more recent introduction. They can be found in the sub-Himalayan regions of India, from Himachal Pradesh in the west to Mizoram in the east). Because the rearing of tassar insects has traditionally been done outdoors on forest trees and field bunds - and as a subsidiary occupation for most growers - the production of tassar silk has been much less assured than the production of mulberry silk. The main season for tassar production begins in June with self or induced multiplication of the silkworm. A cocoon forms after 30-35 days (for seed) and a 'second' or commercial crop of tassar after about 50 days.

The marketing of silk cocoons in eastern India begins in the villages. Most producers sell their cocoons to private traders in weekly *hats.* The government maintains that growers lose out in these transactions, as many clearly do. The Government of India has set up a Tassar Raw Material Bank in Chaibasa, Singhbhum District, to 'ensure a proper price for the primary collector'. The Bank estimates the costs of cocoon production and the Government, acting on advice, sets a floor price. It also feigns to act as a watchdog in the open or black markets. Most of the silk produced in Bihar ends up in Bhagalpur, where it is woven into tablecloths and furnishings rather more than fashion goods. Although Singhbhum is the major area of cocoon production in Bihar, the employment multipliers in terms of processing and weaving are as yet minimal. Some few NGOs are at work in Chaibasa and Dumka (Santal Parganas)

to promote the use of simple machines for the production of silk cloth. Producers also face problems from legal conventions relating to forest use in India: the pruning of trees is banned under the Forest (Conservation) Act of 1980 and forest lands are not supposed to be used for non-forestry activities. (This Act is interpreted more leniently in Madhya Pradesh, where tassar cultivation is allowed in the forest).

In Orissa, tassar marketing has been organised by the government since 1969, when tassar growers' cooperatives were first formed. The cooperatives were able to obtain bank loans or government subsidies to buy and sell seed cocoons (or harvested cocoons). These local cooperatives in turn encouraged the government to set up an apex body, the Orissa State Tassar and Silk Cooperative Society, which is headquartered in Bhubaneshwar. The OSTSCS advances money to growers through the local societies and at a minimal rate of interest. The OSTSCS buys the cocoons back from the growers at a procurement rate which takes into account the international price for silk yarn, export demand, and prices in other cocoon producing regions (including Bihar, Madhya Pradesh and Karnataka). Although only the cooperative societies are meant to buy cocoons in the open market in Orissa, it is clear that some weavers are also buying cocoons from *hats* and smuggling them into Bihar.

6.3.7 Sal Leaves

The collection of sal leaves by women (and men) across the study area is so commonplace that it is possible to overlook its economic significance. The leaves are generally gathered for home use or for sale in local *hats.* There are now signs, however, in Bihar as well as in Orissa, that women (and men) who have traditionally been involved in the collection of sal seeds can gain income and employment from the manufacture of sal leaf plates.

A good example of this income generation strategy is the Daho Women's Industrial Cooperative Committee Limited, which in May 1992 was registered as a cooperative in Ranchi District, Bihar under the Cooperative Act. The committee has nine members and its organiser is a woman. The Daho Committee (which received early and continuing encouragement from the male Mukhiya of Daho-Barwe) received a loan for Rs 260, 000 from the Cooperative Department of the Government of Bihar. This loan was used as working capital for three machines which press double-thickness plates by means of a simple foot-pedal technology. Sandwiched between the two sets of stitched leaves there is a polythene layer. The loan application was forwarded to the Co-op Department by the Block Development Officer.

The Daho Committee is able to sell its finished plates at about Rs 25 per 100 plates (1998 prices); its costs run to about Rs 19 per 100 plates. The Committee now has 11 machines,

and if all the machines are in use it can produce about 11,000 plates in a day. (This rarely happens because of an erratic power supply). The women who are employed as machinists are paid Rs 5 per 100 plates. Other women are employed to collect sal leaves. Even allowing for power stoppages, profits have been sufficiently high that the initial loan (and interest) was paid off by 1995. Profits are now banked and spent as per the decisions of the Committee.

The Daho Committee's enterprise is heavily dependent upon the linkages that have been forged by committee members and the Mukhiya with local electricity supply and repair personnel. A generator would cost Rs 80,000 to purchase (net of spare parts and running costs). This cost would be worthwhile if the Committee could generate a sufficient, and sufficiently reliable, output of plates to meet the demands of traders in north Bihar as well as in Ranchi. (The committee does send some of its plates to Patna and Bihar Shariff, but traders from north Bihar like to take a full truckload of one lakh plates). Committee members are well informed about market prices for their product in North and South Bihar, and they are not minded to branch out from the manufacture of sal plates. Local village leaders and Panchayat members had previously experimented with mulberry (silk) production, but they were hit by a pest attack in 1985 and received no assistance or compensation from the government. Collection of sal seeds was not considered viable: the forests nearby were neither thick enough nor sufficiently uniform.

6.4 Discussion and Recommendations

Large quantities of NTFPs are being offered for sale throughout the Bihar and Orissa study areas. As yet, though, the income generating activities that might run alongside these collections are not always supported by an appropriate mixture of forest management, marketing or legal policies at the state level. These policy failings have been alluded to elsewhere in the chapter. In this part of the report the main findings are consolidated and restated and recommendations for future policy made. These recommendations are directed mainly at government policies for trade in NTFPs (the role of the private sector), and in regard to support for value addition activities (including research and development).

The nationalisation of key circuits and products within the NTFP trading system has been justified in Bihar and Orissa on two main grounds: that primary collectors can be protected against unscrupulous traders, and that government can earn revenues, or at least royalties, from its activities. These arguments are compelling in the abstract, but in practice they rest upon some misleading assumptions and give rise to perverse outcomes. The government views the NTFP marketplace as a location where unwitting tribal men or women come face to face with traders or agents who are out to swindle them. There is some truth in this view, but evidence from this project suggests that it can lapse into caricature. Instead of seeing primary collectors as reasonably well informed economic agents who need to be provided

with more market information (which is how many sellers see themselves: villagers are also more likely to report difficulties in the collection, storage, processing and transport of NTFPs than in the sale process itself [see Table 6.26]), the government has arrogated to itself a protective function which seeks to remove private traders from the NTFP landscape (at least in certain key products). This might work to the advantage of some primary collectors if a second assumption made by the government also holds: namely, that the state's capacity to intervene in NTFP markets or commodity chains is secure and sufficient, and that lower-level state employees are motivated to carry out official state policies transparently or fairly at the local level, and not least in more distant villages. In practice, neither part of this assumption is robust, and certainly not in

Table 6.26

Perceived Difficulties in the Collection, Processing, Transport and Sale of Selected NTFPs in Bihar: The Rankings of Selected Village Respondents

NTFP Name	Ranking of Difficulties by Village Respondents			
	Collection	Processing	Transport	Sale
Aonla	2	3	3	3
Bahera	3	3	3	3
Bhelwa	2	2	3	3
Chiraita	3	3	4	4
Chironji (piar kernel)	2	2	3	3
Dori	2	2	3	3
Genthi-kand	2	2	3	3
Harra	3	3	3	3
Imli (tamarind)	3	2	3	3
Jirhul	2	3	3	3
Karanj	2	2	3	3
Khijur leaves	1	1	3	3
Khukari	3	3	3	3
Koinar	3	3	4	4
Koreya bark	2	2	4	4
Kujari	1	1	3	3
Kusum	2	3	3	3
Mahua	2	2	3	3
Patalkohra	2	2	4	4
Piar fruit	2	4	4	4
Ranu	3	2	3	3
Rugra	3	3	3	3
Sabai grass	2	2	2	3
Sal seed	3	2	2	3
Satawar root	2	2	2	4
Siali leaves	3	3	3	3

1 = Very Difficult; 2 = Difficult; 3 = Some Difficulties; 4 = Few Problems; 5 = No Problems

Source: field surveys

Bihar. In the case of sal seed collections in Bihar, the government has several times failed to ensure that its collection centres were opened on time, if they were opened at all - notwithstanding the fact that the collection season is very short. (Although nationalisation seems to have worked rather better in Orissa, at least in the kendu leaf trading system and from the perspective of primary collectors, a similar story of government inefficiencies can be told of the mahua flower trading system in Orissa in the early-1990s, when it was briefly under government control). The state authorities have a poor record, too, in providing or arranging for the storage and transportation of many NTFPs, and there is considerable evidence to suggest that employees of the Forest Development Corporations act as private agents in the very markets which they are meant to be dominating on behalf of government. The outcomes of these second-best state interventions are predictable. The failure of the state to raise sufficient working capital on time has discouraged many primary collectors from collecting certain NTFPs, or bringing them to market. In addition, a parallel system of private exchange has grown up alongside the 'nationalised' trade in items such as sal seeds or kendu leaves. Private traders are very often successful in acquiring the best qualities or grades of such NTFPs, leaving the public sector with stock of an inferior quality. A vicious circle is then closed whereby the Forest Development Corporation, at least in Bihar, is further starved of funds, and finds itself unable to pay the royalty which it owes to the Government of Bihar. By late 1993 the BSFDC had an accumulated bank debt of about Rs 140 million. (Political calculations also left their mark. At the time of the general election in 1991 the FDC in Bihar was instructed to pay high prices for kendu leaves, only to find that it could not recoup its outgoings in later market operations).

The failure of the NTFP trading system to accord with government perceptions or intentions should encourage a change of direction. The Government of Bihar should be encouraged to further withdraw from the NTFP sector in favour of the private sector (as it has in the case of karanj seeds or oil). Resources which are presently committed to an over-developed and yet also over-stretched FDC could then be switched to research and development or a better system of price information support. The state should also involve itself in the NTFP economy in a regulatory fashion. Instead of seeking to supplant the private sector, it would seek to monitor and control that sector.

Greater private sector involvement in NTFP trading systems should encourage the setting up of better resourced and more highly responsive systems for NTFP collection, storage and transport (and not least for sal seeds). [Needless to say, this will not happen where nationalisation gives way to a private sector monopoly, as seems to have happened in Orissa, where, in 1996, Utkal Forest Products Limited was given exclusive marketing rights to 22 NTFPs. The monopoly lease system in Orissa has favoured the leaseholder over primary collectors, and has been challenged in the courts with some regularity]. In the longer-term,

though, the state and the private sector will need to work in tandem to expand existing markets for NTFPs in India and abroad, and the various income generating opportunities that should accompany them. There are some positive developments to report in this respect. In 1996-7 UFP Ltd in Orissa started to buy unconventional, and hitherto poorly commercialised NTFPs from primary collectors - products like bantusli seed, marda seed, baigoba seed and baghanakhi. Sadly, this practice was discontinued in the following year, but the recent growth of sales of rice beer herbs or chewsticks in Bihar (where once sales were few) indicates the scope for the further development of NTFP sales within India. The development of medicinal NTFPs for sale is another area that government agencies or the private sector, not to mention local producer cooperatives, could usefully explore. Away from the domestic market, tamarind pulp is already being sold to the USA, Europe and the Gulf, and the export of lac from Bihar is mirrored by the export of sal fats from Orissa via Mumbai (Bombay).

But these export trails also point up the problems that face Bihar and Orissa when it comes to the local processing of NTFPs. In the case of tamarind, even basic processing work like deseeding is not carried out within Orissa (or in Bihar for that matter). The drain of jobs to other parts of India is even worse in the case of the bidi industry. The industry in Orissa needs to make better efforts to train local bidi rollers and to stop the drain of value-adding activities to south India. Such training might be effected by NGOs, with minimal financial support from government. The need is pressing because of the threat posed to the industry by cigarettes and the anti-smoking lobby.

More encouraging, perhaps, is the case of tassar, and particularly in regard to post-harvest developments in the tassar silk industry. The Ranchi (Piska Nagri)-based Central Tassar Research and Training Institute (CTRTI) maintains that: “Until about two decades ago, the tassar industry catered almost exclusively to the domestic traditional market for the fine fabric made from twisted yarn produced through thigh and palm reeling. Though these are still the dominant features of the tropical tassar industry, two recent developments hold much promise for making tassar a significant source of stable livelihoods for the adivasis, while simultaneously contributing to wasteland development, employment generation, export earning, etc. They are: (1) new rearing and post-harvest technologies developed by CTRTI, and (2) the opening of new markets using spun yams and blends” (no date). There is also scope for using natural dyestuffs like barera, onions and turmeric in the production of coloured yams - something which may be attractive to markets like Germany, where different laws regulate the importation of ‘natural’ and ‘artificial’ fabrics and clothes.

The CTRTI does note, however, that there is a long way to go in Ranchi and West Singhbhum Districts when it comes to the commercial production of tassar silk. A first problem concerns the promotion and protection of suitable plantations of Asan or Arjun or even Sal. It

takes about four years to produce a stable and productive plantation of tree hosts. Men and women who are not used to thinking long-term might need to be supported by a state-sponsored supervisor-educator and marketing advisor. Such plantations also need support from the Forest Department, and protection from forest laws which ban the use of forest lands for so-called non-forest purposes. The CTRTI points to the Simplipal forest in Orissa as an example of the supportive protection of stands of *modal ecorace* as a biological reserve (and for the production of tassar cocoons). Tassar food plants can also be combined with land husbandry and inter-cropping with legumes as an effective management system for guarding against erosion of wastelands with acidic soils. Inter-cropping of tassar plants on fallow patches of land might also encourage farmers (and the FD) to see tassar silk production as part of a more general strategy for improving land management and household livelihoods.

A second problem relates to the expansion of tassar sericulture - in terms of skilled labour, input supply and technical support. The target (mainly *adivasi)* population will need to be supported by a properly funded extension service, and loans will need to be made available for the purchase of simple processing machines. The investment does not need to be prohibitively expensive. The simplest machines cost about Rs 2,500 and chemicals will cost about Rs 1,000 per annum; caterpillars will generally be supplied free by the State governments. In Bihar, two NGOs are already making progress in installing such machines (and a simple yarn production capability) in Dumka (Pradhan) and Chaibasa (Singhbhum Gramodyog Vikas Sansthan).

These cautionary remarks suggest the need for further research at the local level. In principle, though, they also point to a new role for government in the NTFP marketing system. The Governments of Bihar and Orissa should be encouraged to review their activities in the NTFP sector with a view to assuming a more enabling and regulatory role. NTFP collectors would benefit rather more from determined efforts by government officers to enforce the law in respect to weights and measures, than from forms of direct intervention which discourage local traders from travelling (as they once did) to distant villages, or from State-wide policies which change year on year for political reasons and which continue to tax the trade in a manner that would not be accepted by the sellers of agricultural products. Happily, there are signs that the Government of India, at least, and not a few forest officers in Bihar and Orissa, are beginning to recognise that the public sector has been seeking to do too much, for the wrong reasons, and to little positive effect. In the wake of the Panchayats (Extension to Scheduled Areas) Act of 1996, and in light of a circular letter from the Ministry of Environment and Forests in July 1998 which argues that: "nationalisation reduces the number of legal buyers, chokes the free flow of goods and delays payments to the gatherers", it is possible that future government policies in respect of 'minor forest products' will be informed by similar

conclusions and sentiments to those drawn here. This possibility is considered further in the chapter on Development Strategies.

Appendix 6.1: Computation of Rates of Return on Labour in the Processing and Sales of NTFPs in Bihar and Orissa

The computation of rates of return on labour is never easy, and slightly different assumptions were used in Bihar and Orissa. It remains the case, however, that broadly similar results were generated in the two States.

In Bihar four main assumptions were made:

1. that the ratio of the finished item to the raw material depends upon the quality of the latter: the figure quoted is an average figure;
2. that the unit of raw item is a figure which expresses the amount of a given item (eg sal fruit) that be collected by one person in 8 hours;
3. that it takes a full market day (8 hours) to sell 20kg. of a finished item, on average;
4. that the prices of finished goods - save for chironji and mahua flowers, where an average market price is used - are those fixed for 1997 by the BSFDC Ltd. It was noted that the high rate of return on chironji is unlikely to be sustained: the raw material (piar fruit) is becoming scarce in local forests.

In Orissa there were also four main assumptions:

1. given that collection and travel times vary widely (as between on-farm and village commons collections, or between doorstep and local *hat* sales), it was important to compute an average collection time from three sample points in each village, and to restrict travel times to sales in the *hat* only;
2. that a ratio of finished goods to raw material inputs should be calculated on the basis of (observed) local methods or technologies
3. that the raw item unit should be calculated on the basis of actual collections per day by members of a given collecting unit;
4. that all prices for the finished items should be collected on the basis of observed sales in the *hat* through 1997 (averaged out), and on the basis of OFDC administered prices for sal seeds and kendu.

7.0 GROWING STOCK AND YIELD OF NTFPS

7.1 Introduction

The growing stock and yield of NTFPs were assessed from a range of sample plots in Reserve and Protected forests in both Bihar and Orissa (Table 7.1). In West Singhbhum District of Bihar, a further category was included, Community forests, which are also known locally as private protected forests (PPF) or Mundari-khuntkattidari (MKK) forests.

Table 7.1

Sample plots for species composition and determination of standing volume

Forest type	Bihar		Orissa	
	Ranchi	W Singhbhum	Angul	Keonjhar
Reserve forests	2	-	6	6
Protected forests	9	6	4	4
Community forests	-	6	-	-

7.2 Species Composition

The number of species present in the sample plots is indicated in Table 7.2. Only tree species were recorded, herbs and small shrubs were excluded. The category “understorey” includes all stems found in the plots which were less than 10 cm dbh whereas the “overstorey” category includes only those stems with a diameter at breast height of over 10 cm. In determining the standing volumes of trees in the sample plots only the later category of stems was used.

There are fewer species recorded in the Reserve forests of Bihar than Orissa. The Community forests of West Singhbhum are relatively poorly represented in terms of numbers of species present. The protected forests in Bihar contain more species than their counterparts in Orissa. This information is presented in greater detail in Tables 7.3 and 7.4.

Table 7.2

Number of species in sample plots

Forest type	Bihar				Orissa			
	Ranchi		W Singhbhum		Angul		Keonjhar	
	US*	OS*	US*	OS*	US*	OS*	US*	OS*
RF	18	25	-	-	31	29	30	26
PF	27	33	38	30	27	26	26	20
CF	-	-	20	14	-	-	-	-

* US = understorey (i.e, <10 cm dbh); OS = overstorey (i.e. >10 cm dbh)

Table 7.3

Presence of species in the understorey and overstorey of sample plots in Bihar

Common name	Scientific name	Ranchi		W Singhbhum	
		PF	RF	PF	CF
Amaltas	*Cassia fistula*	+/+	+/+	-/-	+/-
Amra	Spondias mangifera	-/-	-/-	+/+	-/-
Aonla	*Emblica officinalis*	+/+	+/+	-/+	-/-
Asan	*Terminalia tomentosa*	+/+	+/+	+/+	+/+
Asandu		-/-	-/-	-/-	+/-
Bahera	*Terminalia bellerica*	+/+	+/+	+/+	+/+
Bel	Aegla marmelos	+/+	+/+	-/-	-/-
Ber	*Zizyphus jujuba*	+/+	-/-	+/-	+/-
Bhelwa	*Semicarpus anacardium*	-/-	-/-	+/+	+/+
Bija	*Pterocarpus marsupium*	+/+	-/-	+/-	-/+
Bonga sarjom		-/-	-/-	+/+	-/-
Chakundi	*Casia siamea*	+/-	-/-	-/-	-/-
Churchu	*Casearia tomentosa*	-/-	-/-	+/-	-/-
Dahu	*Atrocarpus lakoocha*	-/+	-/-	-/-	+/-
Dhao	Anogeissus latifolia	+/+	-/+	+/+	+/-
Doka	*Lannea grandis*	-/-	-/-	+/+	+/+
Dudhi	*Euphorbia hirta*	+/+	-/-	+/-	-/-
Gada golaechi		-/-	-/-	-/-	+/-
Gamhar	*Gmelina arborea*	-/+	-/+	-/-	-/-
Ghoot		-/+	-/-	-/-	-/-
Ginjan	*Lannea grandis*	+/+	-/-	-/-	-/-
Harra	Terminalia chebula	+/+	+/+	+/+	+/+

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Table 7.3 (continued)

Common name	Scientific name	Ranchi		W Singhbhum	
		PF	RF	PF	CF
Hundur		-/-	-/-	+/-	-/-
Icha	*Woodfordia fruitosa*	-/-	-/-	+/-	-/-
Jamun	*Syzigium cumini*	+/+	+/+	+/-	-/-
Kachnar	*Bauhinia vasiegata*	+/+	+/+	-/-	+/-
Kandeyor		-/-	-/-	+/-	-/-
Karam	*Adina cordifolia*	+/+	+/+	+/+	+/+
Karanj	*Pongamia pinnata*	+/+	-/+	-/-	-/-
Kari	*Miluta velutina*	-/+	-/-	-/-	-/-
Katyarebae		-/-	-/-	+/-	-/-
Kend	*Diospyros melanoxylon*	+/+	+/+	+/+	+/+
Korkot		+/+	-/-	-/-	-/-
Kujari	*Celastrus paniculata*	-/-	-/-	+/-	-/-
Kumbhi	*Careya arborea*	-/-	-/+	-/-	-/-
Kusum	*Schelichera trijuga*	+/+	-/+	+/+	-/+
Kutti	*Corton oblongifolius*	-/-	-/-	+/+	-/-
Lodha	*Symplocos racemosa*	-/-	-/-	+/+	-/-
Mahua	*Madhuca latifolia*	+/+	+/+	+/+	+/+
Mahulan	*Bauhinia vahlii*	-/-	-/-	-/-	+/-
Mango	*Mangifera indica*	-/+	+/+	-/-	-/+
Mattasura	*Antidesma diandrum*	-/-	-/-	+/-	-/-
Miriri	*Cassina glauca*	-/-	-/-	+/+	-/-
Palas	Butea monosperma	+/+	+/+	+/+	+/+
Pandaru	*Ehretia lacius*	-/-	-/-	+/+	-/-
Panjan	*Ougenia dalbergioides*	-/-	-/-	+/+	-/-
Papra	*Gardenia latifolia*	-/+	-/-	-/-	-/-
Piar	*Buchania latifolia*	+/+	+/+	+/+	+/+
Phlandu	Combretum decandrum	-/-	-/-	+/+	-/-
Riri	Caseasa graveoleus	-/-	-/-	+/-	-/-
Roli	Mallotus philippinensis	+/-	-/-	-/-	-/-
Rundth		-/-	+/+	-/-	-/-
Saagwan		-/-	-/-	+/+	-/-
Sal	Shorea robusta	+/+	+/+	+/+	+/+
Salai	*Bosellia serrata*	-/+	-/-	-/+	-/-
Semal	*Salmalia malabaricum*	+/+	-/+	-/-	-/-
Sidha	*Lagerstroemia pariflora*	+/+	-/+	+/+	-/-

Continued overleaf /

Table 7.3 (continued)

Common name	Scientific name	Ranchi		W Singhbhum	
		PF	RF	PF	CF
Simjanga	*Vitex peduncularis*	-/-	-/-	-/+	+/-
Simlimud		-/-	-/-	+/-	-/-
Simlumbui	*Glochidian lanceolarium*	-/-	-/-	-+	-/-
Siris	*Albizzia ordoratissima*	-/+	-/-	-/-	-/-
Tetra		-/-	+/+	-/-	-/-
Tewer	*Bauhinia retusa*	+/+	-/-	-/-	-/-
Tilia	*Wendlandia exsreta*	-/-	+/+	-/-	-/-
Topa		-/-	-/-	+/+	-/-
Turai sing	Cordia macleodii	-/-	-/-	-/+	-/-
Total		27/33	18/25	37/30	20/14

Presence of stems <10 cm dbh/presence of stems >10cm dbh

Table 7.4

Presence of species in the understorey and overstorey of sample plots in Orissa

Common name	Scientific name	Angul		Keonjhar	
		RF	PF	RF	PF
Amla	Emblica officinalis	+/+*	+/+	+/+	+/+
Ankula	*Alangium salvifolium*	-/-	-/-	-/+	-/-
Asan	*Terminalia tomentosa*	+/+	+/+	+/+	+/+
Bahada	*Terminalia bellerica*	+/+	+/+	+/+	+/-
Barabakalia	Helictes isora	+/+	+/+	-/-	-/-
Barakoli	*Zizyphus zuzuba*	+/+	-/-	-/-	-/-
Bhalia	*Semecarpus anacardium*	+/+	-/-	+/+	+/+
Bheru	*Chloroxylon switenia*	-/-	-/-	+/+	-/-
Bhurukunda	*Hymenodictyon orixense*	-/-	-/-	-/-	+/+
Bija	*Pterocarpus marsupium*	+/+	+/+	+/-	+/+
Char	*Buchnania latifolia*	+/+	+/+	+/+	+/+
Dhaura	*Anogeisus latifolia*	+/+	+/+	+/+	+/+
Ghambari	*Gmellina arborea*	+/+	+/+	-/+	+/-
Ghurudu	*Gardenia latifolia*	+/+	+/+	+/-	+/-
Guruva	*Garua pinata*	-/-	-/-	+/+	+/+
Haladu	*Adina cordifolia*	+/-	+/+	-/-	-/-
Harida	*Terminalia chebula*	+/+	+/-	+/+	+/+
Jamun	*Syzigium cumini*	+/+	-/+	+/+	+/+

Continued overleaf /

Table 7.4 (continued)

Common name	Scientific name	Angul		Keonjhar	
		RF	PF	RF	PF
Kalikendu	*Diospyros spp*	-/-	-/-	+/-	+/+
Karada	*Cleistanthus collinus*	+/+	+/+	+/+	-/-
Karanj	*Pongamia pinnata*	-/-	-/-	+/-	-/-
Kasi	*Bridellia retus*	+/-	+/+	+/+	-/+
Kendu	*Dyospyrous melanoxylon*	+/+	+/+	+/+	+/+
Khakada	*Caseria tomentosa*	+/+	+/-	+/-	+/+
Khaira	*Bauhinia variegata*	-/-	-/-	-/-	+/+
Kumbhi	*Careya arborea*	+/+	+/+	+/+	+/+
Kurai	*Hollarhena antidysentrica*	+/+	+/+	+/-	-/-
Kurum	*Adina cordiflora*	-/-	+/+	-/-	-/-
Kusum	*Schleichera oleorosa*	-/-	+/+	+/+	+/-
Lodha	*Symplocos recimosa*	+/+	+/-	-/+	-/-
Mahua	*Madhuca indica*	+/+	+/+	+/+	+/+
Mahasindhu	*Croton oblongifolius*	-/-	-/-	+/+	-/-
Mai	*Lannea ciromandelica*	+/+	+/+	+/-	+/+
Mamuri	*Helicteres isora*	+/+	-/-	+/+	-/-
Palasa	*Butea monosperma*	+/+	-/+	-/-	-/-
Patamasu	*Miliusa tomentosa*	+/+	+/+	-/-	-/-
Phenphena	*Oroxylon indicum*	-/-	-/-	-/-	+/-
Putuli		-/-	-/-	+/+	+/+
Rai	*Dillenia pentagyna*	+/+	+/+	-/-	-/-
Rohini	*Mallotus philippinen*	-/-	-/-	+/+	+/-
Sal	*Shorea robusta*	+/+	+/+	+/+	+/+
Sidha	Lagerstroemia parviflora	+/+	+/+	+/+	+/-
Sisu	*Dalbergia sisoo*	-/ -	-/-	+/+	-/-
Telkuruma	*Ixora arborea*	+/+	-/-	-/-	-/-
Tilei	Wendlandia exsreta	+/+	+/+	-/-	-/-
Total		31/29	27/26	30/26	26/20

* presence of stems < 10cm dbh/ presence of stems >10 cm dbh

There were differences in the occurrence of species in different districts and forest types. In Bihar, Amra was only present in the protected forests of West Singhbhum. Bel was not present in West Singhbhum and Bhelwa was absent from Ranchi. Siali (Mahulau in Bihar) was only found in community forests. In Orissa, the species which were uncommon in Keonjhar but available in Anugul were Barabakalia, Haldu, Palas, Telkuruma. Species such as Kusum, Karanj, Rohini and Ankula were observed in Keonjhar but rarely found in Angul.

Species like *Bridelia retusa* and *Careya arborea* only make a small contribution in terms of the forest density whereas Sal trees are the most common in the dry-deciduous zone of Angul and Keonjhar. *Dalbergia sisso*, a highly valued timber species, and *Pongamia pinnata* are less common and only make a small contribution to the forest cover of Keonjhar.

7.3 Stems per hectare

The number of stems per hectare in the sample plots in Bihar and Orissa are shown in Tables 7.5 and 7.6, respectively. There are significantly more stems per hectare when all the stems are counted than when just those with diameters of greater than 10 cm dbh are considered. This indicates the preponderance of coppice stems in the plots and the level of regeneration. Stocking levels fall from highs in reserve forests through protected and then to community forests. These figures reflect the different levels of management found in these forest types. Stocking levels are broadly similar across districts except for West Singhbhum where the stocking levels are some 65% of those found in Ranchi.

Table 7.5

Stems per ha – by forest type

Forest type	Bihar		Orissa	
	US*	OS*	US*	OS*
RF	2334	1662	3223	899
PF	2228	990	2153	543
CF	1596	616		

* us = understorey (ie <10 cm dbh); os = overstorey (ie >10 cm dbh)

Table 7.6

Stems per ha – by district

Tree size	Bihar		Orissa	
	Ranchi	W Singhbhum	Angul	Keonjhar
<10 cm dbh	2543	1641	2851	2525
> 10 cm dbh	1490	456	672	769

The number of stems per hectare in the sample plots for the main species recorded in Bihar and Orissa are shown in Tables 7.7 and 7.8, respectively. The composition of the stands varies within and between districts and forest types with a wider range of species enumerated in Bihar. In all cases Sal (*Shorea robusta*) is the dominant species. The other main species in both Bihar and Orissa are Asan (*Terminalia tomentosa*) and Char/Piar (*Buchania latifolia*).

Tendu/Kendu (*Diospyros melanoxylon*) only makes up between 4 and 2% of the cover in Bihar whereas in Orissa the levels are higher, particularly in Keonjhar. Mahua (Madhuca latifolia) is present to a far greater extent in Orissa than Bihar.

Table 7.7

Bihar - Species composition (stems per ha) for main species (by district)

Species	Total stems/ha				Percentage cover			
	Ranchi		W Singhbhum		Ranchi		W Singhbhum	
	US*	OS*	US*	OS*	US*	OS*	US*	OS*
Asan	140	111	103	21	6	7	6	5
Bahera	29	24	4	1	1	2	<1	<1
Bhelwa	9	5	66	23	<1	<1	4	5
Dhao	39	35	25	1	2	2	2	<1
Jamun	37	19	9	0	1	1	1	0
Mahua	30	25	22	7	1	2	1	2
Palas	39	31	6	3	2	2	<1	1
Piar	122	58	112	65	5	7	4	14
Sal	1764	961	1093	314	69	64	67	69
Tendu	109	67	32	4	4	4	2	1
Others	227	154	170	18	9	10	10	4
Total	2543	1490	1641	456				

* US = understorey (ie <10 cm dbh); OS = overstorey (ie >10 cm dbh)

Table 7.8

Orissa - Species composition (stems per ha) for main species (by district)

Species	Stems/ha				Percentage cover			
	Angul		Keonjhar		Angul		Keonjhar	
	US*	OS*	US*	OS*	US*	OS*	US*	OS*
Asan	265	48	97	12	9	7	4	2
Char	331	23	247	62	12	3	10	8
Dhaura	89	15	57	13	3	2	2	2
Jamun	33	13	40	14	1	2	2	2
Kendu	154	29	353	94	5	4	14	12
Mahul	145	46	203	82	5	7	8	11
Sal	1224	402	1094	394	43	60	43	51
Others	611	97	435	98	21	14	17	13
Total	2851	672	2525	769				

* US = understorey (ie <10 cm dbh); OS = overstorey (ie >10 cm dbh)

The low occurrence of Asan in Keonjhar suggests that the regeneration and establishment of the species (a very valuable timber species) has been badly affected by adverse biotic and abiotic pressures. The lower proportion of *Diospyros melanoxylon* in Angul relative to

Keonjhar could be due to the differing practice of extraction of tendu leaves from the forest areas. Intensive extraction of leaves in Angul from dry fallow lands and forests over many decades has reduced tendu trees to a more bushy growth habit. In Keonjhar the collection of leaves is lower than in Angul resulting in a higher proportion in the overstorey. There is more *Buchnania lanzan* in Keonjhar than Angul. This explains the significant trading activity in chironji seed which is collected in Keonjhar for consumption in Angul.

Interestingly, there were twice as many *Madhuca latifolia* (Mahua) stems in Keonjhar than Angul. Mahua is a revered species for the tribals of central and eastern India and so is not felled during agricultural field expansion. This is particularly so in Keonjhar, a tribal dominated district. The usefulness of Mahua flowers and seeds, and its ability to survive in the local edaphic factors, has contributed to it being the second most common species in the dry-deciduous zone of Orissa.

When consideration is given to forest type (Tables 7.9 and 7.10) then again Sal is still the dominant species with higher levels found in the community forests of Bihar (75%). A similar situation obtains for Piar where the >10cm dbh category gives 13% of the stand. However, Jamun is absent from this forest type. Overall Sal contributes a lower proportion of the stems in the reserve and protected forests of Orissa. There are more Kendu and char stems in the protected as opposed to the reserve forests in Orissa.

Table 7.9

Bihar - Species composition in sample stands

Species	Stems per hectare						Percentage cover					
	RF		PF		CF		RF		PF		CF	
	US*	OS*	US	OS	US	OS	US	OS	US	OS	US	OS
Asan	164	152	127	68	90	24	7	9	6	7	6	4
Bahera	70	64	14	9	2	1	3	4	1	1	<1	<1
Bhelwa	0	0	26	8	84	29	-	-	1	1	5	5
Dhao	40	40	43	22	1	0	2	2	2	2	<1	0
Jamun	28	22	30	11	0	0	1	1	1	1	-	-
Mahua	34	32	29	17	13	9	1	2	1	2	1	1
Palas	66	62	21	15	10	4	3	4	1	2	1	1
Piar	80	66	113	54	139	80	3	4	5	5	9	13
Sal	1450	908	1499	651	1187	461	62	55	67	66	74	75
Tendu	128	96	76	38	32	3	5	6	3	4	2	<1
Others	354	220	248	95	37	6	15	3	11	10	2	1
Total	2334	1662	2228	990	1596	616						

* US = understorey (ie <10 cm dbh); OS = overstorey (ie >10 cm dbh)

Table 7.10

Orissa - Species composition in sample stands

Species	Stems per hectare				Percentage cover			
	RF		PF		RF		PF	
	US*	OS*	US	OS	US	OS	US	OS
Asan	243	47	119	13	8	5	6	2
Char	312	36	266	49	10	4	12	9
Dhaura	67	13	78	15	2	1	4	3
Jamun	59	21	13	6	2	2	1	1
Kendu	255	79	252	44	8	9	12	8
Mahul	227	80	121	48	7	9	6	9
Sal	1435	531	883	265	45	59	41	49
Others	625	93	421	103	19	10	20	19
Total	3223	899	2153	543				

* US = understorey (ie <10 cm dbh); OS = overstorey (ie >10 cm dbh)

7.4 Standing volumes

Standing volumes in the sample plots were determined on an individual species basis for those species for which individual volume equations exist (see methods section). The remaining species (others) were treated as miscellaneous species when applying the volume equation (Tables 7.11 and 7.12).

Table 7.11

Bihar - Standing volumes and percentage contribution from Sal

	Standing volume per hectare (m3)	Percentage of Sal (%)
District		
Ranchi	115	56
W Singhbhum	20	71
Forest type		
RF	181	56
PF	48	42
CF	20	80

Table 7.12

Orissa - Standing volumes and percentage contribution from Sal

	Standing volume per hectare (m3)	Percentage of Sal (%)
District		
Angul	27	56
Keonjhar	24	49
Forest type		
RF	32	59
PF	21	43

The higher standing volumes in the plots in Ranchi are function of the greater preponderance of high forest in this district. Reserve forests show the highest standing volumes. The community forests sampled are considered to be largely coppice which accounts for the lower standing volume of sal trees in these stands.

7.5 Annual Yields of NTFPs

The average annual yield was estimated by taking measurements of the products obtained from trees in different diameter classes. Randomly selected trees which had flowers and fruits were sampled. Significant problems were encountered when trying to find flowering or fruiting trees as the unusual weather patterns experienced in the region had an adverse effect on the NTFP-yielding trees making it a “poor seed year”. The results obtained are hence likely to be an underestimate of the potential production. The results are further constrained by the fact that the measurement was a one-off event and only a small number of samples were taken. However, the levels of production reported are likely to be within the standard error range of production. Ideally, measurements should be continued for several years to gain a better estimate of the average production. The yields presented, and the models generated, therefore need to be treated with caution.

Table 7.13

Bihar - Yield of major NTFP trees in the study area

Common name	Scientific name	No. of sample trees	Average yield (kg, unless indicated)
Bel fruit	*Aegla marmelos*	40	71.4*
Ber fruit	*Zizyphus jujuba*	40	42.2
Bhelwa fruit	*Semicarpus anacardium*	30	48.8
Karanj seeds	*Pongamia pinnata*	50	29.3
Kend fruit	*Diospyros melanoxylon*	40	24.0
Kusum seeds	*Schleichera trijuga*	40	141.1
Mahua flower	*Madhuca latifolia*	50	60.7
Mahua seeds	*Madhuca latifolia*	20	35.7
Piar fruit	*Buchanania latifolia*	40	15.2
Sal seeds	*Shorea robusta*	40	11.5
Tamarind	*Tamarindus indica*	40	141.8

* number

Table 7.14

Orissa - Yield of major NTFP trees in the study area

Common name	Scientific name	No. of sample trees	Average yield (kg, unless indicated)
Amla	*Emblica offinalis*	17	1.1
Bahera	*Terminalia belerica*	10	14.4
Karanj seeds	*Pongamia pinnata*	10	21.3
Mahua flower	*Madhuca latifolia*	15	23.4
Mahua seeds	*Madhuca latifolia*	15	41.6
Piar fruit	*Buchanania latifolia*	15	4.0
Sal seeds	*Shorea robusta*	10	11.9
Tamarind	*Tamarindus indica*	10	6.0

* number

7.6 Prediction models for NTFP yield

Simple predictive equations of annual yield of NTFPs were developed. The tree diameter overbark, crown diameter and height were regressed against the flower and fruit yield using stepwise linear regression and the results reported in Tables 7.15 and 7.16. The equations are applicable for the assessment of the potential production of NTFPs from forests and farms

in the region. The practice of leasing NTFPs on the basis of the assumed production or visual estimation can be replaced with a rapid annual sampling of small areas to predict the out-turn of specific NTFPs before the royalty amount is assessed or the leasing price is settled.

Table 7.15

Equations for predicting yields of NTFPs in Bihar

Common name	Species	Part	Equation	R^2
Bel fruit	*Aegla marmelos*	Fruit	Y = 0.2519G + 47.48	0.21
Ber	*Zizyphus jujuba*	Fruit	Y = 0.2725G + 15.83	0.30
Bhelwa	*Semicarpus anacardium*	Nut	Y = 0.3956G + 5.54	0.24
Karanj	*Pongamia pinnata*	Fruit	Y = 0.1985G + 3.59	0.38
Kend	*Diospyros melanoxylon*	Fruit	Y = 0.1129G +3.59	0.12
Kusum	*Schleichera trijuga*	Fruit	Y = 0.2813G + 83.47	0.16
Mahua	*Madhuca latifolia*	Flower	Y = 0.2434G + 12.96	0.50
Mahua	*Madhuca latifolia*	Seed	Y = 0.119g + 17.87	0.34
Piar	*Buchania latifolia*	Seed	Y = 0.2157G + 0.73	0.32
Sal	*Shorea robusta*	Seed	Y = 0.0451G + 1.35	0.45
Tamarind	*Tamarindus indica*	Fruit	Y = 0.628G + 43.17	0.18

Table 7.16

Equations for predicting yields of NTFPs in Orissa

Common name	Species	Part	Equation	R^2
Amla	*Emblica officinalis*	Fruit	Y= -1.588+0.481(H)	0.55
Bahera	*Terminalia bellerica*	Fruit	Y= -19.641+2.427(H)+0.79(CD)	0.83
Karanj seeds	*Pongamia pinnata*	Seed	Y= -1.460+1.734(CD)	0.79
Mahua	*Madhuca latifolia*	Flower	Y= 4.149+55.967(D)	0.42
Piar fruit	*Buchnania latifolia*	Seed	Y= -3.254+1.094(H)	0.33
Sal	*Shorea robusta*	Seed	Y= -3.475+47.485(D)	0.82
Tamarind	*Tamarindus indica*	Fruit	Y= -4.033+1.233(CD)	0.58

These equations will be of benefit to both the state government and traders, neither of which has a scientific basis to make realistic assessments of how much of a given product is actually available. They can be used to guide the state forestry department in deciding the commercial exploitation of a species as long as annual assessments are made before leasing of extraction on a forest area is agreed. Traders and industries, using the raw material, would be able to forecast the economics of working the products instead of defaulting on the payment of royalties, a problem often encountered by the Forest Department. A quick

appraisal of the number of stems/ha for a species and the use of the relevant equation can be used to predict per hectare yield of the products before it is put to auction.

8.0 ETHNO-BOTANICAL SURVEY

8.1 Introduction

Some 300 plants were collected and identified which were used by the local peoples for medicinal, food and other uses in Bihar and Orissa. The full listing, by botanical and local names along with their uses and method of preparation, is given in the following section (8.2). The listing will also be available as a database which can be interrogated over the web.

The number of plants and plant parts (different parts of the same plant can be prepared in different ways to treat the same ailment) for a range of diseases is listed below (Table 8.1).

Table 8.1

Summary results of ethno-botanical survey in Bihar and Orissa.

General condition	Specific disease or ailment	Number of plants/plant parts
Diseases	Anaemia	3
	Arthritis	3
	Asthma	6
	Bronchitis	2
	Colds	5
	Coughs	28
	Diabetes	15
	Dropsy	2
	Epilepsy	2
	Epitaxis	1
	Gonorrhoea	1
	Hypertension	3
	Jaundice	17
	Leprosy	1
	Lokabasya disease	1
	Malaria	6
	Measles	1
	Rheumatism	10
	Scurvy	1
	Small pox	1
	Throat infections	3
	Tuberculosis	7
Fevers	Fever	7
	High fever	5
	Persistent fever	2
	Recurrent fever	1

Continued overleaf /

Table 8.1 (continued)

General condition	Specific disease or ailment	Number of plants/plant parts
Gastric	Acidity	9
	Bile	1
	Colic	7
	Constipation	5
	Diarrhoea	36
	Digestion - aid	6
	Dysentery	54
Gastric *(continued)*	Dyspepsia	6
	Gallstones	2
	Gastric problems	8
	Indigestion	9
	Piles	12
	Stomach-ache	31
	Stomach upsets	25
Skin	Body lice	1
	Boils	10
	Burns	7
	Cracks	3
	Dermatitis	1
	Eczema	7
	Head lice	2
	Itches	8
	Pimples	6
	Scabies	4
	Skin diseases	12
	Ulcers	5
	Wound healing	31
Blood	Clotting aid	4
	Purifying agent	8
Worms	Worms (general)	9
	Hookworms	4
	Footworms	2
	Ringworms	5
	Roundworms	3
	Skin worms	1
	Tapeworms	13
Relieve pain	Back pain	2
	Chest pain	5
	General pain relief	22
	Joint pain	4

Continued overleaf /

Table 8.1 (continued)

General condition	Specific disease or ailment	Number of plants/plant parts
	Muscle pain	8
	Sprains	2
Dental	Gum disease	7
	Tooth-ache	27
	Tooth decay	5
Headaches	Headaches	19
	Migraine	1
Bites	Dog bites	7
	Rabies	1
	Rat bites	1
	Scorpion stings	2
	Snake venom antidote	21
	Snake bites	6
Eyes	Cataracts	1
	Conjuctivitis	6
	Eye infections/problems	11
	Eye strain	1
	Glaucoma	1
Mens'	Hernia	5
	Impotency	2
	Nocturnal ejaculation	4
Womens'	Complications after childbirth	8
	Enhance lactation	7
	Infertility	3
	Leucorrhoea	28
	Menstrual disorders	5
	Prevent miscarriage	3
	Relieve labour pain	1
General medical	Broken bones - set	1
	Dehydration	2
	Ear-ache	25
	Fatigue	2
	Fits	8
	Fungal infections	1
	Goitre	1
	Inflammed kidneys	1

Continued overleaf /

Table 8.1 (continued)

General condition	Specific disease or ailment	Number of plants/plant parts
	Insanity	1
	Nose bleeds	4
	Obesity	2
	Paralysis	2
	Sunstroke	5
	Swollen glands	1
	Urinary tract infections	3
	Vomiting - prevent	2
Other	Anti-histamine	1
	Disinfectant	4
	Enhance memory	4
	Fish poison (for fishing)	8
	Good luck (provide)	4
	Insecticide	5
	Ward-off evil spirits, ghosts, omens	17
Cattle	Coryza	2
	Foot and mouth	2
	Lactation enhancement	8
	Sore tongues	7

Table 8.2 Plants Identified in the Ethno-botanical Survey of Bihar and Orissa and their Medicinal, Food and Other Uses

Scientific Name	Local Name	Uses
Abelmoschus moschatus	Bhindi (H)	The tender roots are dried, powdered, and mixed with sugar and milk. Used to cure vaginal discharge (leucorrhoea).
Abrus precatorius	Keyadjang (O) Runjo (O)	The leaves are mulched and warmed and the juice is removed by pressing the contents through a cloth. This is given in 3 doses per day (one spoon each) as a cure for throat infections.
Abutilon indicum	Pedi pedika (O)	This is a useful cure for jaundice. Two spoonfuls of leaf juice are mixed with 2.5 spoons of black pepper and ground. One dose is taken per day. If the person does not urinate then an additional dose is taken. Otherwise doses are taken every 2 hours. It is recommended that no other medicine should be given until the person urinates.
Adhatoda vasica	Basanga (O)	The leaf juice is brushed on the teeth and gums to ease tooth-ache. A bunch of leaves is ground up with two pieces of turmeric. It is consumed in one dose as a cure for stomach upsets and acidity.
Acacia catechu	Khair (H)	The wood extract is taken to cure diarrhoea. A paste made from the roots and applied on joints to cure rheumatism.
Acacia nilotica	Babul (H)	The bark is boiled in water and the concoction taken to cure diarrhoea. The dried bark is pressed between the teeth to ease tooth-ache. The flowers are roasted in mustard oil and the oil used as ear-drops to cure ear-ache and wounds inside the ear. The ash of this plant is mixed with sugar and taken to relieve indigestion. The dried unripe fruit, bark and tamarind seed coats are mixed with sugar and powdered. This is taken with milk to cure vaginal discharge (leucorrhoea).
Acorus calamus	Ghorbach (H)	The dried rhizome (10g) is powdered and taken with water to cure asthma. 15g of rhizome paste is consumed daily on an empty stomach to cure diarrhoea.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Adhatoda zeylonica	Bakas (H) Basang (O)	Leaves (100g) are boiled and the extract is given 2-3 times to cure fever and coughs. Leaf juice (50g) is imbibed 2-3 times for 2-3 days to act as an expectorant. Leaves (100g) are boiled and 2 spoonfuls of the extract given three times per day to cure coughs. Leaf juice (25g) is mixed with Rolla fruits (150g) and Rallipatti fruits (50g). This is made into a paste and pellets are prepared. The pellets are consumed once or twice daily as a cure for asthma and colic. The dried flowers are fried in milk and consumed as a cure for asthma.
Adina cordifolia	Kuruma (O) Karam (H) Haldu (H)	The root is used to cure different stomach problems.
Aegle marmelos	Bela (O) Bel (H) Sinju (H)	The fruit is cut into pieces and pasted with soil or cowdung. It is then dried for 2 to 3 days. After drying it is smoked. One spoon of fruit is eaten with Sunthi and black pepper early in the morning as a cure for stomach and intestinal diseases. The terminal leaves are powdered and consumed to cure dyspepsia. It is also useful as a cure for diarrhoea and constipation. The leaves or fruit juice are mixed with sugar and consumed to cure gastric pain. The fruit pulp is dried, powdered and taken with water to cure gastric pain. The juice of the ripe fruit is made into a squash and consumed to prevent sunstroke, stomach upsets and dehydration. A decoction of leaves is used to treat diabetes. The roots or bark are ground into a paste and applied to burns on the skin. Leaf juice is consumed on an empty stomach as a cure for diabetes. The unripe fruit is eaten to enhance appetite and aid digestion.
Aerva lanata	Dhulia (O)	The roots are ground with the exterior leaves of a Guava tree and the juice consumed to cure diarrhoea.
Agare sisalova	Moraba (H)	The latex from tender leaves is fried in mustard oil and poured into the ears to cure ear-ache. The leaves are powdered and spread on a pond when fishing to poison the fish.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Ageratum conyzoides	Pokasunga (O) Borra (H) Choti-Janjira (H)	Leaf juice (2 spoons) is consumed with one spoon of sugar twice a day for two days to treat high fever.
Ailanthus excelsa	Maharuk (H)	Bark paste is taken by pregnant women to prevent abortion.
Alangium salvifolium	Ankula (O) Dhelkanta (H)	Juice from the roots (50g) is drunk as an antidote to snake venom and dog bites. The root (25mm) is ground and eaten as a cure for diarrhoea and bloody stools. Chips from the fruit are tied on the forehead to cure eye-related problems.
Albizzia lebec	Siris (H)	The bark, leaves and fruit are boiled in water and the extract is consumed as a cure for anaemia and to cure piles. A paste made from this leaf is mixed with sugar is taken to cure coryza. Powdered bark is used as a poison to catch fish.
Allium cepa	Pyaj (H)	Onion seed is mixed with mustard oil and warmed. The vapour is taken inside the mouth as a cure for tooth-ache. Fresh cut onion is inhaled to cure epilepsy.
Allium sativum	Rasuna (O) Lahsun (H)	Raw fruits (50g) are eaten raw to kill tapeworms. The fruit paste is applied to the tongues of cattle to cure cuts on the tongue.
Aloe vera	Ghikuanri	The tuber is chopped into pieces and the juice (14ml) is taken with Saraphunka (1 to 3 g) powder twice a day to treat inflammed kidnies.
Alstonia scholaris	Chatiana (O) Chhatri (H) Chatni (H)	The leaves are used to prepare curry and are eaten as food. Paste from the bark is applied externally on the chest for 3-4 days to ease chest pain. The bark paste is also used as an ointment for muscle pain and pain in the joints. Generally the bark paste is warmed and massaged for the relief of pain. As a cure for skin diseases the bark paste is applied to affected areas. Powdered bark is eaten as a cure for diarrhoea.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Alternanthera sessilis	Garudiara (H) Muchriara (H)	The leaves are washed thoroughly, boiled, dried in the sun and used as vegetables. The leaves and stems are boiled and sun-dried. They are consumed as vegetables to increase the appetite.
Amorphophallus paeoniifolius	Ol (H)	Tubers are mixed with garlic, chilli and salt into an ointment. This ointment is applied on a cow's tongue as a cure for an inflamed tongue.
Andrographis paniculatus	Ralmaig (H) Kalmegh(H) Bhuinimba (O)	The whole plant (25g) is made into a paste and drunk with a glass of water to cure stomach-ache. The whole plant is ground into a paste. One to two spoons of this paste are consumed per day as a cure for malaria. It also acts as a detoxifying agent. The whole plant is soaked or boiled in water and this water is drunk in the mornings for 3-4 days as a cure for malaria and to purify the blood. The whole plant is soaked in water overnight and ground to a paste. Half a glass of this concoction is consumed daily to remove worms from the body. The whole plant is dried and then boiled in water. One glass of the water is taken early in the morning as a cure for malaria, fever, headache and acidity problems. It is also useful for curing diabetes, ulcers and pimples.
Andrographis paniculata	Bhuinimba (O)	About 8 to 10 plants are boiled in water and the extract consumed to remove worms from the body. It may be consumed 3 to 4 times a day. Drinking the leaves mixed with water helps to cure scabies and other skin diseases. The belief is that a person suffering from skin disease and worm infection may put his feet in Bhuinimba water.
Annona squamosa	Sarifa (H)	The seeds and leaves are ground together and a paste prepared. 75g of the paste is applied one to three times on the head to kill head lice. This is also used to remove lice from cattle. The bark is washed, dried and ground to a paste. It is consumed as a cure for jaundice. The roots are washed, dried and ground to a paste and consumed as a cure for diabetes.
Antidesma acidum *syn. Diandrum*	Mattasag (H)	The green leaves are dried and made into a powder and stored. It is cooked with rice starch and tomato and consumed as soup. The leaves can be cooked and eaten.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Antidesma diandrum	Mattasura (H)	The ripe and unripe fruits are sold to traders. This is widely practised. The community does not know what it is used for exactly.
Areca catechu	Gua (O)	The roots are washed in urine (uric acid) and then ground with black pepper. The paste is consumed at the rate of 5g twice a day for 7 days or 21 days as a cure for swelling and pain in the joints.
Anogeissus latifolia	Dhaura (O, and H)	The bark of this plant is cut into pieces and ground. The paste is eaten as a cure for stomach-ache.
Argemona mexicana	Nipania (O) Odasamari (O) Gaon ghauda (O) Chota dhatura (H) Swarna kshiri (Sanskrit)	The dried seeds are collected and the oil is extracted. The oil is applied to cure scabies. The roots are ground and the juice given to children early in the morning to get rid of tapeworms. The latex is used as a cure for scurvy. The seeds are ground and used to cure skin diseases. This plant is believed to be useful in warding-off evil spirits.
Argyreia speciosa	Bedhataraka (O)	The dorsal side of the leaf is placed on a wound until the blood has dried. It is also useful in healing old wounds.
Arisomeles indica	Nanda baguli (O)	This is used for cleaning eyes. Two to three seeds of this plant are applied on the eye.
Aristolochia inica	Panaairi (O) Banakolathia (O)	It is used to cure coughs. Women and girls are recommended to take a mixture of Panaairi root juice (10g), Tulsi leaves(10g) and honey(3ml) twice a day for 21 days. Men are recommended to take the mixture along with bettle vine or ginger juice instead of Tulsi leaf juice as a cure for the common cold. The tuber is ground and applied on the skin to cure skin diseases. The tuber can be taken as food. A concoction of tubers is applied on injured parts of the body. The root juice is used as an antidote for snake venom. The root juice is drunk by the victim and also applied directly to the wound. The root is ground and applied on the lips of children to protect them from evil omens. The root (100mm) is fed with grass to cattle bitten by snakes.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Artocarpus heterophyllus	Panasa (O) Kathal (H) Sharifa (H)	Fruits of this plant are used as food. Burnt flowers are mixed with karanj oil and the resultant ointment applied to wounds which then heal quickly. The root is crushed and used a poison for catching fish. A paste made from leaves is applied externally to cure eczema.
Artrocarpus lakoocha	Dahu (O), Dahu (H)	A paste made from the bark (50g) is consumed on an empty stomach to purge tapeworms. The bark paste (10g) is applied to wounds for 1 week to aid the healing process. Bark (100g) is soaked in 2 glasses of water overnight and the water drunk to cure dysentery. Half a glass of water is taken twice a day for 2 days. Bark (250g) is soaked in a litre of water overnight. One glass of this water is drunk twice a day to cure stomach-ache. A paste made from ground roots is consumed to purge tapeworms and roundworms from the intestinal tract.
Asparagus recemosus	Chhataberi (O) Huding atbir (H) Chhatuari (O) Iswar jata (O) Satabari (O) Satawar (H)	Root juice (50g) is taken along with cows milk (100ml) twice a day to cure diabetes. The root (25-50mm) is powdered and mixed with water. The juice is taken once a day until the patient is cured of fits. This plant is also useful against menstrual disorders. The root (150mm) concoction is consumed to prevent stomach upsets. The roots are washed in water and ground to a paste. 40g of the paste is consumed a day as a cure for urinary tract infections. The fruits are ground in water and consumed to control acidity. A paste made from the whole plant (100g) is consumed to cure stomach upsets. The root (100g) is made into a paste and mixed with sugar and Ramdatoon root and consumed daily on an empty stomach to cure vaginal discharge (leucorrhoea). Root paste (20g) can also be mixed with milk and given daily on an empty stomach to cure vaginal discharge (leucorrhoea). The dried plant is powdered and mixed with sugar and milk. This is consumed to enhance lactation. The root, Tiryo tuber and sugar are mixed and a paste prepared which is taken to cure vaginal discharge (leucorrhoea).

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
		Leaf juice prepared from leaves of Bhuin champa and Satwar is mixed with sugar and consumed to cure dysentery.
		Root juice is dropped into the nostrils to stop nose bleeds.
Avena sativa	Jai (O)	The fruits are plucked and brushed against a hard surface. The juice extracted is consumed as a cure for dysentery.
Azadirachta indica	Nimba (O), Neem (H)	The leaves are boiled in water and the water is applied to the body to cure skin diseases.
		The bark is ground and applied to cure scabies.
		The flower buds are consumed before spring to prevent infection by diseases common during the spring.
		Leaves (10g) of this plant and leaves (10g) of *Clitorea ternatea* are ground to a paste which is massaged on the head to give relief from headaches.
		The bark is used as a cure for eye infections and relieves eye redness and strain.
		The leaves, roots and flowers are boiled and the extract drunk to cure stomach upsets.
		25g of bark paste is eaten as an anti-venom agent against scorpion stings, snake and dog bites.
		The leaves or bark are boiled and the extract (150g) is consumed as a cure for fever and pain.
		The bark is kept in water overnight and the extract consumed in the morning to help purify the blood.
		Dried flowers are mixed with vegetables and eaten to prevent and cure gastric disorders and skin diseases.
		25g of bark paste is consumed twice a day for 23 days as a cure for fever.
		The leaves are boiled in water and the resulting liquid is applied to affected areas to cure pimples.
		The bark or leaves (100g) are boiled with a glass of water and consumed with 2 spoons of honey to purify the blood.
		The flowers are fried in earthen pots and eaten to purify the blood.
		The tender leaves are fried with oil and salt and consumed with other vegetables to cure eczyma and other skin diseases.
		Dried leaves (1000g) are mixed with 5000g of pulses and stored. The leaves enhance the quality of storage.
		The seeds are ground to a paste and applied on the head to remove head lice.
		Powder prepared from dried leaves is swallowed to cure itches.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
		The leaf paste is consumed to cure skin diseases.
		The dried seeds are powdered and mixed with sugar. The mixture is eaten as a cure for worm infections.
		Neem oil is mixed with honey and poured into the ear to cure ear infections.
		Dried leaves are powdered and burnt. The smoke acts as an insecticide.
		Leaf paste is given to buffalo calves to get rid of worms.
Bacopa amrriiri	Brahmi (H)	The whole plant (10g) is boiled in water and the decoction is consumed daily on an empty stomach as a cure for leprosy.
		25g of plant paste is consumed to cure constipation and treat bladder problems.
		20g of leaf juice is given on an empty stomach to children to cure bronchitis.
		Leaf paste is mixed with opium and applied on the forehead to alleviate headaches.
Baliospermum montanum	Danti (O)	The tuber is ground and the paste is used for massaging joints to ease joint pains.
Bambusa vulgaris	Baunsa (O) Baans (H) Bamboo	This is useful as a cure for pimples. Young bamboo shoots are applied to pimples on the face.
		The leaves are fed to cattle as a cure for diarrhoea.
Bankara malabarica	Poto (H) Parho (H)	The roots (15g) are mixed with four pieces of black pepper and two pieces of Lousang and ground to a paste. This is consumed for 4-5 days to cure coughs.
		The fruit (250g) is boiled and consumed twice a day as a cure for dysentery.
Barleria prionitis	Daskeranta (O)	The leaves of this plant are plucked and ground in the palm of the hand. The paste is applied on the eye to treat glaucoma.
Barringtonia acutangula	Hinjala (O) Dimra (H)	The bark is cut into pieces and ground. The mixture is consumed to purify the blood.
		The seeds, along with Hatya Kankana seeds, Apamarga, Mutha root, Danti root, and Chita root are made into a powder and consumed with Nela leaf juice to cure high fever.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Bauhinia vahlii	Sialipatra (O) Siali (O) Gungu (H Mahulan (H)	The leaves are ground with roots of Baga deli and taken to treat dysentery. The roots are dried and powdered. The powder is soaked in a glass of water overnight and the water consumed (1/2 glass per day) to prevent stomach upsets. The bark (25g), along with Kusum bark (15g) and Amara bark (25g) is made into a paste and soaked overnight with 2 glasses of water. The liquid has a red colour. Half a glass of this water is consumed twice a day to cure dysentery.
Bauhinia purpurea	Kochnar (H)	The root juice is mixed with mustard oil and is massaged to increase body temperature. The root paste (100g) is consumed to cure stomach upsets. The dried buds are eaten as a treatment for piles and dysentery. The buds are used as food. The bark is boiled in water and the extract imbibed to cure persistent fever.
Bauhinia variegata	Kachnar (H)	The leaves or flowers are boiled, dried and eaten to prevent sunstroke.
Berberis asiatica	Daru Haladi (O)	The roots of this plant are mixed with Gokhyara, Sunthi, Pipali, Chilli, Gaba root, Satabari, and Ganthiana and made into a powder which is taken twice a day to treat fits.
Bixa orellana	Latkani (H)	The leaves are made into a paste and applied on burns.
Bischofia javanica	Hajam H)	The tubers (10-15g) are made into a paste and drunk twice a day for 2-3 days to cure stomach upsets. This is widely sold to traders.
Bombax ceiba	Simuli (O) Semul (H)	The bark (10g) is ground and taken with sugar as a cure for diarrhoea. The latex from the trunk is idrunk as a cure for diarrhoea. The flowers are ground to a paste and applied to the skin to heal pimples. Root paste or bark powder is taken to prevent nocturnal ejaculation.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Bombax malabarica	Simili (O) Semel (H)	The bark is cut into pieces, ground up and taken to cure dysentery.
Borassus flabellifer	Tala (O) Tar (H)	This is used to treat ear infections. The root juice of a one-year-old tree is dropped into the ear 3 or 5 times to relieve pain. The tuber is dried and powdered. The powder (5g) is mixed in water and consumed every day to enhance memory power.
Boswellia serrata	Salaya (B) Salai (H)	The latex is warmed and applied as an ointment once or twice a day to heal cracks in the skin. About one to two grams of latex is applied daily as an ointment to cure boils.
Brassica campestris	Rai (O) Sarson (H)	The flower is ground and the concoction consumed two to three times a day to cure stomach-ache. If this does not work, it is taken with black pepper. An ointment is prepared from a mixture of burnt hair and Sarson oil and put on the skin to cure itches. The oil is mixed with water to make an ointment used to heal wounds.
Buchnania lanzan	Piyar (H) Char (H)	Latex (20g) is applied twice a day as an ointment to heal wounds and cracks in the skin. Ripe fruits are eaten as food. The gum is eaten to cure diarrhoea.
Bursera serrata	Kaandeyor (H)	The fruit is eaten as food.
Butea monosperma	Palasaphula (O) Palas (H)	The fruits, with Ludha bark, are made into a powder. This is consumed along with rice water to cure vaginal discharge (leucorrhoea). A quarter of a seed is roasted and made into paste with Chinti katha leaves (15g) and sugar (5g). This is consumed once a day for 15-20 days to cure vaginal discharge (leucorrhoea). The seeds (10-15) are ground to a paste and the paste is imbibed on an empty stomach to kill intestinal worms. The seeds are fried in ash and powdered. The powder is mixed with honey to make a paste which is taken to purge tape and hook worms. The bark gum (5ml) is consumed 2-3 times a day to cure diarrhoea.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
		The bark (50g) is boiled with Dahu bark (50g) and the liquid drunk twice a day for 15-20 days to cure vaginal discharge (leucorrhoea). The bark paste is used to cure infections resulting from dog bites. 500g of flowers are soaked in water overnight and the water is drunk daily for 10-20 days as a cure for diabetes. Leaf sap is dropped tin the ears to ease ear-ache. A paste made from root bark is used to treat hypertension.
Butea superba	Erasing (B) Palasa nati (O)	The fruits (8 to 10) are ground with water into a paste which is made into 4 tablets. These are taken to cure dysentery. The roots along with Panijhuli bark, Bela bark, Kaithali bark, Nimba bark, Amba bark, Pahada root, Jhatiki root, Chara bark, Krushnapani root, Sunthi, Pipali, black pepper, Rasuna, Banapalu tuber are boiled in water. The boiled water is consumed as a treatment for noctural ejaculation.
Cajanus cajan	Rohri tusa (H	The tender or mature leaves are ground up and made into 10g pills. These pills (or the green leaves alone) can be chewed twice a day to cure measles.
Cajanus indicus	Arhar (H)	The grain is used as food. A paste made from the grain is used to heal boils. The juice of the tender leaves is mixed with sugar and imbibed as a cure for jaundice. The leaves are boiled and the infusion used as a mouthwash to relieve dental pain.
Calamus viminalis	Beta (O)	The tuber is ground up and the juice is taken with rock-sugar or fried with ghee. This helps in the cure of fever, headaches and fits.
Calotropis gigantea	Arakha (O) Platisekam (H) Akwan (H) Patti (H)	The white latex (30g) is applied two to three times on a wound or scratch on the body inflicted by snakes, jackals or dogs. This removes the poison or infection from the body. The root juice is drunk along with black pepper (3 to 21) to cure stomach-ache and infection or poisoning from snake bites. Root paste is fried in mustard oil and dropped in the ear to cure ear-ache.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
		The latex is mixed with mustard oil in equal proportions and applied on the head to reduce the blood pressure.
		The stem is burnt on one side and smoked like cigarette for 4-5 days continuously to cure a persistent cough.
		The tender leaves are ground into a paste and applied on a dog bite to prevent infection. The tender leaves or latex (2-3 drops) are mixed with jaggery and made into pills. One to two spoons of these pills are consumed per day to heal dog bites.
		The latex or leaves are mixed with jaggery and made into pills which are eaten to stimulate lactation.
		The concoction prepared from the flowers or roots is consumed as a cure for diabetes.
		The root paste is mixed with black pepper powder and consumed as a cure for dysentery.
		The latex is placed between the teeth with cotton to relieve toothache. This is done only after application of mustard oil on the carious teeth.
		The leaves are chewed to cure fever.
		Leaf juice is fried with mustard oil and applied to relieve pain.
		The dried tender leaves are powdered and can either be eaten or applied on wounds.
		The latex is burnt in a vessel and a powder prepared. The powder is taken with milk or water to cure tuberculosis
		The latex is fried in mustard oil to make an ointment which is applied externally to heal wounds.
Capparis sepiaria	Kasthikapali (O)	The roots are ground with unsalted boiled rice and eaten for 1 to 2 weeks to remove white spots on the skin.
Capparis zeylanica	Asadhua (O)	The bark of the twigs (10g) is ground with black pepper (21) and mixed with 50ml of cow's milk. This is consumed continuously for 1 month to cure arthritis.
		The roots are ground into a paste and warmed. The paste is applied on the body to protect against diseases.
Careya arborea	Kumbhi (O) Kumbhi (H)	The bark is cut into pieces and ground to a paste which is eaten to cure dysentery. The bark can be boiled before grinding.
		The bark, along with Korai bark and Satwar root is mixed with sugar and water to prepare a paste which is taken to cure jaundice.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Carica papaya	Amrutabhanda (O)	The latex is applied at the base of a tooth (3 to 4 times) to relieve tooth-ache.
	Papita (H)	The unripe green mature fruit is boiled and consumed (1 cup a day) by mothers to enhance lactation.
Carissa opaca	Karonda (H)	A paste is made from the leaves and roots and applied to affected areas to relieve pain.
Carissa spinarum	Khirokoli (O)	The roots, along with Akanbindu and Patala garuda roots are worshipped at the full moon in order to become a great person.
Caryota urens	Salapa (O)	The bark is mixed with Sunthi, Pipali , Chilli, and Aleicha and powdered. This is consumed to cure coughs.
Cassia fistula	Sunari (O) Bandar louri (H) Harri (H) Amaltas (H)	The root is ground and the paste taken to purge tape and hook worms. The root (25g) is mixed into a paste with Kutti root (25g) and Gethia root (25g). It is then massaged on the body to relieve body pains. The fruit is boiled in water and the extract (15ml) is consumed as a cure for rheumatism. A paste of bark, leaves and fruit is prepared and applied on the bodies of animals to cure muscular inflammation. The seed (15g) is made into a paste and eaten as an antidote to snake venom. The root paste is applied on the back to relieve back pain. The leaf juice is applied externally to cure skin diseases. A concoction prepared from roots, bark, seeds and leaves is drunk to cure stomach upsets.
Cassia tora	Chakor (H)	The root paste is consumed to cure fever.
Cassina glauca	Miriri (H)	The root (50g) is soaked in water and drunk as an antidote to snake venom. The root is ground to a paste, applied on the stomach and left for 1-2 hours to cure stomach upsets.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Celastrus paniculatus	Kujuri (H)	The seed oil (1-2 spoonfuls) is drunk with water to cure coughs, chest pain, and tuberculosis. The oil can also be applied on wounds to aid healing. Two to three drops of oil are taken with hot rice by mothers to treat complications after childbirth.
Celosia cristata	Mayurchullia (O)	The root juice (50g) is taken along with raw rice water (50ml) two to three times to cure diarrhoea.
Cemacarpus anacardium	Bhalia (O)	The seed oil massaged on the body acts as a muscle relaxant. Three fruits are boiled in water for 20 minutes and then removed. 500ml of milk is added to the water and then 150g rice added and milky rice prepared. This is eaten to relieve muscular pain and fatigue.
Centella asiatica	Chobe ara (H) Bengsag (H) Thalkudi (O) Brahmi (O) Choke ara (H)	Memory can be improved by smelling the leaves. The leaves are eaten as food. The green leaves can be cooked straight away or dried and stored and cooked with tomatoes. The leaves are plucked and chewed with honey on an empty stomach to enhance memory power. The roots are roasted and then dried in the sun. They are then powdered and consumed twice a day to cure insanity. Leaves (30g) are boiled with a glass of water and consumed to prevent acidity and stomach upsets. The whole plant is washed and cooked or the green plants are ground with 10g of sugar. Water is added and a solution prepared. One glass is consumed to cure jaundice, sunstroke and dyspepsia.
Chromolaena odorata	Pokasunga (O)	The root is used to relieve fever in children.
Chloroxylon swietenia	Veru (O) Odasamari (O)	The flowers are ground and consumed as a cake. Smoke of fresh leaves used to kill bedbugs.
Chrysanthimum coronarium	Sebati (O)	The leaves are ground and 1 spoonful per day is consumed to cure diarrhoea in children.
Cipaidessa barceifera	Bir horeng (H) Bir rahari (H)	The whole plant is ground into a paste and taken (1-2 spoonfuls once a day) for 5-6 days to treat complication after childbirth.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Cissampelos pareira	Pitusing (H)	The root (25mm) is made into a paste with water and to cure stomach-ache and dysentery. The root (10g) is made into a paste, mixed with lemon juice (3ml) and taken in small quantities for stomach acidity problems.
Cissus guandrangula	Harjora (H).	The whole plant is made into a paste and applied on the body to cure strains and fractures. The paste is applied for 5-6 hours. The bark can be ground and used for the same purpose. It is also useful when treating animals. Bamboo sticks are used to hold the plant paste tight against the fracture. This is also effective on animals. Fresh tuberous root paste is used to set broken bones. Tamarind leaves are crushed with Harjora root and mixed with mud collected from termite mounds. This is placed on the skin around the broken bone. The bark of the Karanj tree is placed on the paste to hold it tight. The broken bone sets within a fortnight.
Clausena excavata	Agni jala (O)	The root is ground with spices such as Kain Keshara, red lotus root, Jeera, Madhuri, Coriander, Kababajani, sugar, Rasakadali, black pepper, Gokhara seeds, Kala jeera, Juani, Ghoda bacha, Abilakala, Purna chandra, Jasthimadhu, Sunthi, Pipali, Nageswar flowers, Ankaranti fruit, and Nabhisanga and made into paste. This is consumed twice a day to cure piles. Juice made from ground roots is used to cure indigestion.
Cleistanthus collinus	Karada (O)	Sticks and pieces of small branches are chewed for 5 minutes to prevent tooth decay.
Cleome viscosa	Anasorisho (O)	The leaves are ground and warmed and put on the body to get rid of body lice.
Clerodendrum serratum	Saramlutur (H)	The root (15g) is made into a paste and consumed with 1/2 glass of water to cure stomach acidity. The roots (50g) are boiled with Miriri roots (50g) and a paste prepared. Half of the paste is applied on the leg while the other half is consumed with water. This cures muscular pain and weakness of the legs.
Clerodendron viscosum	Chamagar (H)	The root (15g) is mixed with Simjanga root (15g) and ground into a paste. This is applied as an antidote to snake venom.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Clitorea ternatea	Aparajita (O)	The leaves and roots are used to treat headaches. A mixture of root juice (50g), cow ghee (3ml), sugar (3g) and honey (3ml) is taken for one week to treat stomach upsets and gastric infections.
Cocculus hirsutus	Dadaia (O)	A leaf concoction is taken with water early in the morning on an empty stomach to prevent gastroenteritis. Green leaves are ground and put on the forehead to relieve headaches.
Cocos nucifera	Nadia (O) Narial (H) Coconut	Juice from flowers (2 spoonfuls) is mixed with sugar and taken to prevent gall stone formation. Sulphur powder is mixed with coconut oil to prepare an ointment. This ointment is applied externally to heal wounds and skin diseases.
Coecinia grandis	Kunduri (O) Kundri (H)	The leaf juice is warmed and put in the ear to cure ear-ache
Comniphora weightii	Gugul (H)	The bark is ground into a powder and used as an ointment once or twice a day to cure piles.
Costus speciosces	Gaigendalia (O)	The tuber (100g), coconut milk (500ml), honey (100ml), ghee (500g) and goat's milk (100g) are mixed into a paste which is taken twice a day to cure rheumatism.
Crossandra undulaefolia	Badianla (O)	The ground root juice (50g) is considered as a fertility agent and used three times a day for three days by infertile women to induce pregnancy.
Crotalaria sericea	Jhunjhunia (H) Chirchiti (H)	A paste made from the whole plant is taken on an empty stomach twice a day to cure rheumatism. The plant ash is boiled in water to obtain a crystalline powder which is consumed as a cure for indigestion, asthma, stomach-ache and dropsy. The root paste is massaged into a wound and drunk as an antidote to snake venom and scorpion stings.
Croton bonplandianus	Gandi (O) Ban mirchi (O)	The roots are ground and the paste taken to purge tape and hook worms.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Croton oblongifolius	Maha sindhu (O) Putri (H) Kutti (H) Korraiya (O)	The ground paste of the root is consumed as a cure for fatigue. Juice from the bark is fried in mustard oil and poured in the ear to relieve ear-ache. Latex (5ml) is mixed with red putus (Lautana camara) root (10g) and applied on a snake bite as an antidote to the venom. The root (25g) is made into a paste with ½ glass of water and consumed twice to cure stomach-ache. The root (15g) is mixed with Harri leaf (10g) and Gethia leaf (5g) and made into a paste. The paste is applied on the body to relieve body pain. Sap from the twigs is dropped into the eyes to cure redness. The bark and root paste is taken to cure dysentery. Juice from the branches is applied to clear ringworms.
Croton tiglium	Jai (O)	The fruits are ground with Sunamukhi leaves, Jada oil and consumed to cure constipation.
Cryptolepis buchanani	Gopakanhu (O)	The roots are ground and consumed to cure diarrhoea.
Curculigo orchiddes	Talamuli (O)	One spoonful of a powder made from the plant is consumed daily in the morning and evening to cure dyspepsia.
Curcuma longa	Bana haladi (O) Haladi (O)	One measure of a juice made from the rhizome is added to 4 measures of mustard oil and warmed. Two to four drops of the liquid is put in the ear to cure ear infections.
Cuscuta reflexa	Nirmuli (O) Amarbel (H	Juice is extracted from the plant and applied on the belly to get rid of piles. The plant is dried and ground and taken with hot water to cure indigestion. The plant paste is applied to cure sprains in cattle. The plant paste is applied and tied with a bandage on the testicles to cure a hernia. The plant paste is applied externally to relieve pain.
Curculigo orchioides	Talamuli (O) Kalimusli (H)	The tuber is dried and powdered. The powder (1g) is mixed with water (200ml) and drunk regularly to increase memory power. The powder (one spoonful) is consumed daily in the morning and evening to cure dyspepsia.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Curcuma aromatica	Bundu sasang (H)	The tuber is mixed with water and ground into a paste. It is either consumed (2-3 spoonfuls) or applied as an ointment as an antidote to snake venom.
Curcuma domestica	Sasang (H)	The tuber is ground into a paste with Emblica leaf and applied as an ointment to relieve muscular pain.
Cymbopogon flexuosus	Dhanitra (O)	The root and leaf juice (20 to 25g) is consumed to cure dyspepsia. The leaves (20 to 30g) are ground into a paste and fed once a day for 4 to 5 days to cure fatigue in cows.
Cynodon dactylon	Duba ghasa (O) Poondi dubla (H) Dubla gashar (H)	The grass is cut into pieces and ground. The paste is consumed with a pinch of sugar or salt to stop nose bleeds arising from sunstroke. A poultice prepared from the leaves and stems of this plant is applied on the forehead once or twice a day to cure migraine.
Cyperus rotundus	Mutha (O) Motha (H) Sunumsanga (H)	The root juice is applied on boils. The roots (10g) are ground with black pepper (3) and applied on the forehead to cure one-sided headaches. Pellets made from the mixture are taken twice a day to relieve headaches. The tuber paste is fried in Karanj oil and applied externally to cure eczema. Tuber paste (15g) is consumed 2-3 times a day to cure fever. A paste made from tubers is applied on joints as a cure for rheumatism.
Dalbergia latifolia	Sisu (O) Shishum (H)	The wood of this plant is boiled in water and applied to treat scabies. The leaf is made into a paste and 50g is taken to cure stomach upsets. The leaves are boiled in water and the extract is taken to cure gonorrhoea. A decoction of leaves is consumed to cure vomiting.
Datura fustosa	Dhatura (H)	The bark is ground with Ratangaura root and the paste is applied to relieve pain. Two to three flowers are burnt and the ash mixed with Karanj oil and applied on the skin to cure dermatitis. Paste made from the flowers is dried and consumed with cow's milk to cure vaginal discharge (leucorrhoea). The seeds are put in cigarettes and smoked as a cure for asthma.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Datura metel	Kaladudura (O	The root (5g) is worn as a talisman against ghosts.
Dendrophoe fabeatu	Sarita bonda (H) Sakhua kabonda (H)	The plant paste is applied externally on the affected part of the body to cure paralysis.
Desmodium heterocarpos	Sala pani (O) Krushna pani (O)	The roots are powdered and consumed to cure prolonged fever. Roots are boiled in water. Black pepper, Sunthi, and Pipali powder are put into the boiled water and the liquid is taken to cure colds and fever.
Desmodium triflorum	Kuradia (O) Lathlathi gasar (H)	The bark is ground and the extract applied to cuts and bruises. The plant is ground to a paste and then mixed with two or three drops of kerosene oil. Two spoonfuls are consumed twice as an antidote for snake venom.
Dioscorea oppositifolia	Panialau (O)	The rhizomes/tubers are cut into pieces and eaten as food.
Dioscorea pentaphylla	Kanta alu (O)	The rhizome/tuber is cut into pieces and eaten.
Dioscorea wallichii	Gethikanda (H) Pita alu (O)	The tuber is eaten as food. The tuber is cut into chips and boiled for 1-2 hours. After boiling, the chips are soaked in water overnight. The mixture is then taken with salt to treat constipation.
Diospyros melanoxycon	Kendu (O) Tendu (H) Tiril (H)	The fruit is used as food. The leaves are dried and prepared as cigarettes. The bark paste (50g) is consumed 2-3 times to cure dysentery and fever. The ripe/raw fruit (1-2) is made into a paste and consumed as a cure for dysentery. One teaspoonful of Tendu oil is consumed twice a day to cure diarrhoea. Two to three unripe fruits are eaten per day to cure dysentery and diarrhoea. The fruit juice is applied to heal wounds and ulcers.
Diospyros montana	Halda (O)	The bark is mulched into pieces and put in the water to paralyse fish to enable them to be caught more easily.
Ehretia lacuis	Pandaru (H)	A mixture of leaf juice, the stem core of a male palm tree and mustard oil is used externally to cure skin diseases The bark and leaves are taken as pan.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Elephantopus scaber	Mayur chandrika (O) Jurbi (B)	The roots (3-5g) are chewed to give immediate relief from a sore throat.
Embelia robusta	Bidanga (O)	When a woman is unable to conceive, she is advised to eat the root (25mm) for seven days. It is also effective in preventing miscarriage.
Embelia tsjeriam-Cottam	Baibidang (H)	The dried fruit is exported to Europe and Asia for medicine and paint manufacture. Used commonly for making drugs against round and tapeworms. The root extract is used to cure chronic cough, dysentery, and indigestion.
Emblica officinalis	Aonla (O) Meral (H) Amla (H) Anola (H)	The fruits along with those of Harida and Bahada are dried and powdered. The powder is taken with salt to treat coughs, colds and malaria. The round shaped part of the stem is tied round the neck after worship/mantra to cure goitre The powdered plant is consumed for menstrual problems. The fruits are boiled, dried and stored. The dried fruits (25g) are soaked in a glass of water which is drunk to cure gastro-intestinal problems. The fruits are processed to prepare pickle. One to two fruits of this pickle are consumed regularly to cure dyspepsia. The dried fruits are eaten as a cure for diarrhoea.
Eucalyptus hybrid	Eucalyptus (H)	The leaf paste is effective against conjuctivitis. The bark is boiled and 25g of the decoction is consumed twice daily against diabetes. Aerial roots (25g) are cut into pieces and ground along with papaya pulp and taken to improve lactation. Mature leaves are boiled in water and the dried extract is mixed with milk and drunk to cure vaginal discharge (leucorrhoea). Alternatively, powdered bark or dried fruits or latex can be used. The latex is dropped in the ear to treat wounds in the ear. Bark ash or leaf sap is consumed with water to cure piles.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Eugenia operuculata	Kuda (H)	Juice from ripe fruits is useful for treating all types of stomach disorder. The ripe fruit juice is kept in a container for 2-3 years. This is allowed to ferment and is consumed (200ml a day) when required as a cure for diarrhoea.
Euphorbia fusiformis	Khirakanchan (O)	The tuber (5g) is ground and the juice taken in 3 to 4 doses (5g each) by women who have lactation problems. The tuber is collected only on Saturdays and Sundays. The root is cut into seven pieces and given in one dose with grass to cows to increase milk yield.
Euphorbia hirsuta	Marikarika (O)	7 leaves are ground with Jai fruits and given to children as a cure for diarrhoea. Roots and Jalakata are ground and consumed by mothers to enhance lactation.
Euphorbia hirta	Hariharika (O) Dudhi (H)	This is used as a cure for dysentery. 7 leaves are ground with Jaiphala (1g) and drunk for 2 to 3 days. The bark is ground and a solution prepared with water. This is drunk to cure the swelling of muscles in arms and legs. The latex is applied externally as a treatment for ringworm.
Euphorbia neriifolia	Patra siju (O) Siju (O)	The leaves are boiled in water. Four layers of wet cloth are put on the site of pain and the hot leaves are placed on top to relieve muscular pain.
Euphorbia nivulia	Katha siju (O)	The whole plant is cut into pieces and boiled in water. It is consumed as a cure for pain in the small of the back.
Ficus bengalensis	Bara (O) Bargad (H) Barh (H)	The leaf latex is put onto a piece of white paper which is placed on a boil to reduce the size. The latex can also be massaged into the boils to help remove the pus. The latex and bark is ground and mixed with sugar and made into tablets. 2 tablets (2 to 3g) are taken for 45 days as a cure for menstrual disorders. The latex is applied on the eye to cure conjuctivitis and other eye problems. The bark is boiled and 25g of the bark decoction is consumed twice a day as a cure for diabetes. The aerial roots (25g) are cut into pieces and ground with boiled papaya pulp. The mixture is taken to increase lactation immediately after childbirth.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
		Mature leaves are boiled in water. The extract is dried and consumed with milk to cure vaginal discharge (leucorrhoea). The dried bark is powdered and given with cow's milk to cure vaginal discharge (leucorrhoea). The latex is mixed with milk and imbibed as a cure for vaginal discharge (leucorrhoea). The latex is dropped in the ear to heal ear infections. The bark ash is drunk with water as a cure for piles.
Ficus glomerata	Doomar (H) Gular (H) Lowa (H)	The sap from the root is mixed along with guava and Bela leaves and ground to a paste. The paste is consumed with sugar as a cure for vaginal discharge (leucorrhoea). The dried fruit (200g) is powdered and consumed daily with vegetables as a cure for tuberculosis. The fruit or root paste is massaged on swollen glands. Root juice (250ml) is taken once a day to cure stomach disorders. The water extruded from the root is imbibed as a cure for leucorrhoea. The green fruits are made into a paste and applied to the teeth to cure toothache. The unripe fruit is consumed as food. The unripe fruit is eaten as a cure for dysentery. The unripe fruit is made into a paste and applied on the teeth to cure toothache. The fruit is boiled in water and the solution taken as a cure for dysentery. The ripe fruits are eaten to prevent abortion.
Ficus hispida	Dumar (H)	The ground fruit powder is consumed to relieve stomach pain. The bark paste is applied externally to heal wounds and as a cure for piles.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Ficus racemosa	Dimiri (O) Dimru (H)	The fruit is useful for curing diabetes. The dried fruit is ground and the powder is taken with honey once a day. This is useful in curing nocturnal ejaculation. The root juice is collected in a vessel and drunk early in the morning.
Ficus religiosa	Odha (O) Pipal (H)	The branch roots are cut into pieces, ground and taken as a cure for menstrual disorders. Leaf juice is mixed with honey and consumed to cure coughs.
Ficus virens	Phutkal (H) Phutkal ara (H)	Flowers are boiled and mixed with rice water and fed to goats as a cure for dysentery. Leaf buds are used as food. Bud leaves are boiled, dried and stored. This material is taken with water to prevent acidity and as a cure for dysentery. The tender leaves are boiled, sun-dried and powdered. The powder is boiled in water and one and a half cups (250ml) of the decoction are taken twice a day as a cure for diarrhoea and dysentery. Juice from the bark is mixed with sugar candy and taken as a cure for dysentery.
Flamingia bracteata	Oteullu (H) Banarasi (O)	The roots are ground into a paste and taken to cure stomach-ache. The root (10g) is made into a paste and taken with a glass of water as a cure for loose motions.
Flemingia chappar	Parvatijata (O) Shyamalata (O) Ranidantakathi (O)	The bark is ground and the extract is applied to the eyes to cure conjuctivitis.
Flephantopus scaber	Gulphulli (H)	Latex from the bud is dropped into the ear as a cure for vaginal discharge (leucorrhoea).
Glochidion lanceolarium	Simlumbui (H)	Root paste is applied on the chest to relieve chest pain.
Gloriosa superba	Shibalingi (O)	The dried fruits are collected and the seeds are removed and ground. One spoonful of this powder is taken daily in the morning and evening to increase memory power.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Grewia disperma	Repre (H)	The roots are ground into a paste and applied on the body for 3-4 days to reduce swellings.
Grewia hirsuta	Sunaragada (O)	This is used to cure regular or recurrent fever in children. 2-5g of the root are tied on children's hands to reduce the fever.
Grewia species	Sirka (H)	The bark (50g) is soaked in a glass of water overnight and the liquid is drunk twice a day for 3-4 days to cure jaundice.
Hamiltonia suaveolens	Pingu (O)	The seed oil or a plant concoction is applied on wounds to heal them. Pingu mardanga and Bela mardanga are ground and made into small balls which are tied around the neck to act as talismans against ghosts.
Helinus lanceolatus	Swargjal (H) Kamarbela (H)	The roots (25g) are made into a paste with water and applied to relieve pain in the small of the back. The root (15g) is made into a paste with water (5ml) and drunk twice a day as an antidote for poison.
Hemidesmus indicus	Onolsing (H) Dudhia (H) Kapuri (H)	The root (20g) is made into a paste with water and drunk twice a day to cure bloody dysentery. The roots are used to cure rheumatism and as an antidote to snake bites. For rheumatism, the roots (5g) along with Githia (5g) and Pitiesing (5g) roots are made into a paste and applied on the affected parts of the body. A paste is prepared from roots of Japrarang (5g), Triphala churn (2 spoonfuls) and honey (2 spoonfuls). The mixture is taken twice a day as a cure for gastric problems. The root (50g) is dried and made into powder along with latex from Kutti, and Harri roots (25g). The concentrate is divided in two. One half is applied on the point of the snakebite and the other half is consumed as an antidote to the venom. The roots (25g) are ground and applied to cure pains caused by spells made by witches or ghosts. The leaves are chewed to cure fever.
Hibiscus rosasinensis	Urhul (H)	The flower buds are made into a paste which is consumed as a cure for impotency.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Holarrhena antidysenterica	Korai (H) Kurumi (O) Indrajiba (O) Dudhi (H) Dudh-koreya (B)	A mixture of the root (5g) with Banakolathia root (5g), Ankula root (5g) and mango bark (5g) is ground. The mixture is taken in 2 to 3 doses to cure diarrhoea. The root is ground and eaten to control acidity. Bark or root paste is taken as a cure for dysentery.
Holarrhena pubescens	Indrajal (H) Kuruchi (H)	The roots are mixed with Mahajal roots in equal proportions and ground into a paste. This is applied on the leg to relieve leg pains. Grains are boiled and taken to cure gall stones.
Hygrophila auriculata	Koholikhia (O)	The plant is dried and powdered. The powder is taken to cure fits.
Hyptis suaveolens	Ganga tulasi (O)	Leaf juice (5-10g) is applied on cuts and small wounds to speed the healing process. The leaves are used to improve fertility in cattle.
Ichnocarpus frutescens	Sualai (O)	This is helpful for curing fever. The root is boiled in water and the liquid is taken with honey. It is also used to cure eye diseases. The sap is put into the eye to cure conjunctivitis. The roots (100g) are boiled in water (150ml) until they evaporate down to 25g. Once cooled the liquid is mixed with honey and sugar. Two spoonfuls are taken in the morning and evening for 3 days to purify the blood.
Imperata cylindrica	Chiro (H) Chhanchhana (O)	The leaves are fed to cows and goats to induce lactation. The root juice is mixed with sugar and taken to cure vaginal discharge (leucorrhoea).
Indigofera cassioides	Giliri (O)	The raw roots are ground and the concoction (10-20g) is consumed within 4 to 5 days to cure diarrhoea.
Indigofera pulchella	Hutar (H)	The flowers are boiled and then dried. They are cooked and consumed as food.
Ipomoea cornea	Amari (O)	The latex is applied to fresh wounds to aid clotting of the blood.
Ipomoea mauritiana	Bhuin kakharu (O)	The fruits are ground and the juice (20-30g) is taken to help blood clotting.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Jasminum sambac	Malli (O)	This is used to relieve labour pains during childbirth. A child faces to the east and worships God near to this plant. The child collects the root which is then ground into a paste. One part is consumed by a pregnant women and the other part is tied in her hair.
Kalanchoe pinnata	Amarpoi (O)	The leaf juice is drunk as a cure for diarrhoea in children. The leaves are ground with black pepper and taken with a glass of water 2 to 3 times to cure diarrhoea and dysentery.
Lagerstroemia parviflora	Sidha (O) Sidh (H)	The bark is tied onto affected parts of the body to relieve pain. The latex and mustard oil is massaged on the groin to treat a hernia. The whole plant is powdered or crushed and immersed in water to poison fish when fishing.
Lantana camara	Nagaairi (O) Putus (H)	This plant is planted in the backyard or kitchen garden to deter snakes. The leaves are rubbed on the tongue to cure inflammation of the tongue.
Lawsonia inermis	Manjuati (O) Mehandi (H)	This plant is useful for curing jaundice. The root (10g) is scraped in watery rice and the juice (2 spoonfuls) is drunk with 10 spoonfuls of water for 21 days. The leaf concoction is applied twice to cure foot worms. The leaf concentrate is applied to the palm to give colour.
Lea maerophylla	Hatikana (O)	The leaves are used to cure inflammation of the joints.
Lens culinaris	Massuri (O)	The bark is mixed with black pepper and then ground into a paste. Tablets are prepared which are taken twice a day for 21 days to cure epilepsy.
Leucas aspera	Gaiesha (O)	The roots, leaves and flowers are chopped and ground and applied on a rat bite as an antidote against rat poison.
Lippia javanica	Gandhiari (O)	The fruits are tied and kept hanging in the fireplace and eaten to treat hernias.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Lipudirra baceifera	Beihore (H)	The root (100g) is ground into a paste and the concoction is divided into 2. One part is consumed while the other is applied on the chest to cure chest pain.
Litsea glutinosa	Jaisandha (O)	The bark is ground and applied to a cut or wound for 7 to 8 days to heal the wound. The bark is ground and the paste taken to cure high fever.
Litsea monopetala	Meda (H)	Bark paste is applied to heal sprains. The oil from the fruit is applied on joints to relieve rheumatic pain.
Lowsonia inermis	Mehndi (H)	The leaf paste is applied on the forehead as a cure for headaches. The leaf juice is given to cows to induce fertility.
Lygodium flexuosum	Mahajala (O) Indrajala (O) Bonganacha (H)	This plant is used to cure fever in small children. The child is exposed to the smoke produced by burning 5g of the root. 25g of root paste is applied or massaged on the head to cure headaches
Madhuca indica	Mahula (O) Mohua (H) Moudkam (H)	The flowers are cooked and used as country liquor. Ground flowers are applied to relieve pain. Equal portions (25g) of the flowers and Meda bark are made into a paste and consumed 2-3 times as a cure for dysentery. The oil from the seeds has digestive properties. The bark is ground to a paste and applied to relieve tooth-ache. The roots are dried and ground into a powder and applied to cure pyorrhoea. The small branches are cut into pieces and used as a toothbrush to cure pyorrhoea. The ripe fruits are collected and the embryos inside the kernels are processed to extract oil. The oil is massaged around the navel on an empty stomach to cure colic. The bark is used as a toothbrush to relieve tooth-ache. The bark is boiled (500g of bark in 2 litres of water) and the liquid used as a mouthwash to relieve tooth-ache.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
		Wine prepared from flowers is mixed with turmeric powder and consumed on an empty stomach to cure gastric disorders.
		The dried seeds are ground and the resultant cake is put into water to poison fish when fishing.
		The wine prepared from the flowers is given as a cure for coryza disease in cattle.
Madhuca latifolia	Madhukam (H)	The flower is boiled in water and the liquid drunk as a cure for stomach-ache.
		The seed oil is massaged on the stomach and around the navel to cure stomach-ache.
		Dry flowers (10g) are soaked in a glass of water and the liquid drunk early in the morning to maintain a healthy body.
		The seeds and seed oil are used as food.
		The seed oil is used for food.
		The branches are used as toothbrushes.
Mangifera indica	Amba (O) Aam (H) Ulli (H)	The bark is cut into pieces and ground. The juice is taken as a cure for diarrhoea.
		Bark juice (25g) is mixed with sugar and a glass of milk and is consumed 2-3 times as a cure for dysentery. The bark paste is taken with lime to cure dysentery.
		The unripe fruit is roasted in a fire and mixed with water and sugar. One to two glasses of the liquid are consumed daily as a cure for sunstoke. Ripe fruit can also be used. The pulp can also be applied on the head and stomach as a cure for sunstroke.
		The bark or root is ground to a paste and applied on burns.
		The bark paste is mixed with ash and applied on the nails to cure jaundice.
		The dried flowers are mixed with sugar and consumed with milk to cure vaginal discharge (leucorrhea).
		The tender flowers are dried, powered and eaten to cure vaginal discharge (leucorrhea).
		The dried kernels are powdered and taken to cure dysentery and to cure vaginal discharge (leucorrhea).
Marsilea minuta	Sunsunia (O)	The leaves are plucked and ground. The paste is warmed and applied to cure swollen fingers.
Melia azadarach	Bakain (H)	The bark is boiled and the decoction taken to purge worms.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Mentha viridis	Pudina (H)	The leaf juice is applied on joints as a cure for rheumatism. The leaf juice mixed with water and sugar is taken to cure indigestion.
Mesua ferrea	Nagaswara (O)	The flowers are mixed with Guluchi and Pasaruni leaves and made into a powder which is taken to cure fits.
Meyna pubescens	Katai (H)	Dried green leaves are made into a powder and stored. They are cooked with rice starch and eaten as food.
Miliusa tomentosa	Gandhapalasha (O)	The leaves are carried to bring good luck.
Miliusa velutina	Gandha palasa (O) Ome (H)	The leaves are carried to bring good luck. The bark and leaves in equal quantities are made into a paste which is applied on the leg to relieve leg pain.
Milletia racimosa	22 chandwa (H)	The root (25g) is soaked in water overnight. This is made into paste and ½ a glass of the liquid is drunk twice. This is used as an antidote to poison and as a cure for 22 different diseases. Root paste is mixed with Chatni bark (25g) and Umasseing bark (15g) and is taken to cure stomach-ache. The bark is ground in a small amount of water and the solution is drunk (One glass each in the morning and evening) as a beverage to cure stomach and abdominal pain. The bark is ground into a paste and the solution (3-4 spoons a day) is consumed as a cure for colic. The bark is washed thoroughly and chewed twice a day to cure colic.
Millintonia hortensis	Akashmalli (O)	The root is tied around the neck as a talisman against ghosts.
Mimosa himalyana	Kirkichi (O)	The roots (200g) are ground and consumed on an empty stomach 2 to 3 times as a cure for dysentery.
Mimosa pudica	Lajakuli (O) Lajwanti (H) Lajaunighasar (H)	The roots are ground into a paste which is consumed to cure fever caused by sudden shock. The plant paste (250ml) is mixed with candy and taken on an empty stomach daily for 1 week as a cure for jaundice.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
		The stems and leaves are ground with Beerbawadi and given to animals to relieve pain. Pills (250g) prepared from this material can also be consumed twice a day.
		The plants are dried, powdered and imbibed as a cure for vaginal discharge (leucorrhoea).
		Leaf paste is applied on a hernia to treat the problem.
Mimusops elengi	Baula (O)	The bark is cut into pieces and boiled in water. It is brushed on the teeth to act as an astringent when the gums are bleeding.
Momordica charantia	Kalara (O)	The fruits are used as food.
	Beer Kaireli (H)	The fruits are taken to cure skin diseases.
	Karela (H)	Seven leaves are ground in the palm and applied on a snakebite to act as an antidote t0 the venom.
		The leaves (10g) are ground into a juice and drunk with sugar as an astringent.
		The leaves (or fruits and leaves) are ground into a paste. The paste is mixed with goat's milk and applied as an ointment on the forehead to cure headaches.
		The fruit juice is drunk to cure diabetes and jaundice.
Moring oleifera	Sajana (O)	The leaf or bark juice (10-15g) is drunk regularly to reduce high blood pressure.
	Munga (H)	The leaves and fruits are used as food.
		The roots (50g) are made into a paste and put on the back for 1-2 hours to cure backache.
		Roots (20g) are made into a paste and consumed early in the morning to prevent skin irritations.
		The leaves, flowers and fruits are boiled together or separately and the resultant decoction is consumed (250ml twice a day) as a cure for diabetes.
		The roots are washed, dried and ground to a paste. The paste is consumed as a cure for jaundice.
		The root paste is applied externally to relieve pain.
Mucuna pruriens	Baidanka (O)	The seeds are boiled in milk which is then drunk to increase male potency.
		The root juice is consumed with honey to cure diarrhoea.
Musa paradisica	Kadali (O)	The fruits are used as food.
	Kela (H)	This is used for cure of hernias. The plant is uprooted and the roots put into the resulting hole and the affected person urinates into it. The roots are then boiled with the urine and the liquid drunk.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
		Two to three pieces of unripened fruit are eaten 23 times a day as a cure for dysentery. One or two matured green fruits are peeled and consumed with salt each day to cure diarrhoea. Tuber juice is given to a cow just after copulation to facilitate conception. Flower ash is mixed with ghee and consumed to cure coughs.
Nardostachys jatamansi	Jatabinsi (O)	The roots are mixed with Bansalochna, Justhimadhu, Debadaru wood, Sunthi, Pipali, Chilli and Harida and made into a powder which is taken to cure coughs.
Nerium indicum	Caner (H)	The leaves are fried in mustard oil and the extract applied externally to cure pain, eczema and to heal wounds.
Nerium odorum	Kandil (H)	About 250ml of root water is taken on an empty stomach daily for 15 days to cure itches. The fried kernel is powdered and mixed with Karanj oil and used as massage to cure itches. The leaves are fried in mustard oil and massaged on the site of pain to cure pain, eczema and to heal wounds.
Nicotiana plumbaginifolia	Hemaraj (O)	The leaves are ground and the powder (15-20g) is taken in the morning and evening as a cure for dysentery.
Nyctanthes arbortristis	Gangasiuli (O) Gotikhadika (O) Soparom (B) Samsiare (H) Harsinghar (H)	This is used to cure fever and is particularly effective for malaria. The leaves and branches (100g) are boiled in water. The boiled water (approx.100g) is taken on an empty stomach early in the morning and evening for seven days to cure malaria. The root paste is applied externally on boils. The root is used for problems after childbirth. 25g of the root is boiled with Rengaborum root (25g) and the liquid drunk twice a day. The leaves with Chariagora and Aonla leaves are boiled in water and the extract is drunk to cure fever.
Ocimum basilicum	Tulasi (O) Bana tulasi (O)	This is used as a cure for coughs. 7 leaves, honey, ginger (2- 3g) are mixed and chewed. It is taken early in the morning and in the evening to cure coughs. The leaf juice is put in the eyes to keep them clean and free from infection. The roots are used to cure foot and mouth disease in cows.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Ocimum canum	Landabaguli (O)	The seed (1-2g) is put in the eyes to cure irritation. This is also useful for the removal of small insects and dirt from the eyes.
Ocimum sanctum	Baduliara (H) Tulsi (H) Badi tulasi (O)	The leaf juice (fresh or boiled) is drunk to cure bronchitis. The root is boiled and the extract drunk as a cure for fever. The leaf juice (fresh or boiled) is applied externally to get rid of ringworms. The seeds are fried with ghee and consumed to cure coughs. The leaf juice is dropped in the ear to cure ear-ache. The leaf juice is mixed with ghee and taken to cure hiccups.
Olax scandiris	Rimbilara (H) Bhadlisag (H)	The green leaves are cooked and used as food. The leaves are dried, made into a powder and cooked as food.
Opilia sp.	Udaudiria (O)	The leaf juice (1-2g) is put into the ear to cure ear infections. This may be applied up to 3 to 4 times a day.
Oppuntia elatior	Nagphani (H)	The phyllode (250g) paste is applied to the tongues of cattle to heal wounds. The phyllode juice is mixed with Phitkiri and dropped in the eye to reduce redness. The fresh leaves are ground and warmed and this is used as an ointment (250-500g, depending on the defects) to cure swellings. The phyllode is eaten to purify the blood and act as a liver tonic.
Oroxylum indicum	Phanaphana (O) Rangebanam (H)	The roots are ground into a paste and applied on the feet to cure footworms. The bark (15g) is made into a paste and applied on the chest. It is left for 1-2 hours to cure chest pains. The root (10g) of this plant is mixed with Swargjal root (10m) and Umasingh root (10g) and made into a paste. The paste is taken (one spoonful) twice a day to cure stomach-ache. The bark (100g) is boiled in water and the liquid drunk once a day for 4-6 days continuously to cure problems after childbirth.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Oryza sativa	Chawal (H)	Residual rice water is massaged on the tongue of cattle to heal wounds on the tongue.
Paederia scandens	Pasaruni (O)	This is used to induce lactation in cows. The leaves and raw rice are made into a pudding which is fed to cows. The leaf juice along with limewater is drunk by small children to purge tape and round worms.
Pandanus fascicularis	Ketaki (O)	The tuber is ground and applied on the body twice a day. It is kept on for 20 to 25 minutes after which the affected part is washed. This cures worm diseases on the skin.
Passiflora foetida	Jhumuki (O)	Roots (25g) are ground into a paste which is mixed with mother's milk and fed to children (3 doses) to cure diarrhoea.
Pedilanthus tithymaloides	Airi (O)	The roots are ground into a paste and taken to cure high fever.
Pergularia daemia	Uturudi (O)	The roots are used to induce lactation in cows. This plant is effective against dental decay and gum diseases. The leaves are mulched in the palm and the juice put in the mouth.
Phaseolus vulgaris	Bean (H)	The leaf juice is applied directly on the affected person to get rid of ringworms. The leaf juice is warmed and applied in the ear to cure ear-ache.
Phoenix acaulis	Banakhajuri (O)	The person has to bite or chew the leaves and tie them on the cracks of the feet to heal them.
Phyllanthus embilica	Anla (O)	The roots are used to treat tooth decay
Phyllanthus fraternus	Badi anala (O) Bhuin anala (O)	The whole plant is uprooted and ground and taken to cure recurrent fever.
Piper longum	Pipali (O)	The fruit is powdered and brushed along with honey on to the teeth to cure tooth-ache. Root powder is fried in honey and consumed to cure coughs.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Piper nigrum	Golamaricha (O)	Seeds/fruits are consumed as a cure for stomach pain.
Piper toicum	Rallisekum (H) Rali (H) Rallipatta (H)	The root (25g) is made into a paste and the concoction is consumed to cure coughs and sore throats. Fruits (50g) are mixed with Rolla fruits (150g) and Bakas leaf juice (20g) and ground to a paste. The pellets are taken once or twice daily to cure asthma and colic. The roots are washed thoroughly and the juice removed by chewing. One tablespoon of juice is taken daily to cure colic. The leaves and bark are ground into a paste and the concoction is taken once or twice a day to cure coughs. The concoction can also be used as an ointment. Roots and leaves are ground to a paste and pills of 5g each are prepared. One to two pills are consumed per day to cure coughs.
Ploygala crotalariaides	Nilakantha (O)	The tuber (15mm dameter) is cut into seven pieces and given to cows along with grass as a cure for foot and mouth disease.
Plumbago zeylanica	Chita (O) Chitamula (O)	The roots are ground into a paste and consumed to relieve acidity.
Plumeria rubra	Katha champa (O)	The fruits and flowers are ground into powder and applied on the body in the morning and evening to remove bad odours and keep the body fresh (i.e. used as deodorant).
Polyalthia longifolia	Debadaru (O)	The roots are powdered and taken to cure coughs.
Polygonum hydropiper	Gadaharaha (O) Gadakarhha (H) Harha (H) Torom (H) Harha (B)	Powdered, leaves, bark or stems are used as fish bait. The whole plant is washed and ground into a paste which is used to induce lactation in animals.
Pongamia pinnata	Karanja (O) Karanj (H) Koronjo (H)	The roots with Jhatikari roots are boiled in water and the liquid is drunk to cure very high fever. It is also useful for treating fevers in children. The seed oil is mixed with Kapoor into an ointment which is applied on burns.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
		The fruit coat is burnt to ash and boiled. The mixture is applied on foot wounds in cattle.
		The seed oil is mixed with waste from batteries and kapoor to prepare an ointment. This ointment is applied to heal foot wounds in cattle.
		The seed oil is applied externally as a cure for rheumatism.
		The seed oil is applied to heal wounds.
		The seed oil can also be applied on the skin to cure skin diseases, pimples and boils.
		The bark is used to treat problems after childbirth. The bark (100g) is made into a paste with 3 glasses of hot water. A plough is heated in the fire until it is red hot and then plunged into the concoction which is then drunk twice a day.
		The seed oil is used as an ointment to repel mosquitoes.
		The bark or roots are ground into a paste and used to heal wounds.
		The tender branches are used for brushing teeth and curing tooth-ache.
		The seeds are ground into a paste and applied on sores.
		Bark paste is consumed to cure indigestion and constipation.
		The leaf paste is used to heal ulcers.
		The bark is eaten to stop internal bleeding from piles.
Premna herbaceae	Gethia (H)	The tuber is mixed with Chandwa root and Saram lutur root in equal proportions. This is made into a paste and applied to cure paralysis.
		The roots are warmed with mustard oil and massaged to cure rheumatism.
Psidium guajava	Pijuli (O) Amrood (H) Guava	The leaves are boiled and the boiled water is applied to cure tooth-ache.
		Leaf or flower (50g) paste is drunk 2-3 times as a cure for dysentery.
		Leaf paste is mixed with sugar candy and drunk to cure jaundice.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Pterocarpus marsupium	Hid (H) Pessar (H) Bijasal (H)	The bark (50g) is soaked in ½ litre of water overnight and the water is drunk in the morning to cure stomach-ache. Bark paste (50g) is drunk with water twice a day to cure stomach-ache. Wood chips are soaked in water for 10 hours and the filtered water is drunk as a cure for jaundice, diabetes and sugar problems. The latex is kept for 10 hours in glasses made from the wood of this plant and consumed daily to cure vaginal discharge (leucorrhoea). This is also useful for diabetic patients. The gum extracted from the bark is consumed to cure diarrhoea. The gum exuded from the bark is applied to cure tooth-ache. Bark gum is drunk to cure fever.
Pterospermum acerifolium	Muchukunda (O) Makchun (H)	The flowers are dried and made into a powder which is used to reduce the effects of diarrhoea. The flower paste is mixed with sugar and consumed to cure bowel problems. The flowers are soaked in water overnight and then pressed to remove the juice. The juice is consumed with water as a cure for dehydration.
Pueraria tuberosa	Bhuin kamari (O) Bhuin kakharu (O)	This is useful when a cow does not allow the newly born calf to feed. The root (10g) is cut into seven pieces and mixed with grass. This is then fed three times to the calf. The roots with Gendu phula leaves and Katu Phala seeds are made into a paste which is applied to clear boils.
Punica granatum	Dalimba (O) Anar (H)	The fruits are ground with Gupa kana latex and taken to cure dysentery. Fresh flowers (25g) are made into a paste and mixed with sugar. It is given to the patient on an empty stomach for 7 days as a cure for jaundice. Leaf paste is taken to cure dysentery. Bark juice is taken for menstrual disorders. Leaf paste is applied to heal burns. The fruit coats are dried, powdered and consumed to purge intestinal worms. Bark is kept in water overnight and the extract is drunk to purge worms.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Radermachera xylocarpa	Garuda (O)	The plant is crushed and the juice extracted is filtered. The liquid is given in 3 to 4 doses to cure stomach pain.
Randia ulginosa	Rantiaara (B) Karhat Amraoti (H)	The young fruit is eaten as a vegetable.
Rauvolfia serpentina	Patalagaruda (O) Arabaha (H) Ara ba (H) Sarpgandha (H)	This is useful for stomach-ache. The root (5g) is taken twice on an empty stomach. The roots are dried and powdered. The powder (2-3g) is eaten regularly to get relief from nocturnal ejaculation. The root (10g) is drunk with cow's milk (10ml) for 7 days as an antidote to the poison from snake or dog bites. The root or stem is made into a paste and consumed. It is useful in curing stomach-aches, coughs, chest pain, dysentery, tuberculosis, jaundice, malaria, and fever. The root paste is applied externally to get rid of boils.
Ricinus communis	Gaba (O) Arandi (H)	The fruits are picked, boiled and consumed to cure headaches. The tender stems are used for brushing teeth as a cure for toothache. They also relieve pain in the gums. The seed oil is massaged on the body to relieve body and muscle pain. The seed oil is used as a mouthwash for tooth-ache. Small branches are used for brushing teeth to prevent pyorrhoea. Bark paste is taken for pain relief. A root concoction is applied to heal watery wounds. The seed oil is applied externally on the body as a cure for Eczema. The seed oil is used as soothing agent for eye irritations and other eye troubles. Leaf juice is consumed as a cure for rabies. Leaves are rubbed on joints to relieve pain. The latex is mixed with salt powder and dropped in the eye as a cure for cataracts. Root bark is soaked in water and the extract drunk to purge intestinal worms. The latex is applied on wounds to act as a disinfectant. The roots are fried in ghee and taken to heal wounds in the mouth. The leaves are warmed with mustard oil and applied to cure fungal infections.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Saccharum officinarum	Katani (H)	The vinegar is drunk to cure abdominal pains. The vegetative parts are used as food.
Saccharum spontaneum	Kaoh (H)	The bark juice is mixed with sugar and taken to cure vaginal discharge (leucorrhoea).
Salamalia malabarica	Semal (H)	The root (50g) is soaked in 1 ½ glass of water and drunk twice a day for 3-4 days to cure blood dysentery.
Santalum album	Chandan (O)	The wood is rubbed with water and the concentrate is applied on the forehead to treat headaches and sunstrokes.
Schleichera oleosa	Kusuma (O) Kusum (H)	The bark is cut and ground into pieces and eaten to relieve pain. Seeds, Sindwain twigs and jaggery are taken in equal proportions and made into a paste which is used as an ointment to heal wounds. Seed powder is applied to cure ulcers in animals. Seed oil is used to cure itches.
Schleichera trijuga	Baru (H)	The seed oil is applied on the hair and the body for general health.
Scindapsus officinalis	Giridhi (O) Gaja pipalli (O) Girudhuni (O)	One spoonful of dried fruit powder is consumed daily to purge tapeworms. The plant is put in water for 4 hours. It is then filtered and ground to a paste. This is fed to cows to treat fits.
Semicarpus anacardium	Bhelwa (H) Sosojang (H) Soso (H)	Seed paste is applied on wounds as a disinfectant. The oil extracted from seeds is applied on animal wounds to help them heal. The seed coat is used to kill rodents.
Shorea robusta	Sala (O) Salha (H) Salhua (H) Sarjom (H) Sarjomjo (H) Sakhua (H)	The bark is dried and ground into a powder which is applied to wounds to help them heal. Seed (10g) is boiled in a glass of water and the extract is given with salt 2-3 times a day to cure dysentery. Bark ash is applied as a wound disinfectant. Seeds are boiled and eaten. The resin powder is mixed with milk and drunk to cure chest pains and stomach-ache. The small twigs are used for brushing teeth. Once the toothbrush has been used it is brushed across the skin to get rid of ringworms.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Sida acuta	Bajramuli (O Chitkilata Bariyari (H)	Seven leaves are smelled by cows to cure foot and mouth disease and mastitis.
Sida cordifolia	Bisakhapuri (O)	The raw leaves (250g) are ground and juice is applied on summer boils to bring them to a head and encourage them to burst and heal. The juice is applied to the forehead to cure headaches. The leaf juice is applied on a poisonous insect bite to act as an antihistamine.
Sida spinosa	Bariar (H)	The leaves are mixed with jaggery and taken to cure dysentery.
Smilax prolifera	Ramdatoon (H)	Root paste (50g) is given 2-3 times daily to cure body pain. The branches are used as toothbrushes. Root paste is taken as a cure for anaemia.
Smilax macrophylla	Sana Muturi (O) Ramdatwan (H) Ravapowar (H)	The roots are used against gastric disorders. The root (150g) is soaked in 3 glasses of water. One glass of water is consumed twice a day for 3-4 days to cure jaundice. The root (15g) is made into a paste and drunk with water twice a day to cure dysentery.
Smilax zeylanica	Muturi (O) Marang atkir (H)	The roots are effective against stomach upsets. The roots are taken with an equal proportion of Chhatabari root and 7 pieces of black pepper. The roots are dried and powdered. The powder is consumed by women early in the morning to tone the muscles and prevent infertility problems. The root (25g) is soaked in two glasses of water and kept over night. The next day it is boiled and made into a paste with Ramdatwan root (10g). It is drunk without water twice a day as a cure for dysentery. Root paste is applied to stop excessive bleeding from a wound. The root and tuber (50g) is ground to a paste and the concoction taken daily with water for 1-2 months to cure vaginal discharge (leucorrhoea). The stems are cut into pieces and used as a toothbrush.
Solanum indicum	Sahasrabheji (O)	The roots along with Bhuinlaga roots are tied around the neck to scare away ghosts. The root (150mm) is given to cows to induce lactation.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Solanum melongena	Baigana (O)	Used as a vegetable.
Solanum nigrum	Nunununia	The fruits are used as a vegetable.
Solanum surattense	Ankranti (O) Rangaini (H) Benghare (H)	This is helpful in curing coughs. The skin of the dried fruit is removed and the kernel taken to get rid of coughs. Leaf juice with mustard oil is used to cure different diseases in children. The seeds are made into a paste which is applied on the teeth for 1 week to cure toothache. The root (20g) is made into a paste and drunk with water as an antidote to snake venom. 2-4 seeds are made into a paste and put in Sal/Kendu leaves and twisted into the shape of a cigarette (bidi). It is lit and the smoke is taken to cure toothache. Seeds are collected from the ripe fruits and dried and then burnt with charcoal. The smoke is inhaled to cure toothache. The roots are ground and mixed with rice water and used as a poultice to cure toothache. Ripe fruits are sun-dried and the seeds removed. The seeds along with onion seeds are burnt and the smoke is inhaled to protect the gums. The roots are ground and mixed with raw rice to prepare a poultice. The poultice is applied on the forehead to cure headaches.
Solanum tuberosum	Balati alu (O)	The raw fruit is polished and applied 4 to 5 times on a burn to aid healing.
Solanum violaceum	Dengabheji (O) Bhejibaigan (O)	The fruits are cut and fried to cure coughs.
Sonseveria roxburghiana	Ranagada (O)	The tuber is made into juice and taken as an antidote to snake venom.
Soymida febrifuga	Rohini (O)	The bark is cut into pieces and ground. The paste is taken as a cure for dysentery.
Sphaeranthus indicus	Bilakadamba (O) Kardhani (H) Gorakhmundi (H)	This is useful for stopping nose bleeds. The person smells the flowers for two to three hours and the bleeding stops. The root (15mm) is tied round the neck to act as a talisman against ghosts.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
		Plant paste is used to heal cuts, burns and wounds. Plant juice is dropped in the ear to cure earache. Plant paste is applied on the forehead to cure headaches. Plant paste is mixed with sugar and consumed to cure itches.
Spondis pinnata	Ambada (O)	The fruits and Tulsi leaves are powdered and given with mother's milk to cure diarrhoea in children.
Stachytarpheta jamaicensis	Jali Jali (H)	Root paste is mixed with sugar and taken to cure vaginal discharge (leucorrhoea).
Stephania japonica	Akanabindu (O)	It is used as a cure for fever. This is useful for relieving stomach pain. After eating rice, the root is eaten (5-10g) in 3 to 4 doses. The leaves or ground roots are used as an antidote to snake venom.
Sterculia urens	Karoya (H) Salap (O)	The seeds and bark are ground and the concoction applied on the forehead once or twice a day to cure fever.
Streblus asper	Sahada (O)	The roots are ground with Lajakuli roots on Saturday and Sunday. On the eve of the solar eclipse this is celebrated with turmeric and raw rice along with the name of the person. This cures Lokabasya disease.
Streblus taxoides	Jhumpuli (O) Jhumpgudi (O)	The bark is cut into pieces, ground and made into a paste. The paste is applied on cuts or wounds.
Strichnos nuxvomica	Kochila (O) Kuchilla (H) Kuchla (H) Muchri sag (H)	The fruits are used as an indicator of the presence or absence of venom when a person has been bitten by a snake. 10g of the fruit are chewed; if it tastes sour then there is no poison/infection, if it tastes sweet then there is poison/infection. The bark is mixed with jaggery and used to trap bears. The bark and the leaves are ground together. Jaggery (20g) is added and pills prepared. One to two pills are given per day as a cure for malaria. Overdosing may be fatal. The seed is rubbed on stones and the juice that comes out is used (10g) to heal boils. Fruits are boiled and consumed to get rid of hookworms. The leaves are boiled, dried and taken to aid digestion of food.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Strychnos potatorum	Kutuli (O) Kataka (O) Katuli (O)	The fruits are crushed and put into water to paralyse fish for easier trapping. The whole plant is burnt and powdered. The powder is mixed with honey and taken to cure bile problems.
Swertia chirata	Chireta (O) Chiraita (H)	This is used to cure fever. The leaves, branches and roots are boiled in water and the water drunk 3 to 4 times. Alternatively it is mixed with Chariagora and Ghato plants and boiled in water to make a paste. This paste is taken to cure fever. The whole plant is soaked in water overnight and the extract is taken to cure dysentery. The leaves are dipped in water and the juice taken to purify the blood. Chiraita, Patalkalra and Samsiare plants are boiled with Amla leaves and the extract taken to cure fever. The leaves are mixed with onion bulbs and made into a paste which is applied externally to cure itches. Chiraita leaves, Sal resin and Karanj oil are mixed to prepare an ointment. This ointment is applied externally to heal sores.
Symplocos racemosa	Lodha (O) Luimbha (H)	The flowers of this plant are ground and the paste used to remove pimples. The roots and bark are mixed in water (7 l) and boiled. The water is removed. It is then boiled again until it looks like jaggery. It is then consumed to cure weak eyes.
Syzygium cumini	Jamu (O) Jamun (H) Kuda (H)	The leaves and mustard oil in 1:5 proportion are mixed and warmed. The mixture is used to treat burns. The bark with guava bark is ground to a paste and taken to cure dysentery. The vinegar (250ml) is taken to cure abdominal pain and stomach upsets. Ripe fruit juice is prepared in sunlight and stored. One to two spoonfuls of this juice are taken to cure dysentery. The juice extracted from ripe fruit in sunlight is drunk (1-2 spoonfuls) with water to cure different stomach disorders. This is most useful in the case of long-standing stomach pain. The ripe fruit juice is fermented and consumed (200ml per day) cure diarrhoea. It is useful for other stomach problems.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Syzygium cumini	Jamu (O) Jamun (H) Kuda (H)	The bark juice is mixed with goat's milk and taken to cure diarrhoea. Seeds, bark, or root are ground to a powder and taken to cure diabetes. Bark paste is imbibed to cure ulcers and dysentery.
Tamarindus indica	Tentuli (O) Imli (H) Jojo (H) Jojopalwa (H)	Women tie roots of this plant on their foreheads to prevent their hair falling out. This also encourages still-borne babies to be aborted. Dried or green leaves (250g) are boiled with rice water and drunk 2-3 times to cure dysentery. The fruit juice is mixed with sugar and imbibed to cure stomach upsets. Young leaves (250g) are dried and powdered. It is then mixed with 25g of dried leaves in a glass of water. It is taken for 2-3 days as a vegetable or soup to cure stomach pains and blood dysentery. Seeds are cut into pieces and a piece is put on a snakebite for 1-2 hours as an antidote the venom. It is believed that the seed absorbs the venom. The tender leaves (250ml) are plucked and boiled with gruel and consumed to cure dysentery and piles. Mature leaves are ground with lime and used as an ointment to cure sprains and cramps in the hands and legs. The fruit pulp is mixed with Bhuin champa to prepare a paste. The paste is massaged on the forehead to cure headaches. The seeds are soaked in water to remove the seed coats. The seed coats are eaten as a cure for dysentery. The seeds are ground to a powder and eaten to cure fever. The fruit pulp is boiled and the infusion given as a cure for fever. The seeds are fried, the coat is removed, powdered and then eaten with goat's milk and sugar as a cure for vaginal discharge (leucorrhoea). The tender leaves are fried and placed on the eyelids with a cotton bandage to cure conjunctivitis.
Tarenna asiatica	Jajanga lati (O)	The branch juice is mixed with Satabari juice and massaged on the head to cure nose bleeds.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Tephrosia purpurea	Bana kolathia (O)	The ground root is applied on a snakebite to neutralise the venom.
	Saraphunka (O)	The whole plant is boiled in water and the boiled water is applied on the base of the teeth for easy extraction.
Terminalia arjuna	Arjuna (O) Garahatna (H) Gadaassan (H) Arjun (H) Gada arjun (H)	It helps in healing old wounds. The dust prepared from the dried bark is applied 3 to 4 times on the wound which then heals. This plant is useful for removing bad odours from the body. Flowers (15g) and Ladha (15g) are ground in water. The concoction is applied on the body. The bark (50g) is boiled in water. The boiled water is used for bathing to cure obesity. The branches are used as chewing sticks. 500g of bark is boiled in 1 litre of water and drunk regularly for 1 week as a cure for anaemia. Fresh latex (10g) is mixed with sugar candy and taken twice a day to cure vaginal discharge (leucorrhoea). Bark paste is used to cure inflamations.
Terminalia bellerica	Bahada (O) Bahera (H)	Equal amounts of Hairda, Bahada and Aonla are dried and kept in a box and mixed with rock salt. One spoonful of this powder is taken early in the morning on an empty stomach as a cure for coughs and colds. The powder is also used to bring back the appetite. Fifty grams of root/bark/fruit/leaf paste is consumed on an empty stomach for 1-2 days to get rid of tapeworms. Dried fruit powder (5g) is given 3 times a day with hot water to cure indigestion. The root is boiled in water and the extract consumed to keep in good health.
Terminalia chebula	Harida (O) Harra (H) Rolla (H) Hooding rola (H) Hadaharha (H)	The fruits are used to aid digestion. The fruit, along with Juani, is kept in water and the water is drunk early in the morning. Dried fruit powder is taken to cure stomach-ache. The fruit is ground on a sandalwood plate and the juice put in the eyes to keep them clean. The fruit is taken along with Bahada, Anala, Adrak and Sunthi in the form of a paste to cure whooping cough. The fruits are powdered and taken (2 spoonfuls per day) for 15-20 days to cure gastric disorders. Fruit powder is taken with honey to cure colds and coughs. 25g of fruit, root, bark, or leaf paste are consumed to get rid of tape worms.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
		The fruits (150g), Ralli patti fruits (50g) and Bakas leaf juice (20g) are mixed, ground to a paste and made into pellets. The pellets are taken once or twice daily as a cure for asthma and colic. Ripe fruit pulp can be taken with honey to cure coughs and asthma.
		The fruits (50g) are fried in ghee and consumed (20-50g) once or twice a day with honey (30g) to cure asthma and colic. Tablets (5-7g) can be prepared and consumed to cure asthma.
		Leaves and branches are ground together and applied as a poultice to induce lactation in livestock.
		Mature green fruits are roasted and taken (20g twice a day) to cure coughs. The unripe fruit is chewed to cure coughs.
		Bark juice is dropped in the nose to cure epitexis.
		Harida, Bahada and Aonla fruits are mixed with milk or honey and taken to cure vaginal discharge (leucorrhoea)
Terminalia tomentosa	Asan (H) Sain (H) Hatua (H)	Root, bark and leaf paste is given 2-3 times a day to cure fever.
		Leaf juice is taken to cure dysentery.
		Bark is fried in mustard oil and applied externally to keep the body warm.
		Bark (100g) and 2-3 fruits are boiled in water. The boiled water is drunk for 4-5 days to cure problems after childbirth.
		Leaf paste is taken to prevent vomitting.
Thespesia lampas	Bana kapa (O)	Root juice (1/2 glass) is consumed to act as an antidote to snake venom.
Tinospora cordifolia	Guluchi (O)	This is used to cure all types of fever. The twigs are boiled with water, cooled and taken with honey (5ml) twice a day.
		The fruits are powdered and the powder consumed early in the morning for two days as a cure for stomach-ache.
		It is boiled in water. Honey is mixed with the filtered boiled water and taken every day to cure any type of fever.
		The plant is boiled in water and the water drunk to cure fits.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Tragia involucrata	Bichhuati (O)	The whole plant is uprooted, dried, crushed and ground with black pepper and applied on the body to cure fits and fever. Fruits are removed along with raw rice and turmeric after worshipping in the name of god. These fruits are chopped into pieces and consumed to cure fever in children.
Trianthema portulacastrum	Puruni (O)	This is useful cure for tuberculosis. The roots (400g), Aonla (200g), Harida (200g), Bahada (100g), Kalamula (200g), Labanga (100g), sugar (500g), Dalchin (100g), Rasuna (250g) are ground and put into water. This liquid is taken with water for 7 days.
Trichosanthes bracteata	Mahakala (O) Pitamahakala (O)	The main root (50g) is made into juice with seven peppers and taken every half an hour as an antidote to snake venom.
Tridax procumbens	Rochonpura (H) Pirimuchri (H) Bisalyakarani (O)	The leaves and Apamaranga leaves are ground and boiled. The liquid is applied on the body (except eyes and mouth) to keep the body cool during diarrhoea The whole plant is made into a paste and applied on fresh wounds and cuts to quicken blood clotting.
Triticum aestivum	Getun (H)	The grains are burnt to ash which is mixed with mustard oil to a paste. This paste is used to cure eczema.
Tylophora indica	Inturudia (O)	The roots, with Bhalia fruit, Akanabindu roots, Chhinda jala, raw rice and tumeric is worshipped in the name of Lord Shiva. It is then tied onto the cow's neck to induce lactation.
Uraria alopecuroides	Chintamani (O) Krushnapani (O)	The tuber is cut into pieces, ground and then taken to relieve body pain.
Urginea indica	Bana oli (O Berpyaj (H) Beer piyazu (H)	The tuber is used to treat piles. 100g is mixed with hot water and drunk twice a day for 10 days. The tuber (25g) is mixed with Sal orchid (15g) and 2 spoonfuls of Kujri oil and ground to a paste and taken once a day for 15-20 days to cure tuberculosis. The tuber is ground to a paste with Oal and consumed (150g) once or twice a day to cure cows of ephemeral fever or glossopharingitis.
Vaugueria pubescens	Serali (H)	The leaves are cooked and eaten as a vegetable.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Vanela tessellata	Rasana (O)	The whole plant (100g) is ground and mixed with water (150ml) and boiled continuously until it reduces to 25ml. This liquid is taken with sugar or honey twice a day for 30 days to cure fits.
Ventilago denticulata	Pichhuli (O) Banga sarjon (B)	The plant (50 to 100g) is boiled with water and the liquid taken once to treat fever.
Ventilago madraspatana	Raktakhai (O)	The tuber is ground with Agnijal, Musthi, Pipali, Nageswar fruit, colianda, Madhuri, chilli, Kadabagini, Gokhara seeds, Kalajeera, Juani, Ghodabaga, Purnachandra, Abilikas, Jasthimadhu, Jeera, Navisanga, Ankranti fruit, Misiri and Rasakadali and made into a paste. This is taken twice a day as a cure for tuberculosis.
Vetiveria zizanoides	Bena (O)	The roots (25g) are ground with water and the mixture applied on the forehead to get rid of hotness of the head. The root juice (50g) is ground with Somaraji seeds (50g) and taken with water to cure obesity. The roots are ground and the paste taken to purge tapeworms.
Vicoa indica	Bana sebati (O) Sunamukhi (O) Sada bihari (O) Sada Bahar (H)	The leaves are ground with Katanga, Sunthi, Chilli, Juani and sugar and eaten to cure gastric disorders.
Vinca rosea	Sadabahar (H)	Leaf juice is consumed as a cure for ulcers.
Vitex negundo	Begunia (O) Bari begunia (O) Sindwair (H) Huharadi (H)	Stem sap is mixed with Susthipipali, black pepper and honey. The solution is taken to cure coughs and cold fever. The roots are tied to give relief from fever. Patients are covered with the twigs to cure them of dropsy and inflammation. The leaves and stems are dried and mixed with pulses. The mixture is used as a pesticide in food storage. People carry this leaf as a symbol of good will. Leaf paste is mixed with burnt hair and used for healing wounds. Stem brooms are used as insecticides. Twigs are boiled and the liquid is used as a mouthwash to cure dental pain.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Vitex peduncularis	Simjanga (H)	Bark (500g) is boiled with 1 litre of water. One glass of water is drunk per day to cure jaundice. The bark (150g) is soaked in 3 glasses of water overnight and the liquid is drunk. Half of the bark is made into paste and applied on the body. The other half is boiled and consumed as tea. This cures body swelling and heals wounds. Root paste is applied on the body to reduce body temperature. The bark can be boiled in water and mixed with sugar. This is taken like tea for relief from the heat. Root paste is taken to cure problems after childbirth. The root (15g) is mixed with Grundai root (15g) and ground into paste. Half of this paste is consumed and the other half is applied at the site of the snakebite to reduce infection and act as an antidote to the venom.
Wattakaka volubilis	Nakchhikni (H)	The leaf paste is used to clear boils. Plant paste is mixed with hot milk and taken for urinary troubles. Leaf juice is inhaled to stop sneezing.
Wendlandia tineloria	Tilaibaha (H) Telai (H)	Leaves are used to relieve tooth-ache. Leaves (100-200g) are placed on a cloth which is held against the teeth. This is used to discourage pests and insects from grain stores.
Woodfordia floribunda	Icha (H)	New leaves (25g) are made into a paste and drunk regularly for 2 days to cure dysentery. Roots (100g) are soaked in a litre of water overnight. The liquid is drunk twice a day (1/2 glass) for 3 days. This helps to cure problems after delivery of a child. The flowers are soaked in water overnight and then mixed with Talkan. A paste is prepared and taken once a day for 20-25 days to cure vaginal discharge (leucorrhoea).
Woodfordia fruticosa	Dajawai (B) Jhatikko (O) Dhawai (H)	The roots and tubers with those of Hadankali and Matikana are ground together and the paste taken to cure of stomach-ache). Seed paste is applied externally to relieve pain.
Wrightia tinctoria	Pitakeruan (O)	The roots and bark are dried and powdered. The powder is consumed (3 to 6g) to cure dysentery.
Zea mays	Makai (H)	The fruit is fried in ash and taken with a glass of water to cure jaundice.

Continued overleaf /

Table 8.2 (continued)

Scientific Name	Local Name	Uses
Zingiber zerumbet	Parsuram kedar (O)	This plant is used to discourage ghosts. The tubers with Patalagaruda roots and 21 black peppers are ground and taken 2 to 3 times a day.
Ziziphus jujuba	Ber (H), Dodari (H)	Dried fruits are powdered and given to children to treat small pox. Bark paste (20g) is taken once a day to cure diarrhoea. The fruits are widely used as food. The roots (5g) of young trees are made into a paste which is mixed with a raw egg and eaten once a day to cure stomach-ache. Leafy branches are fed to cows to increase milk yield. Root paste is used for healing wounds. The leaves are rubbed on the eyelids to reduce inflammation of the eyelids. The root decoction is taken to cure fever.
Ziziphus mauritiana	Barakoli (O) Data todi (H)	The plant is helpful in enhancing milk yield in cows. Roots (7 x 15mm diameter) are tied into a bunch of grass which is then waved over the cow from head to tail. Then the bunch of grass is fed to the cow. Bark is ground with neem leaves and taken twice a day to cure piles.

9.0 DEVELOPMENT STRATEGIES

9.1 Introduction

The provisional findings of the research project were discussed by a wide range of stakeholders and other interested parties at Workshops in Ranchi (Bihar) and Bhubaneshwar (Orissa) in March 1999. Participants at the workshops were invited to comment on possible development strategies in light of the research findings and their own experience, and to consider (and where possible activate) appropriate uptake pathways for the identified strategies. Where necessary, the findings and provisional recommendations were modified to take account of the feedback received in these meetings. The development strategies outlined below also have regard to the Government of India's recent policy statements on the operations of Panchayats in Scheduled Areas, and on the role that 'minor forest products' should play in the contexts of environmental policy and tribal development.

9.2 Development Strategies in Bihar and Orissa

Many of the problems identified in the systems of NTFP collection and use in Bihar and Orissa are common to both States. Nevertheless, there are sufficient differences between the States (and not least institutional differences or differences in the functionings of local government) that it makes sense to consider and recommend development strategies for Bihar and Orissa separately. These strategies relate to the production, collection, marketing and use of NTFPs.

9.2.1 Bihar

9.2.1.1 Production

The plateau area of South Bihar (Chotanagpur and Santhal Parganas) is a major contributor to the NTFP wealth of India. Singhbhum District is a leading site for the cultivation or production of lac and tassar, both of which are commercially important NTFPs. Many households in the region depend heavily on the consumption and sale of NTFPs. In an area which is still largely dependent on a single, rain-fed rice crop, the collection and marketing of NTFPs is a key livelihood strategy for families that are in food deficit. It remains the case, nonetheless, that a careful inventory and mapping of the available NTFP resources in this region has not been carried out. This project has provided the first large-scale and reliable database for NTFP production and collection systems in parts of Ranchi and Singhbhum District, but this database cannot be generalised to other Districts, such as Gumla, Hazaribagh or Palamau.

It is recommend that:

- The Government of Bihar invests in survey and mapping work which would complement the work of this project, and which would establish proper baseline information on NTFP resources throughout the region. This work should begin in areas which are known to be rich in NTFPs.

- The Government of Bihar should take steps to collate and update the information which currently exists in Forest Survey of India and Cadastral maps, and review the possibility of incorporating participatory mapping techniques at the village or watershed level into the Working Plans which record the rights of local people to NTFPs.

- The Government of Bihar, or some appropriate agency, is required to monitor the prices of NTFPs in a selection of village markets with a view to advising on the sustainability of NTFP collections by product.

- Proxy information on sustainability should be supplemented by yield survey measurements of particular NTFPs (including piar fruit-chironji, which were identified as a crop under threat). These measurements could usefully contribute to a regional or national database on ethnobotany, a database that could be established under the remit of the Biodiversity Conservation Act.

- The Forest Department takes steps to revise its Working Plans in the light of the ban on green felling and with regard to maximising NTFP production for local use and sale.

- Natural regeneration should be encouraged wherever possible, and about fifty per cent of artificial regenerations of NTFP species should be planted in degraded or bare forest areas under JFM.

- In plantation areas the current guideline which requires the planting of at least twenty per cent fruit trees should be replaced (or sometimes matched) by one requiring the planting of NTFP species in forty to fifty per cent of the plantation area.

- More attention should be given to the implementation of tree manipulation regimes which would enhance the productivity of NTFPs. Existing research suggests this might be possible, but further field trials are required. The Forest Department should be the nodal department for such research activities, and should be funded appropriately.

9.2.1.2 *Collection*

The forest dependent populations of South Bihar have long claimed free and unrestricted rights of access to NTFPs in their localities. But these rights have not always been respected by the Forest Department, and what might be described as a 'colonial' mentality to the forest resource base (and to local user populations) has encouraged some forest officers to persecute some villagers who have been involved in NTFP collection activities. Even where persecution has not been a problem for local men and women, the collection of NTFPs has sometimes been hampered by a lack of storage facilities, or by a lack of information on which products can usefully be collected for sale (or even consumption).

There are signs that the Government of India is taking steps to deal with the first of these 'collection' problems. A decline in the value of timber outturns has encouraged State Governments to pay more attention to the production, consumption and sale of 'minor forest produce'. The adoption of resolutions in regard to Joint Forest Management in Bihar has also signalled a new willingness to recognise local forest-dependent populations as environmental managers and not as threats to the forest resource base. This change of heart, to the extent that it can be recognised in practice, needs to be encouraged.

It is recommended that:

- Further instruction and training is given to forest officers at all levels in regard to the importance of NTFPs (MFP) and joint forest management.

- This information should be imparted, on at least some occasions, by forest dependent user groups (possibly with the help of an NGO) to the Forest Department.

A slow shift in the working cultures of the Forest Department might also be encouraged by writing into forest law and policy some of the provisions of the Panchayats (Extension to the Scheduled Areas) Act of 1996 [PSEA]. On one reading, the intention of this Act is to endow Panchayats in the Scheduled Areas with "the ownership of minor forest produce". This intention seems to be at one with the Govermnent of India's expressed preferences for decentralising decision-making and fund-holding responsibilities to the local (or panchayat) level, and for encouraging active citizenship and good governance. In practice, it is unlikely that such a radical transfer of ownership rights will be effected. The 1998 Report of the Expert Committee on Conferring Ownership Rights of MFPs on Panchayats/Gram Sabhas argues that a right to collection (of the usufruct) should not be confused with "a share in the ownership" of the resource base, and it reiterates the official line that: "Certain obligations should lie on both the sides. The people cannot exercise their right in such a way as to either destroy the property (Forest) or make it useless" (Ministry of Environment and Forests, 1998: ii). Even so, the Report insists that "The nett surplus available from the MFPs should be

transferred back to the Gram Sabhas with the stipulation that at least *25%* of the surplus is invested for the development of MFPs and *25%* for Community Development" (ibid. iv (also pi2S]). The Expert Committee also recommends that Gram Sabhas or JFM agencies should be involved by the present state trading corporations in the collection and marketing of NTFPs. This recommendation is supported, while noting that functioning Gram Sabhas are more likely to be found in Orissa than in Bihar. Local government (panchayat) elections have not been held in Bihar since 1978, and the Mukhiyas who were elected then, where they still held post, were formally removed from office in 1997 by an Act passed by the Government of Bihar.

9.2.1.3 Marketing

There is a significant trade in NTFPs in South Bihar, and not just in major NTFPs like sal seeds, sal plates, lac, tassar or mahua flowers. Men and women in remote villages depend heavily on the sale of NTFPs in the summer season. For many such households, essential food purchases are paid for by the incomes earned from the sale of NTFPs. But this is also where the problem begins for many collecting units. The nationalisation of certain NTFPs has discouraged private traders from operating in 'distant' villages, and villagers cannot always rely upon the government or its designated agents to open or operate collection centres on time or in a transparent manner. The pattern of state intervention in the marketing of NTFPs needs to be re-thought. Collecting households need to be empowered to sell NTFPs in the marketplace at a time when they command reasonable prices for their produce (this raises the issue of storage), and they need government support in their dealings with private agents or traders (whether in the form of market regulation, support prices or the provision of information on prices).

It is recommended that:

- Storage facilities for NTFPs in more distant locations should be provided by the government on a priority basis.

- Government bodies including the National lnformatics Centre, All-India Radio and Doordarshan should liaise with local government officers and NGOs to provide updated information on the prices of commonly traded NTFPs.

Once again, there are signs that the Ministry of Environment and Forests is beginning to recognise the force of these arguments, and is beginning to make recommendations in respect of the marketing of NTFPs that are at one with the findings and recommendations of this report. In a letter dated 29 July 1998 (D.O. no.8-19/96 FP), the Secretary of the Ministry of Environment and Forests, Vishwanath Anand, writes that: "Nationalisation reduces the number of legal buyers, chokes the free flow of goods and delays payment to the gatherers. It

also reduces incomes of the tribals. I will suggest that government federations should be asked to compete with other traders in the open market purchase of MFP from panchayats/gram sabhas. Just as in the case of procurement of wheat and paddy the Food Corporation of India (FCI) provides support price but farmers are not forced to sell to the FCI alone, similarly, the role of Forest Corporations in the marketing of MFP is to provide a floor price, but allow the private market to develop. Vigilance should be exercised to ensure that traders do not pay a price less than announced by the government".

This recommendation is strongly endorsed while noting that it may need qualification in four respects:

- First a system of support prices can be expensive to operate and sustain. It is recommended that further thought is given to the funding of such a system at national, regional or local levels.

- Second, the pro-market tenor of Secretary Anand's remarks is informed by recent economic thinking on the proper functions of state and markets. This is all well and good, but it needs to be recognised that the 'proper regulation' of markets by state officials will not be carried out unless those officials are properly trained and rewarded. It is recommended that urgent attention is given to the appropriate training of forest officers in regard to market regulation, and that provisions are made (and acted upon) for the disciplining of officers in breach of agreed rules. It is also recommended that the systems of payments and rewards for forest officers are reviewed, with a view to encouraging more effective performance in the field.

- Third (and relatedly), it needs to be recognised that the effective working of a system of government price support - the obligation to ensure that traders do not pay a price less than that announced by the government - depends upon the building up of expert knowledge, self-confidence and social capital amongst households or groups offering NTFPs for sale. Farmers in central and north-west India are well organised by Shetkari Sanghatana or the Bharatiya Kisan Union, and it is unlikely that many of them will be short-changed by private traders. Forest-dependent households or communities in South Bihar are not so well organised or informed. It is recommended that the Government of Bihar, along with appropriate NGOs and local political leaders (the Parha Rajas, for example), take action to prepare such households for a possible denationalisation of some parts of the NTFP trade. Villagers can also be empowered by acting collectively, whether through producer or marketing cooperatives, and/or through joint forest management committees. It is recommended that urgent attention is given to the setting up of such bodies.

- Fourth, panchayats/gram sabhas may not be the appropriate bodies, in Bihar, through which to organise the sale of NTFPs to government federations or private traders in open market operations. It is recommended that village level JFM committees be considered, in addition, as appropriate bodies for this task. It is also recommended that the performance of different collective institutions in organising the collection, storage, transportation and marketing of NTFPs should be monitored by independent researchers or by the Research and Evaluation Division of the Bihar Forest Department.

9.2.1.4 Usage (value addition activities)

There is considerable scope in South Bihar for the production and sale of manufactured goods which use NTFPs as a raw material; to date, however, few households or communities have capitalised on this opportunity. Villagers are often poorly informed about the possibilities of value addition activities in relation to NTFPs, and many lack the skills or capital needed to sustain such operations. The Government of Bihar, for its part, and with the partial exception of tassar (where research and development is centrally funded), has generally failed to fund training or start-up schemes, and has not invested sufficient time or money to secure contracts from end-users for NTFPs produced in the region.

With this in mind, it is recommended that:

- The Government of Bihar reviews the existing stock of NTFP value addition activities in the State, with a view to identifying areas where such activities could be expanded as well as instances of best (or good) practice. The success of the Daho sal-plate making cooperative suggests why this should be an urgent requirement. There is scope for the multiplication of value-addition activities in the region (and not least for women), but proper attention will need to be paid to questions of training, finance, and the securing of contracts.

With regard to training, it is recommended that:

- The Forest Department joins forces with Block Development Officers and agricultural extension workers to devise locally appropriate training programmes. In the case of sal plate making, these programmes should involve field or demonstration visits, and some provision should be made to remunerate villagers (as at Daho, for example) who are prepared to share their experiences and concerns with other villagers. In the case of the kendu leaf economy, the Government of Bihar, with appropriate NGOs and outside experts, should review why it is that the rolling of bidis is generally not carried out within Bihar and whether this could profitably be rectified.

With regard to finance, it is recommended that:

- The Forest Department works in conjunction with other government departments and local bank officials to set up - or support - group-based revolving credit facilities that would allow villagers to purchase sal plate making machines, for example, or bee-hives (bee boxes as they are known locally). Information on such schemes could also be gathered from NGOs like Care or Pradan, as well as from the DFID-funded Eastern India Rainfed Farming Project.

With regard to the securing of contracts, it is recommended that:

- The Forest Department plays a coordinating role, such that various groups of collectors (or village cooperatives) are encouraged to join together to provide sizeable shipments of sal plates or sal seeds, for example, to industrial end-users. Many of these end-users would be willing to purchase NTFPs directly from collecting groups in South Bihar, provided the shipments could be guaranteed in terms of time and scale of delivery. To the extent that some of these shipments would need to be made to end-users out of State, it is recommended that the remaining restrictions on inter-state trade in NTFPs should be abolished. In the longer-term, the best way to ensure that value-addition activities remain within Bihar is to support such activities with funds and advice/training.

The last set of recommendations is related to the role that the Forest Department in Bihar should play in promoting or soliciting new opportunities for value addition in the NTFP economy. It is recommended that:

- The Forest Department should redefine its role to that of a regulating and enabling agency, rather than a body that is concerned mainly with procurements.

- Funds and personnel within the Forest Department should be switched, over a number of years, to support research and development activity in the specific field of NTFP value addition.

- Forest Department officials should join with appropriate local academics to explore the opportunities that might exist for value addition activities in the field of medicines and herbal remedies.

- The Government of Bihar should establish a regional database on medicinal NTFPs in Chota Nagpur and Santhal Parganas, and should establish a herb garden in Ranchi.

- The Government of Bihar acts now to protect the interests of the State and local people in relation to the possible commercial exploitation of medicinal NTFPs. The Government of Bihar should join with other States and the Union government to establish a legal framework for the regulation and exploitation of common or local property resources. This initiative should have regard to the Biodiversity Conservation Act.

- The Forest Department commissions research which would evaluate possible commercial uses for less well known NTFPs in the region. This research should have regard to the commercial exploitation of NTFPs in neighbouring States such as Orissa and Madhya Pradesh.

9.2.2 Orissa

The following are the salient recommendations brought out by the participants of NTFP workshop held on March 20-21, 1999 at Bhubaneswar.

9.2.2.1 Research and Database

The need for a database covering various aspects of NTFP such as the seasonality of collection, processing, marketing was felt by all the participants & the recommendations were unanimous as to an comprehensive and systematic development of a database on the following lines:

- Research on the productivity of NTFP and impact of NTFP extraction on bio-diversity should be taken up on a priority basis.

- Dynamics of social issues such as gender balance, culture and tradition and livelihood systems as regards NTFP collection & marketing should form the part of the research and database development.

- Forestry research encompassing silviculture of NTFP production, seasonal fluctuations, etc. should be a regular feature.

- There is an urgent need for undertaking marketing intelligence information on value addition, demand, prices and export potentials.

- Identified NTFP species should be included in agro-forestry extension under social forestry programmes.

- The research subjects need to be identified in consultation with different stakeholders i.e. collectors, traders, field officers, NGOs. There should be an effort to transfer the research results and appropriate technology for value addition to the village groups.

- The state forest department should identify research institutions and collaborate with them to conduct product development oriented NTFP research.

- Since the present allocation for forestry research is inadequate it is suggestioned funds should be tapped from different resources, i.e. central Government, tribal welfare dept., externally aided projects, forest user agencies. A minimum of 5% of forest revenue in a year should be earmarked for forestry research.

- In order to provide a thrust on forest research and a multitude of flora and fauna that flourishes in Orissa, there should be an autonomous forest research institute. Since basic infrastructure is already available with the Forest Department (SFTRI), Government may initiate the process to make the autonomous institute functional for Forest (NTFP) research and database development.

9.2.2.2 Legal Framework

In view of the 73rd amendment to the Constitution, the Government is required to initiate action to transfer ownership rights of NTFPs to the Grama Sabhas in the scheduled areas.

- Although the Panchayat Act does not specify the type of Minor Forest Produce(MFPs) which should be managed by Grama Sabha the participants felt that the definition provided by the Orissa Forest Act should be made applicable. The Government may consider Bamboo and fuel wood as NTFPs, but the implications should be carefully examined.

- While transferring the ownership rights to the Grama Sabhas care should be taken to protect the interests of the village artisans, village based industries, and other NTFP extractors who depend on NTFPs for food, fodder, fiber, income, etc. The NTFP policy would have to be essentially based on the principle of equity.

- At the beginning Grama Sabhas would require technical support for collection, value addition and trading of various NTFPs which should be provided by forest and tribal welfare departments and NGOs. A proper management control structure at the Grama Sabha level needs to be developed in line with the existing JFM/VFPC groups.

- Royalties should be collected by the Grama Sabhas who then pass on a portion to the State.

- A higher share of the profit earned from kendu leaf trade should flow directly to the primary collectors in the form of higher purchase price and bonus. The Government may consider paying 50% of the kendu leaf grant presently being made available to the Panchayats directly to the kendu leaf collectors as a bonus.

- The current restrictions on NTFP collections in Protected Forest Areas need to be reviewed considering the interest of the forest dwellers of the Areas.

9.2.2.3 Marketing

Several reports highlights the contributions of primary collectors to the state economy and also the hardships faced by them. There is an urgent need for a comprehensive change in the NTFP marketing policy in order to provide stable returns to the collectors on a sustainable basis.

- The NTFP leasing policy needs a thorough examination. Monopolistic leasing of NTFPs has affected both the interest of collectors and that of the State. So this practice should be discontinued forthwith.

- While Gram Sabhas should have the control over NTFP collection and marketing in schedule areas, similar facilities could be extended to local village groups in non schedule areas. In schedule areas Gram Sabha and in non schedule areas primary collectors/village groups should have multiple options for sale of NTFPs.

- Baring the nationalised products, others should be marketed freely to encourage competition. In order to provide a fair competition OFDC, TDCC, TRIFED may compete with other traders/ institutions on an open market basis to buy NTFPs.

- The role of the Forest Department would be to regulate and monitor collection and marketing of the NTFPs and disseminate relevant information to all the stakeholders on a continuous basis.

- For the products and areas monitored which do not command good markets, the Government should facilitate marketing by using district level open auctions and other means.

- In the schedule areas the district co-ordination committee consisting of all stakeholders (GP representatives, Forest Department, NGOs, Traders, etc.) should monitor marketing of NTFPs and act as an arbitrator in resolving the conflicts in NTFP management in the respective district. The district co-ordination committee should also facilitate development

of the NTFP production, collection, value addition and marketing in their respective districts.

- The participants felt the need for support from Development Finance Institutions for NTFPs which would fund infrastructure, value addition, trading activities at Grama Sabha level and at the level of NTFP based Co-operatives, Associations, Private Units, etc. Initially the SC-ST Corporation and APICOL could be asked to perform this role with suitable financial support from the Government.

- The State Government should not be a stakeholder in NTFP management. Rather it's role should be that of a facilitator and an agency to provide a single window service to the collectors and especially to the traders as regards payment of taxes and royalties.

- There was consensus that minimum support prices for each NTFP should be determined by the respective district Co-ordination Committees.

- Access to information on NTFP value addition, demand and prices is vital both to the collectors, traders and other institutions engaged in marketing of NTFPs. It would be the role of the Government and its agencies to collect & disseminate all relevant information and pass it on the same to the district committees, the Grama Sabhas and all other agencies engaged in marketing of NTFPs. The audio-visual media should be used to achieve this objective.

- The Government should establish a Market Promotion Board to ensure the planned development of NTFP marketing in the State. In addition, efforts should be made to facilitate the establishment of multiple Institutions in all forms (Co-operatives, Associations, Private Units).

10.0 CONTRIBUTION TO OUTPUTS

In broad terms the original outputs of the project have been achieved. Unseasonable weather, unreliable official data, data transmission problems, personnel changes and shifts in focus of some of the NGOs involved have combined to present interesting project management problems. The main shortcomings are concerns about the yield figures which are considered to be lower than average due to the changes in the weather patterns and lack of adequate/reliable data to develop the financial model. With these provisos the project has achieved what it set out to accomplish.

The project has contributed to the RNRRS goal by:

- Providing a fuller understanding of the importance of different systems of NTFP production, collection, use and trade in eastern India, particularly Bihar and Orissa.

- Collating existing official data and data from forest sample plots to estimate actual and potential yield figures and growth patterns for selected NTFPs.

- Identifying the biological, socio-economic, informational, political and legal constraints on the production, collection and use (including marketing) of NTFPs in Bihar and Orissa.

- Determining the actual and potential returns to economic agents within selected NTFP production and marketing systems.

- Informing village forest committees, village cooperatives and the joint forest management system of the results which should give them better bargaining power with traders.

- Developing a financial appraisal model which will allow more objective judgements to be made about the costs of bringing new products to market (given the proviso raised above).

- Raising the awareness levels of FD officers, NGOs and villagers, through the way in which the project was conducted and the dissemination process, of the economic opportunities associated with sustainable and improved NTFP production, use and trade.

- Raising the awareness levels of these groups with respect to the dangers of over-exploitation of NTFPs.

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