FRP Urban and Peri-urban Demand Surveys in Brazil, Ghana, India, Mexico, Nepal and Zimbabwe April-July 2000

FRP problem surveys – No. 4

Project No. ZF 0136 – Researchable constraints to the use of forest and tree resources by poor urban and peri-urban households in developing countries

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[1] Wiggins, S.& G.Holt, (2000) 'Report to Forestry Research Programme: Researchable constraints to the use of forest and tree resources by poor urban and peri-urban households in developing countries [ZF 0136]', 28 July

[2] Wiggins, S.& G.Holt, (2000) 'Report to Forestry Research Programme: Poverty, Urban Poverty and Forest and Tree Goods and Services', 8 August

[3] Dipak Kumar Bagchi, Kaushik Bhattacharya, Tapan Kumar Sasmal, Sankar Kumar Gayen, Sukhendu Sekhar Ghosh, Barun Mukhopadhyay, and Kailash Chandra Malhotra, (2000) 'Demand for Forest and Tree Goods and Services by Poor Urban and Peri-Urban Households: A Case Study from Calcutta Megacity', Biological Sciences Division, Indian Statistical Institute, July

Bishwa Nath Regmi & Dr. Vrigu Rishi Duwadi, (2000) 'Forest and Tree Resources for Poor Urban and Peri-urban Households in developing countries: A Case Study of Kathmandu, Nepal', Nepal Agroforestry Foundation, July

Kofi Marfo, Florence Ansere-Bio and Joyce Haleegoah, (2000) 'Demand for Forest and Tree Products and Services by Poor Urban Households: Case Study of Kumasi, Ghana', Crops Research Institute, July

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Acronyms & Abbreviations

CSO	Civil Society Organisation
DFID	Department for International Development (UK)
E	Trade/Economy related RC
EC	European Commission
EU	European Union
FAO	Food and Agriculture Organisation
FRP	Forestry Research Programme
ICIMOD	International Centre for Integrated Mountain Development
ICIPE	International Centre for Insect Physiology and Ecology
ICRAF	International Centre for Research in AgroForestry
ICSU	International Council of Scientific Unions
IFPRI	International Food Policy Research Institute
ILO	International Labour Organisation
ILRI	International Livestock Research Institute
IMF	International Monetary Fund
INFOODS	International Network of Food Data Systems
INGO	International Non-Government Organisation
IPR	Intellectual property Rights
ISEP	International Small Enterprise Programme
ISI	Indian Statistical Institute
IT	Information Technology
ITDG	Intermediate Technology Development Group
IUCN	Th World Conservation Union (International Union for Conservation of Nature and Natural Resources)
IUDD	Infrastructure and Urban Development Department
KaR	Knowledge and Research (Programme)
KEFRI	Kenya Forestry research Institute
KMA	Kumasi Metropolitan Assembly
LI-BIRD	Local Initiatives for Biodiversity, Research and Development
LPG	Liquid Petroleum Gas
MSE	Micro and Small Enterprise
NAF	Nepal Agroforestry Foundation
NGO	Non-Government Organisation
NTFP	Non-Timber Forest Products
NVTS	National Vocational Training Scheme (India)
NWFP	Non-Wood Forest Products
ODI	Overseas Development Institute
OFI	Oxford Forestry Institute
P	Policy related RC
RC	Researchable Constraint
RNRKS	Renewable Natural Resources Knowledge Strategy
RUAF	Resource Centre on Urban Agriculture and Forestry
S	Livelihood/Employment related RC
SL	Sustainable Livelihood
T	Technology related RC
TCN	Timber Corporation of Nepal
UNESCO	United Nations Educational Scientific and Cultural Organisation
UNIDO	United Nations Industrial Development Organisation
UPA	Urban and Peri-urban Agriculture
V	Vulnerability related RC
WIPO	World Intellectual Property Organisation

Forest Product & Species Glossary

Local Name	**Family**	***Genera / Species***
Amlaki	Euphorbiaceae	*Phyllanthus emblica*
Anantamul	Asclepiadaceae	*Hemidesmus indicus*
Arjun	Combretaceae	*Terminalia arjuna*
Arum (kochu)	Araceae	*Colocasia sp.*
Aswagandha	Solanaceae	*Withania somnifera*
Babul/babool	Leguminosae	*Acacia arabica*
Badam	Combretaceae	*Terminalia calappa*
Bakaino	Meliaceae	*Melia azedarach*
Bamboo (bans)	Puaceae	*Bambusa sp.*
Bamunati	Verbenaceae	*Clerodendrum indicum*
Bans (bamboo)	Puaceae	*Bambusa sp.*
Banyan	Moraceae	*Ficus bengalensis*
Basak	Acanthaceae	*Adhatoda vasica*
Bel	Rutaceae	*Aegle marmelus*
Bet	Arecaceae	*Calamus sp.*
Betelnut palm		*Areca catechu*
Bidyadaraka	Convolulaceae	*Argyreia speciosa*
Bilwamul	Rutaceae	*Agel mermelos*
Bohera	Combretaceae	*Terminalia bellerica*
Brahma jasthi	Verbenaceae	*Clerodendrum indicum*
Brahmi-sak	Scrophula riaceae	*Herpestris monniesa*
Bushmeat–akrantie, cane rat, grasscutter		*Thryonomys Swinderianus*
Caja	Anacardiaceae	*Spondias lutea L.*
Coconut	Palmae	*Cocos nucifera*
Dong	Apiaceae	Angelica sinensis
Dudhia	Apocynaceae	*Wrightia tomentosa*
Gammar	Verbinaceae	*Gmelima avborea*
Guava	Myrtaceae	*Psidium guajava*
Haldi	Zingiberaceae	*Curcum longe*
Haritaki	Combretaceae	*Terminalia chubula*
Jackfruit	Moraceae	*Artocarpus heterophyllus*
Jamun	Myrtaceae	*Syzygium cumuni*
Kadam	Rubiaceae	*Anthocephalus cadamba*
Kalmegh	Acanthaceae	*Andrographis paniculate*
Kalmi	Ipomoea	*Septans*
Karanja	Apocynaceae	*Carissa carandas*
Khirika	Saptoceae	*Miusops kauki*
Kochu (arum)	Araceae	*Colocasia sp.*
Kulekhara	Acanthaceae	*Hygrophila spinosa*
Kurchi	Apocynaceae	*Holarrhena antidysentetica*
Lapsi	Anacardiaceae	*Choerospondias axillaris*
Lime		*Citrus aurantifolia*
Macimbi		
Madora		
Mangaba		*Hancornia speciosa*
Mango	Anacardiaceae	*Mangifera indica*
Masawu tsubvu		*Virtex payos*
Mopane worms		
Mungosa (neem)	Meliaceae	*Azadirachta indica*
Mutohwe		*Azanza garcheam*
Muzhanje		*Uapaca sp.*
Myrobalan		*Terminalia chebula*

Neem (mungosa)	Meliaceae	*Azadirachta indica*
Pau de rato (edible root)	Bignoniaceae	Tabebuia heptaphylla, impetiginosa, avellanedae
Peepal	Moraceae	*Ficus religiosus*
Pine		*Araucaria sp.*
Pudina	Labiate	*Mentha arvensis*
Rambasak	Acanthaceae	*Adhatoda vasica*
Saal	Diplevocarpaceae	*Shorea robusta*
Segun (teak)	Verbenaceae	*Tectona grandis*
Shola	Leguminosae	*Aeschynomene indica, Aeschynome aspera*
Singha puchouseholda	Acanthaceae	*Adhatoda vasica*
Siris/sirish	Leguminosae	*Albizzia lebbek*
Sissoo	Leguminosae	*Dalbergia sisoo*
Suli	Oleaceae	*Nyctanthus arbortristis*
Swet chandan	Santalaceae	*Santalum album*
Swetberela	Malvaceae	*Sida cordifolia*
Tal	Arecaceae	*Borassus flabellifera*
Tamarind	Caesalpinioideae	*Tamarindus indica*
Teak (segun)	Verbenaceae	*Tectona grandis*
Tentul	Leguminosae	*Tamarindus indica*
Tulsi	Labiatae	*Ocimum sanctum*
Umbu	Anacardiaceae	*Spondias tuberosa*
Umhobobo		*Uapaca sp.*
Umtshwankela		*Virtex payos*
Utis		*Alnus nepalensis*
Uxakuxaku		*Azanza garcheam*
Varanda	Euphorbeaceae	*Jatroppa curcua*

Executive Summary

The report is based on findings from ZF0136 which pre-project was commissioned as a preliminary step towards examining urban and peri-urban issues as defined by 'A Revised FRP Strategy for the DFID Forestry Research Programme 1999-2005' (4.7), Renewable Natural Resources Knowledge Strategy (RNRKS) CNTR 96 0361 for the benefit of developing countries.

Target communities for the study were poor and very poor households in urban and peri-urban communities. Six in-country collaborators were sub-contracted for fieldwork in Mexico, Brazil, Ghana, Zimbabwe, Nepal and India. Key informants within target communities were contacted and interviewed. Rapid appraisal surveys were conducted with selected households between May and July 2000. Surveys included focus groups, household questionnaires, and occupational case studies.

In terms of the general living conditions of the target populations, surveys showed communities living in over crowded and unhygienic living conditions while municipal authorities struggle to provide basic sanitation, clean water and refuse disposal facilities in newly urbanised areas. Authorities suffer from lack of resources, and inefficient administration and deficient policy strategy for dealing with widespread poverty on limited budgets. Urban communities tended to be better served for basic utilities–water and sewage than peri-urban areas and Harare peri-urban area was exceptional in that the informal sprawl of settlement is now being granted legal recognition and the hope of service provision. However, the levy for services is too high for many residents. In Feira peri-urban area the church not the state clearly fulfilled the role of providing social and welfare support.

Within this context of poverty, deficiency and inefficiency, researchers found that forest products surfaced in many walks of life. Furniture and other manufactured items are of major significance in at least half of the survey sites and the use of forest products for artisan crafts and medicines is also significant. However, timber for construction and the value of trees used as a shaded rendezvous point appear to have the most widespread significance across continents.

Wood fuels and forest foods were overall the least significant products and the level of use of fuel wood showed the most marked difference between urban and peri-urban sites. No urban study community claimed a major significance for fuel wood in their livelihoods. This is perhaps the most obvious manifestation of the urbanisation process as reflected in forest product consumption.

Analysis of surveys revealed a significant difference in the availability and use of timber and non-timber products between geographical regions (Table 6). Specifically, Latin American urban communities consumed forest products with very low frequency due mainly to prohibition on extraction and supply of timber products. In Latin America there was little use of wood in manufactured goods and there were no indigenous crafts based on forest products. Mexican communities had the least involvement with forest products although foods and fuel wood were important to the peri-urban community. In contrast, South Asian communities exhibited high usage patterns and strong cultural value attached to these products. This was partly due to the prevalence of bamboo and cane products in addition to wood products.

Two main factors associated with the supply of forest products were firstly, that most non-wood products consumed are gathered relatively locally. But, wooded areas around cities are disappearing and the availability of non-wood products, particularly food and medicinal plants has reduced. Gathering these forest products has consequently become a more arduous and time-consuming task and the potential for deriving income from gathering has diminished. Secondly, efforts to halt the process of deforestation of distant forests have clearly reduced the supply of timber. Hardwoods are most seriously affected. Demand for wood has been transferred to softwood. Typically, scrap lumber becomes an important source of wood in the urban context. Garden trees play an important role in the peri-urban areas of

Mexico (for fruit) and Calcutta (as a source of occasional high income particularly useful for marriage dowries).

However, in all regions the supply of timber is associated with numerous low-income livelihoods either in microenterprise based on by-products of the supply chain or in manual wage labouring along the supply chain. The use of off-cuts and sawdust for fuel in particular maintains a plethora of informal sector traders and street food vendors. Three products in particular are identified by the study for which supply is increasing rather than decreasing– bamboo, shola and neem.

From this background analysis of in-country reports a Poverty Map was constructed of the underlying factors which have contributed to the low levels of Capital Assets for the poor (as defined by the Sustainable Livelihoods framework after Carney, 1998). From this Poverty Map, the study findings were progressively focused into twelve 'researchable constraints' according to categories, or clusters, of related issues–namely, 'strategic concerns and policies', 'forestry and technologies', 'trade and industry', 'basic needs', and 'sustainable employment' (Table 1). Researchable constraints were then scored according to the following criteria: potential for poverty alleviation, breadth of resource base implicated, regional applicability and urban/peri-urban community focus (Table 3). Through assessment of these linkages the order for discussion of research issues relating to the role of forest products in the livelihoods of urban and peri-urban poor households, was determined as follows:

- Insufficient market research skills and marketing
- Lack of community organisational structures
- Declining peri-urban agriculture and lack of peri-urban agroforestry schemes
- Declining timber supply and decreasing raw materials for small-scale processors and the informal sector
- Lack of innovative & ecological housing materials and participatory house building initiatives
- Cross-sectoral inconsistencies and lack of procedures to develop pro-poor laws and policies
- Insufficient mechanisms for finance of and inadequate institutional structures for wood plantations
- Limited understanding by forestry sector officials of community interaction with forest species
- Inequitable distribution in the supply of bamboo, charcoal and raw materials to manufacturing
- Insufficient utilisation of traditional tree remedies in community health initiatives
- Overuse of wild NTFPs and insufficient inventory and monitoring procedures to promote sustainability
- Inefficient methods of charcoal production

Structure of the Report

In the Section 1, the methodology for ZF0136, which was used in the city case studies, is outlined. This is followed by a consideration of the rationale for this report. Subsequently, details of dissemination activities undertaken since July 2000 are provided. In Section 2, Poverty Map methodology is explained and a Poverty Map for ZF0136 is constructed followed by discussion of the Researchable Constraints ensuing. Finally in Section 3 the accounts abstracted from in-country city case study reports are provided with cross-case comparison as appropriate.

SECTION I

1. Introduction

1.1 City case study methodology

Case studies of the use of forest products and services, and occupations derived from these, were carried out in cities within FRP target countries in Latin America, Africa and South Asia, by overseas collaborators. Case studies consisted of two separate surveys, one in an urban community and one in a peri-urban community. *Urban* locations with a total population of at least 500,000 were chosen and two of these were classified as 'megacities', with over 10 million inhabitants. *Peri-urban* locations were defined as 'beyond the boundary of the urban area but sufficiently close for communities to have frequent and substantial interaction with the urban economy'.

Fieldwork:

The fieldwork for each survey consisted of four stages:

- Interviews with key informants within selected communities;
- Focus groups within the communities;
- Household survey (n=30); and
- Interviews with entrepreneurs of forest product-based microenterprise.

Collaborators were sent a flow chart and guidelines for conducting these four stages of the fieldwork, which are outlined below:

1. Key informants

A target of at least 5 informal interviews were held with professionals and NGO staff in health, education and local government sectors to ascertain what poverty alleviation programmes operated in the area and to aid in the selection of study communities. In addition, where appropriate, religious leaders were contacted to facilitate access to these communities.

2. Focus groups

Two focus group discussions targeted as appropriate, such as for male and female, with 6-10 people in each, were co-ordinated through information and contacts supplied by the key informants.

3. Household survey

A questionnaire relating to household consumption data for the main products identified by focus groups was administered in person to 30 households, selected using the quota sampling technique. The objective of the survey was to establish the following:

- Usage - species, articles, function and approximate quantity used;
- Causes of fluctuations in demand, such as seasonal availability of disposable income;
- Main constraints on demand, such as price and irregular supply;
- Source of supply such as shop, market, or collected locally; and
- Main perceived constraints on supply in terms of efficiency and reliability.

4. Occupation interviews

In-depth interviews were conducted with 3-5 entrepreneurs involved in the main forest product-based occupations identified by focus groups.

Working definitions used for the surveys:

Collaborators were provided with working definitions for 'forest products and services' as identified in 'A Revised Strategy for the DFID Forestry Research Programme 1999-2005' (4.8 a-h) These definitions included the following:

- Fuels–firewood, charcoal and urban biomass;
- Shelter and construction materials;
- Medicines—herbs, bark, roots, leaves and seeds;
- Animal fodder and bedding;
- Foods—nuts, fruits, bushmeat, fungi, snails, and beverages plus leaf plates and wraps;
- Water for domestic use where this came from forest catchments;
- Environmental services—land stabilisation, pollution amelioration.

Collaborators were visited by the members of the University of Reading research team [with the exception of ITDG Zimbabwe due to civil strife] to establish a common understanding of the above terms of reference, and to ensure comparable fieldwork was carried out.

1.2 Characteristics of the surveyed communities

The main characteristics of the case study cities and communities were as follows:

Country	City	Urban area	Peri-urban area
Mexico	Mexico City	Population 23 million. Cuajimalpa–three groups–old inhabitants, poor new arrivals, and rich new arrivals, average household size 4-5.	Huixquilucan–Population 199,000, 30 km from city centre. No marked distinctions, 90% poor, typically less than primary education, average household size 5-6.
Brazil	Feira de Santana	Population 550,000 Tomba–Afro-Brazilian, many female-headed households, urban 'material' culture, 43% poor.	Mangabeira–12 km from city centre, semi-rural, rapidly urbanising. Three sub-regions–agricultural, semi-agricultural and urbanised.
Zimbabwe	Harare	Population 2 million. Mbare–5 km south of city centre, 10% rich, 30-40% middle, 40-50% poor (mostly migrants), literacy about 70%, many criminal gangs.	Epworth–Population 101,000, 12 km south east of city. Began as a squatter settlement in 1980s, 90% poor, mixture of local people and immigrants, many criminal gangs.
Ghana	Kumasi	Population 661,000-801,000 in Metropolitan area. Old Asokwa–urban village, long settled but recent arrivals as well, not much stratification.	Duase–8 km from city centre, 20-30 minute journey. Village, long settled community.
India	Calcutta	Population 11 million, growth rate slightly decreasing, 40% poor, 45% live in slum settlements. North Calcutta street slums–Raja Gopendra & Rambagan–multi-caste, majority of households below poverty line, 70-80% functionally literate.	Gopalnagar village–Population 1,500, 40 km south of city centre. 120 households most below poverty line, majority lowest caste, 70-80% literate.
Nepal	Kathmandu	Population 673,000, growth rate 7%, slums & squatters on riversides. Koteshwor, New Baneshwor, Chabahil and Gaushala–mixture of languages and religions, average literacy 70% but lower for women than men.	Mulpani–Population 2,000-10,000, 4-5 km from city boundary, 10 km from centre. Hindu settlement, mainly lowest caste, most poor, average household size 5-6.

1.3 ZF 0136 Reports

Final Report July 2000

The Final Report (28 July 2000) submitted to Natural Resources International Ltd. was based on an internal researchers workshop followed by and external consultation process.

A weeklong workshop with participant country collaborators was held at the University of Reading. These discussions were chaired, and summarised in matrix format by Dr Steve Wiggins. From the matrix, key researchable issues were identified and these were subsequently used as the basis for discussion with invited advisors at an Expert Consultation Workshop 20th-21st July 2000. At this workshop, following presentation of the literature review and case study findings, small-group discussions relating to sectoral issues and crosscutting themes were convened to discuss the feasibility of research topics. The output from the Expert Consultation Workshop was summarised in the Final report.

Purpose of Report March 2001

'FRP Urban and Peri-urban Demand Surveys in Brazil, Ghana, India, Mexico, Nepal and Zimbabwe April-July 2000, Report to the FRP March 31 2001'

Following consultation with Programme Manager for the FRP, John Palmer and Duncan MacQueen of Natural Resources International Ltd., a second report was agreed with the following objectives:

- To provide an up-date to Natural Resources International Ltd. on dissemination activities following the External Consultation Workshop 20th-21st July 2000;
- To provide further analysis of researchable constraints [identified in the Final Report 28 July 2000] based on Poverty Map methodology[4], in order to harmonise this study with previous studies of a similar nature; and
- To précis the original case study reports from the six participant country collaborators. Although these were available to participants at the External Workshop it was considered worthwhile to reduce overall quantity of text whilst at the same time retaining the emphasis of original.
- To provide a secondary analysis of in-country case study reports.

Limitations on the secondary case study analysis:

Collaborating organisations exhibited diversity in their background–some organisations were forestry based others were social science oriented. Consequently their approaches to the study exhibited difference in emphasis. These different approaches are reflected in the reports. For example, the depth of information provided by collaborators regarding the different elements of the study varied. Some collaborators provided substantial background information on the economy of the country and poverty alleviation programmes. Whilst, other collaborators described the socio-economic characteristics of the target communities in greater depth than others did.

In addition, the way in which household surveys were conducted and the content of recorded data varied–some collaborators focused on what products or species were used, some focused on the use of these products and yet others focused on the different types of people using the products. Consequently, the cross case analysis possible was less rigorous than anticipated.

[4] Duncan MacQueen (1999) 'A Prioritisation Tool For Sustainable Livelihoods and Poverty Eradication', Proceedings of the workshop “Food and fishes, trees and cows: roles of the DFID renewable natural resources programmes in poverty eradication”, 25-26 November, University of Manchester Institute for Development Policy and Management. p. 67-81.

2. Dissemination and feedback since Workshop 20th-21st July 2000

The Final Report and the final draft of the Literature Review were circulated through email and hard copy to:

- All participants at the External Workshop
- Those who had been invited to but were unable to attend the Workshop but expressed interest in the study findings–includng Save the Children Fund; Peter Poschen, ILO; Lawrence Haddad, IFPRI; and Tara Batterai, FAO Regional Wood Energy Programme.
- ID21 Development Research reporting service, a oneworld.net partner organisation enabled by DFID and hosted by the Institute of Development Studies at the University of Sussex.
- The FAO E-Conference on Urban and Peri-Urban Agriculture (including forestry)[5] organised jointly by Food for the Cities Interdepartmental Working Group and Rural Development Division of the Sustainable Development Department of FAO, and the Resource Centre for Urban Agriculture and Forestry[6]. The conference covered two issues of particular relevance to ZF0136. Firstly it dealt with definitions of the peri-urban interface and urban-rural linkages. Secondly, it strengthened connections between agriculture and forestry in the urban context, both of which have repercussions for urban and environmental planning.

The FAO Wood Products Division further disseminated information about ZF0136 via the NWFP Digest. Enquiries were received from, and reports sent to, Pro Found (http://www.ntfp.org); Tropical Forest Resource Group, OFI; IUCN-NTFP Project in Lao; and ICRAF.

From these enquiries, information was received regarding similar initiatives and work in progress at various locations. For example, ICRAF held a one-day meeting (July 4th 2000) to discuss 'Stakeholder planning for peri-urban agroforestry and tree domestication'. The proceedings acknowledge that 'the opportunities and challenges for peri-urban agroforestry lie in a readily accessible market, available labour and the desire of the people to produce high-value trees and crops'. The meeting brought together international and local organisations with a vested interest in the peri-urban zone[7]

Joost Foppes working with FOREASIA sent two papers discussing a study in Lao looking at 'Local solutions for forest product extraction' and 'The use of non-timber forest products'. Krishna Gautam from the School of Forestry, University of Canterbury, New Zealand, also made contact. His work focuses on 'Indigenous knowledge of multiple-products (timber and non-timber) and its contributions to the silviculture for community forestry' in Nepal.

These papers and communications with the authors highlight two factors. Firstly, researchers in rural areas are interested to link work on the role of forest products in these communities with similar studies in peri-urban and urban areas. Such linkage enables comparison of livelihood strategies on the one hand and continuity for the study of trade on the other. Secondly, there is much work in the field, which can be accessed, but there is a greater time commitment involved in accessing publications, which do not enter academic journals.

This latter point was demonstrated also by the late arrival of a publication providing detailed information from a study of microenterprises in Ilam and Bhojpur Districts of Nepal

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[5] http://www.ruaf.org/UPAconf_health.html

[6] The RUAF Website (see note 1) is instructive on the role of trees, linked to which is the Overstory Website (www.agroforester.com/overstory/osprev) on which can be found details of species suited to particular product usage–honey, fodder, food, raw materials for manufacture.

[7] Full details are provided in Appendix I

conducted for ICIMOD[8]. The study contains information on 61 rural and 39 urban enterprises including forest product based manufacturing operations–broom manufacture, wooden and bamboo furniture making. The study is set within a detailed profile of the study areas which includes consideration of economic structure (including migration); social characteristics; infrastructure; natural resources; agriculture; industry; credit; and markets and marketing.

Following distribution of the FRP Programme Advisory Committee minutes, Mike Philip, editor of *'Forest, Trees & Livelihoods'* (previously *'International Tree Crops Journal'*) requested submission of an article to reflect current needs in forest research and this has recently been dispatched for review. A second article is in preparation for submission to the journal *'Environment and Urbanisation'*.

Findings relating to the role of consumable products–tree foods and medicinal plants–in urban and peri-urban livelihoods of the poor were presented to the ICSU[9] International Conference and Workshop on Food Security of Urban and Peri-Urban Systems in Developing Countries, Vienna November 25th-18th 2000. Although the audience was small, nevertheless the interdisciplinary nature of the conference lead to considerable interest in the forestry and food security aspects of the research. The paper was sent also to RUAF and Laura Russo of the Non-Wood Products division of FAO.

Contact was made at the conference with a young Nepalese researcher whose work focuses on the propagation and distribution to domestic markets of the native lapsi fruit[10]. This paper was subsequently passed to Nigel Poole and Colin Poulton, Agricultural and Business Management Research Group, Imperial College at Wye, in contribution to ZF0141 discussion paper 'Poverty and Tree Fruit Research'.

These activities emphasise the topical nature of the ZF0136 study and the potential for continued networking and research in this area. For example, in the food sector, the IFPRI 2020 initiative (www.ifpri.org/2020) devoted their third Brief (Focus 3 August 2000) to markets for urban agriculture with a consideration of the peri-urban interface by Cecilia Tacoli of ODI.

On-going communication with RUAF and Laura Russo regarding papers derived from this and related work is maintained.

[8] International Centre for Integrated Mountain Development, Kathmandu

[9] International Council for Science

[10] Promotion of Lapsi Tree (*Choerospondias Axillaris*, Roxb.) for Fruit Production in Nepal. K. C. Paudel*, K. Pieber**, R. Klumpp** and M. Laimer da Camara Machado** * Department of Forests, (c/o GPO Box 5014) Babarmahal, Kathmandu, Nepal ** University of Agricultural Sciences, Gregor Mendel Strasse-33, A 1180, Vienna

Section 2.

1. Problem analysis and Researchable Constraints

1.1 Mind Mapping

The mind mapping methodology, devised by the Natural Resources International Ltd. team[5], was used to explore the underlying causality of observed consumption patterns and reported constraints on access to forest-products and related occupations. Through the use of mind mapping, analytical rigour was achieved within an overall qualitative research framework.

Within the methodology, each component resource (Capital) of the Sustainable Livelihoods (SL) framework is addressed as a potential problem area for surveyed populations. Causal factors contributing to the problem (low level of the resource) are systematically attributed. Causality is defined by the methodology through asking the question 'What is the evidence for the problem?'.

The Poverty Map presented below was derived from a mind mapping exercise of the evidence provided through the fieldwork surveys. The purpose of this Poverty Map was to identify areas where intervention through research can be expected to bring sustainable benefits to the poor, 'Researchable Constraints'.

The mind mapping process was based on the premise that factors influencing the use of resources and constraints on access to resources are interrelated in the following ways:

- Resources can be subdivided into the elements which comprise the resource and these elements are influenced in unique ways by socio-economic, environmental and cultural determinants of poverty;
- Causality is multifaceted and through the mind-map process the ultimate underlying causes can be identified in addition to more superficial 'symptomatic' causes; and
- Each underlying causal factor can influence access to more than one resource.

Map Branches:

The Poverty Map consists of three 'branches': The First Order Branch contains the SL Capitals–Natural, Physical, Financial, Human and Social. The Second Order Branch distinguishes general poverty-related problem areas of the SL Capitals. The Third Order Branch contains themes reported in field surveys that are factors contributing to the general causes of poverty presented on the Second Order Branch. Branch assumptions are:

First Order Branch: Communities have low levels of SL Capitals;

Second Order Branch: Capitals are made up of elements that are broad problem areas of low resource levels;

Third Order Branch: Underlying factors contribute to general causes of low resource levels.

Researchable Constraints:

Themes or factors arising from the fieldwork which are cited on the Third Order Branch were categorised according to the extent to which they are potential research areas for the FRP. These are identified by the following typeface:

- ***Researchable Constraint which is relevant to the FRP and has a particular urban or peri-urban focus***
- **Researchable Constraint which is relevant to the FRP but is not specifically focused on urban or peri-urban areas**
- Researchable Constraint which is not specifically relevant to the FRP

[5] MACQUEEN, DJ 1999a Mindmapping (subsequently changed to 'Causal diagrams'): a prioritisation tool for sustainable livelihoods and poverty eradication. Pp 67-81. In: Proceedings of a workshop "Food and fishes, trees and cows: roles of the DFID Renewable Natural Resources Programmes in poverty eradication", 25-26 November 1999, University of Manchester, Manchester, UK.

In addition, certain themes were designated as non-researchable because they represent one of the following: 'Development Policy' (#); Basic Law (*); or Fixed State (+).

Poverty Linkages:

Causal themes identified on the Third Order Branch which are related to the same general cause of low resource level (element) were designated as 'looped', ~n, where n is the number(s) of the other Second Order Branches to which the theme is related. For each Second Order Branch element, the sum of loops referring to it is given by {n}. Finally, on the First Order Branch, the total number of referrals per Capital was recorded, {n}.

Subsequently, Researchable Constraints were consolidated into a 'cluster' framework (Table 1) and then prioritised. Details of the method used for prioritisation ('scoring') are provided following Table 1.

Poverty Map of Underlying Causes of Low Capital Assets for Survey Communities

1. NATURAL CAPITAL{23}	a)	Lack of secure land tenure	***Informal charcoal production*** ~4.a) River bank cultivation ~4.a) Uncontrolled squatting ~1.g)
	b)	Food / water insecurity {3}	Reduced water table Dry forest springs Loss of forest resources Land cultivated continuously without inputs
	c)	Loss of forest resources {7}	Land clearance and over extraction ~1.b) ***Regulations prohibiting forest access*** ~5.f) **Mismanagement of forest resources** ~5.g) ***Lack of community forestry / other reforestation schemes*** ~5.b) ***Regulations on felling*** ***Inadequate utilisation of agroforestry potential*** Products grown on marginal land due to competition for land from cash crops ~3.d) Lack of fodder trees for livestock **Species that provide livelihoods generally high maintenance**
	d)	Pollution	Unregulated industry waste dumping in rivers ***Inefficient charcoal production*** ~1.f) Health impact of chemicals ~4.a) Rivers & canals used for sewage disposal ~2.d), 5.j)
	e)	External threats {1}	Wild animal encroachment
	f)	Wastage {3}	***Reduced timber industry by-products*** ***Lack of knowledge of timber industry and effects on livelihoods*** ***Inefficient charcoal production*** Unreliable raw material supply necessitates recycling including house timbers **Unexplored opportunities for timber derivatives such as plywood and chipboard** 4.c), 5.k) Need for sawdust fuel in traditional industries **Potential for deadwood use not fully realised** ~5.g)
	g)	Uncontrolled urbanisation {8}	Lack of regulation over land development and building planning ~1.ch), 5.e) Health impact of overcrowding ~4.a)
	h)	Disaster vulnerability {1}	Unfavourable climate+ **Inadequate erosion control** ~1.c), 5.k) Periodic forced relocation of squatters ~5.j)

2. PHYSICAL CAPITAL {14}	a)	Geographical dispersion {4}	Migrant routes Urban, regional and/or inter-country bias in employment opportunities ~5.l) Need for diverse livelihoods* ~3.e) Spatial arrangement of settlements creates access to livelihood opportunities ~1.g), 3.f) Market development depends of population threshold ***Companies bring labour from outside area***
	b)	Demographic structure of population {2}	Migration associated with young men ~5.a) High proportion female-headed households High proportion youth Transition from extended to nuclear families Lack of reproductive health programmes Lack of targeted support Number of AIDS orphans escalating ~4.a) Larger families than national average ~4.a)
	c)	Inadequate living conditions	***Makeshift housing from scrap materials*** ***Hardwood timber and clay roofing cool and termite resistant but expensive*** ~1.c)
	d)	Lack of or inadequate basic services {2}	Lack of or infrequent waste disposal Lack of or inadequate sewage & sanitation Lack of clean reliable water supply facilities Piped water too expensive leading to excessive bore holing ~1.b) Development levy leads to non-registration of residency ~5.e)
	e)	Poor road surfaces & infrastructure {1}	*Cost of transportation renders supply to urban markets unprofitable* ~1.e) *Cost of transportation increases cost of raw materials* Main transport terminals create locus for activity and concentration of migrants ~2.ai), 5.a) Telephone, electricity low connectivity
	f)	Lack of telecommunications infrastructure {3}	*Lack of processing and packaging services* *Inadequate / lack of affordable market-place and / or storage facilities* Manufactured products retail trade conducted on the pavement
	g)	Inadequate infrastructure for commerce {2}	***Bamboo wholesale and retail trade conducted quasi-legally at roadside*** ~5.e) High post-harvest losses due to perishable nature of product ~1.f), 3.d), 4.c) High rents in council markets ~5.l)
	h)	Inadequate fuel supply infrastructure	***Inequitable distribution of benefits in fuel supply chain*** ~3.c) Inefficient fuel distribution / supply ***Ban on fuel wood use*** ***Charcoal better suited to informal housing than fuel wood***
	i)	Lack of or deficient health infrastructure	Landlord restrictions on wood fuels 5.f) Under developed health services ***Insufficient utilisation of indigenous knowledge of medicinal plants*** ***Church distributes herbal medicines*** ***Roadside tree fruits relied on for nutritional supplement*** ~3.d), 5.i) Lay and shaman healers prescribe medicines

3. FINANCIAL CAPITAL {28}	a)	Lack of investment capital {4}	Lack of affordable long-term credit ~5.l) Lack of understanding of how to apply for credit ~3.b), 5.b) Prevalence of advance payment from customers has implications for nature of self-employment Credit provided by intermediaries
	b)	Poor enterprise performance {4}	*Limited markets for produce due seasonal demand & low consumer disposable income* Low barriers to entry & high competition between enterprises / traders Limited or lack of business skills–marketing and market research and managerial/entrepreneurial skills ~4.ce) Competition from industrial goods and synthetics***** Below critical mass producer, trade and enterprise association marketing and economies of scale **Low quality output** ~1.c), 3.a), 4.c) ***Seasonal and perishable nature of products*** ~2.g) Enterprises rely on family labour ~4.g)
	c)	Inequitable distribution of benefits in supply chain {2}	***Producer, trade and enterprise association below critical mass for leverage with middlemen*** ~3.a) Lack of employment opportunities/ alternative income sources ~3.d) Trade financed by moneylenders ~3.a) Incomplete knowledge of intermediary risks and returns Low salaries and indebtedness ~3.c) Fluctuating demand for employment ***Inadequate agricultural innovation/ diversification options*** ~1.b) ***Redundancies from declining timber industry*** ~1.c) ***Home-based enterprise depends on housing structure***
	d)	Lack of income security {10}	***Decreased supply and/ or quality of inputs*** ~3.b) Need for diverse livelihoods* ~3.d) Land value rising ~1.g) Traditional female occupations offer low returns ~3.d), 5.b), 4.b) Need for mobility to access employment opportunities* ~2.ab), 5.al)
	e)	Insufficient available land {3}	
	f)	Gender bias in available sources of income generation {5}	

4. HUMAN CAPITAL {16}	a)	Health problems {7}	Prevalence of malnutrition, hygiene related disease (cholera, dysentery) and AIDS# ~2.b) Increased manual workload Gender disadvantage in terms of reproductive & child health needs ~3.f) Crowded living conditions Air pollution Lack of health services
	b)	Low literacy / numeracy levels {2}	Lack of basic education# ~4.g) Knowledge transferred orally from community elders ~5.i) Post-primary education not free
	c)	Low technical skills level {4}	***Lack of specific technical training in timber and NTFP manufacture*** ***Lack of knowledge for sale of products out of season*** ~3.b) **Competitiveness of carpenters relies on skilled workmanship** **Failure of mechanisation in manufacturing**
	d)	Low self esteem	Lack of empowerment* ~3.f), 5.b) Disappearance of traditional family and caste related occupations* ~1.c) Transition to non-farm economic culture* ~3.e) Perception that poor are dishonest ~5.b)
	e)	Low business skills level {1}	Lack of management training Failure of Government incentives to produce enterprise growth **Apprenticeship schemes based on subsistence** Need to market labour skills ~1.c), 3.d), 2.a) Limited jobs in formal sector ~6.c)
	f)	Lack of time	***Forced purchase of fuel*** ***Increasing importance of street food vending using sawdust fuel*** 1.f), 3.f), 4.a) More boys attending primary school than girls 4.b)
	g)	Gender impact in education {2}	

5. SOCIAL CAPITAL {38}	a)	Heterogeneous communities (ethnicity, class and income) {3}	Opportunistic migration ~3.e), 2.a), 5.l) Inherent ethnic diversity of national populations+ Breakdown of traditional social ties Not much social stratification and chaotic communities ~1.g)
	b)	Insufficient community organisation {5}	Communities not empowered ~5.cd) Counterproductive customs and beliefs Lack of appropriate representation ~2.f), 5.ei)
	c)	Ineffective civil society {2}	**Theft between traders, illegal felling & charcoal production, permit falsification, bribery of officials** ~3.d), 5.f)
	d)	Criminal behaviour {1}	Anti-social gang behaviour Ineffective law & order policies/ crime prevention ~5.e) Unpaid customer credit ~3.d) Prohibitive regulations on squatting and river bank cultivation ~1.g), 3.f)
	e)	Inefficient implementation & enforcement of policy {6}	Lack of funding to enforce policy+ ***Lack of complete knowledge of charcoal supply chain and its impacts on livelihoods* P1** Corrupt governance ~5.j) Lack of policy expertise Official population estimates exclude informal housing residents ~1.g), 3.d) Lack of data on fuel switching according to function (space, heat, light), season & comparative price Fuel subsidies removed under structural adjustment Paraffin shortage due to world prices+ Lack of data on traditional health systems
	f)	Deforestation, fuel & health policies not integrated {4}	**Deforestation escalating to meet urbanisation and fuel wood demand** ~1.g), 5.k) ***Forest service officials insufficiently informed about species used by local populations*** ~5.i) Programmes lack coordination and efficacy ~2.def), 5.e) Failure to complete World Bank water mains scheme to household level ~5.gj)
	g)	Recruitment, training & service conditions monitoring in public sector not proactive {4}	***Young community members increasingly less able to distinguish different species*** **Forest plants and trees extensively used in religious ritual and worship**
	h)	Donor funding inappropriately targeted or mismanaged	***Traditional forest medicine usage threatened by shortage of plants & increasingly narrower range of cultivated plants used*** ~5.f) ***Manufactured product markets linked to festivals*** ~3.b) Lack of programmes at community level Low level of community awareness of or receipt of benefits from poverty alleviation schemes ~2.f)
	i)	Indigenous knowledge not incorporated into policy formulation	Administrative complexity in squatter settlements ~1.g) NGO schemes not directed to poverty alleviation ~5.c) **Communities aware of need for softwood plantation** **Demand for forest products exceeds supply** ***Enterprises dependent on supply of pine and eucalyptus***
	j)	Inadequate investment in poverty alleviation programmes {4}	Urban bias in employment opportunities Local opportunities taken by outsiders ~3.a)
	k)	Inadequate investment in forestation and plantation schemes {4}	

1.2 Prioritisation of Researchable Constraints

Each RC is presented in Table 1., with the sum of referrals to the Second Order Branch to which the RC relates, the Poverty Linkage. Researchable Constraints (RCs) relevant to the FRP research agenda were first aggregated where agreement of potential research objectives was indicated. These aggregated RCs were categorised according to broad areas of interest, 'Research Clusters', and coded accordingly (P, T, E, V, S). Within this categorisation the following aspects of the aggregated RCs were also tabulated:

- SL Capitals implicated, denoted by their First and Second Order Branch numbering;
- Regional applicability denoted as identified in the Key to Table 1.
- Urban/peri-urban focus denoted as identified in the Key to Table 1.

In Table 2., aggregated RCs were given an appropriate title and presented in order of priority according to both the overall prevalence of a stated problem and the extent to which the problem has multiple effects within the SL frame of reference, based on the following scoring method:

- Poverty Linkages was scored as sum of Poverty Linkages for constituent non-aggregated RCs;
- Resource Base was scored as the sum of SL Capitals implicated for building capacity:

  Low = one Capital implicated
  Low/Med = two Capitals implicated
  Medium = three Capitals implicated
  Med/High = four Capitals implicated
  High = five Capitals implicated

- Regional Replication was scored Low for relevance to one region only, Medium for two regions and High for all three regions; and
- Community Focus was scored; High for relevance to peri-urban *and* urban communities, Medium for relevance to one or the other of these, and Low for a non-specific community focus.

Within this scoring system it was also necessary to make some subjective assessments based on deliberation of all scores.

Table 1. Researchable Constraints by Research Clusters

Research clusters	Ref.	Researchable constraints LA=Latin America; AF=Africa; SA=South Asia UP=no specific focus; U=Urban focus; Pe=Peri urban focus {Poverty linkages}	Capitals implicated	Regions implicated	Community focus
Global issues and strategic concerns (P=policies)	P1	**Deforestation escalating to meet urbanisation and fuel wood demand** {4}	5.f	LA	UP
		Regulations prohibiting forest access {7}	1.c	AF	
		Regulations on felling {7}	1.c	SA	
		Ban on fuel wood use {0}	2.h		
	P2	***Insufficient utilisation of indigenous knowledge of medicinal plants {0}***	2.i	LA	UP
		Young community members increasingly less able to distinguish different species {0}	5.i	AF	
		Traditional forest medicine usage threatened by shortage of plants & increasingly narrower range of cultivated plants used {0}	5.i	SA	
Land use and forest decision making (T=technologies)	T1	**Mismanagement of forest resources** {7}	1.c	LA	UP
		Forest service officials insufficiently informed about species used by local populations {4}	5.g	AF	
				SA	
	T2	**Potential for deadwood use not fully realised** {3}	1.f	LA	UP
		Enterprises dependent on supply of pine and eucalyptus {4}	5.k	SA	
		Decreased supply and/ or quality of inputs {3}	3.e	AF	
	T3	***Lack of community forestry / other reforestation schemes*** {7}	1.c	LA	Pe
		Inadequate utilisation of agroforestry potential {7}	1.c	AF	
		Inadequate erosion control {1}	1.h	SA	
		Species that provide livelihoods generally high maintenance {7}	1.c		
		Inadequate agricultural innovation/ diversification options {10}	3.d		

Trade & industry (E=economy)	E1	***Lack of knowledge of timber industry and effects on livelihoods {3}***	1.f	LA	U
		Redundancies from declining timber industry (10)	3.d	AF	
		Companies bring labour from outside area {4}	2.a	SA	
		Reduced timber industry by-products {3}	1.f		
		Unexplored opportunities for timber derivatives such as plywood and chipboard {3}	1.f		
		Increasing importance of street food vending using sawdust fuel {0}	4.f		
	E2	***Inequitable distribution of benefits in fuel supply chain*** {0}	2.h	LA	UP
		Lack of complete knowledge of charcoal supply chain and its impacts on livelihoods {6}	5.e	AF	
		Theft between traders, illegal felling & charcoal production, permit falsification, bribery of officials {1}	5.d	SA	
		Bamboo wholesale and retail trade conducted quasi-legally at roadside {2}	2.g		
Basic needs (V=vulnerability)	V1	***Makeshift housing from scrap materials {0}***	2.c	LA	U,
		Hardwood timber and clay roofing cool and termite resistant but expensive {0}	2.c	AF	Pe
		Charcoal better suited to informal housing than fuel wood {0}	2.h	SA	
		Home-based enterprise depends on housing structure {10}	3.d		
		Church distributes herbal medicines {0}	2.i	LA	
	V2	***Roadside tree fruits relied on for nutritional supplement*** {0}	2.i	AF	UP
		Forest plants and trees extensively used in religious ritual and worship {0}	5.i	SA	
		Traditional forest medicine usage threatened by shortage of plants & increasingly narrower range of cultivated plants used {0}	5.i		
Sustainable livelihoods and income (S=sustainable employment)	S1	***Inefficient charcoal production {3}***	1.d	LA	UP
		Inefficient charcoal production {0}	1.f	AF	
		Informal charcoal production {0}	1.a		
	S2	**Low quality output** {4}	3.b	LA	U,
		Seasonal and perishable nature of products {4}	3.b	AF	Pe
		Failure of mechanisation in manufacturing {4}	4.c	SA	
		Lack of specific technical training in timber and NTFP manufacture {4}	4.c		
		Lack of knowledge for sale of products out of season {4}	4.c		
		Competitiveness of carpenters relies on skilled workmanship {4}	4.c		
		Apprenticeship schemes based on subsistence {1}	4.e		
		Manufactured product markets linked to festivals {0}	5.i		
		Producer, trade and enterprise association below critical mass for leverage with middlemen {2}	3.c		

Table 2. Researchable constraints prioritised

Priority	Abbreviated title	Poverty Linkage	Resource Base	Regional Replication	Community Focus
	S2: *Theme–Developing forest-product based MSEs*[11].	27	Medium	High	High
RC1a	S2a: Insufficient market research skills and marketing				
RC1b	S2b: Lack of community organisational structures				
RC2	T3: Declining peri-urban agriculture and lack of peri-urban agroforestry schemes	32	Low/Med	High	Medium
RC3	E1: Declining timber supply and decreasing raw materials for small-scale processors and the informal sector	23	Med/High	High	Medium
RC4	V1: Lack of innovative & ecological housing materials and participatory house building initiatives	10	Low/Med	High	High
RC5	P1: Cross-sectoral inconsistencies and lack of procedures to develop pro-poor laws and policies	18	Medium	High	Low
RC6	T2: Insufficient mechanisms for finance of and inadequate institutional structures for wood plantations	10	Medium	High	Low
RC7	T1: Limited understanding by forestry sector officials of community interaction with forest species	11	Low/Med	High	Low
RC8	E2: Inequitable distribution in the supply of bamboo, charcoal and raw materials to manufacturing	9	Low/Med	High	Low
RC9	V2: Insufficient utiliisation of traditional tree remedies in community health initiatives	0	Low/Med	High	Low
RC10	P2: Overuse of wild NTFPs and insufficient inventory and monitoring procedures to promote sustainability	0	Low/Med	High	Low
RC11	S1: Inefficient methods of charcoal production	3	Low	Medium	Low

[11] Micro and Small Enterprise

2. Researchable constraints

RC1 Theme S2: Developing forest product-based MSEs

	27	**Medium High**	**High**

Governments constrained by the need for foreign currency tend to focus support and incentives on large-scale industry to the neglect of MSE development and many of these businesses do not survive more than a few years.

Problems inherent in the MSE manufacturing sector include low-value of goods and basic production technology, which lead to market saturation, limited access to finance, and lack of business development plans.

Effective business survival strategies include value-addition and increased bargaining power through collective action.

RC1a: Insufficient market research skills and marketing
PROBLEM:

Factors such as diverse product use, and substitution with synthetic materials create challenges for marketing wood, cane and bamboo manufactured goods. Seasonal demand, in keeping with sale of crops in peri-urban areas, creates cash flow problems and unstable employment.

Industrial substitutes such as metals, glass, and plastics, that may be more durable, effective, or cheaper than wood, cane and bamboo for household implements and ornaments increasingly capture traditional manufactured goods markets, and demand is boosted by consumer preference for 'modern' products which tends to accompany urbanisation. Nevertheless, although a low-income market that fluctuates seasonally, demand for wooden furniture remains buoyant in developing countries and low quality output may still be cheaper than synthetic substitutes for the very poor. Cane and bamboo products are still widely used for multiple household and enterprise-related uses in Asia and thriving urban markets exist for refined bamboo artefacts. Cane furniture is also in high demand in developed countries.

Survival of forest product-based manufacturing MSEs depends on their ability to adjust marketing and technical resources to changing demand and availability of raw material supply. Successful marketing relies on the identification of good market prospects–both buoyant demand and availability of raw material. Potential growth markets include under-supplied niches such as low cost basic furniture, added-value handicrafts, and specialised sub-contracted production.

Artisanal craft enterprises most likely to survive are those with tourist and export markets. Carvers in Kumasi peri-urban community are active year-round and the prerequisite 3-year subsistence level apprenticeships are in high demand amongst young men. Products from the traditional dyeing and printing industries in Kumasi have buoyant demand and are another potential target for development. Shola handicrafts in peri-urban Calcutta also have a steady market and good supply of raw material[12].

Fair trade offers another niche-market, which some artisans can access. The Natural Resources and Ethical Trade Programme of the Natural Resources Institute[13] believes that there is a major opportunity for fair trade development in non-wood forest products. For example, ethical markets can be developed through on-line direct sales by airlines and travel agents.

[12] There is also potential to farm shola, as well as Hogla plants also used in manufacture, on the wetlands

[13] University of Greenwich, Chatham, UK. Will the WTO prevent the growth of ethical trade? Journal of International Development. 2000. 12: 4, 571-584. 22 ref.

Food preservation and processing also have potential for development, such as ice-lolly and jam making in peri-urban Feira and for fruits and worms supplied from Mount Darwin to Harare.

NON-RESEARCH DEVELOPMENTAL NEEDS:

Education and training are a means to empower people to help themselves. Lack of business and technical skills are a barrier to further development of MSEs and for women there may be additional barriers due to their lack of acceptance in commercial employment and low levels of literacy.

Mechanisation may boost production potential for some enterprises. However, government loans in peri-urban Calcutta in 1990 failed to upgrade manufacture through mechanisation, and lack of small-capacity machinery for small-scale operations may render mechanisation a difficult objective. Training in technical skills therefore needs to be relevant to the production techniques suited to the MSE sector.

Training in quality control and IT is increasingly important, especially for businesses hoping to access markets in the North. There may be means to address these training needs through collaboration with existing services if these can be tailored to the type of training most useful for MSEs–apprenticeship, day-release, block training etc. In addition, the introduction of nationally recognised qualifications, such as the national vocational training system (NVTS) Craftsmen Training Scheme in India, build a career development structure for artisans.

RESEARCH:

Research into the market research and marketing needs of MSE manufacturing businesses is required to answer the following questions about *markets and marketing technologies:*

- Are there buoyant / growth domestic markets and how can these markets be accessed or expanded?
- What is the potential for crafts-based enterprise to access international markets and interact with tourism and related services?
- What product / packaging innovations are required to foster branding and thereby increase sales in identified markets?
- What IT facilities such as 'info shops' are available in the locality that can be used to obtain market information and to market produce via the Internet?

RC1b: Lack of community organisational structures
PROBLEM:

Whereas rural producer groups are a development priority, the equivalent are emphasised less in the urban and peri-urban context. Without the ability to access a community structure, MSEs suffer from lack of economies of scale and opportunities for skill sharing.

Community mobilisation and building community organisational structures are valuable ways to foster MSE development[14]. Producer co-operatives that achieve economies of scale for sale and purchase of goods provide members with the benefits of reduced costs, increased income through consistent supply to larger customers and volume output for mail order to Northern markets. Producer association also provides leverage with municipal authorities and a structure for microfinance schemes and technical assistance can be more cost effective if targeted to clusters of entrepreneurs.

RESEARCH:

[14] See for example the ILO International Small Enterprise Programme (ISEP)

Benefits of producer association in urban and peri-urban areas are not certain. Research relating to community organisational structures is therefore required to address the following questions:

- What local authority policies provide the most enabling environment for producer organisation?
- What forms of organisation are most successful in terms of group size, membership fees, group functions etc.?

RC2 T3: Declining peri-urban agriculture and lack of peri-urban agroforestry schemes

32 Low/Med High Medium

PROBLEM:

Traditional small-scale agriculture in peri-urban communities is declining in importance and some land is cultivated continuously without inputs. Agro-forestry presents an opportunity for revitalising natural and financial capital of peri-urban communities but not much is recorded about the incidence of such systems in peri-urban areas, and design and implementation of schemes is complex.

Surveys demonstrated subsistence need of forest products for fuel, fodder, food and medicinal plants, softwood, bamboo, and environmental maintenance functions–soil erosion control and maintaining aquifers. In Zimbabwe, lack of food security has forced communities to cultivate government land. But overall, peri-urban agriculture is inefficient and informal cultivators are faced with the perpetual threat of government action to prohibit cultivation. There was little evidence apart from in Nepal that community forestry schemes are being used to revitalise peri-urban forestry potential and there were no recorded attempts to combine forestry with agricultural production to provide subsistence benefits or to boost income potential from agriculture. Where peri-urban plantations do exist, there was concern that species do not necessarily meet community needs.

Issues of technical choice of species, assuring water supplies to growing plants, protection of seedlings, costs and co-ordination of efforts present major challenges. Obtaining supplies of seedlings of sufficiently diverse species from Forestry Departments can be a problem since many authorities struggle to produce enough seedlings in public nurseries. Here there may be value in utilising seedlings raised by private gardeners. Also, for the very poor, the issue of land tenure is a major constraint and population density even in peri-urban areas limits availability of land on which trees can be planted. Although under-utilised private gardens offer a possible location for private tree planting, obtaining access to land that can be planted communally relies on permissive local authority regulation. Encouraging community participation in deciding on areas to plant, planting and maintenance of trees is an underlying factor for sustained maintenance of the forestry scheme.

Mushroom cultivation

In the Mexico peri-urban area studied over 19 species of edible mushroom were gathered in local forest and consumed by poor households. There is considerable potential for domestication and cultivation of mushrooms and fungi through 'mycological landscaping' in community forest or more intensively in agro-forestry based micropenterprise. Progress in Nepal draws on both the ancient mushroom growing conditions of East and Southeast Asia and on resources associated with the emergence of small-scale mushroom farming in North America and Europe[15].

[15] See LI-BIRD home page Website under 'ongoing projects', http://www.panasia.org.sg/nepalnet/libird/, LI-BIRD, P.O. Box 324, Bastolathar, Pokhara, Kaski, Nepal

RESEARCH:

Research is required to address the following questions in the peri-urban context:

- What are the costs and benefits of converting peri-urban land to agro-forestry schemes?
- What tree and plant species meet demand for multifunctionality and balance the combined goals for subsistence, environmental protection and income generation?
- What project methods encourage community commitment to tree maintenance?
- How can policies that include peri-urban agro-forestry in municipal / regional development be encouraged?

RC3 E1: Declining timber supply and decreasing raw materials for small-scale processors and the informal sector

23 Med/High High Medium

PROBLEM:

Many livelihoods are associated with the timber industry. In addition to labouring, in places such as Calcutta entire slum communities in the environs of sawmills are dependent on by-products of the industry. These livelihoods are threatened by measures such as log export bans and extraction prohibitions that have lead to a decline in the scale of operation of the timber industry.

The timber industry particularly in India and Ghana has witnessed substantial decline but there is evidence that cities in countries such as Nepal will experience a similar decline in the near future. There is a need to understand the interaction between the formal timber industry and the informal occupations that it supports in order to keep loss of livelihoods to a minimum and to generate alternative sources of employment where feasible.

The decline in supply has created many redundancies in the casual labouring workforce in timber yards, and increased efficiency in the industry is beginning to restrict supply of by-products to informal enterprises such as carpentry and other low cost manufactures. At the same time, demand from street food vendors for sawdust for fuel is becoming increasingly important as more women enter waged employment. More detailed information is required regarding these trades and numbers of people affected by the decline of the industry. It is important therefore to take a balanced approach to benefits in terms of conserving supply derived through increasing efficiency and reducing waste reduction.

Further, whilst foreign trade has to a large degree stimulated the timber industry in developing countries, Northern investors and consumers commonly benefit disproportionately from timber exports at the expense of Southern economies. Means to tip the balance in favour of exporting countries would be through the development of large-scale formal manufacturing industry to add value prior to export. In this way livelihoods of the poor can potentially be sustained through redeployment in these industries. In particular, more detailed analysis of the manufacturing potential of timber derivatives such as plywood and chipboard is required. World Bank notes that in developing countries, reconstituted panel production is minimal compared with the use of sawnwood and to a lesser extent plywood, and what production does exist is predominantly exported[16].

Maximising livelihood potential in the timber industry for poor and low-skilled workers also requires ensuring that the industry operates competitively and without rent extraction through

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[16] see UNIDO (1995) for details of the characteristics of structural timber and the properties and standards of plywood, glued laminated timber and wood-based panel products, such as particleboard, fibreboard and strandboard.

such means as timber concessions and discretionary licensing of plywood mills to a privileged group of companies. Further, since small-scale felling, practised illegally, generally causes less environmental damage, if timber is sawn into planks at source, and could be an effective and sustainable means to supply the domestic timber market, if regulations permitted. More needs to be found out about institutional constraints on small-scale logging.

RESEARCH:

In order to reduce unemployment, research is required to answer the following questions:

- What low-cost technology innovation opportunities for waste reduction exist and what are the implications of efficiency gains on livelihoods derived from by-products?
- What opportunities exist to add value to timber through processing prior to export (for example see RC4), and for redeployment of labour in these formal activities?
- How does corruption associated with official logging, and illegal logging practices affect (a) distribution of profit, and (b) supply of timber and by-products to the poor?

RC4 V1: Lack of innovative & ecological housing materials and participatory house building initiatives

10	**Low/Med**	**High**	**High**

PROBLEM:

As much as 30-60% of urban & peri-urban dwelling is unplanned settlement. This very low-income housing relies substantially on waste products, including metal and plastic. These structures are susceptible to inclement weather and residents are vulnerable to homelessness and negative health impact.

'Adequate shelter for all' and 'sustainable human settlements' were articulated as main themes on the Habitat II 1996 Agenda and in the Global Report on Human settlements 1997. In addition, many informally constructed houses combine residential and workspace, with income from home-based enterprise providing as much as 75% of total household income. Informal housing therefore makes a significant contribution to the urban economy despite the substandard work environment.

Products derived from renewable natural resources are important construction materials in rural & peri-urban areas. The EC-sponsored GAIA Programme includes a mandate to 'establish and strengthen indigenous building materials industry', and 'formulate programmes to enhance utilisation of traditional construction techniques'.

Where there is access to bamboo, low-income housing is typically constructed of woven bamboo screens. In Ghana, cane is an important construction material. There is potential to further utilise these natural building materials in densely populated urban & peri-urban areas. Durability and flammability are significant problems and, unless structures are treated, expected life is about five years. TRADA Technology Ltd has compiled databases of suitability of bamboo species for construction, physical characteristics of these species, appropriate preservative treatments and guidelines for application. However, target communities may perceive bamboo and cane structures as insufficiently modern. To address this constraint, structures using bamboo-reinforced concrete for flooring and foundations with walling of plastered woven bamboo have proved successful. Structures can also combine housing needs with water storage facility. Treated bamboo in combination with modern construction materials is therefore a means to develop sustainable settlements.

The use of poles obtained from thinning wood plantations is permitted in countries, such as India, which have otherwise banned the use of forest timber in construction. DFID Urban Planning Department (IUDD) incorporates use of timber poles in construction according to a

manual commissioned from TRADA Technology Ltd. Housing projects[17]. The manual covers use of natural resources, such as small diameter timber poles, soil blocks and micro-concrete roof tiles to substitute for bricks, clay tiles and coconut timber rafters, can result in a 30-50% reduction in total house costs. Building materials derived from plywood, chipboard and other reconstituted panel industry development [RC3] also hold potential for innovation in housing.

Community self-help groups and design of self-build schemes are seen as an integral component of RC4. Materials development is inextricably linked with variability of housing needs and livelihoods. It is important to target construction design according to residents' income, job stability and length of residence. Further, the construction sector is often dominated by small-scale production and since the current focus for housing provision is through integration of public and private sector initiatives, housing schemes employing small-scale entrepreneurs provide jobs for the urban poor.

RESEARCH:

Research is required to address the following questions:

- What are the costs and benefits of using forest product-based materials (bamboo, timber poles, recycled timber products, scrap timber, and reconstituted panel materials) in construction of dwellings for poor urban and peri-urban populations?
- What factors contribute to sustainability in design and operation of schemes to upgrade squatter settlements?
- What are the institutional constraints on the incorporation of forest-product based housing schemes into urban planning policies?

RC5 P1: Cross-sectoral inconsistencies and lack of procedures to develop pro-poor laws and policies

18 Medium High Low

PROBLEM:

Nation states and their economies are complex systems within which policies can have contradictory objectives and unseen / unintentional consequences on the livelihoods of the poor[18]. Hence, understanding feedback loops between policies and their combined effects is of growing importance to poverty alleviation and a central issue for achieving consensus about which development policies to promote. In particular, a discontinuity of interests is found between forest, energy and health policies.

In peri-urban areas fuel wood consumption patterns are similar to those of rural households. For example, in Calcutta, wood was the main source of fuel in 70 per cent of households in the peri-urban community. But in urban areas fuel wood bans are prevalent especially in Latin America. This is partly due to fire hazard from the close proximity of dwellings but also bans are seen as a positive measure to relieve pressure on forests.

Discouraging fuel wood use also acts in synergy with efforts to reduce the incidence of acute respiratory disorders caused by inhalation of wood smoke in confined dwelling space. However since alternative (fossil) fuels are prohibitively expensive (and there may be a preference element too relating to the insect repellent benefits of smoky fuels), this can lead to fuel deprivation and illegal wood gathering and consumption (typically wood is still burnt in illegal squatter settlements).

Conversely, pro-poor policies that keep the price of wood fuels low tend to discourage energy efficiency improvements and therefore have a negative impact on forest conservation. There

[17] See UNCHS Best Practices Database

[18] Garcia (1984) 'Food Systems and Society: a conceptual and methodological challenge', UNRISD

is a need to understand the interplay between these policies in different regions in greater depth. For example, in India, the government gas distribution programme terminated in April 2000. This has increased the cost of gas and there may consequently be a return to wood fuel use. The effect of this fuel switch has yet to be realised.

Examples of interaction between forest, energy and health policies:

- Structural adjustment programmes → Removal of fuel subsidy → Increased demand for fuel wood → Increased illegal extraction and consumption of fuel wood → Negative health impact.
- World oil prices → High cost of fossil fuels for depreciated currency → Increased reliance on wood fuels → Increased illegal extraction and consumption of fuel wood → Negative health impact.
- Policies to prevent potential fire hazards and air pollution → Ban on fuel wood use in urbanised areas → Illegal consumption of fuel wood → Negative health impact.
- Policy to protect forests → Decreased availability of fuel wood → Increased reliance on quick burning scrap wood and cardboard → Decreased fuel security & increased negative health impact.

There is existing recognition of the causal connection between policies. For example in India, 'economic and trade policies are being progressively fine-tuned to facilitate the conservation and sustainable use of forests. This is reflected in incentives for wood substitution, subsidies for the use of fuel-saving devices and alternative sources of energy supply such as biogas and solar energy, and financial incentives to supply seedlings free of cost or at subsidised rates[19]. Similarly Barraclough & Ghimire have recently investigated the causal connections between trade policies and deforestation[20].

It is important also to understand household movements on the fuel ladder. Generally, a fuel switch from biomass to fossil fuels occurs at a threshold income level, which varies depending on availability of free fuel wood and subsidised fossil fuel supply. However, the survey in Brazil demonstrated that there is a range of income in which households have a flexible relationship with fuel use. Whereas below an income of US$56 per month fuel wood was collected and above an income of US$84 a continuous supply of gas was affordable, between these income levels, determinants and pattern of fuel consumption behaviour are more complex. Movements on the fuel ladder are further complicated because a decreased consumption of fuel wood can lead to price decrease for fuel wood and consequent increase in consumption.

RESEARCH:

Research is required into linkages between measures to abate deforestation–reforestation programmes and extraction prohibition–energy, and health policies, in specific regional contexts. Such research would address the following questions:

- What quantifiable indicators, such as relevant morbidity statistics, can be used to assess energy, health and forest policy effects at community level?
- What are the combined (neutral, synergistic or divergent) effects of energy, health and forest policies at community level–for example, household motivation and actual movements on the fuel ladder?
- What are the implications of expected future development of new sources of energy, such as solar and hydroelectric power, for formulation of fuel, health and forest policies?

[19] Indian Government to the eighth session of the United Nations Commission on Sustainable Development

[20] Agricultural Expansion and Tropical Deforestation (2000) Earthscan

RC6 T2: Insufficient mechanisms for finance of and inadequate institutional structures for wood plantations

10 Medium High Low

PROBLEM:

The central problems for increasing supply of wood through industrial forest plantation are (a) cost burden on the state, and (b) time required for realisation of benefits, which can be as much as 8-15 years from planting to harvest. These barriers must be overcome in order to encourage private investment in the forest sector, in line with current World Bank development policy to liberalise existing public sector-funded functions.

National Forest Policies include the creation and management of permanent forest resources. Reforestation rates in the countries studied range from less than 0.1 per cent of total forest area to 1.44 per cent and the proportion of existing plantations range from 0.2 to 21 per cent. Plantation grown woods, such as pine and eucalyptus, are important sources of raw material for artisan manufacture of furniture, doors and window frames. Given the reported shortage of supply of timbers, reforestation rates appear inadequate.

	Brazil	Ghana	India	Mexico	Nepal	Zimbabwe
% Forest hectare under plantation	0.9	0.6	21	0.2	1.2	1.0
% Hectare protected	3	nd	4	5	8	8
% Annual hectare reforestation	<0.01	0.02	0.22	0.04	0.08	1.44

RESEARCH:

In order to facilitate private investment in wood plantation, research is required to address the following questions:

- What are the main contributory factors for sustainable private industrial wood plantation?
- What institutional constraints on opportunities for private sector investment in industrial wood plantation are identifiable?

RC7 T1: Limited understanding by forestry sector officials of community interaction with forest species: Building consensus on the need for sustainable extraction regimes

11 Low/Med High Low

PROBLEM:

The economic importance to rural communities of non-timber forest products is well recognised. Sustainable harvesting of forest resources is feasible and can be used as a management technique. Further, community forest management is an important element in a decentralised and participatory planning framework and there has been a recent and positive trend in the involvement of local communities in management and sustainable extraction of resources from forests. In some countries, such as Uganda, the Government has allowed sustainable extraction of forest resources, primarily non-timber products, and communities are engaged in the elaboration of a forest management plan. However, forestry policies, laws and regulations imposed by the State in other countries such as Ghana, have created conflicts between rural communities and government agencies over the use and control of forest resources, and jeopardise the overall management and conservation of forests.

The availability of support services, monitoring and enforcement of control mechanisms, and capacity building of local organisations are all key elements of successful community forest management. Equally important in promoting community forest management is the facilitating role of forest officials. However, cost-cutting services has detrimentally affected

human resource capacity and forest officials may lack appropriate knowledge of species used by communities and sustainable extraction levels. In addition, training for the forestry sector may be too technically focused and lacks a socio-economic component that would prepare forest officials for liaison with rural and peri-urban communities that are currently faced with the market imperative. Officials may also lack an understanding of relevant policies and institutions.

RESEARCH:

Research is required to achieve the overall aim of building capacity within the forestry sector to improve forest officials' knowledge about community NTFP initiatives, through addressing the following questions:

- What is the extent of divergence in perceptions of (a) sustainable extraction levels and (b) income generation potential, of NTFPs, between forestry officers and communities?
- What are the implications of gaps in forestry officers' understanding of community needs for in-service training?

RC8 E2: Inequitable distribution of profits in the supply of bamboo, charcoal, and raw material inputs to manufacturing

	9	**Low/Med**	**High**	**Low**

PROBLEM:

Market failure is usually defined as the inability of market forces to produce an 'efficient' use of resources whereby marginal costs are equal to marginal returns, but does not say anything about who pays costs and who receives returns. Such market failure is recognised as a major barrier to equitable trade.

Poor roads require producers to have access to vehicular transport in order to take products to urban markets. Hence, forest product collectors and manufacturers in rural and peri-urban areas market their products through either a trader or wholesaler. Returns are low. Further, despite the prevalence of self-employment in forest product based microenterprise (furniture and other manufacturing) in practice, labour is based on agency contracts, where artisans take specific orders from clients who whilst not owning the process nevertheless closely monitor work in progress. But, the availability of cash advances is a benefit of dealing with intermediaries and advance payment from dealers can be an important source of start-up capital for businesses, for example carvers in Ghana.

In many regions a small number of traders fix prices at artificially low levels. The extent to which this is exploitative depends on the extent to which intermediaries provide security to producers. This in turn depends on the level of risks taken, in supply due to the perishable or seasonal nature of the product or of uncertain demand, and / or high transport costs covered by intermediaries. Further, urbanisation has lead to complex supply chains in which many intermediaries operate and benefits are distributed disproportionately along the chain, with producers tied into credit arrangements. Barriers to entry at all stages of the chain often relate to capital investment required.

Where there is a wider range of channels of sale, including direct to customers, wholesale, and retail distributors, the main factors influencing producer/processor choice are previous market experience, effectiveness and cost of intermediaries, and willingness to bear risks associated with handling product. Negative stereotypes of private market intermediaries are reinforced by the extent of corruption in performance of marketing systems in developing economies.

Commodity chain approach:

Contributory factors to relatively successful bamboo markets in Kerala, India, have been investigated through a comparative study of marketing systems for bamboo and eucalyptus wood using semi-structured interviews at bamboo depots. The study examined trade practices and marketing margins and found that the higher remuneration to the producers resulted from high demand, fewer intermediaries and competition among traders. In addition, the study concluded that legal restrictions and bureaucratic procedures were the main bottlenecks in market function and that relaxation or removal of these restrictions would stimulate bamboo resource development on-farm. A similar commodity chain approach was taken for a study of maize marketing by Bangladesh Agricultural University[21], which was based on data collected from farmers, wholesalers, retailers, processors and organised traders (of the Bangladesh Rural Advancement Committee and Grameen Krishi Foundation). The study investigated the marketing system and cost, margins and price spread to analyse returns to intermediaries relative to producers.

Identification of corrupt practice in markets:

A survey of mango and wheat marketing systems in India conducted by the Department of Agricultural Economics and Business Management at Wye College[22] documents examples of corruption in agricultural markets.

Analysis of financial constraints:

Clearly, access to financial services is a crucial determinant of the perceived benefits of security derived from intermediaries and therefore research needs to address constraints on access. Microfinance success at providing access to credit, particularly for women, has been achieved in India through linking banks and self help groups[23]. Recovery is almost 100 per cent and profit is now so attractive that banks are expanding the linkage programme without directives from the Central Banking Authorities and Government of India.

Research on informal financial markets suggests that identifying demand aspects in financial intermediation, such as for specific financial service profiles and in particular women's demand structures, are key to the adoption of these services by artisans and traders. New Institutional Economics is a useful way to interpret research findings.

Further, an important aspect of the linkage programme in India is the role that NGOs can play as change agents within communities, as trainers of financial institution (bank) officials, as well as acting as financial intermediaries themselves. Research is required on suitable norms for NGOs and their institutionalisation in this role.

Suitable areas for research:

Bamboo trade to peri-urban and urban areas in Nepal and India; wood supply to low-cost furniture enterprise in Brazil, Ghana, Nepal, India and Zimbabwe; wood supply to craft enterprise in Ghana, Zimbabwe, India and Nepal; charcoal supply to urban areas in Brazil, Mexico, Ghana and Zimbabwe.

RESEARCH:

Research is required to address the central research issue of how links between producers, processors and consumers of forest commodities can be improved in order to maximise benefits to small-scale operators in the chain, through addressing the following questions:

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[21] Haque, A. B. M. M. Raha, S. K. Maize marketing in Bangladesh - a micro level study. Bangladesh Journal of Agricultural Economics. 1997. 20: 2, 107-114. 4 ref.

[22] Smith, L. E. D. Khushk, A. M. Stockbridge, M. Case studies of corruption in agricultural markets in Sindh Province, Pakistan, and implications for market liberalisation. Journal of International Food & Agribusiness Marketing. 2000. 11: 1, 19-42.
33 ref.

[23] Small Farmers' Development Programme, Production Credit for Rural Women, Banking with the Poor, Regional Rural Development Banks, Micro Credit Project for Women, Nirdhan, and Centre for Self-help Development

- How does profit distributions, as characterised by supply chain analysis, differ between commodities?
- How does transaction cost analysis help explain inequitable distribution of profits?
- What are the costs and benefits as perceived by small-scale producers in obtaining credit from (a) moneylenders and (b) microfinance schemes?

RC9 V2: Insufficient utilisation of traditional tree remedies in community health initiatives

0 Low/Med High Low

PROBLEM:

Traditional health care systems exist in parallel to modern medicine. However, as the diffusion of modern medicine advances there is a risk that remedies with proven curative properties are neglected despite their potential economic advantage over synthetic drugs.

Use of traditional herbal remedies arises in part due to the lack of health service infrastructure and availability of free medication. But also, knowledge of plant and bark properties is embedded within religious beliefs and practices. Hence, the use of these medicines is deeply related to cultural coherence as well as economic advantage. Nevertheless, overall demand for traditional medicine is waning, as modern clinical treatments become more attractive.

In Zimbabwe medicinal remedies were widely used in both communities especially by AIDS sufferers who lack palliative treatment. In Brazil there was widespread use of plant medicines, including woodland species, in both peri-urban and urban areas, for a variety of common ailments. The Brazil survey revealed also that in some areas of Bahia, community health care projects are emerging which utilise traditional herbal remedies.

RESEARCH:

The overall aim of research is to assess the potential for assimilation of native tree remedies into the health infrastructure of poor communities, through addressing the following questions:

- What traditional remedies, in terms of types of illness and administration methods (tincture, infusion etc.), are employed in existing community health care projects?
- What are the experience of, and satisfaction with, modern and traditional health care systems, and barriers to access to these, as perceived by poor communities?

RC10 T4: Overuse of wild NTFPs and insufficient inventory and monitoring procedures (based on local knowledge) to promote sustainability:

0 Low/Med High Low

PROBLEM:

Knowledge of woodland species amongst elder members of long-established peri-urban communities is high but community knowledge is declining rapidly as species are threatened by extinction.

In Mexico peri-urban residents were able to name over 19 species of mushroom and 21 curative species. However, the necessity for diverse livelihood strategies, which increasingly take advantage of opportunities in the nearby urban economy, remove the younger members of the community from gathering activities.

The empowerment of indigenous knowledge so that it has equal footing with Western knowledge is seen as an important step in a strategy of enabling people to alleviate poverty

for themselves. Efforts are now being directed towards systematic documentation of plant knowledge through participatory action research and dissemination in bilingual publications.

Indigenous knowledge studies are challenging because of their inevitable political dimensions regarding protection from private sector patents. Many oppose the imposition of intellectual property rights (IPRs) because these are supposed to be commodity knowledge in the common domain. But, communities that have invested in conservation of genetic resources have not benefited from their commercial exploitation and high costs of hiring patent attorneys can make the present patent system out of reach of grassroots innovators. Most developing countries lack any institutional set-up to extend help to obtain patents for communities and oppose patents by others on local knowledge. The Convention on Biological Diversity provides a framework for regulation but not many governments have experience of instituting and implementing such laws. Informed national approaches to enforce access to genetic resources and benefit-sharing provisions of the Convention are therefore seen as important.

Due to low social status in most cultures women are especially disadvantaged when dealing with issues of intellectual property rights. For this reason, FAO's Women In Development service has worked for several years with local and indigenous knowledge[24].

The UN World Intellectual Property Organisation (WIPO)[25] is responsible for promoting the protection of intellectual property, and harmonisation of national intellectual property law and procedures. Activities relevant to food and agriculture (sub-programme 11.2 Biological Diversity and Biotechnology) include:

- on-site documentation of traditional knowledge relevant to the preservation, conservation and sustainable use of biological diversity; and
- study of IPR-related needs of holders of indigenous knowledge, innovations and genetic resources, such as in agriculture and medicine.

The INFOODS programme (International Network of Food Data Systems, a joint FAO/United Nations University project)[26] compiles, documents and disseminates data on the composition of wild plants and other traditional foods based on local knowledge.

Suitable areas for research:

Medicinal plants–Mexico, Brazil, Zimbabwe, Nepal, India;

Fungi–Mexico;

Fruit–Zimbabwe, Brazil.

RESEARCH:

Research is required to address the following questions:

- How can effective communication and working partnerships between scientists and local groups be institutionalised?
- What are the most appropriate tools and techniques for documentation of indigenous knowledge about location and ecology of species?
- What are the main constraints on pro-poor policies for IPRs?

[24] ***Gender, Biodiversity and local Knowledge Systems (LinKS) to Strengthen Agricultural and Rural Development*** http://www.fao.org/sd/wpdirect/wpre0035.htm Participating countries: Zimbabwe, Tanzania, Mozambique, and Swaziland. Executed by FAO and funded by the Government of Norway. (GCP/RAF/338/NOR)

[25] http://www.wipo.org

[26] http://www.fao.org/infoods/

RC11 S1: Inefficient methods of charcoal production: Mechanisms to improve the technological efficiency of informal charcoal production in peri-urban and urban areas

3	**Low**	**Medium**	**Low**

PROBLEM:

Charcoal plays an important role in both the energy sectors and economies of most African countries. Charcoal is still vital for poor communities, a switch to kerosene can represent as much as a doubling of fuel costs, and many Africans consider charcoal a 'modern' fuel. However, urban demand for charcoal places a heavy strain on local wood resources. Further, wood markets are still relatively new and profitability of charcoal production is uncertain. Charcoal making provides a quick return on investment and often forms part of a diverse livelihood strategy. The use of charcoal cannot be stopped but can be reduced through a variety of measures to promote sustainable and efficient use of charcoal through incentives at local level. There has been considerable research effort in recent years (for example through the DFID KaR Energy programme) aimed at increasing stove efficiency. For example, an estimated 16-30% increase in stove efficiency would reduce charcoal consumption in Nakuru by 50%. Production techniques could also be improved.

Charcoal is inefficient to produce–as low as 10-20% energy efficiency but this can be increased to 30% through techniques such as drying of wood, better stacking methods, chimney construction to force inverted draft, and better process control. Improved kilns do not require a large capital outlay but they do require understanding and control of the carbonisation process. Adoption of improved techniques also implies time and effort for preparation and surveillance.

RESEARCH:

The aim of research is to develop demonstration programs to present to traditional charcoalers at their work site. In order to achieve this aim, research is required to address the following questions:

- What are the main producer-level constraints on adoption of improved charcoal production methods?
- What are the main institutional constraints that need to be overcome in order to gain support for demonstration projects from local government?
- What policies are required to ensure continued financial benefits from, and commitment to, efficient production methods by charcoalers?

Section 3 Case study analysis

1. Summary

1.1 Location of case studies, urban development and poverty dimensions

Six cities were chosen to provide a breadth of vision for the study in relation to geographical region, culture and urbanisation. Two cities were selected on each of the continents of Africa, Latin America, and India. Primary (capital) cities in Mexico, Zimbabwe and Nepal were selected. Secondary cities in Ghana, Brazil and India were selected. Two of these cities–Mexico City and Calcutta–were classified as megacities with a population in excess of 10 million. All other cities had a population in excess of 500,000. Within each city two survey sites were identified in one urban and one peri-urban area.

Salient characteristics of the surveyed communities are outlined below and summarised in Table 3. Descriptive accounts of life in the poor neighbourhoods abstracted from case study reports are found in Section 5.1.

Migration

Recently settled inhabitants–migrants–were found in the urban survey areas of Mexico, Harare, Kumasi and Kathmandu. These migrants came mainly from the rural hinterland although in Kumasi many peri-urban residents had relocated to the city. In Harare, the urban area with a large bus terminal is the first stopping point for migrants arriving from Zambia and Mozambique. In Calcutta most migrants are found in the squatter settlements which were not surveyed. In Kathmandu the arrival of many foreigners to the city was also reported. With the exception of Harare, migrants were not reported in peri-urban areas. In Harare, Zambian migrants, after reaching the city, often relocate to the peri-urban area where housing is cheaper.

Peri-urban communities in Feira and Kathmandu showed a flux in the pattern of life. Many residents migrate daily to the city for work. Low land values were reported in Feira urban area whereas in Kathmandu the cost of land is prohibitive for many would be migrants.

Sociocultural characteristics

In Calcutta urban slums and Feira urban area, despite urbanisation of the cities, the communities studied were relatively longstanding. Kathmandu urban community was described as chaotic with landlords unsure who their secondary tenants were and school teachers unsure of the residential address of pupils. The Feira report also describes communities as heterogeneous with rich and poor not geographically separated. Reports for Harare and Feira represent the urban environs as ‘bustling’ and a ‘hub’.

In Feira urban area the community had a high proportion of AfroBrazilians. In this community and in Harare peri-urban community households were predominantly female-headed. In Kumasi peri-urban area households were composed of extended families whilst in the urban area families were ‘nuclear’. This dichotomy arose from the predisposition shown by younger males to relocate to the city.

Calcutta peri-urban area was perhaps the most cohesive and self-contained community with all residents involved in the shola crafts industry. But in Kumasi and Kathmandu too there was a traditional social structure in the peri-urban areas. In Mexico, Kumasi and Kathmandu peri-urban areas were described as agricultural communities, but agriculture was on the decline. In Feira the peri-urban area had three distinct subsections varying in their degree of urbanisation. Agriculture had waned to the extent that informal sector employment predominated and this was accompanied by increasingly complex livelihood strategies. Such diversity of livelihood strategies was only seen in the poorest of urban residents.

Poverty programmes

Overall, a common tale of poverty and urbanisation is revealed–municipal authorities unable to keep pace with migration rates, ad hoc construction, inadequate provision for water, sewage and waste requirements, overcrowding, and unhygienic living conditions. Authorities suffering not only from the enormity of the problem but also inefficient administration, deficient policy strategy and sometimes lack of urgency or downright disinterest

Poverty programmes were reported in varying depth. Kumasi was reported to lack any programmes of substance altogether. Urban communities tended to be better served for basic utilities–water and sewage. Harare peri-urban area was one of the few informal settlements that have been given recognition and the hope of service provision but the levy for these services is an unwanted expense for many residents. In Feira peri-urban area the church not the state clearly fulfilled the role of providing social and welfare support.

Table 3 Characteristics of case study areas and communities studied

Cities	Urban	Peri-urban
Mexico DF	Population 23m, density from 5 to 25k/sq km, 64% in commerce and services. Main occupations–unskilled formal wage labour, unskilled informal wage labour, commerce, construction, domestic services, scavenging & recycling. Three groups: old inhabitants, poor new arrivals, and rich new arrivals. Poor have no house or job, several families share same house, average family size: 4.5	Population 199k, density 1.4k/sq km, 30km from centre of DF. Main occupations labouring at low wages unskilled informal labour, agricultural labouring, commerce, construction, and domestic services, scavenging. No marked distinctions, 91% seen as poor, typically have less than primary education, most involved in farming, Ave. household size: 5.4
Feira de Santana	Population 550k, 43% poor, 78% work in services. Afro-Brazilian, many female-headed households, balance between formal and informal employment, urban 'material' culture.	12km from centre, semi-rural, rapidly urbanising. Main occupation informal labouring, independent and diverse livelihoods. Three sub-regions–agricultural, semi-agricultural and urbanised
Harare	Population 2m, 10% rich, 30-40% middle, 40-50% poor—mostly migrants, literacy about 70%. 5 km south of centre. Housing in flats, houses and shacks. Mixture of few rich and poor migrants, oldest low-cost quarter, many criminal gangs, rich have formal jobs, high unemployment.	Population 101k, 12 km south east of city. Began as a squatter settlement in 1980s. High density housing–5-households/200sq m–houses, cottages and shacks. 90% of households are poor, high unemployment, mixture of local people and immigrants, many criminal gangs.
Kumasi	Population 661k-801k in metro area. Urban village, long settled, but recent arrivals as well, not much stratification, unemployed or badly paid, insecure jobs, little crime.	Village, long settled, 8km from centre, 20-30 minute journey. Farm work limited as little land for farming, long settled community, little crime.
Calcutta	Population 11m, growth rate slightly decreasing, 40% poor households, 45% live in 5,511 slum settlements, four-fold increase in slums since 1951, waged work in sawmills Slum dwellings - one room living space (100-150 sq. ft), multi-caste, majority of households below poverty line (gol definition), 70-80% functionally literate, sanitation & drinking water at community level.	Population 1,500, 40 km south of centre, easily approachable, 120 households most below poverty line. Multi-caste but majority lowest caste, 70-80% literate, primary occupation: shola-based crafts, secondary: farming and trading.
Kathmandu	Population 673k, growth rate 7%, situated in mountain valley, slums & squatters on riversides. Main occupations public employees, construction, labouring. Mixture of languages and religions, literacy 71% but higher for men, 26% outside of public water supplies.	Population 2-10k, 4-5 km from edge of city, 10 km from centre, recent road access, electricity, phone. Main occupations in trades, construction work, labouring, drivers, woodcutters. Hindu settlement, mainly lowest caste, main occupation vegetable farming, most are poor, Ave. household size 5.6 persons

1.2 Forest resources and supply of products

Table 4 gives a comparison of the level of forestation in the study countries. In terms of percentage cover, Brazil heads the list at 65 per cent and Ghana too is densely forested with 40 per cent cover. However, as the survey discovered this was not the determining factor of forest product use. Brazil and Mexico showed the least use of products, in particular timber, whereas in Asia wood and bamboo use was widespread. India has the highest proportion of plantation forest that could help explain why there was a high prevalence of timber used by the communities studied. Mexico was exceptional in the lack of timber used and this related not only to policy to halt deforestation but also to regulations regarding land tenure and size of land holdings, which were not found in other cities.

Comparison of the city studies indicates two main factors associated with the supply of forest products. Firstly, most non-wood products consumed are gathered relatively locally. But wooded areas around cities are disappearing and the availability of non-wood products, particularly food and medicinal plants has reduced. This means that non-wood products must continually be sourced from more distant wooded areas. Gathering these forest products has consequently become a more arduous and time-consuming task and the potential for deriving income from gathering has diminished. In Harare and Kumasi, forest foods are brought from distant locations. Honey supply to Kumasi is declining but supply of fruits and worms to Harare from Mount Darwin amongst other locations appears to be relatively stable.

Table 4 Forest data for survey countries

Hectares (000')	Mexico	Brazil	Zimbabwe	Ghana	India	Nepal
Total forest area	55,387	563,911	8,710	9,022	65,005	4,822
Natural forest	55,278	559,011	8,626	8,969	50,385	4,766
Plantations	109	4,900	84	53	13,230	56
Percentage of total land area under forest	29	65	23	40	22	34
Average annual % change ('90-'95)	-0.9	-0.5	-0.6	-1.3	0	-1.1
% Protected	5	3	8		4	8

Sources: CIA, 1998 (http://www.odci.gov/cia/publications/factbook); FAO, 1999 http://www.fao.org/fo; Iremonger, S., Ravilious, C., and Quinton, T., eds., 1997. A global overview of forest conservation CD-ROM. World Conservation Monitoring Centre and Centre for International Forestry Research, Cambridge, U.K.; Roberts, L., ed. 1998. World Resources 1998-1999. World Resources Institute, United Nations Environment Programme, United Nations Development Program, and World Bank, New York, Oxford University Press.

Secondly, efforts to halt the process of deforestation of distant forests have clearly reduced the supply of timber. Hardwoods are most seriously affected. In Calcutta the timber traders sit idly in their offices at the depots awaiting the infrequent arrival of timber. In Calcutta the term 'wood' was previously understood to mean hardwood, now only used for middle to low income housing or above rather than for poor housing. Demand for wood has been transferred to softwood. The pressure created on supply of softwood has in Calcutta lead to the immature felling of local tree sources. Hardwood supply to Kathmandu is reportedly still good though decreasing daily. State supply is unreliable though cheaper than the more reliable private sector supply. Pine plantations as a source of timber are mentioned only in the Mexico and Feira reports. The Kathmandu report is the only report that mentions plywood consumption.

Sources of forest products were diverse throughout the survey. Typically, scrap lumber becomes an important source of wood in the urban context. This was particularly so in Calcutta and Kumasi where the timber trade dominates and the effect of available lumber is especially important in terms of income generation activities as discussed in the following section. Garden trees play an important role in the peri-urban areas of Mexico (for fruit) and Calcutta (as a source of occasional high income particularly useful for marriage dowries). The Feira study highlights also the use of shop waste, cardboard and timber scraps.

Supply chains (depicted in Figure 1 of case study abstracts) clearly indicate that in all regions the supply of timber is associated with numerous low-income livelihoods either using by-

products of the supply chain or as manual labour force in the supply chain. The use of off-cuts and sawdust for fuel in particular maintains a plethora of informal sector traders and street food vendors. Semi-skilled livelihoods in joinery and carpentry are also under threat as the large operators, such as sawmills, increasingly recycle waste to meet their own budget constraints. In Ghana, traditional craft enterprises with buoyant demand for products–dyeing and printing–are dependent on timber by-products for fuel.

The Calcutta study gives the most detailed information about the sources of timbers, canes, bamboo, and plants, which includes differentiation of products by species. Source locations are also identified with geographical precision. Cane supply like that of timber has reduced substantially and available product is inferior in quality. However three products are identified for which supply is increasing rather than decreasing–bamboo, shola and neem. Some data on retail prices in Calcutta market is given. The Kathmandu study also provides a depth of analysis of timber and bamboo supply chains and the constraints on the supply of bamboo from the peri-urban area. In this study prices throughout the chain are given. This is a prime example of what can be achieved through detailed survey of forest product commodity chains. Softwood in Calcutta would appear to fetch 3 times the market price of Kathmandu.

There is also a state supply of fuel wood to Kathmandu but this is available only for cremations. Private sector suppliers of fuel wood are able to command higher prices. In Feira illegal supplies of charcoal come from farms operating under falsified permits and by purchase from intermediaries in the legal supply of charcoal to the steel industry.

Table 5 Summary of forest resources available to case study cities

Cities	Urban	Peri-urban
Mexico City	5 km to large area of temperate, often pine forests—protected areas, some private forests & communal forests within a few km	Forested area, pine forests, both private and communal woodlands
Feira	Few public urban trees, trees and shrubs in yards, woods at 15km, tropical forests at 1,500 km	Swamps at 0.5 km, trees & shrubs in yards, some public trees, woods nearby, 1-3 km
Harare	Forest products from 150-620km	Some local woods
Kumasi	Natural forest at 30 km, few urban trees	Small local woods, most products from distant forests
Calcutta	Distant forest, wetlands nearby, timber from local and from distant forests and imported	Forest 60 km, wetlands plentiful, Shola from Calcutta
Kathmandu	Some forests within municipal boundary, hardwoods from Terai, green belt along ring road	Local community forest, trees on farmland

1.3 Consumption of forest products in surveyed neighbourhoods

Table 6 gives an indication of the relative importance of different products in the livelihoods of the study communities as derived from collaborators' assessment of their data. Reported significance of environmental services may reflect the scope of different surveys rather than actual community perception of environmental benefits.

Products and services

From Table 6 it is apparent that wood fuels and forest foods were overall the least significant products. Construction timbers and the value of trees as a shaded rendezvous point for the community appear to have the most widespread significance across continents. Furniture, other manufactured items are of major significance in at least half of the survey sites. The use of forest products for artisan crafts and medicines are also significant.

The use of fuel wood showed the most marked difference between urban and peri-urban sites taken over all three regions with no urban study community claiming major significance for fuel wood. This is perhaps the most obvious manifestation of the urbanisation process as reflected in forest product consumption.

Regional differences

Asian study communities demonstrated extensive involvement with forest products and services, highlighted by the inclusion of many species names in the reports. This was seen to a lesser extent in the African studies also. In both Asian cities and Kumasi, implements and crafts made from various forest-derived materials were important in daily life.

A number of poor households in both urban and peri-urban areas of Calcutta used several forest products for a variety of purposes–construction, furniture & tools, religious & ceremonial usage. Peri-urban households used a far greater amount of wood in construction, furniture and implements but urban households used a greater variety of wood species. Bamboo and hogla were also used more in the peri-urban area. The use of timber for construction is declining partly due to preference for 'pucca' houses, made of concrete and cement, particularly in the urban area. Competition from cheaper plastic products, and shortage of natural products is becoming apparent but natural products are still widespread. For example one million hogla mats are made each year for the largest of the Hindu *melas*.

In Kathmandu bamboo is in daily use in both areas studied and has strong cultural significance. Bamboo required for ceremonies is often presented as a gift but bamboo required for construction or agriculture must be purchased.

In Kumasi urban area wood fuel from industrial waste and in the peri-urban area, fuel wood freely gathered, were obtained and consumed frequently. In both areas fruit, mushrooms, medicinal plants and bushmeat were consumed seasonally, the latter now being scarce and expensive. In both areas durable items such as construction timbers and wooden household items, especially the mortar and pestle, used to make the traditional staple *fufu,* are used daily but obtained infrequently. In Harare wood in construction and furniture was prevalent. Several foods and medicines were also consumed.

In Latin America there was little use of wood in manufactured goods and there were no indigenous crafts based on forest products. In Mexico communities had the least involvement with forest products although foods and fuel wood were important to the peri-urban community. In the urban area of Mexico City only environmental services were found to be of major significance. The average number of wooden furniture items owned by peri-urban households–4-5 compared with less than 2 in the urban area–also illustrates the difference between peri-urban and urban consumption in Mexico. In Feira medicinal plants were the most important forest product in both communities and were considered essential for well being. Whilst fuel wood from industrial off-cuts and natural wood was still important in very poor households in both areas, bottled gas was the main fuel used.

A more quantitative comparison of consumption was not possible across all sites. Frequency of consumption was variously recorded. For Brazil, Mexico and Kathmandu there is data on the number of households in the 30-household door to door survey claiming to use the product. The Kathmandu case study recorded frequency of use also. Similarly comprehensive information about cost of forest products purchased is available only for Kathmandu and Calcutta. Brazil and Mexico case studies provide some data on price or equivalent value of substituted products such as fruit. Some collaborators provided consumption data about one site only. The problems encountered in recording comparable quantitative data highlights the potential value to be gained through longer household studies.

Table 6 Forest products/services of major significance in case study areas

Product or service	Mexico City	Feira de Santana	Harare	Kumasi	Calcutta	Kathmandu
Fuel wood	Peri-urban			Peri-urban	Peri-urban	Peri-urban
Charcoal				Urban Peri-urban		
Housing		Urban Peri-urban	Urban Peri-urban	Urban Peri-urban	Urban Peri-urban	Urban Peri-urban
Furniture			Urban Peri-urban	Urban Peri-urban	Urban Peri-urban	Urban Peri-urban
Implements			Urban Peri-urban	Urban Peri-urban	Urban Peri-urban	Urban Peri-urban
Crafts				Urban Peri-urban	Urban Peri-urban	Urban Peri-urban
Food	Peri-urban			Urban Peri-urban		
Medicines		Urban Peri-urban	Urban	Urban Peri-urban		Urban Peri-urban
Tree worship or religious meeting place		Urban Peri-urban	Urban Peri-urban		Urban Peri-urban	Urban Peri-urban
Shade for business					Urban Peri-urban	
Water, erosion & pollution control	Urban Peri-urban			Peri-urban		Urban Peri-urban

1.4 Livelihood strategies and forest product based occupations in surveyed neighbourhoods

The full range of forest product based occupations encountered throughout the six case study cities covered every aspect of product consumption: fuel trade, joinery and carpentry for construction, manufacture of utilitarian goods and crafts, trade in foods and medicinal plants. However, there was wide variation in the prevalence of these sources of income in different cities.

The fuel trade was seen in the peri-urban areas of Mexico City, Feira, and Kumasi, and in the both areas of Harare. Although small-scale trade in timber off-cuts for fuel for squatters took place in Calcutta but was not recorded separately from other off-cut trade.

The timber industry was an integral aspect of the economy and provided manual jobs in Kumasi, Calcutta and Kathmandu although the impact of deforestation had reduced trade.

Construction for urbanisation was prevalent in all city studies, and manual jobs were available. In Mexico this trade did not involve use of forest products except for the wood lining used in concrete moulds.

In Mexico, livelihoods were derived from labouring, public sector employment, various trades and trading activities, construction and driving.

In urban Feira there was a clear divide between those, nearly half, in formal employment–mainly industry and commerce–many receiving the minimum salary, and those without fixed employment–trading fruit & vegetables or manual labouring. Poorer inhabitants exhibited the diverse informal livelihood strategies seen in the peri-urban area where women did domestic and farm work earning well below the minimum salary, and men did construction and farm labouring, with periods of unemployment. The very poor eked out a living through activities such as paper & card and other waste recycling, rearing chickens & growing vegetables, making ice-lollies & herbal remedies, fruit & vegetable trading, and collecting wood. Some travelled to town shoe-shining, selling and begging. Apart from the inclusion of forest products in petty trading, only two forest product-related occupations were encountered–cabinet making and charcoal trading, both of these in the peri-urban area although carpentry and occasional wood trading in the urban area were mentioned in discussion groups. Neither of these activities seemed likely to provide secure livelihoods or future prospects. Both livelihoods also depend on the lack of control and financial benefits of the informal sector and would not be profitable if taxes or rates were levied.

In Kumasi livelihoods were diverse in both areas. A significant proportion of urban livelihoods were based on forest products, principally timber processing–direct employment in mills, by-product livelihoods in carpentry and street food vending.

In Harare, the informal sector is the main source of livelihoods in both areas some of which are forest, based–carpentry and basketry. Other sources of income include welding, fruit & vegetable and fleamarket trading, farm workers, and various microenterprises (tuckshops, hairdressing, steelwork, and sewing), for which family labour is used. Those who find employment in the formal sector work as security guards, general hands and domestics. Self-employed brick makers operate in a shrinking market despite the urbanisation rate. There was almost no involvement in occupations associated with forest products.

In Calcutta urban areas many livelihoods were based on forest products–unskilled and semi-skilled work in timber trades (labouring, machining, and polishing), carpentry and trading bamboo, cane and Saal leaf products. The peri-urban area was chosen because it is a village based on shola enterprise but other forest product activities were encountered too–carpentry, bamboo, hogla, nol and cane manufacture, and trading neem twigs.

In Kathmandu, informal sector employment predominated in the urban area. Manufacturing activities including carpentry were prevalent. In the peri-urban area farm communities were increasingly looking to the city for alternative sources of income.

Table 7 General and forest related livelihoods (Main occupations in bold)

Cities	Urban	Peri-urban
Mexico City	**Public sector employment** **Construction & labouring** **Driving** Casual work in timber yards	**Petty trading** **Construction & labouring** **Driving** **Wood cutting** Fuel wood trade
Feira	**Unskilled formal wage labour** **Unskilled informal wage labour** **Commerce** **Construction** **Domestic services** **Scavenging & recycling** Carpentry	**Unskilled informal labour** **Agricultural labouring** **Commerce** **Construction** **Domestic services** **Scavenging & recycling** Carpentry Fuel wood trade
Kumasi	**Waged work in sawmills** **Mechanics** Furniture making Charcoal production (from sawmill waste) Crafts: dyeing and printing	**Farming** **Trading** Carving of crafts Fuel wood trade
Harare	**Informal sector trading** **Labouring** Carpentry Timber selling Trading Mopane worms, fuel wood, medicinal plants, wild fruits	**Informal sector trading** **Labouring** Carpentry Trading medicinal plants, wild fruits, fuel wood Basket, wooden implements and broom making
Calcutta	**Carpentry** **Labouring in timber trade** Crafts (bamboo, cane) Mat making Basketry NTFP trading: toothsticks, astral roots, broomstick, Saal leaf plates	**Shola crafts**
Kathmandu	**Informal sector enterprises & trading** **Labouring in timber yards** **Carpentry** Bamboo basketry, mat making Wood carving & handicrafts Leaf plate making	**Farm work** **Labouring in timber yards** Bamboo basketry Leaf plate making

2. Case Study Abstracts

2.1 Location of case studies, urban development and poverty dimensions

Mexico–Mexico City DF

With a population of 23 million this was one of the two megacities studied and the largest city in the study. The urban area chosen was **Cuajimalpa** with a population of 137,000, 30 per cent of which is aged less than 15 years. Population density ranges from 5,000 to 25,000 per sq. km. There are three groups of inhabitants; old established communities; poor migrants and wealthy migrants. The poor are distinguishable in that they are usually unemployed and live in crowded conditions with several families–average size 4.5 members–sharing a single house or dwelling.

In the peri-urban area the village of **Huixquilucan** was surveyed. Located 30 km from the city centre with a population of 199,000 spread over the municipal. This is a farming community but much of the population is involved in labouring. Inhabitants are generally poor and most have less than primary education.

In the urban area there is a technical training programme which provides full grants for apprenticeships as plumbers and electricians, when funding is available. The only entry requirement to the scheme is literacy. A similar scheme operates in the peri-urban area but offers only subsistence payment during training.

Brazil–Feira de Santana

Although Brazil is classified as a middle income country, the World Bank estimates that 25 per cent of the population lives below the $1 dollar per day poverty line due to large income disparity[27]. About half Brazil's poor are located in conurbation and around 60 per cent are in the Northeast where Feira is situated. Urbanisation of Feira began in the 1960s when rural-urban migration was prevalent following severe droughts, and aggressive modernisation of agriculture leading to concentration of farm holdings. Feira continues to receive migrants from surrounding rural areas.

The inner city area selected, **Tomba,** is the largest poor neighbourhood, set within a bustling commercial district renowned for its market. The centre has cobbled streets, running water and a sewage system. More of the lowest income group had to rely on well water[28] but some households used well water since it is cheaper than piped water. In a few wealthier households pumps had been installed. A considerable number of families are female-headed, with an average of 2-3 children. All participants were literate.

The peri-urban site, **Mangabeira,** by contrast[29] is a semi-rural community with three distinct areas: the Alto de Mangabeira–two-hectare farms with no running water; a small shanty town on the railway sidings where families share washing and toilet facilities; and central housing, most with running water and sporadic waste removal. The city is reached by a 45-minute bus ride. The area is urbanising but there is no sewage system, school or health centre. The church provides meals and herbal remedies. Nearly half the families are female headed with an average 3-4 children. Literacy levels are low.

Neighbourhoods are heterogeneous, with rich and poor living in close proximity, and lack strong community organisation. Religion is very important, all residents are officially catholic and the Church is influential but many frequent the Candomblé (voodoo) centres also.

Poverty alleviation programmes are planned at federal level and implemented at both state and municipal level (Appendix II). With the exception of Community Health, the

[27] GNP US$ 4,890 per capita, Gini coefficient of 0.60 analogous to countries with much lower GNP per capita such as Mexico 0.54 and Venezuela 0.47 (Wagstaff, 2000).

[28] Wells are easily dug in both areas due to the accessible water table.

[29] Named after the Mangaba tree–*Hancornia speciosa*

communities were not aware of these programmes, in particular there appears to have been a failure to complete the World Bank funded mains water scheme to household level.

Zimbabwe–Harare
Zimbabwe is a low-income country with an economy dependent mostly on agriculture, manufacturing and mining. Poor economic performance and structural adjustment programmes have lead to high unemployment. Population growth means that 44 percent are aged 15-20 years. One fifth work in the formal sector where average income is eight times that of the informal sector; three fifths of the population live at subsistence level. At any one time, around 80 percent of urban residents are permanently or temporarily unemployed. Migrants arrive from rural areas, Zambia and Mozambique.

The city survey site, **Mbare,** is the oldest low cost suburb and the closest to the centre. The polluted Mukuvisi River runs through the area and light and heavy industrial sites border it. There is a large bus terminus. Mbare is a strategic location for the unemployed that cannot afford travel. Long-established residents occupy four-roomed formal housing most have electricity and water supply–sometimes one family to a room. [30] There are some government built flats.[31] The official population estimate is probably about half the actual population because it largely excludes the residents of informal housing around the bus terminus. Families have an average of five children, many youths are unemployed and the number of children orphaned as a result of AIDS is rising. Local government has prohibited the burgeoning cultivation of riverbanks, and chemical waste dumping but legislation is not enforced. However, the high-density suburb is the social hub of Harare, famous for its stadium and Stodard hall, venues for sports and political activities. There is a multitude of churches–Catholic, Protestant and Apostolic.

Pressure on housing has lead to squatter settlement of the peri-urban zone. In **Epworth** over half the residents have out-migrated from Harare. It is the only settlement that government has decided to upgrade through road and school building, electricity & water supply. But, services are inadequate and households are charged a development levy of US$ 1.5 per month, which has lead to non-registration of residency. In 1999 the population was 101,000, 14 per cent without land tenure. Tenure may be granted but forced relocation is also practised. 90 percent of households are poor, 50 percent are very poor, and mean family size is higher than the national average. Rents are lower than Harare[32] but there are few amenities. More boys than girls go to school and education beyond primary is prohibitively expensive. There is no mains water, sewage, electricity, or rubbish collection and consequently a high risk of cholera and dysentery. Almost half the households use wells and 80 percent use unimproved pit toilets or open spaces. There are limited water points. Various food programmes exist[33] to abate the rise in kwashiorkor.

Ghana–Kumasi
In Ghana, good rates of economic growth up to the 1960s slowed to negative growth by 1983. An Economic Recovery Programme with structural adjustment as the key component was launched in that year with the support of the World Bank and the IMF. There has been some economic restructuring to encourage exports. Kumasi, Ghana's second largest city after Accra, with a central location and good rail and road links, had an official population of 661,000 in 1996 but housing data puts it at 801,000. Kumasi's economy, previously linked to the cocoa trade, is driven by commerce and the timber industry. Various ethnic communities coexist. Migrants are widespread; influx was high in the 1970s accounting for over half of population growth.

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[30] Mostly employed, or retired, and married because these were prerequisites for residency under the Rhodesian constitution

[31] Cost of housing (US$ per room per month): flats–30-60; private houses–16-20; government houses–10-15; shacks–6-15

[32] Cost of housing (US$ per room per month): standard houses–6-10; shacks–3

[33] see appendix

The city site of **Old Asokwa,** located 3 km from the centre and about 10 km from the metropolitan area boundary, is a flat neighbourhood situated close to a contaminated river, and hemmed in by timber factories. There is electricity in all homes and piped water in some but most residents use the standpipes. There is not much social stratification, most residents are poor. More affluent residents live in planned housing. Male-headed households predominate and the average age is lower than in the peri-urban area. These younger males are attracted by the increase in formal sector job opportunities in the area. Households are also smaller–nuclear rather than extended families. The limited number of opportunities in the formal sector has made self-employment for men in poor households important.

The peri-urban neighbourhood of **Duase** is 8 km from the city centre on the periphery of the metropolitan boundary. The neighbourhood recently became part of the metropolis when the boundary was redrawn. Terrain is flat and the area is urbanising rapidly as land in the city centre increases in value. Duase has close and growing links with the urban economy. Farming dominated up to 10 years ago and is now rapidly declining in importance. Agricultural land is cultivated continuously without inputs. Male household heads dominate and most residents are natives living in extended families.

Currently there are no poverty alleviation programmes at community level. The district authority, Kumasi Metropolitan Assembly (KMA), like all district assemblies in the country operates a Poverty Alleviation Fund. However, none of the communities studied had benefited from this facility.

India–Calcutta

The second largest city in India, located on the river Hooghly 154 km upstream from the Bay of Bengal. After independence urbanisation due to migration from East Pakistan (Bangladesh) followed the pattern of industrial expansion–jute, textiles and engineering–to the north along the banks of the Hooghly, and during the last 70-80 years to the south. Agricultural and flat wetland areas to the east, at a distance from the Hooghly River, are now in the process of urbanisation. Population increased five-fold between 1921 and 1991 to 11 million with one of the highest population densities in the world–8,132 people per km^2 according to the 1991 census (Chatterjee et al., 1999). About 45 percent live in one of the 5,511 recorded slums dotted throughout, although concentration is higher in north and central parts. Illegal squatter settlements are found on either side of the once navigable canal systems, consisting of 12 canals now serving as drains, and of the railway track, especially the south Sealdah section. The lowest strata of all are homeless pavement dwellers.

In the city **North Calcutta street slums–Raja Gopendra** of 117 households and **Rambagan** housing 300 families and a population of 2000 were surveyed. These are Hindu communities, predominantly Dome caste. Average family size is 5-6. About 70 per cent of respondents had received primary education or higher. Each community has potable water taps, state education and medical facilities. Although services are inadequate polio vaccination for children is nearly 100 per cent. There are a few NGOs operating in the area–Janakalyan Samity & Karmibrinda in Rambagan–and some slum development committees–Phoolbagan Bastee–contributing significantly to training and self employment, house construction and literacy. New schemes to assist unemployed women through loans and training are emerging but entrepreneurs interviewed said they were unable to obtain loans.

In the peri-urban area, **Gopalnagar village** 30 kms from the centre was surveyed, inhabited by 120 families who have been settled for many generations. The population of 1200-1500 is primarily engaged in making products from the stem of the leguminous plant, shola (*Aeschynome aspera*). Average household size is 4-8. All villagers are reasonably literate, over half having primary education or higher. About a third of the households maintain livestock (cattle and goats) and graze their animals on common lands. Nearly all households engage in forest product-related occupations–carpenters, woodcutters and craft work. The municipality as in other peri-urban areas is engaged in providing water, primary schools,

health centres, and slum improvement through sanitation, road construction and waste removal. Community participation at ward level was introduced five years ago.

There are many Swarna Jayanti Rojgar Yojana[34], urban and village poverty alleviation schemes, slum improvement projects, free schooling, school meals and medical services, corporation, municipal & panchayat self employment schemes, and business loans from national, regional and local government, and NGOs in operation in the city. However, these suffer administrative and financial constraints. Slum communities are provided with potable water from hand pumps plus river water for bathing and washing. Extension of services and financial assistance to squatter developments is administratively complex and no comprehensive schemes to improve living conditions or create job opportunities currently exist.

Nepal–Kathmandu

Kathmandu is the Capital City and headquarters of the Central Development Region. District population was estimated at 938,439 in 1998, density 2,376 per sq. km, comprising various religious groups–nearly 80 per cent Hindu, the remainder made up of Buddhist, Moslem, Christian, Jain, and Kirati (Bhandari, 1996; Rimal, 1999). Land is very expensive. Any Nepalese citizen can buy property but the urban development plan is not enforced and house building is unregulated.

The urban community is 'chaotic' and the poor were identified by the type of housing or on the street through criteria such as daily wage labourers, homeless or renting, beggars, 'does not have food for more than one day', and jobless. Popular perceptions of poverty are that the 'dishonest' are very poor. Four locations were selected based on these poverty criteria– Koteshwor, New Baneshwor, Chabahil and Gaushala. The main sources of income in the urban area were private business, daily wage labouring and furniture workshop activities. In some areas of the city the underground water table, derived either from local rainfall or inflow from other areas, which can be reached by bore hole. A few participants in the focus groups perceived that water sources in Kathmandu have decreased mainly due to lifting of excessive underground water from tube-wells and water pumps.

In the peri-urban area, **Mulpani,** a Hindu community 5 km from the edge of the city and 10-12 km from the centre was surveyed. About half the population works in the city and half are in local business and/ or farming. The village has recently been made accessible by metalled road and there is electricity and telephone. The main castes are Brahmin and Chhetri. Only poor farmers were included in the survey. Poverty was assessed on the size of landholdings and food sufficiency from the previous year's on-farm production. The main sources of income in the peri-urban area were farming, civil servant, and private business. Residents in the peri-urban community studied were aware of community forests, schools, health centres, road projects and rubbish tips in the vicinity.

There is a multitude of INGOs and NGOs in and around Kathmandu but only a few are directly involved in poverty alleviation in the Kathmandu conurbation (Appendix II). Bisheshower and Ganesh Man, government, city programmes for sewage, waste disposal, road building, and health and sanitation lack co-ordination and reliable implementation.

2.2 Forest resources and supply of products

Mexico DF

There is a large area of temperate and pine forest around the city. These are protected areas. Timber cutting is strictly regulated by the government because of forest degradation. There are also some private & communal forests within a few kilometres. In the peri-urban area there are both private pine forests and communal woodlands

[34] A government income-generation scheme introduced in1997 and based on a poverty line of US$ 6-7 per month.

Feira
Charcoal is legally produced for the steel industry in the state capital Salvador and the southern state of Minas Gerais. Small farmers also produce charcoal illegally and sell to traders who falsify official permits. Farmers 50-100 km away, who are often in recently introduced agrarian reform projects, supply Feira. If restrictions on small-scale production in rural areas are enforced charcoal prices may become uncompetitive in comparison to gas.

Hardwood for doors, windows and roof timbers come from Amazonian trees felled in the state of Para and Mato Grosso, and are trucked to saw mills in Feira along with wood from pine plantations. There are also restrictions on the extraction of bark and leaves used medicinally that are not enforced but in any case the supply of medicinal plants to Feira does not depend on intermediaries as the local population gathers the products. In urban and peri-urban areas fruits bought in the supermarket and market–cashews, mangoes, Caja, Jackfruit and other fruits–come from 50-200km away depending on type and season.

Harare
The deforestation rate in the peri-urban areas such as Epworth has been very high in recent years as a result of demand for firewood, and clearance for housing and cultivation. Nevertheless peri-urban woodlands continue to supply foods, fuel and construction timber although these sources are declining and products are sourced further afield each year which has particular repercussions on the viability of trade in forest foods and fuel wood.

Kumasi
There is heavy industry and residential demand for timber and other products. Although still a wooded zone, by around thirty years ago the forests in the Kumasi urban area had disappeared. Previously these forests provided fuel wood, bushmeat, and fruit (especially mango), and maintained rivers. Until 1999, trees felled from farmland by small-scale chain saw operators supplied the domestic market. The ban on small scale felling has lead to shortage of timber supply to the domestic market, but unlicensed operators carry out some felling. Wood is now supplied from farms in the hinterland. However, if District Assemblies in the forest-transition agro-ecological zone of the Ashanti and Brong Ahafo regions enforce by-laws in forested areas this could further reduce supply. The extraction of dyes and prints and wood for carving can be sustainably extracted but officials responsible for forest control are insufficiently informed about population needs and these species are included in usage bans.

Charcoal is produced inefficiently and informally in the urban area but increased efficiency in the timber industry, and recovery rate of timber processing firms and the use of waste for their own fuel needs threatens the supply of wood for charcoal production. The gathering of fuel wood in the peri-urban areas is also threatened, by forest clearance for urban development. This has led to the import of fuel wood from outside the region.

Calcutta
There are large tree-lined parks in the centre and many roadside trees. The city's close connection with trees is reflected in the many streets, avenues and localities named after trees.[35] During the last 10-15 years there has been a concerted effort to create and maintain parks and plant trees and shrubs. However, species that could provide livelihoods are seldom planted as maintenance requirements are often high, and the poor are generally not involved in tree planting schemes. The nearest forest to Calcutta is around 100 kms and there are natural wetlands on the eastern fringe, which supply many plant species, as do private plantations in the peri-urban zone.

[35] For example–Goabagan the garden of Betelnut palm (*Areca catechu*), Hortukibagan-Myrobalan (*Terminalia Chebula*}, Piara bagan-Guava (*Psidium Guajava*), Nebubagan-Lime (*Citrus aurantifolia*). The area called Neemtala was named after a very big neem tree (*Azadirachta indica*) near the bathing ghat and temple, and Banstala was once an area of bamboo forest.

Timber: supply of hardwood from Northeast states and North Bengal has been prohibited and timber is currently imported mainly from South East Asia, Australasia and South Africa although some mature fallen and felled trees from local areas are used. Softwood–mango, Jamun, sirish, Kadam and gammer–is supplied from local trees. The supply rate of timber has decreased over time causing rising prices and reducing trade and activities associated with depots, saw mills, and carpentry.

Bamboo[36] is supplied from plantations in West Bengal. On average 2000 poles per month are brought by wholesalers to Calcutta markets–Maniktola being the main one. Demand for valko is particularly high. Bamboo used for chatai (mats) is generally from the peri-urban area rather than imported from outside the state but rapid urbanisation of these areas has reduced supply and prices have risen considerably.

Nol is a thin stemmed bamboo supplied from Assam and Tripura in Northeast Bengal and brought to Calcutta market in bundles of 60-70 pieces.

Canes are supplied from Assam and the Andamans and brought to Maniktola and Beliaghata markets in Calcutta. Cane supply has also reduced substantially in recent years.

Shola is a leguminous plant growing on marshy land in peri-urban areas. Villagers harvest the plant from August to early March and store it. It is also cultivated on the border regions of Bongaon and Bangladesh. The supply of shola has increased in recent years. There is a shola market in the Bidhannagar area of Calcutta.

Hogla is a marshy land vegetation found in peri-urban areas collected mainly by women who make mats that are sold to wholesalers in Calcutta market.

Neem, babool, karanja and dudhia twigs are brought from Midnapore, Murshidabad and Maldah to the central Calcutta market and sold to migrant Hindus working as labourers who use them like a toothbrush. Supply of neem has increased recently.

Saal leaves are obtained from Midnapore in Southwest Bengal and Mayurbhanj district in Orissa. Bundles are sold in Calcutta market. Saal bowls are mainly purchased from Orissa.

Astral plants are cultivated primarily in Basirhat, Ghatakpukur, Baruihati (North 24 Parganas), Contai (Midnapore), Bangladesh, Chakdah and Bongaon. Many other leaves, twigs and plants are freely collected in peri-urban areas and traded in Calcutta markets.

Table 8 Calcutta: Prices of forest products

Products	Wholesale price US$	Price at market US$
Softwood per cu ft		6-17
Shola per bundle or 8-10 pieces		0.2-0.4
Saal leaves per bundle of 1000	0.6	0.8-0.9
Saal plates per bundle of 400	1.2	1.6-1.8
Various leaves and twigs per packet		0.02-0.04

Kathmandu

In Kathmandu district only 2.9 per cent of land area is covered with forest as cultivation or construction has replaced forest. What remains is confined to small patches and apart from trees preserved by farmers or communities, for fodder or other products, consists of thorny shrubs. Kathmandu Metropolitan City Programmes maintain parks and green sites, some of which are maintained by private and public bodies, such as the Hotel Association of Nepal and the AQUA mineral water company in exchange for advertising rights. The Road Department is responsible for tree planting and maintenance along the 17-km ring road.

There are two community forests in the peri-urban area studied. One is well established and supplies products the other is 4 years old and will not supply products for another couple of years. Similarly, they help to conserve domestic water sources.

[36] Valko, Jaya, Basni, Talta, mar, muli.

Forest resources from the hills surrounding Kathmandu are inaccessible. As a result, the high demand for products for construction and brick industries attracts supply of fuel wood, bamboo and hardwood from the Eastern Terai.

Peri-urban forest areas meet a small proportion of total demand. The peri-urban community studied will be self-sufficient in softwood in a couple of years. In farmed areas, including the peri-urban zone, bamboo is grown on slopes and marginal land to avoid shading field crops. Constraints on supply from these areas include lack of metalled roads and low prices offered by middlemen. In Kathmandu the Bagmati Integrated Watershed Management Project, funded with EU assistance, focuses on peri-urban sites and includes bamboo planting.

Timber: Demand for construction timber is very high due to a proliferation of government and private offices, and residential premises for nationals and an increasing number of foreign settlers. The Timber Corporation of Nepal (TCN) is the official supplier selling at a fixed priced. Surplus demand is met by the private sector selling at much higher prices, due to the length of the supply chain there are many intermediaries, but quality and quantity of supply is more reliable.

Hardwoods are imported from the Terai and foothills of Nepal. There is a good supply of hardwoods but price is increasing daily. *Dalbergia* cultivated as a cash crop in the Terai is cheaper and is increasingly available as wild sources diminish.

Softwood comes mainly from the Utis Hills. Species have declined drastically over the last five years, mainly due to land fragmentation, and there is public awareness of the need to plant trees in community forest and on private farmland.

Bamboo wholesalers truck Terai bamboo to Kathmandu, Biratnagar and other major cities of Nepal. Kathmandu is the main market for Terai and hill bamboo and receives 20-30 truckloads per month but this does not meet demand in the construction industry.

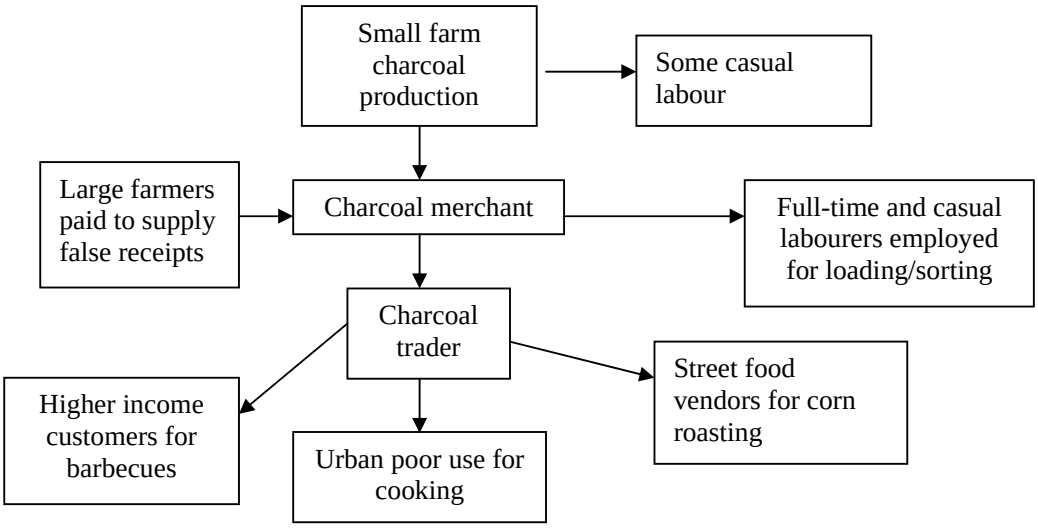
Fuel wood: TCN and the District Forest Office supply for cremation. A number of private enterprises supply the brick, bakery and catering industries. Fuel wood is purchased at auction and trucked to Kathmandu. Farm forestry is not enough to meet peri-urban requirements for fuel wood.

Table 9 Kathmandu: Price variation for timbers

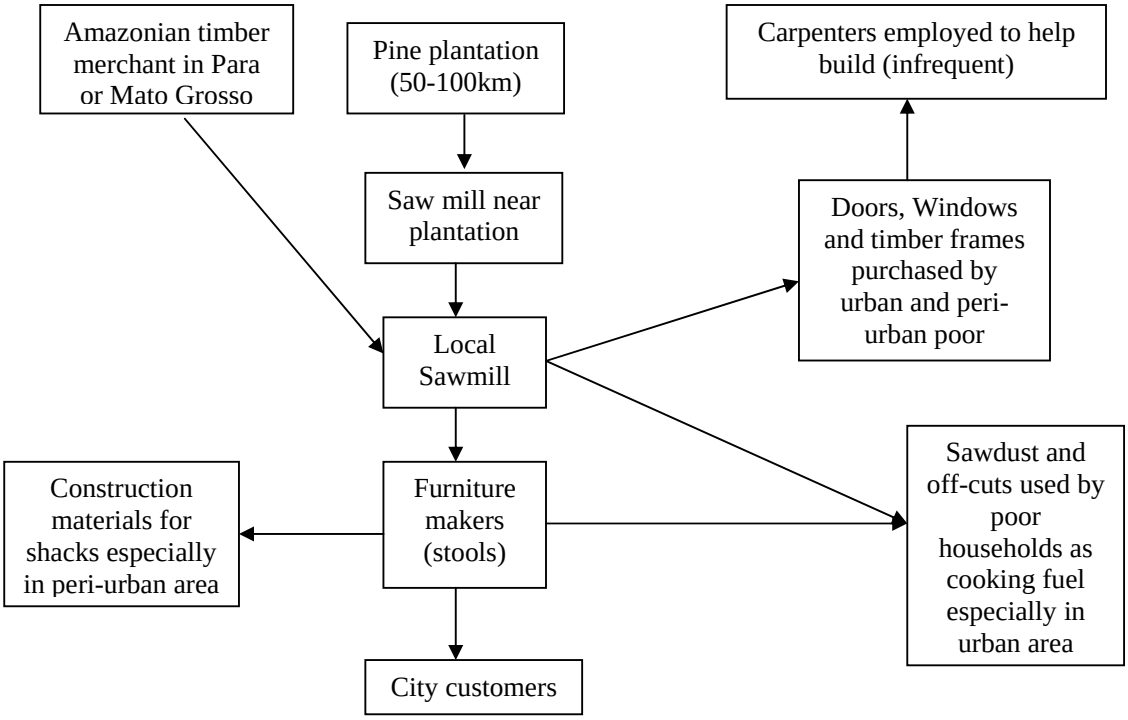
Product US$/ per cubic ft	Saal *Shorea*	Sissoo *Dalbergia*		Sawdust & offcuts per kg	Bamboo		Softwood & plywood
		Wild	Cultivated		Terai	Peri-urban	
Source	3-5				0.5	0.3	
Timber yard–purchase	8	8-10	2-3	(per truck) 7-8			
Sawmill–purchase	9-11	16-18	5	0.03-0.04			
Wholesale					0.9	0.6-0.7	1.8-1.9
Workshop–purchase	11-13	18-20	5-8	0.03-0.04			
Workshop–sale/ Retail	14	20-25	9-11	0.1	1-2	0.8-1	2

Figure 1. Supply chains

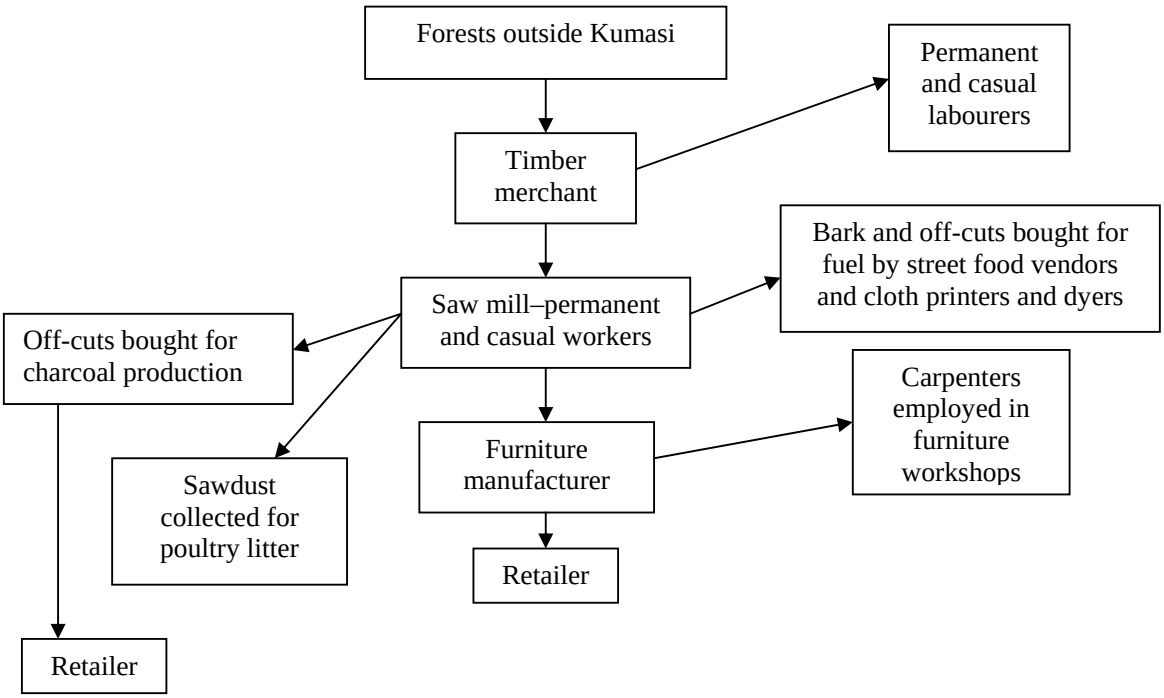
a) Feira: Charcoal supply chain



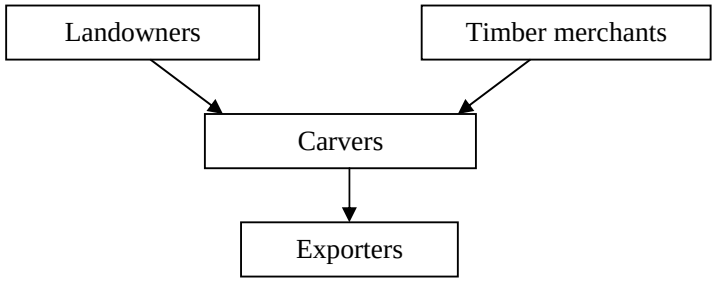
b) Feira: Timber supply chain



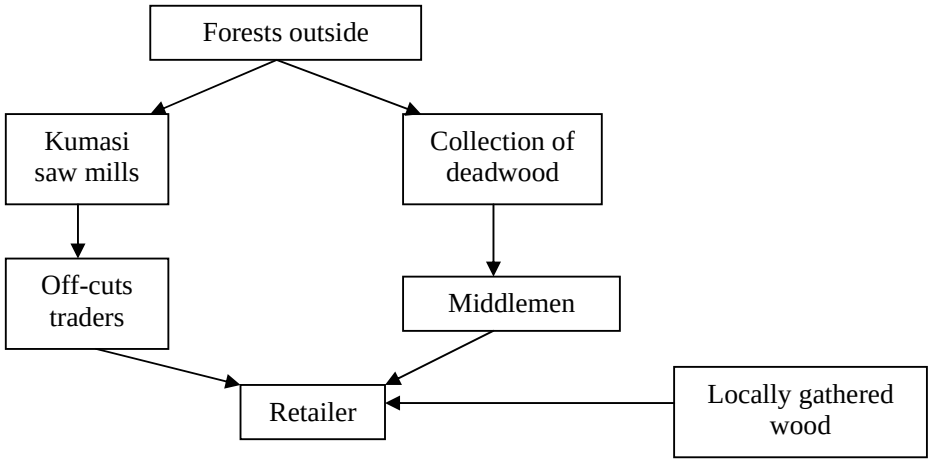
c) Kumasi: Timber supply chain



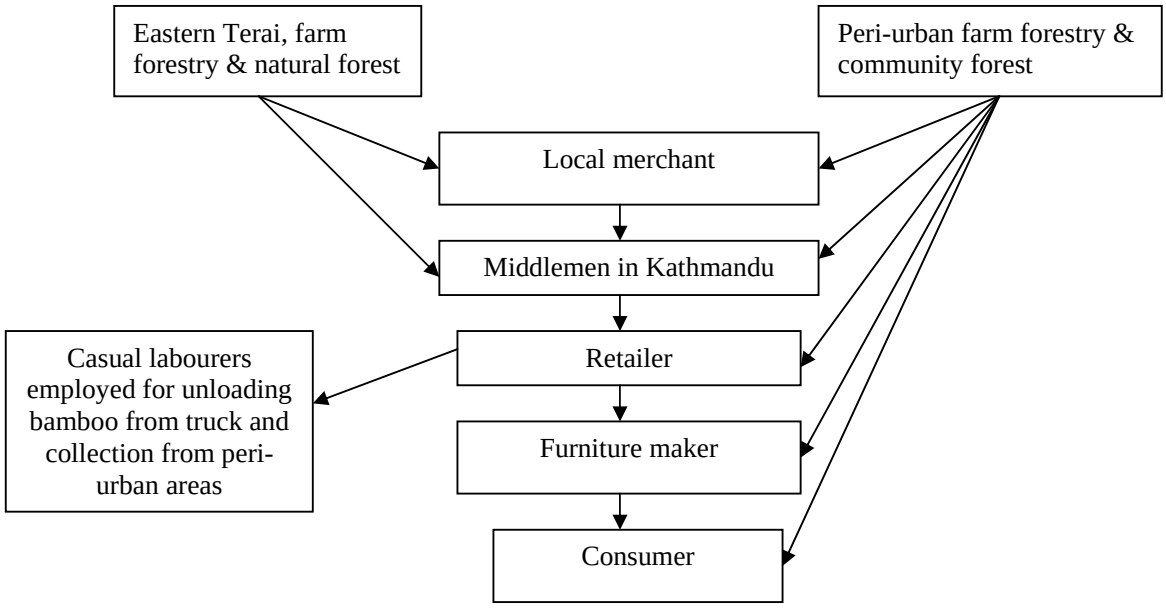
d) Kumasi: Wood supply chain to peri-urban wood carvers



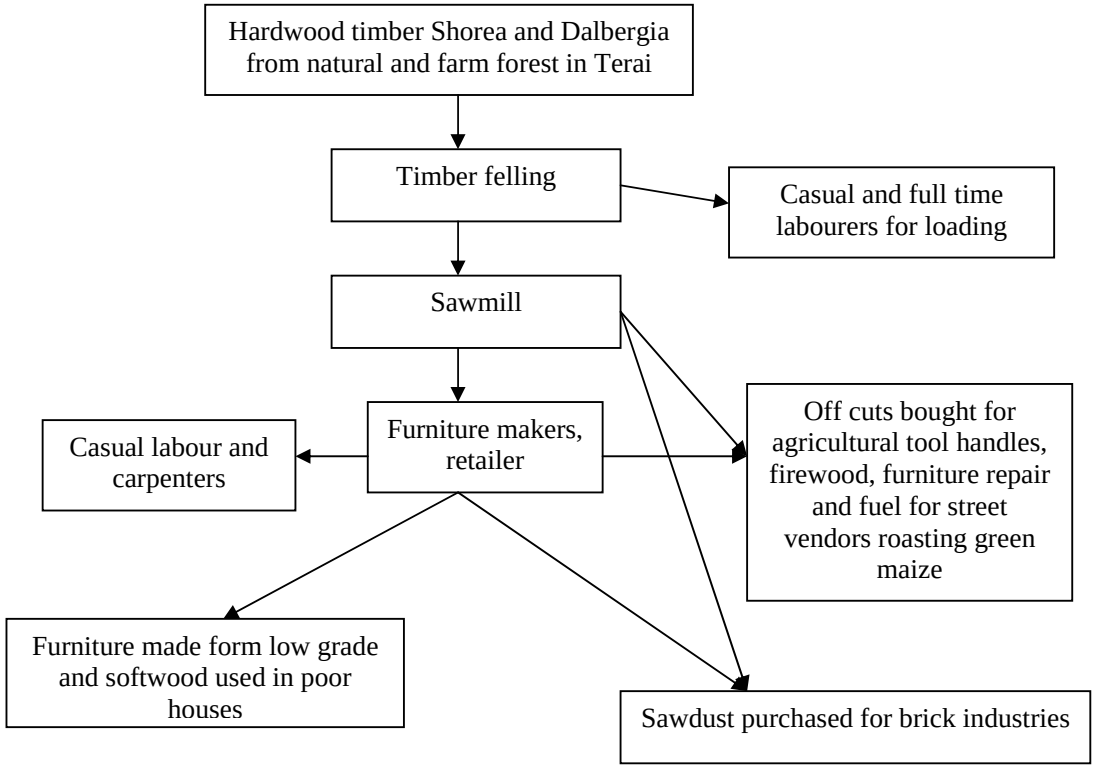
e) Kumasi: Fuel wood supply chain to peri-urban area



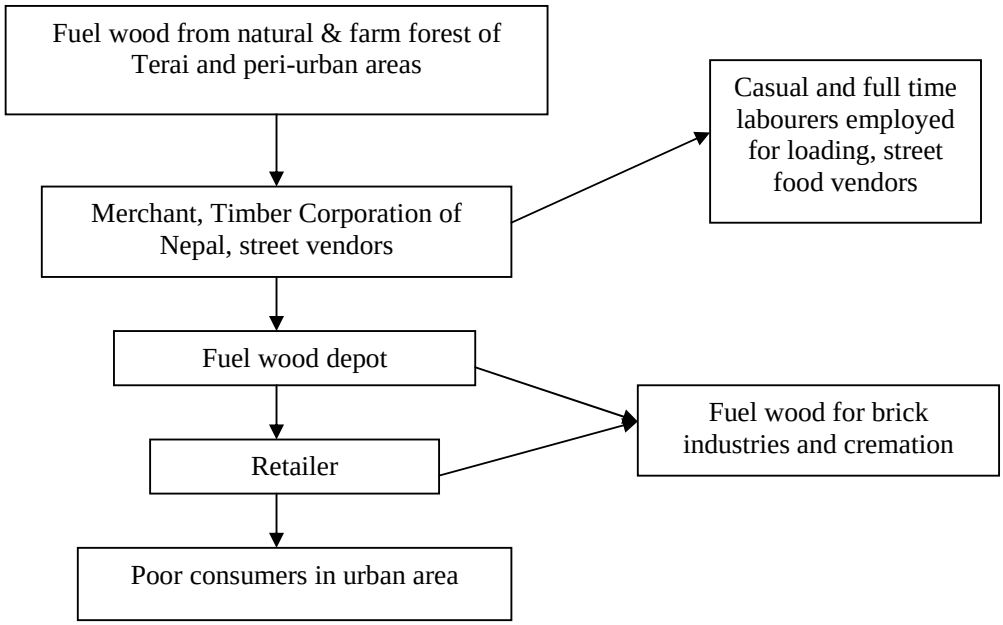
f) Kathmandu: Bamboo supply chain



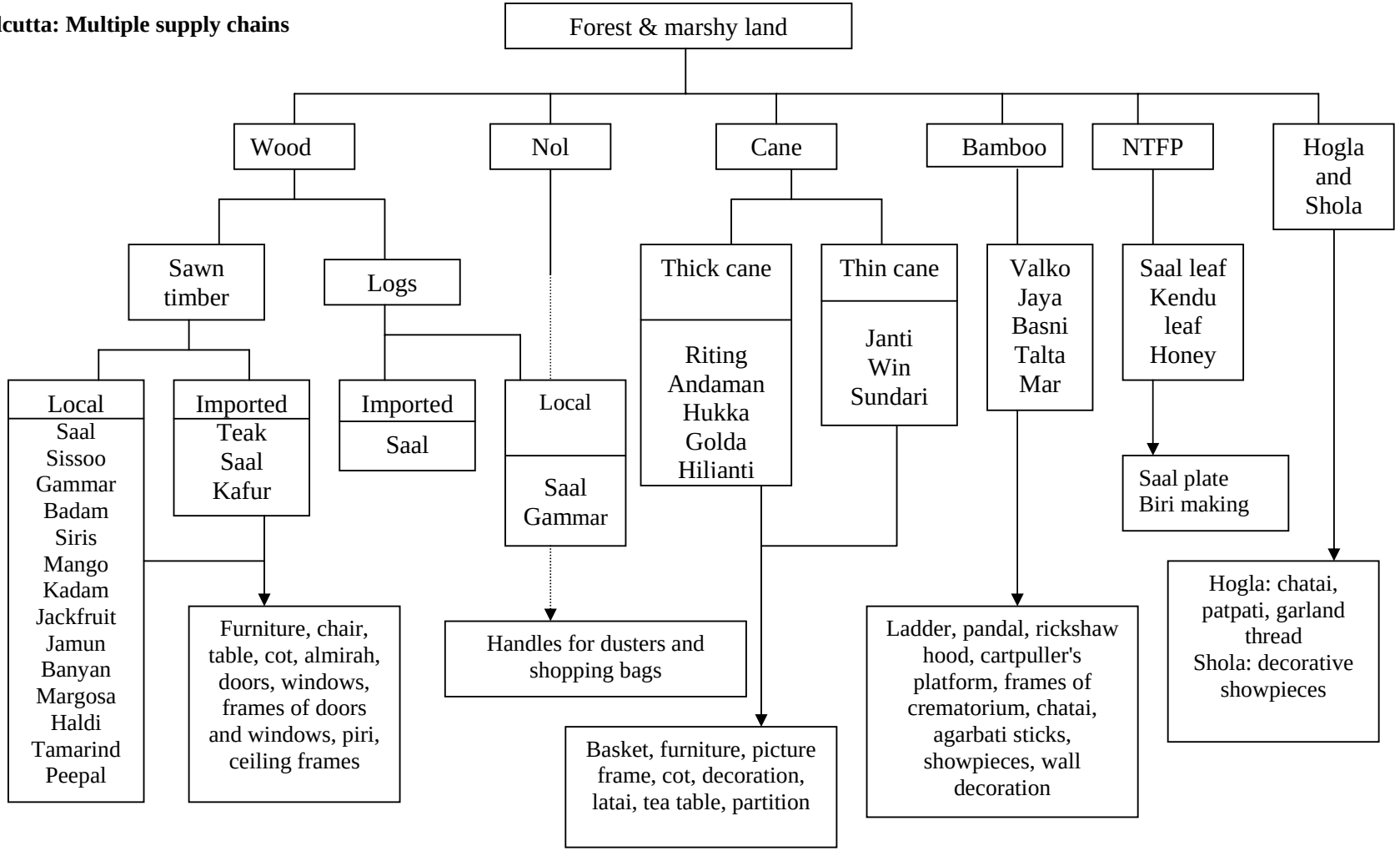
g) Kathmandu: Timber supply chain



h) Kathmandu: Fuel wood supply chain



i) Calcutta: Multiple supply chains



2.3 Consumption of forest products in surveyed neighbourhoods

2.3.1 Energy

Mexico City: Charcoal was used by just over half the urban study households mainly for fiestas and when the gas runs out. The price of charcoal is US$ 3.5/kg and it is bought in bags of 3.5 kg. In the peri-urban area, fuel wood is gathered by nearly three-quarters of the community, on average for 2.5 hours per day. Firewood can also be bought for US$ 4.6 per 0.6 cubic m, which lasts one day.

Feira: There are restrictions on burning fuel wood and charcoal but these are not enforced. Wood is used for cooking by about half the peri-urban households and one third of the urban households, although in both areas gas[37] is also used. Wood, charcoal and paper are burnt when there is a cash shortage. Wood is collected about twice a month in the peri-urban area and 4-5 times a month in the city, always by women. In the peri-urban area wood is collected mainly from the ground of private farms, rarely from common land or road verges while in the urban area abundant scrap wood is collected off the street. Natural wood burns more slowly than industrial scrap and a three-day supply takes from 20-30 minutes to gather. In the city it takes an hour to gather a bundle of scrap. Urban dwellers in particular resent the time required to collect fuel wood and those in formal employment were forced to use charcoal or gas due to time constraints. Increasingly, industrial wood and paper waste is also used in the peri-urban area, especially in the favelinha, as workshops and supermarkets appear in the neighbourhood. Peri-urban residents that beg in the city bring back scrap wood. Access to natural wood in peri-urban areas is diminishing, farmers increasingly deny access to land and much land has been cleared for housing or plantation. The urban shack dwellers relied most on fuel wood. The average contribution of wood to income (i.e. equivalent cost of gas) was US$ 3-4 per month, which for the very poorest represented 14 per cent of income.

Consumption of charcoal followed a similar pattern to that of wood, as a supplement when gas runs out, used more often in the peri-urban than in the urban area. Charcoal is expensive and poor families prefer to collect wood unless time is a constraint, due to illness or for women involved in wage labour. Otherwise, below an income of US$ 56 per month wood is collected and above an income of US$ 84 a continuous supply of gas is affordable. Charcoal is purchased at small supermarkets in five litre sacks costing US$ 0.7. Each sack lasts three days depending on family size. Average expenditure on charcoal in both areas was US$ 4-5 per month or approximately 5-8 per cent of average income.

Harare: Most shacks in the peri-urban area and informal slums in the urban area do not have electricity and use paraffin or wood for heating and lighting. Fuel wood is also used in shacks with electricity as a supplement to save money. Fuel wood is the main source of fuel for space heating in winter. The current shortage of paraffin has increased the demand for fuel wood.

Kumasi: Fuel is the main use of forest products in Kumasi. In the peri-urban area fuel wood is still the main source of fuel although use of electricity and gas is increasing.

In the urban area housing structures are such that fuel wood cannot be used, instead off-cuts and tree barks from saw mills are used for production of charcoal.

Fuel wood and charcoal consumption is affected by the rising price of LPG resulting from depreciation of the local currency–in 1995 the US dollar equivalent was 1200 cedis compared with 5500-6000 cedis in 2000. In forest areas District Assemblies are becoming aware of the environmental consequence of charcoal production and this could further restrict supply in future.

[37] At US$ 8 per bottle, lasting on average 15-20 days, gas expenditure represents about 15 per cent of monthly income.

Calcutta: Wood is the main source of fuel in 70 per cent of households in the peri-urban community but urban households, except squatters, use LPG. However, the government gas distribution programme was terminated in April 2000. This has increased the cost of gas and there may consequently be a return to wood fuel use although the full extent of this fuel switch has yet to be realised.

Kathmandu: In Nepal, the major product harvested from trees and forests is firewood, however, in Kathmandu firewood is not common in poor households because the majority live in rented accommodation and landlords prohibit the use of firewood. Non-commercial firewood use is mainly for cremation.

In peri-urban areas non-traditional fuels have not substituted fuel wood due to the greater availability of firewood and agricultural wastes. A bundle of 30-40 kg is enough for 10-12 days for a family of 3 to 5 or 4-5 days for a larger family. Requirement increases by 50 per cent from summer to winter. A tree equivalent to 20 bundles and 600-800 kg costs US$ 14. However firewood is more often derived from thorny shrubs gathered locally. Over the last 10 years the situation has worsened and kerosene stoves are increasingly used as an alternative. In urban and peri-urban Kathmandu those using fuel wood spend about 2 hours per day collecting.

Table 10. Comparison of fuel costs

	Quantity	Cost US$	Monthly equivalent US $
Mexico	0.6 cubic m firewood=1 day supply 3.5 kg charcoal	0.5 10.5	14.0
Feira	Gas 1bottle=15-20 days supply Charcoal 5 litres=3 days supply	8.0 0.7	12-16.0 7.0
Kumasi	Bundle of fire wood	0.8	
Calcutta	Firewood from house demolition per kilo	0.02-0.03	
Kathmandu	Firewood Tree=20 bundles=600-800 kg=10 months supply	14.0	1.4

2.3.2 Housing

Mexico City: There is no wood used in the construction of poor dwellings but wood is fashionable in middle class houses to give an authentic rustic ambience. However, older housing in the peri-urban area provides evidence of past use of wood in construction.

Feira: Land values are still very low in Feira and municipal control over building is weak. Until 20-30 years ago, houses in both areas were made from local timbers. In the urban area housing is one storey, the oldest occupying sixteen square metres, with small backyards and virtually no room between, although a few located on the margin have gardens. Houses are brick built with timber framed clay tiled roofs. A few shacks housing about 30 of the poorest residents are found under the railway arches. Most housing is informally constructed–without planning permission or municipal intervention. In the peri-urban area three types of housing exists:

- Farmhouses in the most rural region are made of mud bricks or wattle and daub with timber framed roofs and clay tiles. Most have 3 rooms with an outside toilet and no running water and with wooded or farmed areas between.
- Favelinha houses are constructed of uncemented industrial bricks; some have plastic walls and tin or asbestos roofs.
- Houses in the centre are larger, brick built with timber framed roofs and fired clay tiles,

Most houses still have wooden external doors, windows and roof structure. Few houses have internal doors as curtains are used instead. Window frames and doors are relatively

inexpensive. External doors cost around US$ 11 and windows US$ 8. Timber frames[38] for roof tiles are very expensive, about 25 per cent of total house construction cost–US$ 180 for a two-bedroom house–and are therefore recycled. Timber remains affordable for roofs due to the very low cost of clay tiles (US$ 28 per thousand). Substitution with concrete for roofs and steel for doors and window frames seems likely to occur as timber prices rise. Ironically, the poorest group, the urban shack dwellers had housing constructed almost totally from (scrap) timber, with some plastic sheeting.

Harare: In the urban area houses can be classified as well-maintained, unaltered, hostels and informal shelter. Hardwood is usually used in construction of informal housing. Most squatter settlements are made of poles, plastic, wood planks and corrugated iron.

In the peri-urban area, 'proper' houses are made of corrugated iron or asbestos and brick. Very few houses have tiled roofs. Substandard houses are made of poles, dagga, grass, unburned brick and corrugated iron sheets. Rented shacks are made of wood planks, other shack are constructed out of any available material—thatch, canvas, mud, corrugated iron, planks, cardboard.

Kumasi: Hardwood is used for roof beams, door and window frames for housing in both areas.

Calcutta: A variety of forest products are used in construction. In the peri-urban areas walls and roofs are made of bamboo and most windows are wood although some are bamboo. Nearly all doors are wood, mostly Siris. Hogla is also used for cheaper housing. In the urban area wood is used for frames and doors (Siris, mango and Jamun).

Kathmandu: Most housing in the peri-urban area is made of unbaked mud brick, corrugated roofing, with walls of metal sheets. Hardwood such as *Shorea robusta (*Saal*)* and *Dalbergia sisoo* are used for windows and doors, or softwoods such as *Melia azedarach* (Bakaino), *Alnus nepalensis* (Utis) and *Choerospondias axillaris* (Lapsi). Doors and windows are replaced every 20-30 years. About 50 cubic feet of hardwood is required costing US$ 570 to build a medium sized house, and US$ 286 for a small house. Bamboo is used to make poles for scaffolding, fences and other construction needs. In the peri-urban area, 10-20 bamboo stems are required per household per year.

2.3.3 Furniture and crafts

Mexico City: Peri-urban households had an average of 4.5 pieces of wooden furniture compared with urban households which had an average of less than 2 pieces of wooden furniture. The average expenditure on wooden furniture in the last 5 years was US$ 323 in the peri-urban area and US$ 83 in the urban area. However, 60 per cent of households had not purchased furniture in the last 5 years. Lower socio-economic groups purchase cheap and basic pine furniture from itinerant vendors. Higher quality wooden furniture purchased from specialist outlets and produced by cabinetmakers is prohibitively expensive for the poor.

All utensils have now been replaced with plastic and metal items.

Feira: Households had little furniture but all had some wooden or part-wooden furniture. Poorer families generally were given or found furniture and rarely purchased items except for small stools made locally.

Harare: Urban households used softwood for furniture.

Kumasi: In both areas wood, including hardwood, was used for furniture and implements, especially the mortar and pestle.

Calcutta: Many households possessed a variety of wooden furniture–tables, stools, at least one bed, piri (seat), jal-chowki (low-height table), bench, wooden rack, wooden almirah,

[38] Beams, perlins and batons all made from hardwood to resist termites.

made of various woods–saal, mango, Jamun, Badam, segun, sirish, chap, tamarind and pakur. A variety of tools were also made of wood–banti (vegetable cutter), dal kanta (soup stirrer), chakti and baloon (dish and roller), basket, thakur-singhasan (religious throne), and salt container. A variety of species are used–jamun, mango, jack fruit, segun, chap, pine, Badam, jarul, sirish, pakur–and also bamboo. Preferred trees are Jamun and mango. A majority of households use products made of wood, bamboo and cane in ceremonies (childbirth, marriage, sradh, and cremation).

Kathmandu: Hardwoods such as *Shorea robusta (*Saal*)* and *Dalbergia sisoo* (Sissoo) are used for beds, tables, chairs, cupboards and racks. Softwoods such as *Melia azedarach* (Bakaino), *Alnus nepalensis* (Utis) and *Choerospondias axillaris* (Lapsi), and plyboard are also used. Softwood furniture is made locally. The cost of softwood furniture to peri-urban residents was US$ 28 for a cupboard, US$ 21 for a table and US$ 6 for a chair. These are major expenses and only made when living standard rises above poverty. Items of furniture last 20 years before being replaced.

Bamboo has multiple uses and religious value. Bamboo is used to make furniture, fencing, baskets and needles for stitching leaf plates. In Hindu communities the deceased are traditionally transported to cremation on a bamboo platform but this practice is increasingly being replaced by vehicle.

2.3.4 Food and medicines

Mexico City: There is much seasonal consumption of mushrooms gathered locally in the peri-urban area–reaching 1.2 kg per household per week between May and October. The number of families gathering mushrooms weekly ranged from nearly three quarters in the more rural area of Piedra Grande to less than half in the more built up area of Yuatepec. Participants were able to name over 19 species of edible mushroom. Each year the supply of mushrooms diminishes and the young members of the community are increasingly less able to distinguish edible from poisonous species. About 10 per cent of peri-urban households also engage in rabbit hunting in the surrounding woods. The cost of rifles, ammunition and the necessary permit however limit the ability of households to take advantage of this source of food.

Medicinal plants were used by nearly half of both communities and mainly for inflammatory conditions, fever and stomach problems. Participants were able to name 21 curative species. Urban sources were either purchase from the market or urban trees and peri-urban sources were local woods and gardens.

Feira: Many households in the peri-urban area consume fruits from local trees and make juices and conserves. A mixture of native and non-native fruits–cashew, mango, guava, Mangaba, jack fruit–are collected ‘ad hoc’ by women and children, often on the way to and from school or work. With the exception of Jackfruit, the season is short. Mangaba is found only in woodland but most other fruits are picked from planted roadside trees. Based on market price, fruit harvesting could save US$ 1-2 expenditure per month. This is a very small contribution to economic wellbeing but families valued the nutritional supplement fruit represented particularly for children. Many native forest fruits–umbú (*Spondias tuberosa*), Caja (*Spondias lutea)*–are now domesticated. Little out of season or imported fruit was consumed due to cost. Average monthly expenditure on tree fruits was US$ 2-3. No local tree fruit is sold because the prices are so low in season and fruits are abundantly available for free and a multitude of rural producers comes to the city market. The cost of transport to market would be greater than potential income. A second food consumed was home reared chickens, which relied on sawdust for litter.

Medicinal plants–bark (especially cashew), leaves (especially guava), seeds, roots (especially *pau de rato*) and wood–are by far the most commonly consumed forest products in both urban and peri-urban areas being traditional remedies in indigenous and afro-Brazilian cultures. They are administered in the form of teas, compresses and smoke for physical conditions and

infusion baths and smoke inhalation for spiritual maladies, protection and cleansing. Principally, women are involved in collection, prescription and use, the plants are perceived as feminine and their use often focuses on female or child-related problems. Families procure remedies 3-4 times per week from local trees or their own gardens–lemon verbena and lemon grass, not strictly forest products. Herb remedies are a substitute for purchased medicine and therefore contribute indirectly to household income. Most women regularly used forest remedies using knowledge from the *Candomblé*. Some women are spiritualists and a growing number are evangelical Protestants particularly in Mangabeira. The local church makes herbal remedies using local ingredients, which are freely distributed. As wild sources become depleted the community increasingly uses a narrower range of domesticated plants. However, cultivation is threatened by urbanisation of available land. In some areas of Bahia community health care projects utilising traditional herbal remedies are emerging.

Harare: Mopane[39] worms growing in local woodland in the peri-urban area are harvested in season, December and August. Urban residents consume Mopane worms also. The worms are considered a great delicacy and are also a rich source of protein.

In the peri-urban area, wild fruits[40] native to the locality have long been gathered by local people as a supplement to their diet. Harvesting is seasonal, in July, September and December. Wild fruits are also brought from Mount Darwin in Mashonaland Central province and consumed in season in both peri-urban and urban areas.

Medicinal plants are widely used for treating every day ailments and also for more serious conditions. Medicinal remedies are now widely used by the many AIDS sufferers who lack any other form of treatment.

Kumasi: Chewsticks were the principal food or medicinal use of forest products in the areas studied and the use of these is now on the decline as toothpaste gains popularity.

Calcutta: Saal leaves are widely used for plates. Leaves, flowers, fruits, betel nut, and Myrobalan are used in Hindu ceremonies. Chewsticks are used as toothbrushes by the poor and very poor. Roots have long been used for astrological healing (Naba graha)[41]. Most households practised tree or plant worship–mostly Tulsi, but also Banyan, Peepal, and less often Bel and neem. Urban households increasingly worship a plant called monsa.

Kathmandu: In the urban area availability of fruit, nuts and medicinal herbs have been drastically reduced in nearby forests. Several households reported use of four non-timber forest products–amlaki, horitikai, ajwain, and honey.

In the peri-urban area bamboo shoot is used for pickle. The medicinal plant most valued in the peri-urban area is the root of a wild shrub (raspberry) which is used for healing wounds. There are also four spring water sources. One of the sources is very close to the established community forest. Participants were very aware that trees play a vital role in preventing soil erosion and increasing water supply from the spring. Before the establishment of the community forest and following the destruction of natural trees around the spring almost all the water had dried up. With proper conservation the source is now supplying adequate drinking water for 10 to 15 households plus domestic animals). Rice wheat, maize and soybean are grown for subsistence but nowadays, tomato and bean cultivation as cash crops is

[39] Madora in Shona and Macimbi in Ndebele

[40] Uapaca species (Muzhanje, Umhobobo), Virtex payos (Mutsubvu, Umtshwankela), Azanza garcheam (Mutohwe, Uxakuxaku)

[41] Nine "astral plants" were identified: Swetberela (*Sida cordifolia* Linn., Fam:Malvaceae); Bilwamul (*Agel mermelos* Corr, Fam: Rutaceae); Khirika *(Mimusops kauki* Linn, Fam: Saptoceae); Anantamul(*Hemidesmus indicus* R. Br., Fam: Asclepiadaceae); Bidyadaraka(*Argyreia speciosa* Sw., Fam: Convolulaceae); Bamunati or Brahma jasthi (*Clerodendrum indicum*, fam: Verbenaceae); Rambasak or Singha puchouseholda *(Adhatoda vasica* Nees Fam: Acanthaceae); Aswagandha (*Withania somnifera* Dunol., Fam: Solanaceae); Swet chandan (*Santalum album* Linn, Fam: Santalaceae).

increasing in these areas and bamboo is used for staking these crops. Forest litters are used for animal bedding but there are no fodder trees in the locality.

Tables 11 a)-f) Consumption survey data

a) Calcutta: Uses of timber and bamboo species

Trade Name	Uses
Siris	Low quality furniture, fuel wood
Mango	Furniture, plough
Kadam	Electrical bits, join box
Jackfruit	Furniture, piri, leaf used as fodder
Jamun	Furniture
Tentul	Instruments handle, used as seed press in oil mills in village
Bel	Religious & ritual purposes
Bans (Bamboo)	Utilitarian & crafts
Bet	Utilitarian & crafts
Arjun	Furniture, bark used as medicine
Neem (Mungosa)	Furniture, oil used as antiseptic, dried leaf as preservative, fuel wood by Brahmin only
Banyan	Sofa frame, religious
Haldi	Furniture
Peepal	Sofa frame
Teak (segun)	Furniture
Saal	Door frame, furniture
Sissoo	Chair, dining table
Gammar	Door & window
Badam	Door & window
Shola	Handicrafts
Tal	Construction & crafts
Suli	Medicinal
Bohera	
Haritaki	
Basak	
Kulekhara	
Amlaki	
Kurchi	
Tulsi	
Kalmegh	
Varanda	Mouth wash
Babul	
Karanja	
Dudhia	
Brahmi-sak	Leafy vegetable
Kalmi	
Arum (kochu)	
Pudina	Used raw in drinks
Coconut	Soft drink & ceiling frame

b) Mexico: Household consumption of forest products

Source	Product	Primary use		Frequency of households using n=30	
				Urban	Peri-urban
Local forest	Firewood	Fuel		9	10-28
Local and distant forest	Charcoal			16	0
	Timber	Construction		0	6
Uncertain	Wood	Furniture	pieces per household	<2	4-5
Local forest	Mushrooms	Food	gathered	0	13-22
Local forest and urban trees	Fruit			0	56
	Medicinal plants	Medicine		50	40

c) Feira: Household consumption of forest products

Source	Product	Primary use	Market	Frequency of households using n=30	
				Urban	Peri-urban
Cabinet makers and sawmills	Scrap wood	Fuel for cooking	Women Very poor	9	16
Local woods and trees	Cut natural wood		Women (peri-urban)		
Supermarkets	Thick card		Very poor (urban)		
Cabinet makers, sawmills & timber merchants	Sawdust				
Supermarkets	Charcoal	Fuel for cooking (limited use for barbecues and street foods)	Women	3	6
Local saw mills & timber merchants	Ready made wood products (doors, window frames etc.) Cut and scrap wood	Construction Roofing	Men	11	16
Urban trees and local forest	Tree fruits	Food (some made into ice-lollies)	Women and children (peri-urban)	7	11
Local woods, trees and private gardens	Tree remedies (bark, leaves, roots etc.)	Minor ailments		23	24

d) Harare: Urban household consumption of forest products

Source	Product	Primary use	Market
Epworth, Woodrow, Harare	Fuelwood	Braai, cooking	Butcheries who operate braai stands, poor households
Harare, Mutare	Hardwood	Furniture & implements	Young couples, retailers
Local forest	Reeds	Basketry	Fruit & vegetable vendors
Mutoko, Mbare, Woodrow	Softwood	Brooms	Housewives
Local forest–Epworth, Chipinge, Mutoko, Mbare, Mt Darwin	Plants	Medicinal – mainly sexual and reproductive use	Vendors, infertile people, people with sexual problems, foreigners, married people, pregnant women
Mt Darwin, Domboshava	Wild fruits	Medicinal and dietary	Vendors, school children, people with sexual problems
Bulawayo, Plumtree, Mt. Darwin, Domboshava	Mopane worms	Snack or main meal with porridge (sadza)	Mainly people who drink beer

e) Kumasi: Household consumption of forest products

Urban usage	Product	Primary use–Urban	Primary use–Peri-urban
Transition zone (Brong Ahafo)	Charcoal	Fuel	Fuel
Outside and local forest	Deadwood		Fuel wood
Forest outside	*Odum*	Roof beams, windows, doors and frames, off-cuts used for charcoal and fuel wood	Roof beams, windows, doors and frames
	Various hardwood & off-cuts	Furniture, charcoal, fuel wood	Furniture
Plantations in the forest-Guinea savannah transition zone	Teak	Furniture	
Potrikrom forest at 30km	Off-cuts		Carvings
Forest-Guinea transition zone	Edinam (tree bark) Dong	Dyes	
Forest outside and sawdust	Badee Honey	Prints	
Peri-urban forest	Mushroom	Food	Food
Peri-urban and outside	Bushmeat, fruit (mango)		
Forest close to peri-urban region	Palm –fruit, oil, fungi on dead trees	Cooking oil	Food, oil, alcohol
Outside forest	Bark	Medicine	Medicine
Local shrubs	Herbs		
Forests in West Ghana	Chewing stick	Dental care	

f) Kathmandu: Household consumption of forest products

Product	Cost US$	Item	Frequency of households using n=30			
			Urban		Peri-urban	
			Poor	Very poor	Poor	Very poor
Biomass	-	Agri-residue	0	0	14	15
	4-6/kg	Firewood	4	5	15	15
	Source	Own farm	2	1	13	11
		Forest	0	1	2	7
		Purchase	3	3	4	0
Bamboo	0.9-1.4/stick	Construction	4	5	12	15
		Furniture	1	0	4	1
		Crop stake	0	0	13	10
		Fencing	1	0	13	15
		Religious	5	0	1	1
		Firewood	0	0	5	3
	Quantity	Sticks per year	2-15	2-7	5-25	4-20
	Source	Purchase	6	5	8	9
		Gift	1	1	1	3
		Own farm	0	0	8	6
Plywood	0.2-0.4/sq ft	Construction, furniture	15	12	14	11
	Quantity	Square feet/year	15-90	15-60	30-315	30-195
Fruit and nuts	56/kg	Frequency	8	7	13	10
	Quantity	Kilograms/year	1-5	1-4	1-5	1-2.5
	Source	Collection	0	0	13	9
		Purchase	8	7	3	9
Medicinal plants	0.5-0.7/kg	Frequency*	(Collected) 6	(Collected) 6	(Purchased) 3	0
	Quantity	Grams/year	150-1000	150-3000	150-250	-
Hardwood	10-25/cubic ft	Windows, doors, poles	15	15	15	15
	Quantity	Cubic feet/year	20-190	9-150	15-175	6-150
	Source	Private timber yard	15	7	14	12
		Farm forestry	0	3	12	7
Furniture inventory (number of pieces)	4-11	Chair	2-4	1-2	1-5	1-5
	9-30	Table	1-7	1-2	1-4	1-2
	11-70	Bed	1-4	1-4	2-7	1-5
	30-70	Stool**	1-11	1-2	6-15	4-10
	1-2	Cupboard	1-3	1	1-2	1-3
	30-70	Bookshelf	1-2	1-2	1-2	1-2
	28-70	Heavy Kit	2	2	1-6	1
	35-60	Bench	1-2	1-2	1	0
	2-7	Showcase	1-2	1	0	0

**Species used:*

Peri-urban Poor–Ghortapre Gurjoo, Neem, Ghewkumari, Thulookhati, Vasaca

Peri-urban Very poor–Ghortapre Gurjoo, Neem, Ghewkumari, Thulookhati, Vasaca, Sweet flag, Lankasani, Batulpate, Pakhanbed

Urban: Harchur, Pakhanbed, and Neem

***Rectangular wooden plank approximately 1 ft by 2 ft used for sitting while having dal bhat (Nepalese lunch and dinner).*

2.4 Occupations based on forest products in survey neighbourhoods

2.4.1 Fuel trade

Mexico City: A few people in the peri-urban area were involved in the fuel wood trade but returns were very low.

Feira: Supermarkets generally sell charcoal but a few independent traders exist. The trader interviewed, an 89-year-old woman, bought charcoal from official suppliers 180 km away for US$ 45 per cubic meter. This was sold by the woman for US$ 1 for a three gallon can (1 cubic metre = approximately 76 cans). The women sold approximately 40 cans per month giving earnings in the region of US$ 17-23 per month. Many very poor families buy only a quarter can but some street food vendors buy charcoal in relatively large amounts. The ability to sell charcoal informally depends on the level of government control over production. Gas prices also affect demand.

Harare: The main season for wood fuel trade is winter (May to August) when electricity becomes too expensive for space heating but some traders in the peri-urban area, where firewood is the main cooking fuel, are active year round. The main constraints on the activity in the urban area are the cost of transport. In the peri-urban area the by-laws intended to curb deforestation render felling illegal, and transport costs for traders buying off middlemen, and night theft of firewood stocks at point of sale render the livelihood insecure and with low returns.

Kumasi: In the city itself, women perform charcoal production using waste from sawmills. Some operate under commission to female traders who supply non-labour inputs, others buy directly from sawmills or from men who transport waste timber from the sawmills to the charcoal-making site. The production of charcoal is an environmental problem and this is largely due to the informal and inefficient nature of the technology.

Fuel wood using saw mill waste is an essential energy source for both printing and dyeing trades. It is the most costly input into the process as the cloths are subjected to a lengthy boiling process. Urban street food vendors also use timber waste as fuel.

Due to the disappearance of trees on farmland, sale of fuel wood, from sawmill waste as well as from land clearance, is becoming an important source of income for some women in the peri-urban area; often it is a full-time occupation. Fuel wood is sold outside their residence and the linear settlement pattern enables easy identification of these houses. Customers are often commuters to Kumasi so that they have no time to gather wood themselves.

Calcutta: Saw dust and off-cuts are traded in the urban area as well as by-products from the cane manufacturing industry (chanchari). Wood from demolished houses is traded for fuel at US$ 0.02-0.03 per kg. In the peri-urban area, woodcutters also engage in selling firewood.

Kathmandu: Firewood is mostly used by the brick industries, bakeries, and medium sized hotels and for cremation. There are a number of private dealers in the urban area whilst in the peri-urban area fuel wood is gathered rather than traded. Casual and full-time labourers are also employed for public (TCN) and private distribution.

2.4.2 Timber and bamboo trades

Mexico City: There is a flourishing timber trade in Mexico but it operates largely outside the domain of poverty. Green timber can only be extracted by landowners. Some of the communities were employed in labouring activity in the timber yards and in the peri-urban areas there were twenty woodcutters operating. These men were poor, uneducated and continuing a traditional family occupation but they were able to work throughout the year. However the quality of wood has diminished and with it the price, creating the need for other sources of income. Woodcutters can therefore be categorised as full-time or part-time operators. Full-time woodcutters own a power saw and have on average more animals that can be used for traction. Wood supply is taken principally from dead trees but some woodcutters extract illegally especially if they have orders for roof timbers. In order to continue operation it is imperative not to be caught by the forest authorities. Initial investment in equipment amounts to around US$ 1000. Ongoing costs are principally for

animal feed. A woodcutter working with two animals can extract two loads of wood per day with sales value of US$ 4-6 each. Green wood fetches US$ 5-8 per trunk; four of which can be extracted in a day, but woodcutters must consider the risk of this trade and the need to retain sufficient money to pay fines. Daily earnings range between US$ 4-28.

In the urban area studied there were about 25 lumberyards catering for the upmarket furniture trade. Each establishment employs about five permanent and 10-15 casual labourers. Monthly earnings are in the region of US$ 50-120. However whilst timber yard owners said they employed local labour the survey participants disputed this saying that labour was employed from the state of Michoacan where the trade originated.

Kumasi: Kumasi's economy is based on the timber industry. There are at least nine sawmills in Asokwa and several more within walking distance of the neighbourhood. These mainly employ young men. Waste timber trading requires a tractor; most of these operators live outside the neighbourhood. Available waste is diminishing as mills improve efficiency and use waste for their own energy.

Calcutta: Historically the timber trade and sawmills were a flourishing sector of the Calcutta economy–found mostly in Nimtala, Ultadanga and Maniktala in North Calcutta–employing a sizeable number of daily wage labourers. As well as these main timber centres there is also a large number of smaller trading & processing depots in central Calcutta and the suburbs. Poor unskilled workers have been affected most by industry decline–in Nimtala, 500 permanent labourers have remained but the 4500 casual workforce has diminished to 1500 and in Ultadanga casual workforce has reduced from 400 to 50. The job is now seasonal, monthly incomes are highly variable, US$ 6-54 depending on job availability.

Urban semiskilled workers in machine handling, and polishing are also in less demand. Most graduated from unskilled labouring. Monthly income ranged between US$ 32-64, ranking poor to low income. Competition from synthetic materials means surplus labour is available in these industries.

In the peri-urban area woodcutters work on contract felling trees from private land. The work is not regular. Average monthly earnings are US$ 21-39.

Kathmandu: The timber trade is still relatively buoyant compared with Calcutta and similar casual labouring is available. There is one TCN timber yard and about 50 sawmills and 300 bandsaws run by private bodies. Approximately 25 to 27 furniture shops are supplied by one bandsaw. Casual and permanent labourers are also employed by bamboo wholesalers and truck owners to cut at source, load and unload in Kathmandu. Bamboo wholesaling and retailing takes place at the roadside although municipal authorities discourage this practice. A total of nineteen bamboo stalls were observed in the urban area. The average income from one bamboo stall is enough to support a family of 5-6 people. Cost of bamboo varies from US$ 0.75-1.15 per pole.

2.4.3 Construction

Mexico City: About a quarter of the urban, and a fifth of the peri-urban community, were employed in the construction industry. However, this is predominantly based on concrete and steel structures.

Feira: Although not directly related to forest product activity, many poor men work as labourers in the construction industry.

Calcutta: Women in the urban slums are involved in manufacture of bamboo mats (chatai) which are widely used for walling. Typically these workers are attached to shops which sell the product and provide tools. Monthly income is US$ 9-32 depending on number and size of mats sold. The work is semi-skilled and usually conducted on the pavement.

Hogla is another material important in construction of temporary housing. It can withstand only one monsoon season and there is therefore steady demand from poor households. Mats ranging in size from 30-50 sq. ft are sold to wholesalers in Calcutta market for US$ 0.3-0.5, yielding profit of US$ 0.07-1.00 per mat. As well as householders, employers buy these mats for their casual labour force to use.

Kathmandu: Livelihoods are found in labouring, manufacture of construction materials–doors, windows, bamboo and timber scaffolding structures.

2.4.4 Carpentry, manufacture and craft work

Mexico City: Plastic and metal have replaced virtually all wooden furniture. Wood furniture is the preserve of the middle-classes. No craftwork was encountered in the study.

Feira: Cabinet making is a relatively common activity in both areas, within the city there are 200-250 furniture workshops. It is a male occupation of the second income group–US$ 56-84. Most independent cabinet makers previously worked for larger formal operations but were made redundant and subsequently started their own small workshop. There is enough business for year round full-time activity. Skilled operators make elaborate pieces such as wardrobes and less skilled operators make simple items such as stools. Workshops also mend household implements. Workshops are between 30-50 sq. m. Tools are manual plus electric saws–representing a high investment at US$ 225. Raw materials, hard and softwoods, are obtained from sawmills on the outskirts of town. Softwood stools are sold in the city to the urban poor for US$ 1-2 each and directly to commercial establishments for more. Inferior quality product is sold to very poor families for US$ 0.6 each. Small workshops survive because industrial operations cannot compete on price. The low price is dependent on a cheap supply of softwood (eucalyptus and pine) from the region's reforestation programs. Although the market for stools is currently stable it faces uncertain competition from industrially produced alternatives

Harare: Mbare is the largest long-distance bus terminus in the country and offers a lucrative market for furniture. About half the carpenters interviewed reported year round activity in both urban and peri-urban areas. Other carpenters are mainly active during November and December when most working people including civil servants get their end of year bonus. The trade is low-skilled using only hand tools–saw (crosscut and reap), G-clamp, hammer, vice, drill, jackplane, smooth plane, chisel, measuring tape. Carpenters train formally or as an assistant to a full time artisan. Manufacture of furniture, such as wardrobes and kitchen units, takes at least one year to master. The size of the workshops varied depending on location: in the urban market 4-5 sq. m, in the peri-urban market 4 sq. m, and a peri-urban home-based operation 6-8 sq. metres. The main constraints on the trade in the urban area are the limited and/ or unreliable supply of raw materials which necessitates recycling old product and house timbers. The main constraints on the trade in the peri-urban urban area are the high cost, due to inflation, of raw materials (wood, nails, adhesive, coating), and transport costs (most obtain raw materials from the city). Also, lack of start-up capital, low demand due to low levels of disposable income, and customers paying on credit and leaving debts unpaid– known as 'lodgers' who relocate periodically–render the trade insecure and low income.

In the urban area there were also a few traders of woodcarvings. Traded products come from Chivi in Masvingo, Hwange and Binga Craft Centre in Matebeleland, North province. In the peri-urban area, brooms are made from a special type of softwood harvested seasonally. Most traders are active in October and November. No major constraints on the trade were found although raw material costs can be high during the off-season.

Kumasi: In the urban area carpentry is practised using wood bought from sawmills and small-scale timber merchants. However, the ban on timber trade has decreased supply and lead to increased efficiency of urban timber industries reducing the availability of off-cuts for carpenters, especially of preferred traditional species, and increasing price (two-fold rise over the past year) of wood.

Old Asokwa urban area is a centre for dyeing and printing and for training in these traditional trades. Dyes are made from a solution made with tree products. The dye is black and the cloths are mainly for mourning. Prints are similar but the plant product is mixed with honey. Honey is increasingly substituted by sugar as cost increases. Fuel for the process is obtained from sawmill by-products. Wooden mortars and pestles are used.

In the peri-urban area carving of dolls and masks for export has gained in importance attracting young men to train. Most trainees already have around 10 years of formal education. The trade in the area employs about 30 carvers in total, most of who are natives of the area. Artefacts are mostly produced to order but sometimes for stock. Wood of low economic value is obtained from forest about 30 kms away. Previously, carvers worked near the source of wood but now obtain raw material through middlemen at Ehwiaa, a traditional rural centre outside the periphery of Kumasi, and the trade has attracted some workers to come in from this area. There are three principal foci for the trade each managed by 3-4 entrepreneurs with 2-3

apprentices, usually relatives. The apprenticeship fee is about US$ 1.5 and pays food money, '*sokalafia'*, only. Training can take up to 3 years and natural talent is important. On completion, a trainee either continues in 40:60 partnership with his trainer or sets up his own enterprise. Advance payment from dealers is the most important source of funding for the business and means that initial start-up capital is not a specific problem. The trade is year round with peak activity between June and December. The trade is constrained by the lack of availability of cheap wood and not by lack of orders.

Calcutta: In Raja Gopendra Street slum small furniture making–cash boxes, stools, thrones for idols–using local woods–mango, Jamun, tamarind, Siris–was a traditional cottage industry in the locality. Twenty years ago there were 117 shops in the locality selling wooden products but now there are only three. Free lance carpenters complained of scarcity of quality materials available at reasonable prices and of competition from synthetic products. Children did not see any future in following the family trade. Freelance carpenters, possessing a few hand tools, earn daily rates of US$ 2 and are reasonably able to find work, if they travel around Calcutta and market their skills by engaging with prospective customers. Better quality wood from demolished buildings is also used to make furniture with profit of US$ 0.7-1.2 per item.

Mainly poor households are engaged in making broomsticks on the pavement from date palm leaves–2 leaves are made into one broom in 15 minutes, one person can make 40-50 brooms per day. Leaves are bought for US$ 1-1.4 per 100 and brooms are sold for US$ 0.05 each.

Cane work was also noted in this slum–baskets, furniture, food containers, and decorative pieces. Demand is highest in the Hindu festive season (September-October). With the involvement of all family members the community is able to sustain poverty level livelihoods throughout the year. Raw materials are becoming increasingly scarce and future prospects are uncertain.

Although not typically a forest product, shola grows in the Calcutta wetlands and provides livelihoods for the entire peri-urban community studied–120 families including males, females and children were engaged in handicraft manufacture. Shola handicrafts have a steady market. Very simple tools are required and manual skills are learnt from community elders. Attempts to improve skills through mechanisation by small machines have not succeeded. Families engaged in shola craft work received one-off government support payments of US$ 40 in 1980 and US$ 275 in 1990 half of which was repayable at 6 per cent interest per annum. Monthly income of households surveyed varied from US$ 12-46 depending on skill required. Supply of raw materials is under threat from urbanisation and middlemen take a large share of retail price.

Kathmandu: Demand for furniture[42] in Kathmandu is buoyant and increasing. Tradesmen estimated that the number of furniture shops, workshops and carpentry businesses has increased more than 5 times in the last 10 years. About 3 to 10 furniture shops were observed in each street of the survey sites. A total of 47 shops were observed. The occupational caste involved in woodworking has now been joined by others attracted by the low investment and risk of the trade, high return and demand, and easy access to various types of timber from timber yards. In order to be competitive, woodworkers need to be skilled. Typically the new entrants work as daily labourers in an existing workshop to acquire skills before opening their own workshop–costing a minimum of US$ 143-215 to establish. Small workshops provide work for 1 or 2 carpenters and larger workshops employ 3 or 4 carpenters, each able to support an average sized family. The main equipment required is; chainsaw, bow saw, band saw, wood cutter, screwdriver, circular machine saw, hack saw, hammer, machine drill, wood saw, basila, plane, button or angular scale, measuring tape, scale, and pencils.

2.4.5 Food and medicine trades

Mexico City: Some mushrooms are traded in the peri-urban community for US$3 per kilo, mainly by women and children. However, since the mushrooms are highly perishable and must be brought to market the same day they are picked, they are only brought to market if a sufficient quantity is gathered on that day. This makes the activity an insecure source of income.

No trade in medicinal plants was noted.

[42] Tables, chairs, benches, desks, beds, racks, cupboards, doors and windows are most frequently made by carpenters with less demand for showcases, television stands and dining tables.

Feira: Some households keep chickens for sale of meat and/ or eggs and sawdust is used for chicken litter.

Most medicines are self-administered; inhabitants in both neighbourhoods were familiar with their use for colds, flu, fever, menstrual symptoms and nausea. However, a few lay professionals and shaman healers (*rezadores)* specialise in curing and the *Candomblés* often use tree-based potions.

Harare: Mopane worms are brought from woodland in Regions IV and V of Matebeleland South (Gwanda and Plumtree) where Mopane trees grow in abundance. Mopane worms are traded in urban (Mupendzanhamo**)** and peri-urban (Musika) markets. A minority of traders store dried worms for sale out of season when they fetch high prices due to unmet demand. Traders require grading and packing skills. Equipment comprises an electric plastic-sealer or paraffin stove for packing the worms, and weighing scale for selling, less often they are sold by volume.

Mbare is a big market for medicinal plants. At Mupendzanhamo there is a large section for medicinal plant traders. Most traders get their supplies from Manicaland. Herb sellers were encountered in both areas. Mostly the trade is year round. The main constraints on the trade are diminishing stocks of the required species in local forests and woodlands. Perpetual settlement of the area and the need for fuel wood has led to more and more deforestation of the source of the plants forcing gatherers to travel greater distances thus raising costs. Attack from snakes and lions is a hazard of the business but now the demand for traditional medicine is also waning as modern clinical treatments become attractive to the population.

In the peri-urban area, wild fruits (mostly masawu from Mt Darwin in Mashonaland Central province, also tsubvu & nyii) are sold in season at Musika bus terminus, mainly to other traders who sell them in Harare suburbs. About one third of traders are active year round. Some fruit is stored and sold at inflated prices out of season. Most wild fruits are delivered to market green and need storage space to ensure air circulation and hence low moisture content. Skills required are the ability to identify high quality wild fruits that do not easily go bad and can fetch higher prices. Paraffin stoves are usually used for sealing plastic packing, a few traders use electric sealers. Fruits are retailed in bags of 100 grams to 3 kg. Constraints on the trade include loss of stock from decay, competition among traders leading to price-cutting, and high rents in city council controlled markets.

Calcutta: In almost all markets a few vendors sell twigs, leaves and flowers of selected local plants and dub grasses required for pujas and other Hindu religious activities. Trade is year round with peak activity on Thursdays, marriage season, and weekly puja. Average monthly income is US$ 21-35.

In Calcutta market neem, babool, karanja, and dudhia twigs are sold as toothbrushes. Customers are mostly poor and with rising poverty demand has increased. The trader interviewed was illiterate and supported a family of five through the occupation on an income of US$ 28-35 per month. Lack of capital for stock purchase means the traders are forced to work for moneylenders and do all manual work involved in the trade from collection to sale.

An important occupation is sale of Saal leaves, and Saal plates and bowls, which are used especially by sweet shops and for festivals. Moneylenders also finance this trade. Deforestation has badly affected the trade; good quality leaves are difficult to obtain.

Astral plant vendors, usually Muslim, come from Calcutta suburbs, Howrah and Hooghly, peri-urban areas such as 24 Parganas, and Midnapore, into the city where they sell on the pavement in various parts– Dalhousie Square, Shyambazar, Hazra, Bhowanipore, Tollygunge–suburbs and villages. Hindus generally avoid the trade because the plants are worshipped.

Kathmandu: The survey team recorded no trade in food or medicines.

Table 12. Average monthly earnings for selected forest product based occupations

	Urban	US$	Peri-urban	US$
Mexico	Timber labouring	50-120	Woodcutters	16-112
Feira	Charcoal trading	17-23	Cabinet making	56-84
Kumasi			Wood carving	180
Harare	Furniture making	26-40	Fuel wood trade	10-44
			Medicinal plant trade	12-14
			Fruit trade	34-66
			Worm trade	20-40
Calcutta	Neem twig trade	28-35	Woodcutters	21-39
	Religious plant trade	21-35	Shola crafts	12-46
	Timber labouring	6-54	Chatai mat making	9-32
	Machine polishers	32-64	Carpentry	40-60

Table 13 a)-c) Forest product-based occupations

a) Kumasi: Forest product based occupations (no. of households)

N=30 but some households were involved in more than one activity	Urban	Peri-urban
Leaf vending	0	4
Chew stick vending	0	2
Medicinal plant vending	1	2
Fuel wood vending	2	10
Craft work	3	5
Charcoal sale	6	2
Furniture manufacture	6	1
Charcoal production	7	1
Construction timber	7	1

b) Harare: Frequency of forest product based occupations (no. of households)

Occupation	Freq. n=60	Gender (Freq. male)	Seasonality (Freq.)		
			Year round	Oct-Dec	June-Sept
Furniture making [43]	19	19	10	8	1
Basket making	1	-	-	-	-
Fuel wood trade	4	2	1		3
Medicinal herb trade	7	5	6	1	-
Mopane worm trade	5	3	1	3	1
Wild fruit trade	8	3	2	2	4
Timber labouring	4	-	1	2	1
Wooden implement trade	2	-	-	-	-
Broom trade	1	-	-	-	-

[43] Urban – beds, coffins, lounge suites, room dividers, kitchen units; Peri-urban – bed bases, chairs, tables, wardrobes, kitchen units, doors, picture frames

c) Calcutta: Frequency of forest product based occupation case studies

Occupation	Constraints	Prospects
Urban		
Carpenter –hardwood furniture, own showroom	Increased cost of wood, competition from synthetic materials	Poor, children will not continue
Carpenter – (local) softwood windows and doors	Pressure on wood supply	Buoyant demand but children will not continue
Carpenter – electrical boards and boxes, local wood	Competition from synthetic materials	Poor, children will not continue
Wood polisher	Competition from laminates and machine polishing	Poor, will either retrain or learn machine polishing
Labourer unskilled, loading and unloading logs	Competition from younger men	Poor due to age
Carpenter –hardwood machined patterning & design	Profit depends on quoting adequate price	Good but low income
Bamboo mat maker for construction	Supply of bamboo from Assam is quasi legal and irregular, transport costs increasing	Poor but local species being tried
Brush-stick trader (retired jute mill operative)	Effect of television on consumption of toothpaste	Good due to increasing poverty
Peri-urban		
Shola craftwork – decorative flowers and birds	Demand lowest in rainy season, highest in festival months, sale to traders dependent on their liking his designs, quality shola is expensive, no capital for bulk purchase	Good demand throughout India and for export, family provide labour and will continue trade
Shola craftwork – ceremonial hats	Demand highest in festive months, new entrants creating competition	Good, children will continue
Date palm mattress maker, raw materials from surrounding villages	Shortage of palms means increased travel and health problems, retail price not increasing	Demand buoyant depending on price
Palm leaf craftwork – fans, hats and sashes	Cost of raw materials have increased but so too have retail prices	Good, children will continue
Tree feller	Physically taxing	Good but low pay and hard work therefore children will not continue

Appendix I: Report on stakeholder planning meeting for peri-urban agroforestry/tree domestication

ICRAF HQs, 4 July, 2000 Proceedings

The participants were welcomed by Jonathan Muriuki and Tony Simons, who gave background information about ICRAF's interest to widen it's agroforestry, and especially tree domestication, agenda into the peri-urban zones recognising the growing need for agricultural and agroforestry produce for a growing urban population. The opportunities and challenges for peri-urban agroforestry lie in a ready and accessible market, available labour, and the desire of the people to produce high-value trees and crops. Presentations were given by some of the organisations, outlining their current involvement in peri-urban agroforestry or agriculture and their future plans.

CABI is currently running a programme for peri-urban vegetable production in Thika, Ongata Rongai, Kikuyu and Athi River. It is running farmer-training centres (farmer field schools) in Thika aimed at accelerated dissemination.

FAO - Forest, Trees and People Network has a focus on food security issues. A focus of current work is on reducing pressure on existing forests near towns by encouraging tree growing on farms.

The Green Town Project works within municipalities and encourages people to plant trees for environmental protection.

GTZ-ITFSP has carried out a few pilot studies in Kikuyu and Wangige in which the role of trees in peri-urban farms was analysed. Leafy vegetables are the main crops in town-near agricultural production, mainly because of the short time available between harvest and consumption, and the relatively high value of this crop. A definition for the peri-urban zone was offered as the area around town in which intensive vegetable production in a 'garden agriculture' takes place using high inputs of fertilisers and pesticides. GTZ has a project on urban agriculture based in Dar-Es-Salaam.

Greenbelt Movement is working in 26 districts in Kenya and has established over 6,000 tree nurseries to support community tree planting activities. These nurseries are assisted with inputs, such as tools, polybags and support to buy soil, where necessary, as well as training in better nursery management. Greenbelt also works in slum areas – mainly with community groups – to support environmental activities, such as composting of organic waste.

ILRI is working on several projects studying the value of woody legumes for animal feed and nutrient cycling. A hypothesis presented was that livestock production in small peri-urban plots could have a beneficial effect on soil fertility as feed is often imported, and manure spread onto the field, thus a net-import of nutrients. A large-scale study on the potential for *Calliandra calothyrsus* production in dairy farms in Kenya has been carried out, using GIS and parameters such as the distance to road, population density and main agricultural system in an area.

A current pilot study of 1,200 farms in Kiambu District was presented, in which a detailed characterisation survey studies the farming system, land area used, household income, family education, etc. A similar survey is presently being carried out in Western Kenya.

KEFRI is involved in several projects related to peri-urban wood production and energy saving activities. In Ngong, KEFRI works with women groups to promote the use of energy saving stoves and the production of fuelwood trees. It has carried out a survey in Kiambu on use of fodder trees and is currently establishing group demonstration sites in the district.

The Centre for Urban Research is involved in urban agriculture studies in Nakuru and in compiling a detailed bibliography on urban agriculture around the world. One of the focal points of CUR's interest is urban pollution.

The **UNESCO People and Plants Initiative** is interested in supporting wood carvers to buy useful trees from producers rather than extracting endangered species from the forest. Species of current interest are *Jacaranda mimosifolia, Mangifera indica* and *Grevillea robusta*, which are available from urban gardens. The project intends to help set up contacts between buyers and sellers.

ICIPE is working on a large project on fruit fly management. Fruit fly could become an important problem in peri-urban fruit gardens if mango and other host plants are promoted without adequate knowledge about pest management.

Issues for research and development

An array of issues for research and development were considered. A definition for 'peri-urban' agroforestry was sought, but it was concluded that for every town the term 'peri-urban' needs to be defined taking into consideration geographical, political and socio-economic factors. Population density relative to the surrounding urban and rural areas was seen as an important criterion. Other criteria included small plot size hence close settlement, accessibility to transport and other urban facilities and market orientation.

The discussion focussed on the delineation of peri-urban *versus* rural agroforestry. Important points mentioned were:

- Peri-urban agroforestry needs to be more flexible to fit into a dynamic, changing system (towns grow rapidly, agricultural land gets sold and built up for housing).
- The system has a stronger market-orientation than the rural system; tree species used need to reflect that.
- In the peri-urban zones, marketing and processing facilities are available, as well as labour opportunities (both for off-farm work and for farm labour). This gives the peri-urban zone a unique advantage over the rural areas for intensive agriculture.
- Agroforestry has important niches in urban systems in areas unsuitable for urban expansion.
- Limited land availability and insecure land tenure are factors inhibiting production in urban and peri-urban zones.

Policies were mentioned as important area for possible interventions. It was mentioned that the peri-urban zones are in a policy vacuum, since local policies are defined for urban centres, and for rural zones, but are often unsuitable for the peri-urban areas. Agriculture within cities is often prohibited by law but is tolerated by the authorities.

An important area of concern was pollution of urban ecosystems and food produced within the urban and peri-urban agricultural systems due to use of raw sewage for irrigation and industry and traffic emissions resulting in accumulation of high amounts of heavy metals and other toxic components. A chance was seen for trees to be able to absorb pollutants and to help rehabilitate polluted urban wastelands. A list of potential collaborators and partners was drawn up as follows:

1. Ministry of Agriculture (Extension service)
2. HABITAT
3. Ministry of Local Government (Urban Planning and Environment)
4. Forest Department (Ministry of Environment and Natural resources)
5. Ministry of Lands and Settlement (Urban Management Unit)
6. National Environmental Secretariat
7. International Development Research Centre (IDRC)
8. Kenya Institute of Organic Farming (KIOF)
9. East African Wildlife Society (EAWS)
10. Kenya Agricultural Research Institute (KARI)
11. Undugu Society
12. National Museums of Kenya
13. Nature Kenya
14. Office of the President
15. Ministry of Water Resources
16. Mathare Youth Sports Association (MYSA)
17. Permanent Presidential Commission on Soil Conservation and Afforestation
18. Moi University
19. Ministry of Home Affairs (Prisons Department)
20. Private Sector (Firms directly involved with afforestation activities)
21. Resources Oriented Development Initiative (RODI)
22. Friends of Nairobi Association (FONA)

Finally, a short list of potential collaborative projects was suggested as follows:

1. Nairobi River Basin Project (UNEP, Ministry of Lands and Settlement; Urban Planning Department)
2. Rehabilitation of Nairobi Dam (UNEP, Habitat, Managing Water for African Cities)
3. Peri-urban Vegetable Project (CABI, KARI-NARL, KARI Thika)
4. Nairobi Centennial Celebration Committee (IDRC, Centre of Urban Research)
5. Fruit Fly Identification Project (ICIPE)
6. Marketing and Processing of Wood Products (KEFRI)

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Appendix II: Poverty alleviation programmes

a) Feira de Santana

- *Comunidade Solidaria* (Solidarity Community)–local committee to co-ordinate services and infrastructure controlled by civil council. Currently covers a few rural areas with plans to expand to urban areas such as Feira de Santana.
- *Bolsa Escola*–provides grants to families for each child in school. Successful in the Northeast particularly in conjunction with the joint federal-UNICEF drives to eliminate child labour. Feira de Santana has 2000 children in the scheme
- *Agentes Comunitários de Saúde*–programme to strengthen preventative health care, in line with healthcare decentralisation policy, through training Community Municipal Healthcare workers to undertake home visits, and provide basic health care & information. Successful and well received by the local population.
- *FAT/Capacitação (uni-trabalho)*–universities, institutes and companies receive funds to train poor youths. Some courses and training have been run in Feira and the scheme is expanding.
- *Expansão da rede de água e esgoto*– Expansion Program for Water and Sewage Systems consisting of major drainage and water provision to which private and public concessionaires link dwellings and other establishments. Still in operation. Although not directly targeted at poor neighbourhoods it has involved many. Supported by World Bank under the WB Northeast poverty reduction program, and a priority of the *Avança Brasil* federal planning blueprint.
- *Cesta do Povo* (People's Basket)–Uniquely Bahian programme, 342 state run supermarkets selling at cost or subsidised to the poor urban population but do not offer credit. Little researched but evident impact on local competition. Feira de Santana has three of these shops.
- *House Building Schemes*–until recently construction materials, especially cement and bricks, were given to poor families to build or improve housing. Occasionally, the program also conferred land title.
- *Cesta basica* (basket of goods donation)–until recently the municipal government funded baskets of goods for 3,000 families each month distributed by local NGOs and CSOs.
- *Programa Regular* (Seed distribution)–rural families, 2,500 in 1999, receive seeds each year for planting.

b) Harare

- Plan International is active in Epworth with projects to supplement diet, fund fostered children's school fees, boost health facilities– a maternity wing has recently been built at the local clinic to save residents the 25km journey to Harare– and provide water services and schools.
- Help-age Zimbabwe: an international charity primarily concerned to raise living standards of the elderly has in recent years drilled several water holes in Epworth.
- World Vision, a non-governmental organisation, ran a soap-making project. Although the project has now ended, those trained continue to profit from this source of income.
- ITDG runs a building materials and shelter programme, including brick making in Epworth, in co-operation with Housing People in Zimbabwe and Plan International. The project disseminates information on tile and (stabilised soil) brick fabrication
- Zambuko Trust and SEDCO offer soft loans to microenterprises; several people in Epworth have received loans from the scheme but find repayments difficult to meet.

c) Kathmandu

- LUMANTI supported by ACTION AID Italy & UK–P O Box 10546 Kathmandu; E-mail: shelter@lumanti.wlink.com.np Community capacity building through formation of groups for women, children and resource users and Upgrading settlements, Lobbying for housing rights, Resource centre and information dissemination
- SOS Youth Village–Mr. T P Bhandari, Director, Koteshower, Kathmandu, Provision of permanent homes and life skills training for street children (max. 42) and disabled (max.40)
- Child Workers in Nepal (CWIN) supported by Redd Barna (Save the Children, Norway) and PLAN International–P O Box 4374, Rabi Bhawan, Kathmandu– E-mail: cwin@mos.com.np; Website WWW.cwin-nepal.org, home for homeless and abandoned children aimed at socialisation and re-integration for children at risk.
- MAITI Nepal supported by Redd Barna and Save the Children UK–P O Box 9599, Gaushala Pinalasthan Kathmandu; E-mail: maiti@ccsl.com.np Educating and mobilising the public to reduce child prostitution. Functions include prostitute rehabilitation–education&training, counselling, and hostel accommodation (43 girls and 136 children)
- Women's Rehabilitation Centre (WORECK) set up by Dutch benefactors now self-funding –Gaurighat, Kathmandu Lobbies for women & children's rights and development Income generation programme–machine sewing, candle making, fabric painting
- Agroforestry, Basic Health and Co-operatives (ABC) Nepal supported by Japanese donors–P O Box 5136, Koteshwor, Kathmandu; Email:abc@transit.wlink.com.np Action to promote agroforestry, & provide basic health, and form women's co-operatives that raises awareness of girl trafficking and AIDS
- Happy House supported by Jawlakhel Ekantakuna (Belgium)–P O Box 10012, Kathmandu, E-mail: som@children.wlink.com.np. Provides rehabilitation of street children (19 boys, 28 girls), provision of food, lodging, and schooling