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बहुसरोकारवाला वन कार्यक्रम

Forest-based Value Chains in Nepal

an MSFP Working Paper

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Preface

The Multi Stakeholder Forestry Programme came to an end on 15 July 2016, and in the final few months of the Programme, it was necessary to review the dissemination policy of the knowledge products produced or commissioned by the programme.

The publications and other papers, commissioned by the MSFP and defined as deliverables for the public domain, totaled over 300 documents.

In addition, several of the stakeholders, such as research organizations and non-governmental implementing agencies, produced a number of case studies, background papers and other documents.

As some of MSFP's implementing partners produced case studies on a number of forest-based value chains, the Programme decided to prepare a summary document, with the purpose of putting some of MSFP work related to value chains into a wider national and international context. The author also made significant use of a recently published document from the Ministry of Forests and Soil Conservation, the Forest Resource Assessment of Nepal (FRA 2015).

It is hoped that this effort will contribute to the analysis and promotion of forest-based value chains. If this paper can facilitate the passing of MSFP results and FRA data to the actors and future contributors in the sector, then it has served the intended purpose.

Abbreviations

ANSAB	Asia Network for Sustainable Agriculture and Bio-resources
CAPA	Community Adaptation Plan of Action
CFUG	Community Forestry User Group
DAG	Disadvantaged Group
ECARDS	Environment, Culture, Agriculture, Research and Development Society, one of MSFP's implementing partners
FAO	Food and Agriculture Organization of United Nations
FNCCI	Federation of Nepalese Chambers of Commerce and Industries
FRA	Forest Resources Assessment
FSS	Forest Sector Strategy
GDP	Gross Domestic Product
GIZ	German Technical Cooperation
GoN	Government of Nepal
hh	household
IA	Implementing Agency
LAPA	Local Adaptation Plan of Action
LFG	Local Forestry Group/s
LIBIRD	Local Initiatives for Biodiversity, Research, and Development, one of MSFP's implementing partners
MEDEP	Micro Enterprise Development Programme
MoFSC	Ministry of Forests and Soil Conservation
MIS	Management/Marketing Information System
MSFP	Multi Stakeholder Forestry Programme
mt	metric tonnes
NPR	Nepalese Rupee
NRs	also Nepalese Rupee
NTFP	Non-timber Forest Products
PES	Payments for Environmental Services
RRN	Rural Reconstruction Nepal, one of MSFP's implementing partners
RIMS	Resource Identification and Management Society, one of MSFP's implementing partners
SDC	Swiss Agency for Development and Cooperation
SFM	Sustainable Forest Management
VA	Value Addition
VC	Value Chain

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1 INTRODUCTION AND APPROACH

Over 60 value chain studies have been carried out in Nepal in recent years, although selection criteria and quality of documentation varies considerably. The value chain approach is a valuable one and has contributed to the understanding of the values in the sector, and the necessary product and capacity building work required in the markets and products, and for the producers and stakeholders. It was only natural that the Multi-Stakeholder Forestry Programme (MSFP) chose to apply the value chain approach in some of its development work.

This working paper is an attempt to put MSFP's work on forest-based value chains into the Nepalese national context. The idea is to try to complement the individual product-based case studies and bring them to the wider context of forest-based value creation. This also includes an attempt to put Nepalese forest-based products and services into an international trade and global context.

The approach chosen in this paper, is to start from the biological diversity of the Nepalese forests, and relate that to the human needs, and observed uses of forests. These observed uses create the basic use values that people have developed over centuries. Some of the forest-based products and services also have an international exposure, are well known, and compete on the international markets. Many of the local value chains are not monetized and still remain on the level of subsistence use, but this does not make these value chains any less important; some of this category of products have great potential.

In some cases, the traditional, locally adapted value chains have been integrated into the monetized markets, and earn much needed cash income for the collectors, cultivators, processors, and other stakeholders. It is these monetized value chains that typically receive most attention. The understanding here is

that the local traditional uses are the rich background from which the existing value chains can be enhanced, and "new" ones can be observed, identified, researched and developed.

There is a major concern about the sustainability of certain forest-based value chains. Although recent data has shown an increase in the forest cover in Nepal over the past 20 years (FRA 2015), the forest resources of Nepal are considered by some to have diminished as measured by such crude indicators as wood volume, biomass, or carbon contents. In many cases the availability, supply and sustainability of single products or single value chains are facing similar sustainability issues as the resource base as a whole.

At the basic level, the (un)sustainability of certain land-use practices have an effect on the productive potential of the forests themselves. These negative effects can be observed at the watershed level, with direct implications on the water resources. A decrease in land productivity in some areas can be observed due to soil erosion and nutrient depletion, and these effects impact ecological systems and biological diversity.

In terms of the value chain approach, the negative effects due to the use are trade-offs, which reduce the positive values that can be created in the respective value chains. It is only reasonable that a part of the factor income should be invested back to the resource base, in the spirit of sustainable forest management (SFM). In many cases, it is the role of the public sector to guide this policy, and in some cases direct public rent capture (tax revenues) is necessary to conserve, manage, cultivate, domesticate and develop the resource base.

Based on the approach chosen here, human needs are reflected in the use patterns. These patterns have been evolving through centuries, and suitable genetic characteristics have been identified and used to fulfill particular human needs. Fortunately, there is a rich body of new information on this – and here, the main emphasis is put on how various forest-based species fit into the traditional use patterns. Key human needs are identified by categories such as nutrition, shelter and health. In Nepalese conditions, forest-based value chains are often intimately integrated into animal husbandry, which can be described as an inter-related group of value chains - leading to fulfilling complementary human needs.

When looked at from the forests' point of view, almost all of the species of plants and animals have a use profile that has been evolving through a long tradition of experiences – for example, the long trial and error of search and experiment that has eventually led to the traditional uses. One can also observe how the genetics of the human being and the surrounding natural species are meeting, to form a co-existence, often a symbiotic one.

It's not by accident that some related species are often channeled to similar end-uses. On the other hand, there are certain species that are often selected as the best for a particular need. In total, this has created sequences of substitution between species for a particular end use. Furthermore, a particular species often has multiple uses - in the empirical material used for this paper, it's not rare that a favorite species has many, even more than 10 identified end-uses. One can conclude, that the value chains, which are related to such species, are complicated, but quite robust at the same time, although their very favorable characteristics have in some cases led to sustainability issues. On the other hand, investment in such a favorite species is likely to have a low risk.

A number of end-uses and human needs, are not material, nor tangible. One cannot treat the overall forest-based values without including immaterial and non-tangible values. In the Nepalese context, many of the forest-based species have traditional, religious or spiritual value. In some cases, one can observe that these religious values are institutionalizing or enhancing the material use values of favorite species (such as in animal husbandry), but in other cases they are dedicated to specific uses that are not related to material uses.

Forest-based resources have strong international linkages as well. The deep human needs of water and climate change control, are excellent examples of this. In the case of Nepal, the downstream linkage of Himalayan waters to over a billion people, is reflected as the watershed management (or river basin management) need in Nepal. This creates a need for understanding the potential value of payments for environmental services (PES). The carbon sequestration services through the photosynthesis of forest plants is another such PES value chain.

Conservation efforts may be the primary approach to improve the sustainability of a species or ecology, and this has often been successfully undertaken in Nepal. Contrary to some beliefs, creating transparent market

values for a product, can sometimes be the best guarantee of sustainability. The effect comes through the incentive of resource managers to understand the opportunity and resource value related to the particular product – and this fits well with the promotion of community forestry as a management regime of forests. Appreciation of the resource value becomes reflected as dedication to conservation efforts by the local forestry groups (LFGs).

The success of value chain upgrading depends on the knowledge of needs and end-uses, among other factors. For example, the various end-use values require different types of knowledge and skills:

- construction (technical and physical),
- nutrition and fodder (chemical and nutritional),
- medicine (chemical, pharmaceutical),
- fibre (physical and weaving properties),
- energy (physical, energy values, health).

Value chains need to be looked at in combinations as many of them are inherently inter-related. There are often trade-offs - promoting one species or value chain may exclude the other or have a negative effect on it - but more often, there is a strong synergy between neighboring value chains. Thus, for example, a collection centre, processing unit or marketing organization cannot be a stand-alone entity, but will only be feasible in combination and aggregate, gaining from the economies of scale. These kinds of gains are evident also in research and development, and in organizing local development efforts.

The end-use demands for the forest-based products are not due to particular products or species, but due to the profile of properties they have, to fulfill particular end-user needs. The value chains which are selected for promotion must have well identified and understood end-uses. There are continuums of resource values through substitution between species, and it is suggested that the marketing and promotion of end-use values succeeds best when they are based on local traditional uses and knowledge.

- Values are based on human needs
- Fulfilment is based on resources
- Chains are needed to link resources to needs

Table 1 is an attempt to illustrate and describe the variety of end-uses, and the kind of forest plant-based products commonly used. As is often the case, most of the plants and their parts can be used for a variety of end-uses. The Table describes the situation in the Middle Mountains of Nepal, but similar patterns can be observed elsewhere, with somewhat differing ecological and cultural dimensions. The social survey of the FRA 2015 has been one of the new sources that have contributed to the understanding of local end-uses of forest-based products. The data base of the FRA has not been made available as yet, but the published material is used here to illustrate the wealth of knowledge available on Nepal's forest resources.

Table 1 Use of plant based products: an example of the middle mountains zone of Nepal

End-use	Portion of source in percent				
	Tree	Shrub	Herb	Other	Total
Fodder	39.9	22.6	27.1	10.4	100.0
Medicinal plants	29.0	21.6	34.7	14.7	100.0
Animal bedding	55.1	20.1	17.3	7.4	100.0
Fruit and nuts	47.8	33.3	9.0	9.9	100.0
Construction material	57.9	12.6	21.9	7.7	100.0
Utensils, handicrafts	61.9	17.9	17.3	2.9	100.0
Religious plant	49.3	15.5	25.0	10.1	100.0
Veterinary medicine	30.3	22.1	31.2	16.4	100.0
Support for climbers	63.5	27.0	9.6	0.0	100.0
Vegetables	17.3	12.7	46.4	23.6	100.0
Fibre and fibre yielding	34.1	23.1	24.2	18.7	100.0
Spices, condiments and other flavorings	40.9	17.1	33.0	9.1	100.0
Insecticides and herbicides	46.4	29.8	19.1	4.8	100.0
Seeds	69.9	15.1	8.2	6.9	100.0
Beverage	50.8	24.6	19.7	4.9	100.0
Ornamentals	42.4	18.6	17.0	22.0	100.0
Fumitory and masticator materials	63.8	13.8	13.8	8.6	100.0
Drying/tanning	62.5	21.4	10.7	5.4	100.0
Soap/cosmetics	38.5	15.4	36.5	9.6	100.0
Exudates	74.5	23.4	2.1	0.0	100.0
Vegetable oils and fats	51.5	27.3	12.1	9.1	100.0
Legumes or pulses	41.4	17.2	13.8	27.6	100.0
Starches and cellulose products	26.9	19.2	23.1	30.8	100.0
Biofuel	68.4	15.8	10.5	5.3	100.0

Source: FRA 2015, social survey

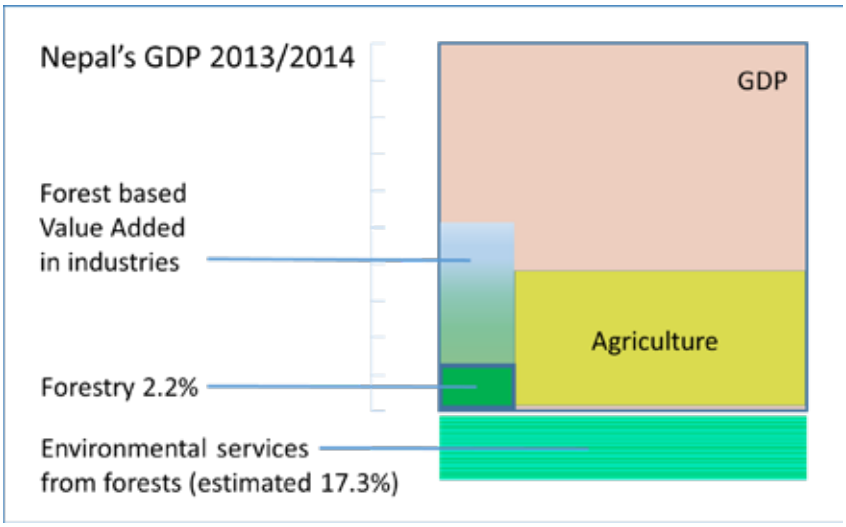
2 VALUE CHAIN AGGREGATE: THE ECONOMIC CONTRIBUTION FROM NEPAL'S FORESTS

Figure 1 illustrates the contribution of forest-based activities in relation to the gross domestic product (GDP) of Nepal. The GDP study commissioned by MSFP recorded that the contribution of activities inside the forests was just 2.2% of the GDP. This, of course, should not be held as the total value that the forest resources are contributing to the economy and the society as a whole. Fortunately, the study also invested much effort in quantifying the contribution of the environmental services provided by forests – and it was concluded that environmental services can be estimated at 17.3% of the GDP, although it should be stressed here that these services are not, as yet, a part of the standard national accounts.

In Nepal, the integration of agriculture, livestock and forestry is an intimate one. Lots of forest biomass is moving towards livestock and agriculture, as fodder, animal bedding and soil improvement material. Thus, it is important not to constrain oneself into a narrow definition of the contribution of forests to rural livelihood and hence GDP. What seems as "forest disturbance" from a forester's point of view, can be excellent sourcing from the point of view of livestock and agriculture. For example, the FRA 2015 found out that cattle grazing in the forests is responsible for disturbance in almost two thirds of the forest area of Nepal. It is clear that the farmers and rural households appreciate forest inputs to their lives and livelihoods considerably more than the foresters. As 83% of the total population of Nepal[1] are in one way or another dependent on agriculture and livestock for their livelihood (a total of 3.83 million households[1], all of whom with land to fertilize and/or livestock to feed, it is very evident, that the positive contribution of forests to GDP remains significantly underestimated.

[1] *GoN Agricultural Census 2011, Central Bureau of Statistics*

Figure 1 Forest-based Contributions in Relation to GDP



Source: MoFSC, MSFP GDP study 2015

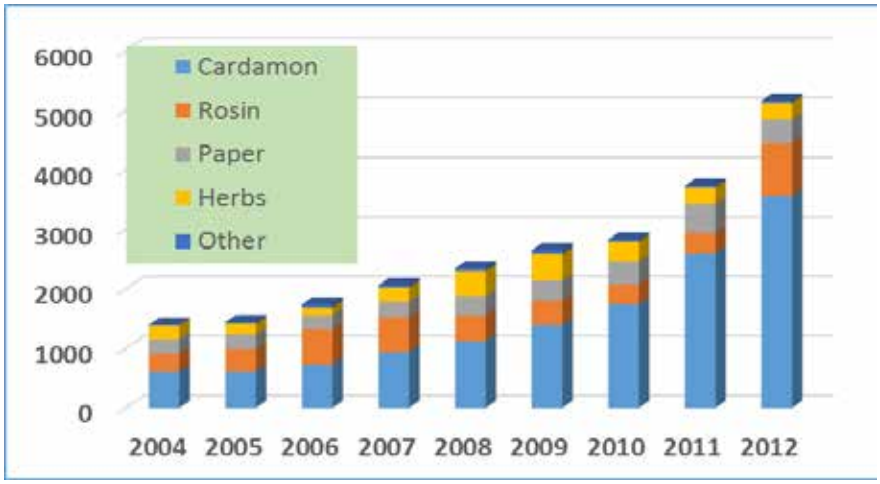
There are no recent nor reliable estimates of forest-based value added in Nepal. Some earlier assessments have estimated the contribution of non-timber forest products (NTFP) at around 5% of GDP. Timber-based economy is likely to have a contribution of roughly the same order of magnitude. The value chain approach here combines all these positive values. If a newly defined GDP including environmental services is used, in terms of the national economy, the total aggregate forest-based value chains cover an estimated 25% of the GDP.

Even if this estimate has an uncertainty around it, it can be taken as a rough indicator of the forests' economic and political importance - even more so, if the challenge of sustainable development is taken seriously. With skillful implementation of the best opportunities in value chain promotion, the forest sector can expand its contribution, at least at the rate of growth of overall GDP, for the coming one or two decades.

Cardamom (see Figure 2) is an excellent example of an internationally well-known and highly valued forest-based product. In this case, the international market demand already has a strong pull effect on the cardamom value chain.

The roots of the value chain, however, are in the local understanding of the qualities of the product, and in the skills of the farmers. As noted in Table 2, however, there are issues in the cultivation efforts - finding a solution to dealing with plant diseases is another opportunity for joint or public effort.

Figure 2 Value of Exports of Some Key NTFP's from Nepal



Source: MoFSC, selected non-timber forest products only: y axis in NRs '000.

The success of international marketing of Nepal's forest-based value chains is not limited to the five products mentioned in Figure 2. Eight additional ones, which have been successfully introduced to India and/or China, are mentioned in Table 2, a summary analysis of the international trade from Nepal's forest-based value chains - see also Tables 16, 17 and 18, which include further indications of international market exposure of Nepal's forest-based products.

Table 2 MSFP's Focus on Some of Nepal's Key Forest-based Value chains

Products	Cultivation	Processing by Community	Market Access
Alaichi (Cardamom)	Cultivation on a medium scale but suffering from the increasing problem of disease	Limited processing but only through the conventional drier and this is not commercially viable from quantity/quality aspects	Mainly India and some in the domestic market

Products	Cultivation	Processing by Community	Market Access
Bael *(Aegle marmelos)*	Limited cultivation with less benefit to the community	Manual processing - lack of technology	Mostly local, some regional and national
Chiraito *(Swertia chirayita)*	Gradually increasing but limited to small areas and patches	No processing (lack of knowledge but use of compressor machine has been introduced)	Mainly **India** and **China**, only some 5% consumed nationally
Satuwa *(Paris polyphylla Smith)*	Possible but no cultivation yet (recently being piloted by a community in Bhojpur district)	No processing yet but traded in the form of raw material	Mainly **China**
Rudraksha *(Elaeocarpus sphaericus)*	Gradually spreading towards the potential areas	Lack of processing at the local level (no local demand) - raw product only supplied	National, **India** and recently **China**
Allo *(Girardinia diversifolia)*	No cultivation (natural growth is sufficient)	Conventional method of processing (but lack of appropriate technology)	Good market niche (local, national and **international** markets)
Amriso (Broomgrass)	Cultivation at a small and medium scale, both in community and private forests	Lack of vertical integration	Local, national and **India**
Lokta *(Daphne Bholua)*	Piloted with low success; in Argheli cultivation is successfully practiced	Lack of technology transfer	Good national and **international** markets
Khair *(Acacia catechu)*	Cultivation done on a medium scale	No processing at the local level (needs significant investment)	National and **India**
Khote Salla *(Chir Pine)*	Some cultivation with limited success	No processing at the local level (needs significant investment)	Some domestic but mostly **India**
Uttis *(Alnus nepalensis)*	Successful cultivation at a medium scale (mainly in private land)	Semi processing but lack of enabling policy environment	Veneer and plywood enterprises
Bans (Bamboo)	Cultivation for only family consumption	Traditional methods of processing but lack of appropriate technology	Good market in both local and national levels

Source: MSFP Cluster 1, RRN 2014

3 MULTIPLE USE VALUE CHAIN NTFP SPECIES

In the Terai, according to the social survey of FRA 2015, the most-used multi-purpose NTFP species was Shorea robusta – with such diverse uses as leaf plates, cups, resin, seed oil and agricultural implements, among others. Other species with multiple uses include *Acacia catechu, Schleichera oleosa, Syzygium cumini, Phyllanthus emblica, Bauhinia vahlii, Asparagus racemosus, Murraya koenigii, Aegle marmelos, Bombax ceiba and Lagerstroemia parviflora.*

As summarized in Table 3, many of the multiple use species are high performers through most of the categories of human need, and respective end-use categories. For example, Chiuri, Khayar, Salla, Bhorla and Asare (local names) are all performing well through all of the categories. One can conclude that the low risk strategy of developing these resource bases should succeed. Of course, there can be threats on the supply side (such as plant disease), which can risk even best market performers. This is the reason why the multiple use value chains need to be complemented by multiple sourcing (multiple species and origins) for each end-use category.

Table 3 Selected Top Multiple Use NTFP Species

Zone	*Scientific name*	Local name	Nutritional	Fodder - cattle	Medicinal	Structural	Fibre, other	Total uses
Chure	*Shorea robusta Gaertn.*	Sal, Sakhuwa, Agrakh, Chimar, Sakhu	5	3	6	3	3	20
Terai	*Shorea robusta Gaertn.*	Sal, Sakhuwa, Agrakh, Chimar, Sakhu	2	2	5	3	2	14
Chure	*Diploknema butyracea (Roxb.) H.J. Lam.*	Chiuri, Mahuwa	7	2	5	2	2	18
Chure	*Acacia catechu (L. f.) Willd.*	Khayar	5	3	4	3	3	16
Terai	*Acacia catechu (L. f.) Willd.*	Khayar	3	1	3	2	1	12
Chure	*Pinus roxburghii Sarg.*	Rani Salla, Khote Salla, Salla, Aule Salla	2	2	4	3	4	15
Chure	*Bauhinia purpurea L.*	Tanki, Rato Koiralo, Koiralo, Kachnar	6	3	1	2	3	15
Chure	*Bauhinia vahlii Wight & Arn*	Bhorla, Balu	4	2	5	2	2	15
Terai	*Bauhinia vahlii Wight & Arn*	Bhorla, Balu	3	2	2	2	2	11
Chure	*Lagerstroemia parviflora Roxb.*	Bot Dhaiyaro, Asare, Sidda, Hade	4	3	3	3	1	14
Chure	*Phoenix humilis Royle ex Becc. & Hook.*	Khajur, Thakal	5	2	1	3	3	14
Chure	*Terminalia alata Heyne ex Roth*	Asna, Saj, Yasal, Sajha, Asan	3	2	6	3	0	14
Chure	*Cleistocalyx operculatus (Roxb.) Meer.*	Kyamuna, Phulepa, Phandir	5	2	3	3	0	13
Chure	*Cassia fistula L.*	Rajbrikshya, Bandar Lathi, Amaltas	4	3	1	3	2	13
Chure	*Careya herbacea Roxb.*	Kumbhi, Kuma, Bodar	1	2	6	3	1	13
Chure	*Bambusa tulda Roxb.*	Tama Bas	3	2	1	3	4	13
Chure	*Phyllanthus emblica Linn.*	Amala, Yabara, Aaura	6	1	2	2	2	13
Terai	*Phyllanthus emblica Linn.*	Amala, Yabara, Aaura	5	1	1	2	2	11
Chure	*Syzygium cumini (L.) Skeels*	Jamuna, Jambu, Phadir, Kalo Jamun	3	3	3	3	1	13

Zone	*Scientific name*	Local name	Nutritional	Fodder - cattle	Medicinal	Structural	Fibre, other	Total uses
Terai	*Syzygium cumini (L.) Skeels*	Jamuna, Jambu, Phadir, Kalo Jamun	4	3	0	2	2	11
Chure	*Sterculia villosa Roxb.*	Odal, Odane, Andal	3	3	2	2	2	12
Terai	*Schleichera oleosa (Lour.)*	Oken Kusum, Gosum, Gausam	4	3	2	2	1	12
Chure	*Schleichera oleosa (Lour.)*	Oken Kusum, Gosum, Gausam	4	2	2	2	1	11
Chure	*Desmodium oojenense (Roxb.) Ohashi*	Sadan, Pandan, Tinkire, Sandan Pipli	2	2	4	3	1	12
Terai	*Asparagus racemosus Willd.*	Satawari, Kurilo, Makuri, Thota	4	2	2	1	2	11
Chure	*Dalbergia sissoo Roxb. ex DC.*	Sisam, Sissoo, Sisawa	2	3	1	3	2	11
Chure	*Bombax ceiba L.*	Simal, Simar	3	2	2	2	2	11
Chure	*Dillenia pentagyna Roxb.*	Tantari, Agai, Chalta	5	2	0	3	1	11
Chure	*Ficus lacor Buch.-Ham.*	Kabhro, Pakadi, Palaksa	4	2	2	2	1	11
Chure	*Ficus semicordata Buch.-Ham. ex Sm.*	Khanya, Khanayo, Khaniyo, Khurhuri	3	2	1	2	3	11
Chure	*Semecarpus anacardium L.*	Bhalayo, Bhela, Kumbha, Kage Bhalayo	2	2	3	2	2	11
Chure	*Thysanolaena maxima (Roxb.) Kuntze*	Amriso, Amliso, Mujo, Gerai, Amreso	2	3	2	2	2	11
Chure	*Trichilia connaroides (Wight & Arn)*	Chaichunge, Singmur, Aankha Taruwa	2	3	2	2	2	11
Chure	*Woodfordia fruticosa (L.) Kurz.*	Dhaiyaro, Dhuinya, Amar Phool	2	3	2	3	1	11
Chure	*Xeromphis spinosa (Thunb) Keay*	Main Kanda, Main Phal, Maidal	3	2	3	3	0	11

Note: number of identified main end uses according to the social survey of the FRA 2015.

4 NUTRITION, FODDER AND MEDICAL VALUE CHAIN NTFP SPECIES

Table 4 summarizes the selected top nutritional value chains, as revealed by the social survey of FRA 2015. Generally, the nutritional species do not have over-arching end use values through all human needs – this, however, is quite understandable as, for example, a plant structure, part and tissue that is good for food, is rarely strong enough for construction.

What can be observed in Table 4 is that the plant with high nutritional value, often has the nutrients stored in various parts, such as having both edible fruit and root. Also, one can implicitly observe a range of nutritional values offered in the same species, such as proteins from nuts, oil, carbohydrates from roots, and nutritional fibres from leaves. It is stressed that Table 4 is just a very shallow surface of the wealth of nutritional values that is commonly used for forest-based food security and alternative sourcing.

Table 5 summarizes the selected top value chains that are relevant for animal husbandry, as fodder, veterinary medicine or bedding (again based on the FRA 2015). As can be observed from the columns of alternative end-uses (and from comparison of Tables 4 and 5), the plants that are nutritious for cattle and animals are often alternative nutrition to humans, and even include some of the same species that are favored as food for humans.

Table 6 summarizes the selected top human medicinal species. Again, it's not a wonder that there is much overlap with the nutritional and fodder, and even veterinary species. Maybe somewhat surprisingly many of the medicinal species have quite favorable structural properties – which can possibly be explained by the presence of herbicides and insecticides which are a part of the plant's natural defense.

Table 4 Selected Top Nutritional Value Chains of NTFP's

Identification of species and zone		Nutritional uses									Alternative uses			
Zone	*Scientific name*	Beverage	Fruit + nut	Legu+ pulse	Seeds	Spice	Oils	Vege-Table	Other food	Total	Cattle	Medicine	Structural	Other
Chure	*Diploknema butyracea (Roxb.) H.J. Lam*	1	1	1	1	1	1	1		7	2	5	2	2
Chure	*Bauhinia purpurea L.*		1	1	1	1	1	1		6	3	1	2	3
Chure	*Phyllanthus emblica Linn.*	1	1		1	1	1	1		6	1	2	2	2
Chure	*Bauhinia malabarica Roxb.*		1	1	1	1	1	1		6	2	1	0	0
Chure	*Shorea robusta Gaertn.*	1	1		1	1	1			5	3	6	3	3
Chure	*Acacia catechu (L. f.) Willd.*	1	1		1	1			1	5	3	4	3	1
Chure	*Phoenix humilis Royle ex Becc. & Hook.*	1	1			1	1	1		5	2	1	3	3
Chure	*Cleistocalyx operculatus (Roxb.) Meer.*	1	1		1	1		1		5	2	3	3	0
Chure	*Dillenia pentagyna Roxb.*	1	1	1		1		1		5	2	0	3	1
Chure	*Spondias pinnata (L. f.) Kurz*		1		1	1	1	1		5	1	3	1	0
Terai	*Phyllanthus emblica Linn.*	1	1		1	1		1		5	1	1	2	2
Chure	*Bauhinia vahlii Wight & Arn*		1	1	1		1			4	2	5	2	2
Chure	*Lagerstroemia parviflora Roxb.*		1			1	1	1		4	3	3	3	1
Chure	*Cassia fistula L.*		1	1	1			1		4	3	1	3	2
Chure	*Ficus lacor Buch.-Ham.*		1		1	1		1		4	2	2	2	1
Chure	*Schleichera oleosa (Lour.)*	1	1			1	1			4	2	2	2	1
Chure	*Asparagus racemosas Willd.*				1	1	1	1		4	2	3	0	1

Identification of species and zone		Nutritional uses									Alternative uses			
Chure	*Toddalia asiatica (L.) Lam.*		1		1	1		1		4	1	3	1	1
Chure	*Bauhinia variegata L.*		1			1	1	1		4	2	3	0	0
Chure	*Madhuca latifolia (Roxb.) Macbride*	1	1		1		1			4	2	2	1	0
Chure	*Pueraria peduncularis (Benth.) Graham*		1	1			1	1		4	1	1	1	1
Chure	*Wrightia arborea (Dennst.) Mabberly*		1	1		1		1		4	1	1	0	2
Chure	*Piper longum L.*		1		1	1		1		4	0	2	0	1
Chure	*Tamarindus indica*	1	1			1		1		4	0	0	1	0
Terai	*Schleichera oleosa (Lour.)*	1	1		1			1		4	3	2	2	1
Terai	*Asparagus racemosus Willd.*		1		1	1		1		4	2	2	1	2
Terai	*Syzygium cumini (L.) Skeels*	1	1			1			1	4	3	0	2	2
Terai	*Aegle marmelos (L.) Correa*	1	1		1	1				4	0	2	2	2

Note: Number of identified main end uses according to the social survey of the FRA 2015

Table 5 Selected Top Animal Husbandry Value Chains of NTFP's

Identification of species and zone		End use in animal husbandry				Alternative uses			
Zone	*Scientific name*	Bedding	Fodder	Animal medicine	Total	Nutrition	Medicine	Structural	Other
Chure	*Bauhinia purpurea L.*	1	1	1	3	6	1	2	3
Chure	*Shorea robusta Gaertn.*	1	1	1	3	5	6	3	3
Chure	*Acacia catechu (L. f.) Willd.*	1	1	1	3	5	4	3	1
Chure	*Lagerstroemia parviflora Roxb.*	1	1	1	3	4	3	3	1
Chure	*Cassia fistula L.*	1	1	1	3	4	1	3	2
Chure	*Syzygium cumini (L.) Skeels*	1	1	1	3	3	3	3	1
Chure	*Sterculia villosa Roxb.*	1	1	1	3	3	2	2	2
Chure	*Dalbergia sissoo Roxb. ex DC.*	1	1	1	3	2	1	3	2
Chure	*Thysanolaena maxima (Roxb.) Kuntze*	1	1	1	3	2	2	2	2
Chure	*Trichilia connaroides (Wight & Arn)*	1	1	1	3	2	2	2	2
Chure	*Woodfordia fruticosa (L.) Kurz.*	1	1	1	3	2	2	3	1
Chure	*Melia azedarach Linn.*	1	1	1	3	2	3	2	0
Chure	*Murraya koenigii (L.) Spreng.*	1	1	1	3	2	4	1	0
Chure	*Spatholobus parviflorus (Roxb.) Kuntze*	1	1	1	3	2	2	1	2
Chure	*Cissus repens Lam.*	1	1	1	3	2	2	1	1
Chure	*Engelhardia spicata Leschen. ex Blume*	1	1	1	3	1	3	2	1

Identification of species and zone		End use in animal husbandry				Alternative uses			
Zone	*Scientific name*	Bedding	Fodder	Animal medicine	Total	Nutrition	Medicine	Structural	Other
Chure	*Urtica dioica L.*	1	1	1	3	1	3	2	0
Chure	*Artemisia dubia Wall. ex Besser*	1	1	1	3	1	3	0	1
Chure	*Justicia adhatoda Linn.*	1	1	1	3	1	3	0	1
Chure	*Colebrookea oppositifolia Sm.*	1	1	1	3	0	2	1	2
Chure	*Garuga pinnata Roxb.*	1	1	1	3	0	3	2	0
Chure	*Artemisia indica Willd.*	1	1	1	3	0	3	0	1
Chure	*Millettia extensa (Benth.) Baker*	1	1	1	3	0	2	1	1
Chure	*Holoptelea integrifolia (Roxb.) Planch.*	1	1	1	3	0	1	2	0
Chure	*Pogostemon benghalensis (Burm. f.)*	1	1	1	3	0	2	0	1
Terai	*Schleichera oleosa (Lour.)*	1	1	1	3	4	2	2	1
Terai	*Syzygium cumini (L.) Skeels*	1	1	1	3	4	0	2	2
Terai	*Murraya koenigii (L.) Spreng.*	1	1	1	3	3	2	2	0
Terai	*Ficus semicordata Buch.-Ham. ex Sm.*	1	1	1	3	2	1	0	0

Note: number of identified main end uses according to the social survey of the FRA 2015

Table 6 Selected Top Medicinal Value chains of NTFP's

Identification of species and zone		End use in medical and related uses							Alternative uses			
Zone	*Scientific name*	Drying + tan.	Exudat-es	Fumi-tory	Insecti-cides	Medi-cines	Cosm -etics	Total	Nutrition	Cattle	Structural	Other
Chure	*Shorea robusta Gaertn.*	1	1	1	1	1	1	6	5	3	3	3
Chure	*Terminalia alata Heyne ex Roth*	1	1	1	1	1	1	6	3	2	3	0
Chure	*Careya herbacea Roxb.*	1	1	1	1	1	1	6	1	2	3	1
Chure	*Diploknema butyracea (Roxb.) H.J. Lam.*		1	1	1	1	1	5	7	2	2	2
Chure	*Bauhinia vahlii Wight & Arn*	1	1	1	1	1		5	4	2	2	2
Terai	*Shorea robusta Gaertn.*	1	1	1		1	1	5	2	2	3	2
Chure	*Acacia catechu (L. f.) Willd.*	1	1	1		1		4	5	3	3	1
Chure	*Pinus roxburghii Sarg.*	1	1	1		1		4	2	2	3	4
Chure	*Desmodium oojenense (Roxb.) Ohashi*	1	1		1	1		4	2	2	3	1
Chure	*Murraya koenigii (L.) Spreng.*			1	1	1	1	4	2	3	1	0
Chure	*MAllotus philippensis (Lam.) Mull.- Arg.*	1		1		1	1	4	1	2	2	0
Chure	*Psidium guajava Linn.*	1		1	1	1		4	1	1	1	1
Terai	*Piper longum L.*		1	1		1	1	4	1	1	1	1
Chure	*Lagerstroemia parviflora Roxb.*		1		1	1		3	4	3	3	1
Chure	*Syzygium cumini (L.) Skeels*	1			1	1		3	3	3	3	1
Chure	*Cleistocalyx operculatus (Roxb.) Meer.*	1		1		1		3	5	2	3	0
Terai	*Acacia catechu (L. f.) Willd.*	1	1		1			3	3	1	2	3

Identification of species and zone		End use in medical and related uses							Alternative uses			
Zone	*Scientific name*	Drying + tan.	Exudat-es	Fumi-tory	Insecti-cides	Medi-cines	Cosm -etics	Total	Nutrition	Cattle	Structural	Other
Chure	*Xeromphis spinosa (Thunb) Keay*				1	1	1	3	3	2	3	0
Chure	*Semecarpus anacardium L.*		1		1	1		3	2	2	2	2
Chure	*Melia azedarach Linn.*		1		1	1		3	2	3	2	0
Chure	*Engelhardia spicata Leschen. ex Blume*			1	1	1		3	1	3	2	1
Chure	*Asparagus racemosas Willd. racemosus*				1	1	1	3	4	2	0	1
Chure	*Azadirachta indica A. Juss.*				1	1	1	3	3	2	1	1
Chure	*Castanopsis indica (Roxb.) Miq.*	1	1	1				3	2	2	3	0
Chure	*Spondias pinnata (L.f.) Kurz*			1	1	1		3	5	1	1	0
Chure	*Toddalia asiatica (L.) Lam.*				1	1	1	3	4	1	1	1
Chure	*Urtica dioica L.*			1	1	1		3	1	3	2	0
Chure	*Bauhinia variegata L.*		1			1	1	3	4	2	0	0
Chure	*Ficus racemosa L.*	1	1			1		3	3	2	0	1
Chure	*Aegle marmelos (L.) Correa*	1	1			1		3	2	2	1	1
Chure	*Sapium insigne (Royle) benth. Ex Hook. f.*		1		1	1		3	1	2	3	0
Terai	*Butea monosperma (Lam.) Kuntze*	1		1		1		3	3	2	0	1
Chure	*Artemisia dubia Wall. ex Besser*		1		1	1		3	1	3	0	1
Chure	*Justicia adhatoda Linn.*			1	1	1		3	1	3	0	1
Chure	*Garuga pinnata Roxb.*	1	1			1		3	0	3	2	0

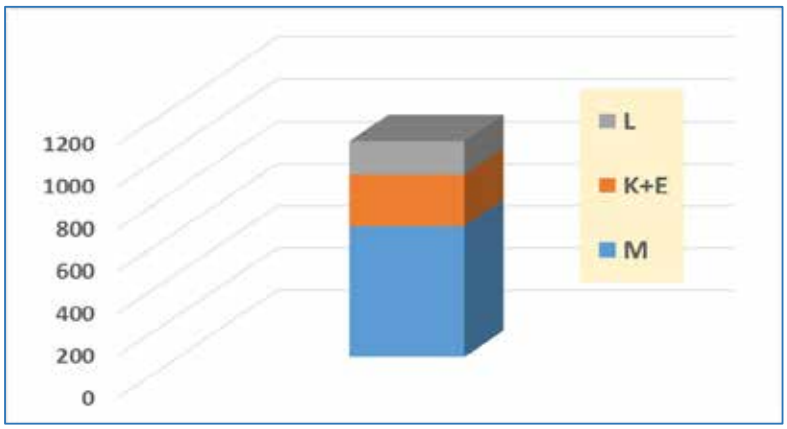
Note: number of identified main end uses according to the social survey of the FRA 2015

5 CONSTRUCTION VALUE CHAIN SPECIES

Nepal is a net importer of wood and timber products. It's more relevant to judge the marketability of wood products according to domestic end-use. Supply should be expanded to meet domestic demand, by applying active SFM practices.

This section reviews the value chains for various timber species (see Tables 7 and 8). For example, Figure 3 illustrates the estimated value and factor shares of Sal *(Shorea robusta)* sawnwood value chain in the year 2012. The internationally comparable market price was estimated at just above 1,000 USD per cubic meter in Kathmandu. This is a rather high price, and well reflects the market situation and the supply constraints; these include an inefficient value chain and a number of policy hurdles, and barriers to trade.

Figure 3 The Financial Value Chain of Sal Timber (USD per m3)



Note: factor shares of labor (L), capital, energy (K+E), and raw material (logs, M), based on Kanel 2012

An attempt was made in Figure 3 to regroup the factor cost shares to labor, capital, energy and raw material, respectively. Even with the inefficiency of the value chain, the resource rent, due to stumpage for the roundwood from the forest, is the largest cost item, and forms clearly over a half of the total cost. The factor shares paid for labor in different stages of the value chain, are key items to be negotiated when the value chain is upgraded to a more transparent one. The same applies to the payment to capital, and to energy. In addition, the share of the resource rent (stumpage fee and taxes to GoN) is a key parameter to observe. From the SFM point of view, one of the key issues is how much of the resource rent is collected, and how much is invested back to SFM.

For some of the most appreciated species (see Table 7), both the market price, and the stumpage rent capture is even higher than for Sal. Kanel 2012 indicates that the market price for Sissoo *(Dalbergia sissoo)* was 32% higher than that for Sal. On the other hand, some useful but somewhat less appreciated species, such as Asna *(Terminalia alata)* had 50% lower market prices compared to Sal.

Table 7 Selected Top Construction Wood Value Chains

Identification of species and zone		End use in construction				Alternative uses			
Zone	*Scientific name*	Utencils	Construct	Support	Total	Nutrition	Cattle	Medicine	Other
Chure	*Shorea robusta Gaertn.*	1	1	1	3	5	3	6	3
Chure	*Terminalia alata Heyne ex Roth*	1	1	1	3	5	3	4	1
Chure	*Careya herbacea Roxb.*	1	1	1	3	2	2	4	4
Chure	*Diploknema butyracea (Roxb.) H.J. Lam.*	1	1	1	3	3	2	6	0
Chure	*Bauhinia vahlii Wight & Arn*	1	1	1	3	2	2	5	2
Terai	*Shorea robusta Gaertn.*	1	1	1	3	4	3	3	1
Chure	*Acacia catechu (L. f.) Willd.*	1	1	1	3	5	2	1	3
Chure	*Pinus roxburghii Sarg.*	1	1	1	3	1	2	6	1
Chure	*Desmodium oojenense (Roxb.) Ohashi*	1	1	1	3	3	3	3	1
Chure	*Murraya koenigii (L.) Spreng.*	1	1	1	3	5	2	3	0
Chure	*MAllotus philippensis (Lam.) Mull. Arg.*	1	1	1	3	4	3	1	2
Chure	*Psidium guajava Linn.*	1	1	1	3	3	2	1	4
Terai	*Piper longum L.*	1	1	1	3	2	2	4	1
Chure	*Lagerstroemia parviflora Roxb.*	1	1	1	3	3	2	3	0
Chure	*Syzygium cumini (L.) Skeels*	1	1	1	3	2	3	2	1
Chure	*Cleistocalyx operculatus (Roxb.) Meer.*	1	1	1	3	2	3	1	2
Terai	*Acacia catechu (L. f.) Willd.*	1	1	1	3	5	2	0	1
Chure	*Xeromphis spinosa (Thunb) Keay*	1	1	1	3	2	2	3	0
Chure	*Semecarpus anacardium L.*	1	1	1	3	3	2	2	0
Chure	*Melia azedarach Linn.*	1	1	1	3	1	2	3	0
Chure	*Engelhardia spicata Leschen. ex Blume*	1	1	1	3	2	2	2	0
Chure	*Asparagus racemosas Willd. racemosus*	1	1	1	3	1	2	2	1

Identification of species and zone		End use in construction				Alternative uses			
Zone	*Scientific name*	Utencils	Construct	Support	Total	Nutrition	Cattle	Medicine	Other
Chure	*Azadirachta indica A. Juss.*	1	1	1	3	2	2	1	1
Chure	*Castanopsis indica (Roxb.) Miq.*	1	1	1	3	1	1	0	4
Chure	*Spondias pinnata (L.f.) Kurz*	1	1	1	3	0	2	2	1
Chure	*Toddalia asiatica (L.) Lam.*	1	1	1	3	0	2	2	1
Chure	*Bauhinia variegata L.*	1	1	1	3	0	2	1	2
Chure	*Ficus racemosa L.*	1	1	1	3	2	2	1	0
Chure	*Aegle marmelos (L.) Correa*	1	1	1	3	3	1	0	1
Chure	*Sapium insigne (Royle) benth. Ex Hook. f.*	1	1	1	3	2	1	0	2
Terai	*Butea monosperma (Lam.) Kuntze*	1	1	1	3	1	2	0	2
Chure	*Artemisia dubia Wall. ex Besser*	1	1	1	3	5	3	6	3
Chure	*Justicia adhatoda Linn.*	1	1	1	3	5	3	4	1
Chure	*Garuga pinnata Roxb.*	1	1	1	3	2	2	4	4

Note: the number of identified main end uses according to the social survey (FRA 2015)

Table 8 Selected Top Value chains for Other End Uses, including Fibre

Identification of species and zone		Other end uses					Alternative uses			
Zone	Scientific name	Fibre	Energy	Ornament	Religious	Others	Nutrition	Animals	Medicine	Construct.
Chure	*Eulaliopsis binata (Retz.) C.E. Hubbard*	2	0	0	1	3	2	2	1	2
Chure	*Aegle marmelos (L.) Correa*	0	0	1	1	2	4	0	2	2
Chure	*Anthocephalus chinensis (Lam.) A. Rich.*	0	1	1	0	2	3	2	1	2
Chure	*Spatholobus parviflorus (Roxb.) Kuntze*	1	1	0	0	2	2	3	2	1
Chure	*Bombax ceiba L.*	1	0	0	1	2	1	2	2	2
Terai	*Dioscorea bulbifera L.*	2	0	0	0	2	3	2	2	0
Chure	*Ficus auriculata Lour.*	1	0	0	1	2	2	2	2	1
Chure	*Terminalia bellirica (Gaertn.) Roxb.*	1	1	0	0	2	3	2	1	1
Chure	*Boehmeria rugulosa Wedd.*	1	0	1	0	2	2	1	1	2
Chure	*Colebrookea oppositifolia Sm.*	0	0	1	1	2	0	3	2	1
Chure	*Dioscorea deltoidea Wall. ex Griseb.*	2	0	0	0	2	3	1	2	0
Chure	*Ficus benghalensis Linn.*	0	0	1	1	2	2	2	2	0
Terai	*Imperata cylindrica (L.) P. Beauv.*	1	0	0	1	2	0	2	1	3
Chure	*Mangifera indica Linn.*	0	0	1	1	2	3	1	2	0
Chure	*Smilax ovalifolia Roxb. ex D. Don*	1	0	0	1	2	2	2	2	0
Chure	*Wrightia arborea (Dennst.) Mabberly*	0	0	1	1	2	4	1	1	0
Terai	*Calotropis gigantea (L.) Dryand.*	1	0	0	1	2	1	1	3	0
Chure	*Ficus religiosa L.*	0	0	1	1	2	2	1	2	0
Chure	*Ficus religiosa L.*	0	0	1	1	2	1	2	2	0
Chure	*Tinospora sinensis (Lour.) Merr.*	1	0	0	1	2	1	2	2	0
Chure	*Acer oblongum Wall. ex DC.*	2	0	0	0	2	0	2	1	1
Chure	*Dioscorea pentaphylla L.*	2	0	0	0	2	2	1	0	0

Note: the number of identified main end uses according to the social survey (FRA 2015)

Table 9 Selected Tree Species with Availability, Altitude and Market Exposure

Local name	Scientific name	Volume	Low (m)	High (m)	Known	Exposure
Sal	*Shorea robusta*	19.28%	100	1500	79%	38%
Oak	*Quercus spp.*	14.80%	1500	3900	87%	36%
Khote Salla	*Pinus roxburghii*	7.05%	400	2700	34%	33%
Laliguras	*Rhododendron spp.*	5.27%	1200	4000	90%	2%
Asna	*Terminalia alata*	4.67%	200	1400	51%	19%
Bunge salla	*Abies spp.*	4.59%	2000	4400	94%	2%
Gobre Salla	*Pinus wallichiana*	3.75%	1800	4300	35%	36%
Uttis	*Alnus nepalensis*	3.56%	500	3000	33%	35%
Thingure salla	*Tsuga dumosa*	3.48%	2100	3600	60%	3%
Chilaune	*Schima wallichii*	2.66%	200	2100	54%	49%
Dhale katus	*Castanopsis indica*	1.73%	450	2300	40%	31%
Bhoj patra	*Betula utilis*	1.61%	2500	4000	75%	4%
Angeri	*Lyonia ovalifolia*	1.43%	1300	3300	53%	4%
Jhunde salla	*Picea smithiana*	1.43%	2400	3600	58%	2%
Jamun	*Syzygium cumini*	1.10%	100	1800	72%	15%
Bot Dhaiyanro	*Lagerstroemia parviflora*	1.06%	100	1000	74%	2%
Phirphire	*Acer spp.*	1.00%	2000	3600	89%	2%
Banghi	*Anogeissus latifolia*	0.98%	100	1200	43%	3%
Acar	*Buchanania latifolia*	0.75%	100	1400	46%	4%
Sindhure	*Mallotus philippensis*	0.73%	100	1000	55%	2%
Sandan	*Desmodium oojenese*	0.69%	100	1000	32%	2%
Bhalayo	*Semecarpus anacardium*	0.68%	100	1000	64%	2%
Jhingat	*Lannea coromandelica*	0.63%	100	1400	57%	2%
Khirra	*Falconeria insignis*	0.54%	100	1000	51%	17%
Haldu	*Haldina cordifolia*	0.53%	100	800	55%	7%
Barro	*Terminalia bellirica*	0.45%	100	1100	53%	2%
Rudraksha	*Eleocarpus sphaericus*	0.00%	100	2000	72%	74%
Lokta	*Daphne bholua*	0.00%	1500	4000	54%	45%
Khayar	*Acacia catechu*	0.00%	100	1400	49%	38%
Simal	*Bombax ceiba*	0.00%	500	1100	55%	25%
Sissoo	*Dalbergia sissoo*	0.00%	150	1500	83%	18%
Devdaru	*Cedrus deodara*	0.00%	600	3000	62%	15%
Champ	*Michelia champaca*	0.00%	500	1600	54%	12%
Masala	*Eucalyptus spp.*	0.00%	200	2500	94%	5%
Sagawan	*Tectona grandis*	0.00%	100	1000	87%	2%
Lahare pipal	*Populus spp.*	0.00%	300	3000	82%	2%

Note 1: volume based on FRA; data under 1% derives from a MSFP estimate, based on frequency count;
Note 2: minimum and maximum growing altitude range, from a number of sources, indicative only;
Note 3: known in the international market, based on internet frequency; same for Nepal's exposure.

However, the most important conclusion is that there is a wide continuum of construction timber species, with a continuum of wood properties to cover a wide range of end-uses. Table 7 presents over 30 species much appreciated as construction species and as raw material of utensils and handicraft. However, this is only the surface, as at least 200 of the species available have technical characteristics which fit as wood for these purposes.

Table 8 gives a summary of the selected wood species from the demand point of view. Table 9 provides a ranking by volume, according to the potential availability, measured by estimated volume of stem wood in Nepal's forests. Table 9 also makes an attempt to indicate how well the timber species are known in the international market place and how frequently Nepal has been mentioned in the context (an index based on the number of internet references has been used as a proxy). Tables 16, 17 and 18 give similar estimates for NTFP's.

The demand for construction timber and other wood raw material is quite high and on the increase. The market, and the timber value chains are squeezed by supply constraints. In very broad terms, the problem and the issue is the lack of sustainable forest management. Active harvesting and regeneration for timber supply has not been Allowed in most of Nepal's forests, and have been practiced only on a pilot scale. It may be very wise to keep conservation as the primary target, but overall value would be enhanced by dedicating a portion of the forest area for active timber management, resulting in increased tree growth and higher value.

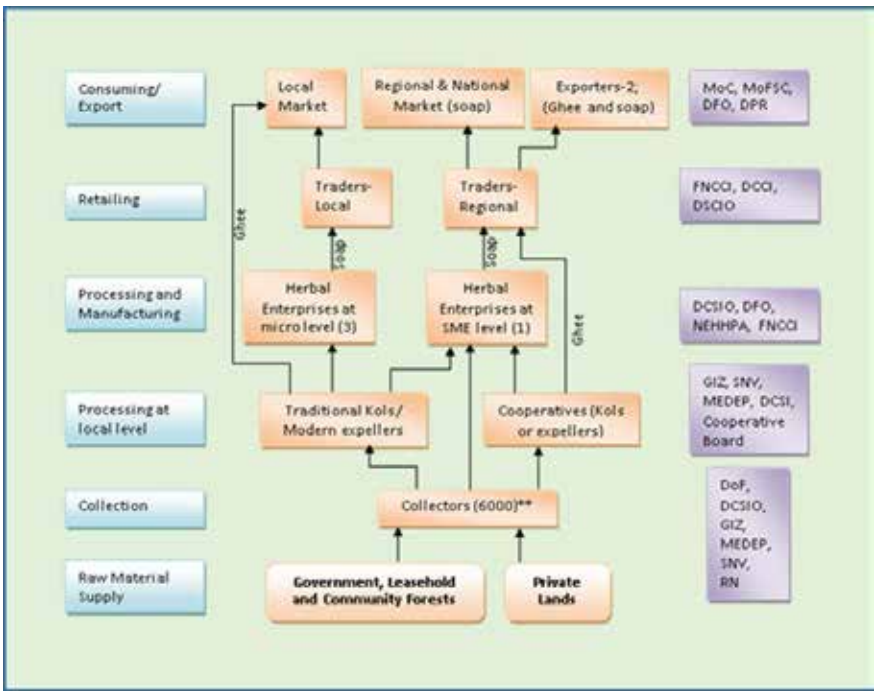
6 VALUE CHAIN CASE STUDIES

Four case studies are presented in this section to illustrate the potential for the production and marketing of various products through the value chain approach.

6.1 The Case of Chiuri

Chiuri, the Nepalese Butter Tree, *Diploknema butyracea* (Roxb.) H.J. Lam, is a multipurpose tree. In the list of multipurpose species (Table 3), it was the second most used multipurpose species. The social survey of FRA 2015 identified 18 uses for it in the Chure zone. Of those uses, 7 were nutritional and 6 were medicinal (including cosmetic and pharmaceutical uses). Indeed, in the list of nutritional value uses (Table 4), Chiuri comes on top of the list, and in the list of indicative medicinal value uses (Table 6) Chiuri is in fourth place.

Here Chiuri is presented as an example of a medicinal and pharmaceutical value chain. It is mostly collected from community forests and GoN managed forest, but some also from private forests. It is known that Chiuri trees are found in about 50 of Nepal's 75 districts. Figure 4 illustrates the mapping of the value chain of Chiuri.



Source: MSFP Cluster 5, Rupantaran:

** Collectors either process themselves, or sell the seeds to village level traders who process or sell to cooperatives.

Figure 4 Value Chain Map of Chiuri

Typical target markets for Chiuri, (i.e. processing industries for final consumer products), are the following:

- Soap companies estimated use 1,080 mt
- Monasteries and temples estimated use 120 mt
- Cosmetic companies estimated use 100 mt
- Exports for cosmetics estimated use 240 mt.

Figure 5 illustrates the stages of Chiuri processing.

A case study (GIZ 2014) estimated that in three study districts, Dang, Pyuthan and Surkhet, the current area occupied by Chiuri in a mixed forest is about 1,900 hectares, but this could potentially be expanded by 2 to 3 times.

Figure 5 Chiuri, an Example of Processing in Value Chain

Source: GIZ 2014

MSFP included specific work on Chiuri in two of its six clusters: in cluster 4 in the western region, and in cluster 5 in the mid-western region. These have been documented by the Implementing Agencies, LiBird in cluster 4, and Rupantaran in cluster 5.

In MSFP cluster 5, the Chiuri study area covered Rolpa, Rukum, Pyuthan, Dang and Salyan districts. Rolpa district was estimated to produce over 5,000 tonnes of Chiuri seeds in a year, and Rukum 4,700 tonnes of seeds. The five

districts were estimated to produce a total of about 23,000 tonnes of Chiuri seed; this volume converts to about 9,000 tonnes of Chiuri butter (see Table 10).

Box 1 documents both the struggles in establishing a small manufacturing unit for Chiuri butter, but also the potential for employment, income generation and export.

Box 1 Small Beginnings - a Chiuri Enterprise in Surkhet

Chiuri (*Diploknema butyracea*) grows at altitudes of between 500 and 1400 m in natural forest areas of Nepal. Fruiting occurs in June-July and seed is used to extract ghee which has excellent cosmetic properties. The traditional approach for expelling Chiuri oil is time and labour consuming. MSFP and its partners made great efforts in 2014 and 2015 to source an efficient machine for expelling the oil; a machine previously imported from India for mustard oil extraction, jammed after a week when used for Chiuri due to the thick and highly viscous nature of the oil.

The Deuti Herbal Industry (DHI), established in 2012 and run by a cooperative in Surkhet, was most interested in the potential for Chiuri but suffered for years because of the lack of efficient machinery. Sundar Nepal, MSFP's local implementing partner, became keenly involved in the search for a suitable Chiuri expeller together with the Himalayan Bio-Trade Pvt Ltd (HBTL). A suitable Chiuri expeller was eventually sourced, imported from China, blockaded

▲ *Dried Chiuri seed ready for oil extraction*

▲ *Lip Balm prepared by HBTL with Chiuri oil from DHI*

▲ *Dryer for the Chiuri seed provided by MSFP*

on the Indian-Nepal border for 4 months, but finally installed in February 2016. The new machine successfully expelled oil from Chiuri seeds without a problem and produced quality ghee.

Impacts:

- 45 tonnes of Chiuri seed were collected in the summer of 2015 (mostly in July and August) in Surkhet by poor householders of the community forest user groups, earning between NRs. 30 and 40 per kg of collected seed – this was seed collection at a much bigger scale than ever before in the district;
- a solar dryer has helped to dry the seeds quickly and this avoids a common summer time fungus problem in the collected seed;
- a long term business partnership between DHI and the HBTL has been established; HBTL have guaranteed to purchase 5 tonnes of Chiuri ghee per annum;
- HBTL has sent a sample of the Chiuri ghee from Surkhet for testing in Europe, and the ghee was approved for export to France and Germany; 5 tonnes of the Chiuri ghee from Surkhet have already been exported;
- the collection, processing and production of Chiuri ghee has created good local job opportunities.

The following support was provided by MSFP through Sundar Nepal:

- training and awareness raising on the Chiuri subsector, the value chain development approach, good collection/harvesting practices, organic certification, enterprise development, forest governance and GESI principles;
- the establishment of a 9-panel solar dryer house for the efficient treatment of the Chiuri seed, and provision of packaging materials;
- organization of meetings with financial institutions and potential buyers;
- facilitated the sourcing of the expeller machine, and the buy-back guarantee agreement between HBTL and DHI.

Table 10 Chiuri: Estimates of Various Products from the Tree (in tonnes)

District	Fruits	Seeds	Butter	Honey
Dang	18,178	4,545	1,788	856
Pyuthan	18,585	4,646	1,828	875
Rolpa	20,966	5,242	2,063	987
Rukum	18,812	4,703	1,851	886
Salyan	15,439	3,860	1,519	727
Total	**91,980**	**22,996**	**9,049**	**4,331**

Source: MSFP Cluster 5, Rupantaran 2014

Table 11 summarizes the estimates of income, cost, and profitability of subsequent steps in the Chiuri production process.

Table 11 Chiuri - a financial view of the value chain

Actors	Buying Price (NRP)	Value Added Cost (NRP)	Cost of Production (NRP)	Selling Price (NRP)	Profit (NRP)
Collector 1 kg seeds				25	
Trader 1 kg seeds	25	8	32.8	40	7
Processor (modern) * 1 kg ghee	100	16	116	160	44
Processor (traditional) ** 1 kg ghee	120	10	130	160	30
Manufacturer *** of soap	187	22	209	375	166
Wholesale/ retail 1 kg soap	375	5	380	625	245

Source: GIZ 2013

* 2.5 kg seeds are required to process one kilogram of ghee from a modern expeller machine

** 3 kg seeds are required to process one kilogram of ghee from a traditional expeller machine

*** Cost of raw materials including Chiuri ghee (220 g @ Rs 160 per kg).

Finally, but not least, as is customary in value chain studies, the MSFP case study prescribes the upgrading procedures for Chiuri. In the case of MSFP Cluster 5, the following is included in the detailed documentation:

- Product upgrading
- Process upgrading
- Channel upgrading
- Functional upgrading
- Trans sectoral upgrading
- Interfirm upgrading.

6.2 The Case of Uttis

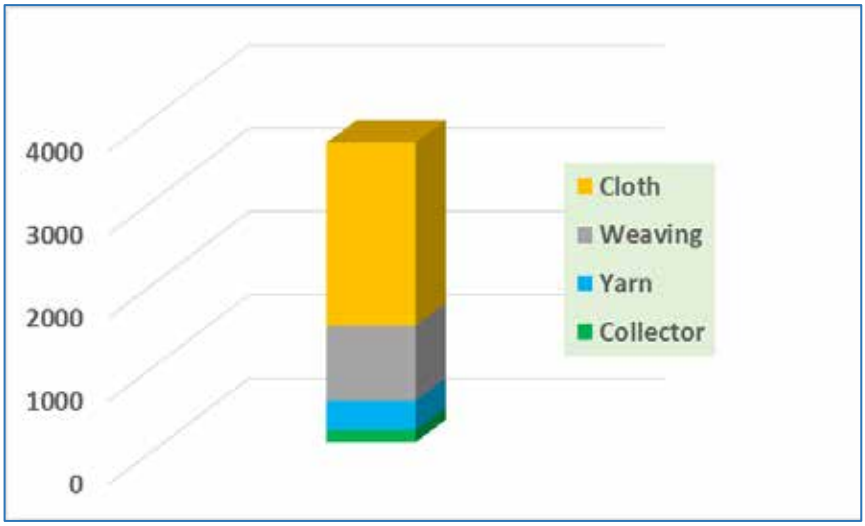
The Nepalese Alder (Alnus nepalensis) is number eight in Nepal, measured by the assessed volume of stem wood, having 3.56% of the total stem wood volume of Nepal's forests (see Table 9). That is a remarkable volume, and the species has remarkable characteristics. It has a biological adaptation to a wide range of conditions, and a wide indicative altitude range from 500 m to 3,000 m. One genetic characteristic is its ability to fix atmospheric nitrogen.

Uttis is a fast growing species as well, and is used for multiple household uses, including as fodder for cattle. Much of this use is non-market subsistence use by households. Because of these characteristics it has been selected as one of the key species to be promoted (see Table 2), the main reasons for which are the successful cultivation of Uttis on a small to medium scale (mainly on private land) and its use in veneer and plywood production.

6.3 The Case of Allo Fibre

Allo, *Girardinia diversifolia,* or Himalayan Nettle, was not identified in the FRA 2015 data as published in its social survey, and there may be a good explanation for this. On the global list of plants, there are 25 scientific name synonyms for this plant. Also the common stinging nettle *Urtica dioica,* which is recognized by the FRA user survey, is somewhat similar in characteristics, and also in fibre and nutritional uses. All five MSFP Clusters, which have done explicit work on value chains, have included Allo in their case studies and promotion. Figure 6 illustrates the financial value chain of Allo, and Figure 7 illustrates the mapping of the Allo value chain. The national production of Allo thread has been estimated to be around 1,800 tons per year (MEDEP 2010), and approximately 50% of the production is consumed within Nepal, with the other half being exported. Exports of Allo clothes, worth almost NRs 5 million has been reported for the years 2012 and 2013.

Figure 6 Financial Value chain of Allo Cloth



Source: MSFP, RRN 2014. Indicative value (in NPR) of one kg of readymade Allo cloth.

Allo goods have become a part of the successful export of Nepali handicrafts. Other products of this group include wool and pashmina and felt products, as well as cotton, silk products and hemp goods. Table 12 summarizes some of the key recommendations, which arose during the consultations by MSFP. Detailed documentation has been provided by four of MSFP's implementing partners, Li-Bird, Rupantaran Nepal, ECARDS and Rural Reconstruction Nepal, and their publications are included in the MSFP knowledge products.

Much of the spinning of Allo into thread is undertaken at the household level on a very small scale, as illustrated in the case study from Dailekh in Box 2.

Box 2 Spinning an Income - slowly transforming a Magar community through Allo Processing

The Jharana community forest user group (CFUG) in Dwari VDC, Dailekh District was established 8 years ago and most members belong to the Magar community. After a period of dormancy, MSFP, its implementing partner, the Everest Club, and the District Forest Office revived the group and assisted the CFUG to renew their operational plan.

In 2013, MSFP provided 70 Allo spinning machines to the group, as well as skills development training in the new machinery;. "The new machine can spin better quality thread and increase production, but they still use Taku (traditional local spinning equipment) during their spare time when grazing their livestock – this shows their dependence on the benefits of Allo thread as an income generator" - according to Kul Bahadur Roka, Chairperson of the Jharana CFUG.

All female trainees now produce a regular supply of Allo thread throughout the year, as there is sufficient Allo found in the local community and private forests – and as the income of women increases, their voice has become louder. The story of two of the women who received the skills training follow.

Kamala Pun lives with her husband and 2 children in Dwari VDC. She tells that it is much easier to spin Allo thread with the new machines than using the Taku; with the Taku, she produced 100 gm/day of spun thread, with the machine this has increased to 500 gm per day. Kamala, who spins in her spare time and whose daughter sometimes helps her, is able to sell 5 kg in a month. Local traders buy thread in her village at NRs 500/kg, thus she earns an average of NRs 2,500/month, which she uses for clothes, food and the children's education. Kamala wants further training especially in weaving clothes from Allo thread, and is sad to hear the MSFP will be closing down, as she is ever grateful to MSFP and the Everest Club for the assistance provided.

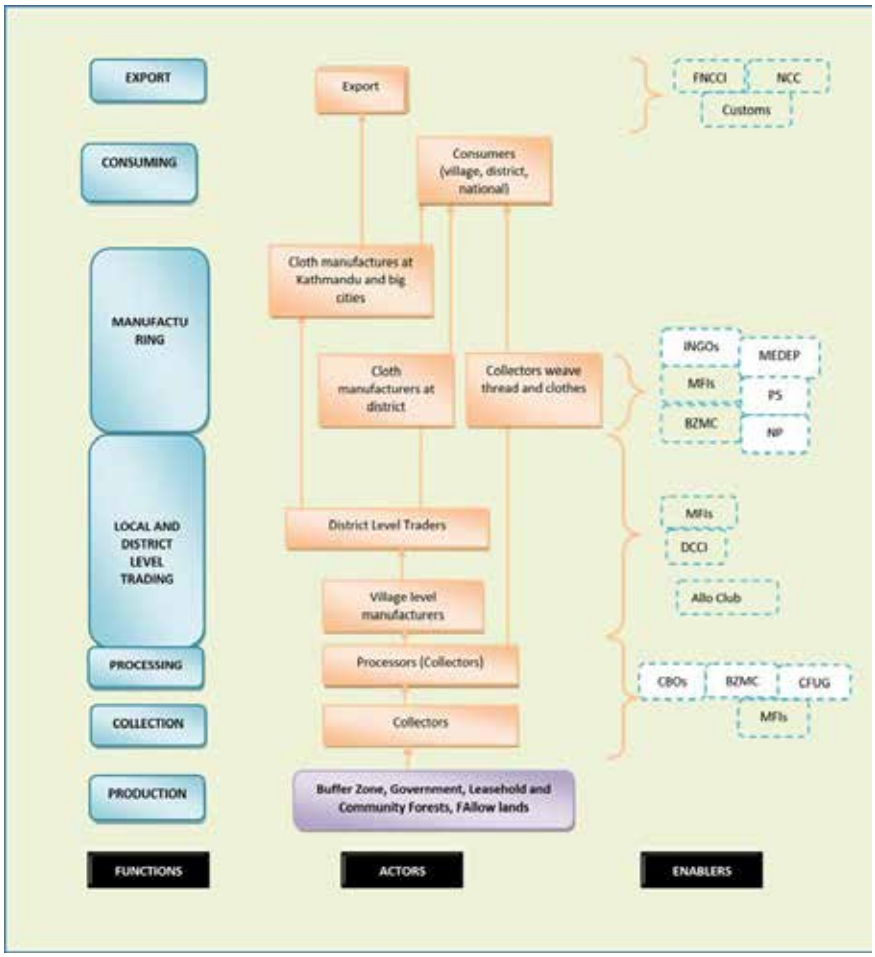
Amrita Pun is 29 years old, and also lives in Dwari VDC together with her husband and two daughters. They have 4 sheep, being raised by her husband. She also agrees that it is much easier and faster to spin the Allo thread with the new machine, adds that it also improves the quality of thread, and says that it has doubled her production to 5 to 6 kg/month. She collects the Allo from their private land as well as the community forest, and says her income is now more than her husbands. She too requests further technical training support from MSFP in knitting clothes from Allo thread, and is sad to hear that the Programme is closing.

The Dailekh DFO plans to develop several VDCs, including Dwari, as a production area for Allo and herbs, but recognizes that most of the people require much more technical, business management and marketing training.

▲ *Kamala Pun (left) and Amrita Pun at work with the new spinning machine*

The women illustrated above in Box 2 are the collectors (see Figures 7 and 8) and processors, and may evolve, with further support, into village level manufacturers – see Figure 7. However, their knowledge of the whole value chain is not likely to be extensive.

Figure 7 Value Chain Map of Allo



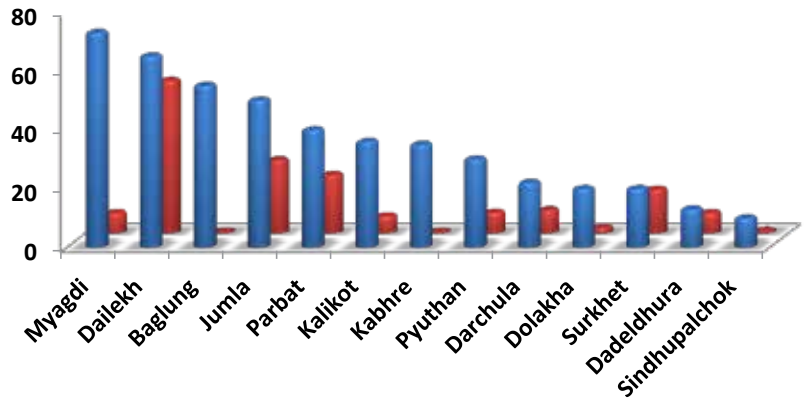
Source: MSFP, RRN 2014.

Table 12 Selected Upgrading Recommendations for the Allo Value Chain

Products	Diversification of Allo product making (through sub-contracting and skill transfer). Technology transfer for making coarse fibre.
Functions	Skill and function transfer to downward actors such as Allo product making from existing thread producers.
Channels	Strengthen existing channels and facilitate road transport for Allo products trade to Kathmandu and other market centers.
Inter-sector	Cultivation and collection of other forest products such as Chiraito , Argeli along with Allo.
Inter-firm	Alliance between exporters and Allo product producers group for sub-contracting
Services	■ Provision of market information system ■ Research on cultivation ■ Orientation on legal processes on collection.
Business environment	Facilitate collection of Allo from buffer zones and protected areas (paradigm shift in protected areas).

Source: MSFP, RRN 2014

Figure 8 Estimated Potential Supply and Actual Collection of Allo, by District



Source: MSFP Cluster 4, LIBIRD 2014 (blue = supply, red = collection)

6.4 The Case of the Bamboos

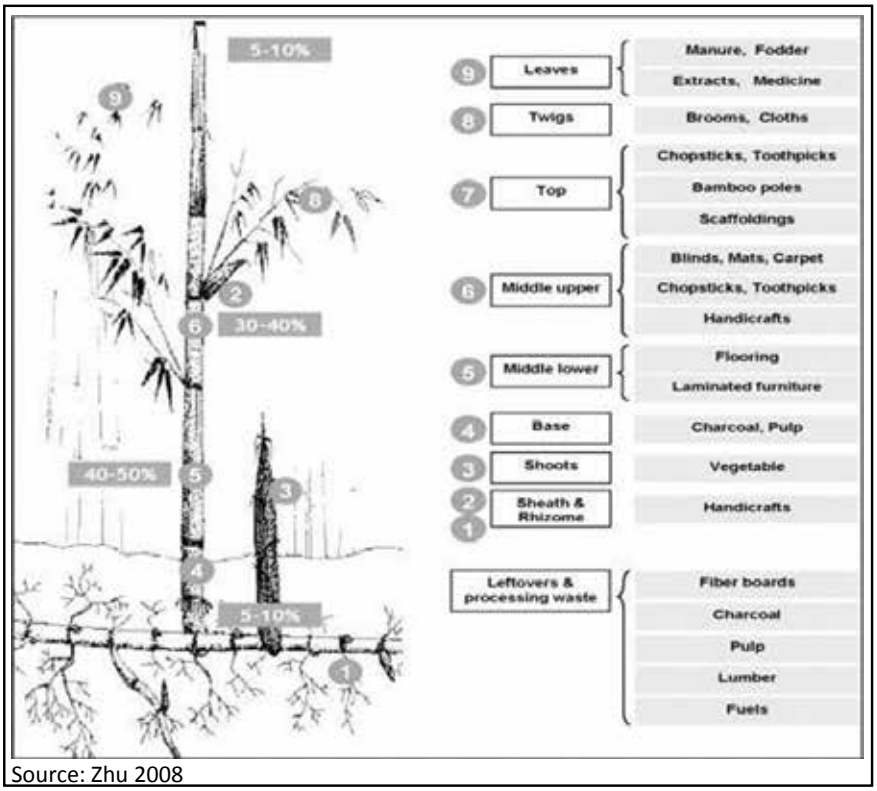
Nepal has over 50 bamboo species, and some sources indicate over 70. They have a wide range of properties, and a wide range of uses as well (see Figure 9). Table 13 indicates typical end uses for the main species, and Table 14 reports frequency of use, as reported by the FRA 2015 social survey. Table 15 presents a wider list of bamboos by typical uses and indicating an approximate range of altitudes in which they typically grow.

Table 13 Most Common Bamboo Species in Nepal

Bambusa balcoa	Dhanu Bans	Scaffolding, storage, fence, roofing
Bambusa tulda	Taru Bans	Basket, weaving, scaffolding
Bambusa nutans	Mal Bans	Construction, bridges
Bambusa arundinacea	Kante Bans	Construction, buildings
Dendrocalamus hamiltonii	Choya Bans	Nutrition, weaving
Dendrocalamus hookerii	Kalo Bans	Fodder, construction, weaving
Dendrocalamus strictus	Kaban Bans	Construction, support
Dendrocalamus patellaris	Lyas Bans	Weaving, utensils
Dendrocalamus giganteus	Dhungre Bans	Construction, containers, weaving
Drepanostachyam spp.	Nigalo Bans	Fodder, weaving, construction
Oxytenanthera spp.	Koraincho Bans	Construction, fencing, weaving
Thamanocalamus spp.	Chigar Bans	Fodder, weaving

Source: MSFP, 2015

Figure 9 Bamboo as a Multiple Use Plant



Source: Zhu 2008

Bamboos are an important category of forest-based raw material, although foresters do not generally classify bamboos as trees, wood or timber. However, from the point of view of ecology, raw material and use, they are in most cases comparable to trees (large size species) or shrubs (small size species) or as a substitute for wood in many instances.

One bamboo was found to be a much favored species in the social survey of FRA 2015. This is *Bambusa tulda* (Tama Bas), which was identified with 13 use categories (out of a total of 30). These included nutritional and construction uses among others (see Tables 1, 13, 14 and Boxes 3 and 4).

Table 14 Bamboo Species Most Frequently Identified as Being Used

Zone	Scientific name	Local name
Chure	*Bambusa tulda Roxb.*	Tama Bas
Terai	*Bambusa tulda Roxb.*	Tama Bas
Chure	*Bambusa arundinacea Willd.*	Tamabas, Bhalu Bas, Taru Bas, Kata Bas
Chure	*Bambusa vulgare Schrad.*	Tama Bas, Bansi Bas, Sin
Chure	*Dendrocalamus hamiltonii Nees & Arn. ex Munro*	Tamabans, Choya Bans, Dhungre Bans
Terai	*Dendrocalamus strictus (Roxb.) Nees*	Mal Bans, Kaban Bans
Chure	*Dendrocalamus strictus (Roxb.) Nees*	Mal Bans, Kaban Bans
Chure	*Drepanostachyum intermedium (Munro) Keng f.*	Nigalo, Ma

Source: the social survey, FRA 2015

The MSFP stakeholders and implementation modality has been well aware of the importance of bamboos, and especially in the eastern and middle regions of Nepal, the MSFP Cluster teams and implementing agencies have taken bamboos into their value chain promotion programmes, which were operationalized as follows:

- Cluster 1 (RRN) Bamboo in Dhankuta district
- Cluster 2 (ECARDS) Bamboo in Ramechhap, Khotang and Okhaldhunga districts
- Cluster 3 (RIMS) Bamboo in Kapilvastu, Rupandehi and Nawalparasi districts
- Cluster 4 (LIBIRD) Bamboo in Parbat district

The two case studies, Box 3 and Box 4 which follow, illustrate the importance of bamboo as a raw material for small local enterprises, and the need for further assistance in value chain analysis and promotion for these small businesses which are being established in increasing numbers in the rural areas of Nepal.

Box 3 The Art of Bamboo Craftwork – in urgent need of value chain analysis

"My name is Chandra Prakash Rai, and I live in Aakhisalla VDC Ward No. 3 in Dhankuta District. My parents are farmers but they also make bamboo products, which provides us a cash income. I grew up watching them create a variety of bamboo products in all sorts of designs.

As we children grew older, all of us started making bamboo products, in order to preserve the family occupation, and ensure the rupees kept flowing in. Over the years, my skills slowly improved, and I even began to teach others in my village the art of making innovative bamboo products. Today, 55 households in my village are involved in crafting bamboo products! To ensure the stability of the business, I have registered my bamboo crafts industry at the Department of Cottage and Small Industries.

In 2013, I exhibited my bamboo crafts at the Dhankuta Fair, and my work received recognition and acclaim. Later the same year, I also exhibited my crafts in Dharan at the "Nepal Fine Arts Council Handicrafts Fair" and received acclaim there too. These awards helped a lot in increasing the visibility of my industry and products, and also in encouraging me to continue.

These days, my regular bamboo craft work brings me an annual income of more than NRs. 2 lakh – which has not only helped me earn a living and support my family, but has also helped increase the visibility of my community. I continue to teach others the art of bamboo craftwork, and how to make a good living from it. Now, with the help of MSFP and RRN, we have started a cooperative of bamboo crafts makers - all of us involved in making bamboo products have started to make savings in the cooperative, and we have all found a way to make bamboo earn a living for us".

(thanks to J.P. Bhujel, MSFP Coordinator with SolveNepal, Dhankuta – one of MSFP/RRN's local implementing partners)

Postcript: Mr Rai also exhibited the groups handicrafts during the MSFP National Completion Workshop in Kathmandu on 16 June 2016.

▲ *Chandra Rai in discussion with the MSFP Cluster Coordinator with some of his products on display*

Box 4 Returning Migrants Ready for Value Chain Assistance for their Bamboo Products

A group of nine, eight of whom are migration returnees, started an enterprise in Chyasku village of Ramechhap district with the support of their Community Forest User Groups (CFUG), the MSFP District Programme Implementation Office (the DPIO of ECARDS), and the District Forest Office.

Four CFUGs led by the Dugursing Hup CFUG, selected the potential entrepreneurs from the disadvantaged amongst the CFUG members, and requested assistance from the MSFP-DPIO for the establishment of a bamboo related enterprise. The DPIO organized a training in the summer of 2014 in bamboo artifact production in the participants' own village as there was abundant bamboo locally available. In addition, the DFO provided the CFUG modern machines; tools and equipment for felling, cross cutting, splitting, drilling and decorating the bamboo. Dugursing Hup CFUG procured the bamboo, some raw materials and other items to establish the enterprise.

With the continued support of the ECARDS DPIO and MSFP, the entrepreneurs have now formed a group called the "Dugursing Hup Handicraft Group", have hired a building to store the machines, tools, and bamboo products, and by 2016 were able to manufacture 18 bamboo items – including photo frames, chairs, and stools; as bamboo furniture cannot be manufactured the year round, they are learning how to produce more and more handicraft items.

A sub-group has been formed to manage the supply of raw materials and to pursue potential markets for their products. The group is now working well together, have a clear process to fix the product prices, are keen to learn the different aspects of running a business, and know they require further assistance in business management aspects. The Ramechhap District Forest Sector Committee, comprising officials from DDC, DAO, DFO and representatives from political parties and the press, have observed their products at the manufacturing site and appreciated their skills and commitment. These returned migrants are now confident that they will not have to go abroad again for employment opportunities – and are very pleased that they have found such a business venture that holds such a bright future.

▲ *Members of the Dugursing Hup Handicraft Group hard at work in their bamboo product factory*

▲ *A nearly completed picture frame made by the Group*

Table 15 Bamboo Species by End-Uses and Indicative Altitude Range

Type of Use	Local Name	Scientific Name	Low (m)	High (m)
Construction	Bhalu bans	*Bambusa arundinacea*	100	1000
Construction	Dhanu bans	*Bambusa balcooa*	500	1600
Construction	Bansi bans	*Bambusa vulgaris*	100	1200
Construction	Dhungre bans	*Dendrocalamus giganteus*	100	1000
Construction	Lahure bans	*Melocanna baccifera*	500	1500
Fencing	Khosre malingo	*Yushania maling*	1600	3000
Fodder	Arundinaria	*Arundinaria*	2900	4000
Fodder	Ban nigalo	*Drepanostachyum khasianum*	1000	2000
Fodder	Jarbuto	*Thamnocalamus nepalensis*	2800	3500
Fodder	Rato nigalo	*Thamnocalamus spathiflorus*	2800	3500
Fodder	Mailing	*Yushania microphylla*	2300	3500
Multipurpose	Tama bans	*Bambusa nepalensis*	1000	1500
Multipurpose	Kada bans	*Bambusa tulda*	100	1000
Multipurpose	Bhalu bans	*Dendrocalamus hookeri*	1200	2000
Multipurpose	Diu nigalo	*Drepanostachyum falcatum*	1000	2000
Multipurpose	Tite nigalo	*Drepanostachyum intermedium*	1000	2000
Multipurpose	Malinge nigalo	*Himalayacalamus brevinodus*	1800	2200
Multipurpose	Thudi nigalo	*Himalayacalamus falconeri*	2000	2500
Multipurpose	Tite nigalo	*Himalayacalamus fimbriatus*	1000	1800
Multipurpose	Padang	*Himalayacalamus hookerianus*	2000	2500
Multipurpose	Seto nigalo	*Himalayacalamus porcatus*	2000	2300
Paper	Lathi bans	*Dendrocalamus strictus*	100	1000
Scaffolding	Mal bans	*Bambusa nutans*	1000	1500
Weaving	Nibba	*Ampelocalamus patellaris*	1200	1800
Weaving	Mugi bans	*Bambusa aimaii*	100	1000
Weaving	Kalo nigalo	*Bambusa emeryi*	2600	3200
Weaving	Chigar	*Borinda chigar*	2600	3100
Weaving	Murali bans	*Cephalostachyum latifolium*	1500	2000
Weaving	Choya bans	*Dendrocalamus hamiltonii*	500	1500
Weaving	Ghumre nigalo	*Himalayacalamus asper*	1800	2300
Weaving	Malinge nigalo	*Himalayacalamus cupreus*	2300	2800
Weaving	Nigalo	*Phyllostachus nigra*	800	1500

7 INDICATIVE NTFP SPECIES RECOMMENDED FOR PROMOTION

As discussed earlier, there are many NTFP species in Nepal that can be considered for value chain analysis and subsequent promotion. These species, many of which have a high potential for export, are listed below in three Tables (nos. 16, 17, 18) according to altitude. These lists are far from exhaustive, and are included to provide an indication of the great unexplored wealth of the Nepal ecosystems in terms of NTFP species.

Table 16 Shortlisted NTFP Species for Promotion at Low Altitude

Local name	Scientific name	Name	Low (m)	High (m)	Known	Exposure
Gurjo	*Tinospora cordifolia*	Gurjo	200	1200	53%	42%
Amriso	*Thysanolaena maxima*	Broom grass	100	1900	35%	36%
Bael	*Aegle marmelos*	Bael fruit	100	1500	69%	22%
Shikakai	*Acacia concinna*	Shikakai	100	800	77%	17%
Neem	*Azadirachta indica*	Neem tree	400	1500	85%	15%
Amala	*Phyllanthus emblica*	Malacca tree	200	1800	62%	14%
Harro	*Terminalia chebula*	Harro	100	1100	64%	14%
Bet	*Calamus spp.*	Rattan	200	2400	81%	12%
Dhaturo	*Datura stramonium*	Thornapple	1000	2500	78%	9%
Sarpagandha	*Rauwolfia serpentina*	Snakeroot	100	1300	67%	5%
Jiwanti	*Otochilus porrectus*	Orchid	1900	2300	45%	4%
Bhyakur	*Dioscorea deltoidea*	Yam	150	3100	60%	4%
Pipla	*Piper longum*	Long pepper	200	1800	80%	3%
Kurilo	*Asparagus racemosus*	Asparagus	200	2200	89%	3%
Kantakari	*Solanum surattense*	Nightshade	100	2000	82%	3%
Banmara	*Mikania micrantha*	Bitter vine	100	2000	62%	2%
Ghodtapre	*Centellia asiatica*	Pennywort	200	1800	79%	2%

Note: MSFP, indicative only

Table 17 Shortlisted NTFP Species for Promotion at Mid Altitude

Local name	Scientific name	Name	Low (m)	High (m)	Known	Exposure
Allo	*Girardinia diversifolia*	Himalayan nettle	1200	3000	46%	32%
Kachur	*Curcuma zedoaria*	White turmeric	100	1200	48%	21%
Ritha	*Sapindus mukorossi*	Soap nut	200	1500	83%	19%
Alaichi	*Cardamon subulatum*	Cardamon, black	600	2000	59%	14%
Tejpat	*Cinnamomum tamala (Buch*	Indian cassia	500	2400	39%	9%
Dalchini	*Cinnamomum tamala*	Nepali cinnamon	450	2000	65%	7%
Timur	*Zanthoxylum armatum*	Sichuan pepper	1000	2100	26%	6%
Titepati	*Artemisia vulgaris*	Mugwort	1200	3400	83%	5%
Majitho	*Zanthoxylum armatum*	Timur	900	2200	59%	4%
Sugandha kokila	*Cinnamomum glaucescens*	Cassia	200	1300	78%	3%
Asuro	*Adhatoda vasica*	Malabar nut	200	1300	72%	3%
Ban lasun	*Allium wallichii*	Wild garlic	2300	4800	57%	3%
Bojho	*Acorus calamus*	Sweet flag	200	2200	94%	3%
Kuchila	*Strychnos nux-vomica*	Strychnine tree	100	1350	69%	2%
Thulo Okhati	*Astilbe rivularis*	False buck's beard	400	2500	71%	2%
Indrayani	*Trichosanthes tricuspidata*	Snake gourd	800	2300	51%	2%
Ghiu Kumari	*Aloe barbadensis*	Aloe vera	100	1500	93%	2%

Note: MSFP, indicative only

Altogether, MSFP through its implementing partners, have undertaken work on 38 different subsectors in its six clusters; each cluster had a minimum of 8 subsectors to a maximum of 21. The most common subsectors were furniture, essential oil, handmade paper, bamboo craft and Allo, followed by honey, sisnoo and leaf plates.

Table 18 Shortlisted NTFP Species for Promotion at High Altitude

Local name	Scientific name	Name	Low (m)	High (m)	Known	Exposure
Satuwa	*Paris polyphylla*	Love apple	1800	3300	59%	59%
Nirmasi	*Delphinium himalayai*	Blue Delphinium	2400	5000	54%	56%
Sunpati	*Rhododendron anthopogon*	Anthopogon	3000	4800	46%	44%
Silajeet	*Asphaltum punjabianum*	Asphaltum	2500	5000	76%	43%
Chiraito	*Swertia chirayita*	Chiretta	1500	3000	44%	43%
Laghupatra	*Podophyllum hexandrum*	May apple	4000	5200	56%	43%
Pakhanbed	*Bergenia ciliata*	Rockfoil	1300	3000	38%	38%
Yarsagumba	*Ophiocordyceps sinensis*	Caterpillar fungus	3000	5000	76%	38%
Gucchi	*Morchella esculenta*	Morel	5000	6000	53%	38%
Loth Salla	*Taxus wallichiana*	Himalayan Yew	2300	3400	37%	34%
Kutki	*Picrorhiza kurrooa*	Kutki	3500	4800	72%	34%
Panchaule	*Dactylorhiza hatagirea*	Orchis	2800	4000	52%	33%
Jatamansi	*Nardostachys grandiflora*	Spikenard	3000	5000	59%	29%
Dhupi	*Juniperus indica*	Juniper	3600	4800	42%	28%
Nagbeli	*Lycopodium clavatum*	Club moss	2000	4000	24%	22%
Bikhma	*Aconitum bisma*	Aconite	3300	4800	54%	20%
Bish	*Polypodium vulgare*	Polypodium	1200	2500	83%	17%
Atis	*Delphinium himalayi*	Larkspur	4300	5500	59%	11%
Sugandhawal	*Valeriana jatamansi*	Red Valerian	1200	3000	49%	11%
Somlata	*Fritillaria (roylei)*	Himalayan Fritillary	3000	4000	54%	10%
Jhyau	*Lichen spp.*	Lichen	3000	5000	99%	5%
Padamchal	*Rheum emodi*	Himalayan rhubarb	3000	4000	51%	5%

Note: MSFP, indicative only

At a later stage of the 4 year phase, MSFP developed a road map for engaging the private sector, and asked the implementing partners to select only a few flagship products for development and implementation in a value chain approach – see Box 5.

Box 5 Flagship products in the MSFP clusters

Lot I	Lot II & III	Lot IV	Lot V	Lot VI
Bamboo crafts	Essential Oil	Sisnoo, Sitake	Chiuri	Chiuri, Dhatelo, leaf plates

Although the value chain concept is not new in the forestry sector, its implementation has been weak at field level. Most of the required interventions are similar to those needed for micro-enterprise development where there are weak backward and forward linkages. Interventions in the past have mostly adopted the welfare-based approach with heavy subsidies, and projects themselves performing as value chain actors

What was encouraging in relation to the MSFP approach was the involvement of the private sector and the traders from both inside and outside the area of production. There are many forest subsectors waiting for focused promotion and value chain analysis – see Box 6. Further details of the MSFP approach to the private sector and business development are documented in Gauli, K. 2016. Reflections on the Private Sector Component of MSFP from 2012 to 2016. Multi Stakeholder Forestry Programme, Ministry of Forest and Soil Conservation, Nepal.

Box 6 A Flagship Product – waiting for support

In fiscal year 2072-73, about 725,000 kg of machhino (winter green) leaves were utilized in Okhaldhunga, Ramechhap and Khotang, to produce 2,900 litres of essential oil from 20 distillation units operated by 14 enterprises – sales totaled NRs 11.6 million (~ NRs 4,000/litre)

8 ENDEMIC, PROTECTED, AND THREATENED PLANT SPECIES – THE CASE OF THE CHURE ZONE

As an example of the species which fall into the endemic, protected or threatened categories, Table 19 summarizes such plants in the Chure zone. Similar classifications and norms have been established for all physiographic zones.

The factors behind the scarcity of these species are many, but certainly the high demand for the properties of these popular species, is among the factors.

Norms and classifications for conservation measures are an important first step in the effort of trying to maintain the sustainability of the precious species. Another factor is an overall degradation of forests in terms of decrease in biomass and the effect of a number of disturbances. The FRA 2015 found out that the disturbances are very common. Of the 15 assessed disturbances, open grazing was the most common one, affecting almost two thirds of Nepal's forests. It is clear that these disturbances as a whole have an impact on the sustainability of NTFP's.

Table 19 Endemic, Protected, and Threatened Plants in the Chure Zone

Botanical Name	Local Name	Endemic	P	IUCN	MPRD	MPAD
Asparagus racemosus Willd.	Satawari, Kurilo				√	√
Bergenia ciliata (Haw.) Sternb.	Pashanbhed				√	
Borinda chigar Stapleton	Chigar	√				
Cinnamomum tamala (Buch.)	Tejpat, Shisi				√	
Cycas pectinata Griff.	Kalbal, Thakal			VU		
Dalbergia latifolia Roxb.	Satisal**		√	VU		
Dioscorea deltoidea Wall.	Bhyakur				√	
Gaultheria fragrantissima Wall.	Patpate, Dhasingare				√	

Botanical Name	Local Name	Endemic	P	IUCN	MPRD	MPAD
Homalium napaulense (DC.)	Phalame Kande	√				
Hypericum cordifolium Choisy	Areto, Kelang	√				
Juglans regia L.	Okhar				√	
Phyllanthus emblica Linn.	Amala, Yabara				√	
Piper longum L.	Pipla, Sano Pipla				√	√
Pterocarpus marsupium Roxb.	Bijaya Sal**		√	VU		
Rauvolfia serpentina (L.) Benth.	Sarpagandha*		√		√	√
Rubia manjith Roxb. ex Fleming	Majito				√	
Sapindus mukorossi Gaertn.	Rittha				√	
Shorea robusta Gaertn.	Sal, Sakhuwa**		√			
Tinospora sinensis (Lour.) Merr.	Gurjo, Guruj				√	√
Zanthoxylum armatum DC.	Timur, Yerma				√	√

Note:

P Legally protected under the Forest Regulations of 1995 (amended in 2001)

* Export outside the country without processing is banned

** Felling, transport, and export are banned

MPRD Medicinal plant prioritized for research and development by Dept. of Plant Resources, 2012

MPAD Medicinal plant prioritized for agro-technology development by Dept. of Plant Resources, 2012

VU Vulnerable according to the IUCN Red List

9 VALUE CHAINS AND SUSTAINABLE FOREST MANAGEMENT

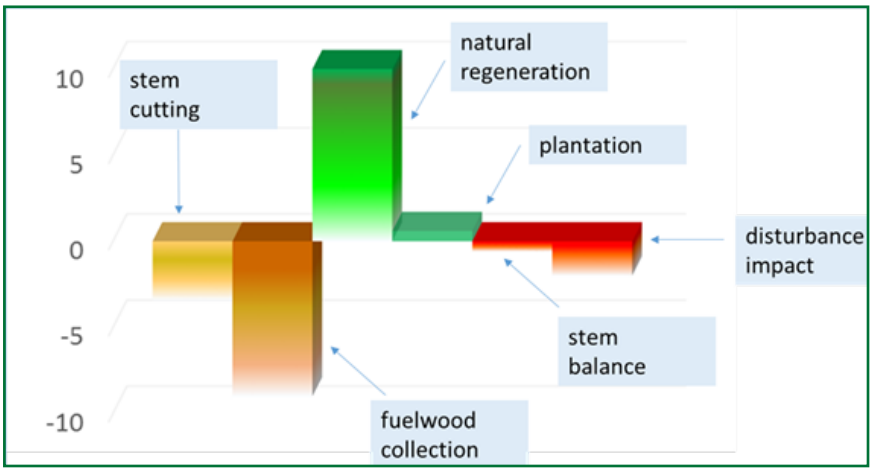
The FRA 2015 concluded that nearly two-thirds of the total forest area in the country was affected by grazing; tree cutting, bush cutting, sapling cutting, lopping and forest fires were also common. Fifteen types of disturbance had been identified by trained ecologists, and the evidence is quite clear: observation plots had an average of 3-4 types of disturbance each. The risk of having at least one disturbance was 85% in the High Mountains and Himal, and 94% in the Middle Mountains.

The lack of sufficient recovery is reflected in the estimated 0.4% compound annual volume degradation rate, which is equivalent to about 4.0 million cubic meter's volume loss per year. So, there is a continued net loss of an estimated 0.6 million cubic meters of stem wood, on top of the harvesting removals (4.0 – 3.4 = 0.6).

Figure 10 is an approximate summary of the annual wood balance of Nepal. It is mostly based on information from the FRA 2015, REDD+ (2014) and FAO (2014). Multiple actors in the sector are making efforts at afforestation and reforestation, but deforestation, and especially degradation of forests' canopy and volume seem to be dominant. The stem wood cutting estimate is based on estimated stem wood removals in 5 years, and the net balance of stem wood is based on volume degradation in 15 years; disturbance and plantation impacts on the wood balance are indicative only.

The forests of Nepal are not sustainably managed at the present. They are not under SFM by its definition, neither by implementation of national policy or strategy, nor by analytical investigation of the ground evidence.

Figure 10. Approximate Annual Wood Balance in Nepal Around 2012



Note: Source is FRA 2015, interpretation by MSFP

There are many positive aspects, though:

- the forest ecology is very diversified and has a strong regenerative power;
- the new forest policy and forest sector strategy provide sound guidance on many aspects, including SFM;
- participatory and multi-stakeholder institutions are in place for improved governance.

MSFP was designed to produce four outcomes:

Outcome 1: Government and non-state actors jointly and effectively implementing inclusive forest sector strategies, policies and plans.

Outcome 2: Private sector (farmers, entrepreneurs and financial institutions) increases investment and jobs in the forestry sector.

Outcome 3: Rural communities – especially poor, disadvantaged and climate vulnerable people and households – benefit from local forest management and other investments.

Outcome 4: Forest and trees sustainably managed and monitored by government, communities and private sector and climate resilient.

Of these outcomes, 4 is the most closely related to SFM in the physical and ecological sense. However, outcomes 2 and 3 are intimately related to the socio-economic sustainability. It is really these aspects that deliver on the livelihoods, and equitable and inclusive benefit sharing, as well as creation of social capital.

10 AN INFORMATION SYSTEM FOR VALUE CHAINS - THE CASE OF CHIRAITO

Chiraito (Swertia chirayita) is a medicinal herb found in broad leaf forests and on open slopes all along the Himalayan Mountains, from 1,600 to 2,500 meters. It reaches a height of one meter. The plant contains chiratin, a bitter-tasting chemical used to treat stomach-aches, constipation, and excess urination, to eliminate parasites, and to prevent or treat malaria. Chiraito falls under the IUCN threat category "vulnerable plant".

Chiraito is one of the export oriented NTFP's of Nepal (see Table 2). The main markets are India and China; and as value addition (VA) in Nepal has not been common, the export has been in the raw form. There would be an opportunity both in value added production and in increasing the supply through cultivation. MSFP has observed successful local operations.

An increase in the value added to forest-based products is seen as the main mechanism to improve the forest sector's contribution to economic growth, the GDP, employment, wages and thus in the reduction of poverty in Nepal.

The VA can best be created by private sector entrepreneurs - but in the Nepal context, the public sector and the third sector can be of importance as well. The third sector includes such actors as local forest groups including community forest user groups.

Nepal is facing structural problems, which partially discourage VA creation through forest-based activities. Some of these hindrances include policy hurdles and complicated bureaucracy. Another reason is non-transparency of many of the markets, particularly the timber market.

From the point of view of the existing or potential market participants, one technical reason for the lack of transparency is the scarcity of market information. This typically includes price information, but also availability,

product specification, as well as contacts and other qualitative information.

The need for a market information system can be made more explicit with a concrete example. Amongst the most promising NTFPs is Chiraito . The markets and the value chain of Chiraito have been studied, including work from MSFP: Value Chain Analysis of Forest Products in Koshi Hill Districts of Nepal: Challenges and Opportunities for Economic Growth.

Figure 11 illustrates the long term price development of Chiraito between 1999 to 2015. The main source used was the MIS of the Asia Network for Sustainable Agriculture and Bio-resources (ANSAB), and the prices are in NPR. There is a discontinuity in the time series due to the civil disruption and subsequent disturbance in the market. However, the quality of data has improved over time, and interpolation and time series analysis methods have been used to estimate some missing values.

This is an attempt to demonstrate that an opportunity exists to elaborate existing market information to a format, which the decision makers can use more easily. Particularly, graphic presentation can serve as a decision support tool in value chain development. It is notable that data exists in Nepal, but there is only very little systematic elaboration.

Figure 11. Price development of Chiraito , Kathmandu, 1999-2015 (current NPR/Kg)

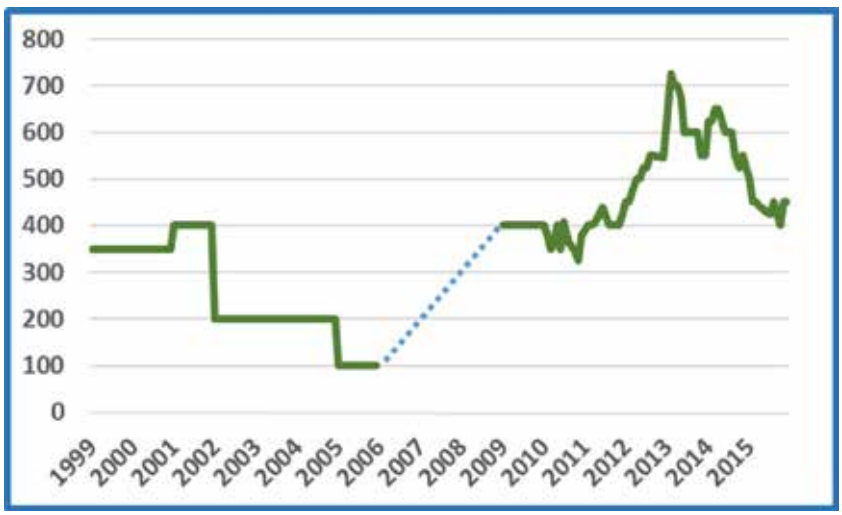
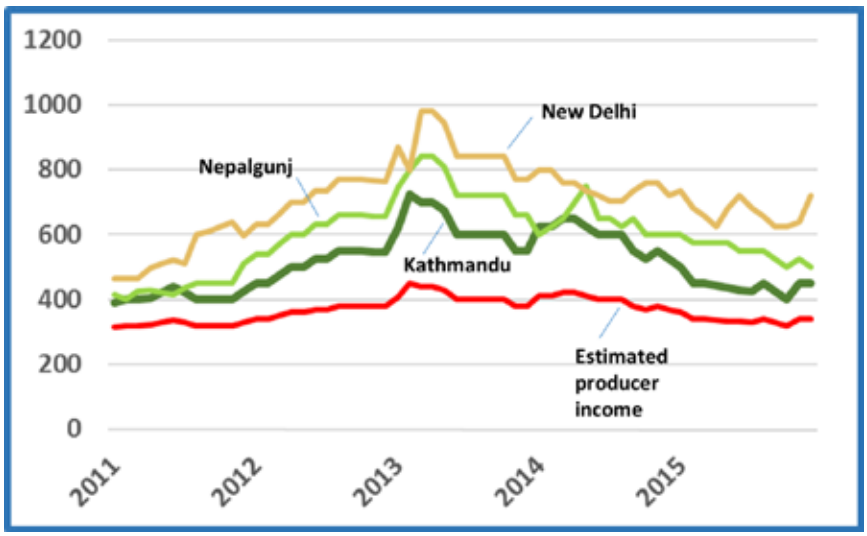


Figure 12. Price of Chiraito through Value Chain Analysis, 2011-2015 (current NPR/Kg)



Of course, price is not the only thought-provoking phenomenon in the market. ANSAB has an interesting service portfolio, including catalogues of market participants, as well as support services to producers and buyers. The Chamber of Commerce and Industries could be a natural participant in the development of forest-based market information systems.

Figure 12 summarizes a quick analysis of the dynamics of the Chiraito market chain. With proper techniques, the dynamics of the distribution chain and the VA of the value chain can be analyzed. From the forest sector point of view, two particularly important aspects should be systematically analyzed: (i) VA potential through the value chain, and (ii) benefit sharing, particularly estimates of the producers' income share.

It should be noted that the producer income in Figure 12 is an initial estimate only, and is here presented to illustrate the potential of a MIS-based value addition and value chain analysis. What seems obvious is that strong market demand tends to increase distributors' margins, rather than increasing producers' income. To change the benefit sharing should be one of the objectives of value chain upgrading and promotion; another objective is to provide assistance in marketing skills to small rural-based groups, such as the one described in the case study below, Box 7.

Box 7 The Beginning of a Value Chain – Chiraito production at home earns more for a returning migrant than his job in Malaysia

Mr. Rinji Sherpa, a 42 year old permanent resident of Jantarkhani-7, in Okhaldhunga District, worked for 8 years in Malaysia. When he finally decided to return to his village, he began thinking of a business venture. He started to work as the Secretary of the Lamelung Phalate CFUG, and combined this with starting a new business venture in partnership with Ang Kami Sherpa. With the support of MSFP and ECARDS in the village, he participated at the end of 2013 in a training about the commercial cultivation of Chiraito, and its sustainable management and marketing. He was eventually selected as the Secretary of the Chiraito Networking Group in his VDC which was later registered as the Jantarkhani Herbal Cooperative.

He was soon cultivating Chiraito on 40 ropani of land – through both planting out seedlings from a nursery, and through direct sowing of seeds. He has high hopes of earning NRs 5 lakhs during each of the next two years. By 2015, his income was two lakh per year through the trading of Chiraito. He is comfortably managing to support his family of six, and has become a great example to the young people of his community – "why go abroad when you can earn like I am here in your home community? Here I am making good money in the commercial cultivation and trading of Chiraito – and you know something – I earn more in Nepal in 60% of the time than in Malaysia from a full time job!".

11 CONCLUSIONS

A. Institutions and Value Chain Selection

In its less than planned four years, MSFP has continued the tradition of selecting token products as pilots for studies and suggested value chain development. The selected products have been conventional ones, where previous efforts have focused, and it has been easy to "recycle" the study results. Some scaling up or scaling out has been carried out for some commodities.

It has been customary to mostly treat the selected value chains primarily as Chains: qualitative illustrations of processing sequence and distribution channels. Less attention has been paid on the Value: which are the most valuable alternatives to promote, and who is receiving those values. However, these latter questions are related to the political economic choices that the nation has available to improve the total economy, and the welfare of the people most in need.

If the GoN, MSFP, or a subsequent programme will take the value chain development seriously, they need a more comprehensive approach – and steps have been taken to establish an institutional setup for this purpose. It is necessary to have the private sector in the driver's seat, and this has been assisted at all levels by the MSFP's multi-stakeholder approach. Other promising developments include:

a) the Federation of Nepalese Chambers of Commerce and Industry (FNCCI) has already been a counterpart with MSFP, and has a proven track record from agricultural product value chains;
b) the GoN has been progressive and established the Forest Products Division at the MoFSC;

c) the Asia Network for Sustainable Agriculture and Bioresources (ANSAB) is well positioned to provide value chain related services, of which an example is provided in section 10 in relation to a market information system.

As important as the institutional setup is the strategic framework. The new forest policy and forest sector strategy (FSS, 2015) provide an adequate overall direction, as the involvement of private sector is sufficiently prioritized. This includes reducing the policy hindrances and unnecessary obstacles, and removal of barriers to trade. Some practical measures have followed, such as modification of the rule concerning the distance of the processing site from the forest.

To become an effective policy and strategy on private sector promotion and economic development, strategic guidelines for priority value chain selection are needed. At the minimum, on federal, provincial and district levels, several aspects of value chains should be tackled. Species selection should be wide but prioritized at the national level, and become more specific at the local level.

Such propositions as "one district - one product" should be abolished, as they can be very counter-productive, and can introduce myopic bias to potentially sound local practices. It is important to emphasize the local knowledge and adaptation of a variety of species to the spectrum of human needs, and putting all one's eggs in one basket is bad practice in this as well as many other aspects of life. Key components to be selected to the development portfolio are the following, in order of priority:

1. Selection of top multiple use species to be promoted (see Table 3). This is a generic risk reduction measure as many end-uses are being served on the user side.
2. Selection of top nutritional value species to be promoted (see Table 4). This is a food security measure. The FRA 2015 social survey indicates continued urgent need.
3. Selection of top financial return species. This can be of any top priority end-uses, but most commonly timber, or other high biomass species, to cover the bulk of costs.

4. Selection of top animal husbandry species to be promoted (see Table 5). This is for the private household investment, for medium term livelihood improvement.
5. Selection of top medical value species to be promoted (see Table 6). This is the already common practice of medicinal products for domestic use, and cash income.
6. Selection of top construction value species to be promoted (see Table 7). This includes timber and bamboo species for shelter and other construction.
7. Selection of top bamboo species to be promoted (see Tables 13, 14 and 15). This is similar to multiple use, but recognizes bamboos as a complementary supply source.
8. Selection of top other use species to be promoted (see Table 8). Fibres should always be selected, and in most cases, also alternative species, such as those with religious and intangible significance.
9. Selection of value chain species with international exposure (see Table 16, 17, 18) is important, especially in locations with good existing connections and road corridors.
10. Selection of top species for research and product development. This is a long term investment for marketing, processing and value enhancement.
11. Last but not least, the selection of top species for conservation (see Table 19) according to vulnerability rankings. This should include priority domestication species.

It should be noted that these selections are not final and forever, and they should be updated frequently. It is also important to note that fuelwood was not included as a separate selection criteria or end-use. This does not imply that energy is not an important end-use - but this reflects the fact that users are capable of an almost continuous chain of substitution between sources of fuel. Thus, the generic promotion of high volume species and others, will take this aspect into account.

The selection list above is prepared from the point of view of user needs, and species that serve those priorities. There are other aspects, which are needed for complementary viewing. Of the environmental concerns, the carbon

sequestration is similar to fuelwood as it is part of the same carbon cycle, not species specific, and is mostly taken care of simultaneously with the high biomass sustainable forest management concerns.

There are concerns that are not taken care of by any of the above selection criteria. These particularly include the soil and watershed conservation (on the tangible side), and the landscape concerns (on the intangible side). Both of these are examples of a wider range of potential payments for environmental services (PES), and comprise a range of value chains with a growing potential.

B. Private Sector and Value Chains

The implementation of the strategic framework above is, of course, an even more challenging task. Such strategic items from the above list of 11, such as conservation, research and development, and international market promotion, can mostly be handled on a national level, or in future on a state level. However, most of the implementation measures should be led by district and local level units that are responsible for the economic development and resource management.

The local implementation of the value chain strategic framework and approach has to be based on existing institutions and integrated into overall plans. The MSFP's multi-stakeholder approach can be very beneficial in this integration. However, the main responsibilities lie with district decision making, including the implementation of the district development plan and the district forest management plan but it is very important that the private sector is actively involved, through, for example, the District Chamber of Commerce and Industries in the development planning, and the local forestry groups representation in the district forest management plan. It is most important that the private sector is the change agent, as the market demand and the human needs in the end-uses, are the primary driving forces. When the private sector and the end user are not involved, it is clear that forest-based promotions resemble "pushing with a wet rope".

The criteria to ensure that the district forest management plan is adequately promoting sustainable forest management (SFM) and the value chain approach, are as follows:

- district plans include SFM for all management regimes, and these are indicated on a map with indications of hectares of area and the time horizon for implementation;
- value chain selection covers 8-10 priority species (as indicated in the selection strategy above) and support is indicated on the map and by implementing units;
- value chain selection of species, and the value chain approach are included in the operational plans of the local forestry groups.

The District Forest Officer has the leading professional responsibility for checking the consistency of the plans – in order that the district forest management plan and the operational plans of the local forestry groups fulfill the criteria of the forest sector strategy, and involve the private sector in a multi-stakeholder manner. In addition, the plans have to include the following important aspects:

- the principles of sustainable forest management, including ecological, economic and social dimensions (and regulations such as the community forestry inventory guidelines);
- climate change resilience principles, including consistency with the local climate change adaptation plans (LAPA), and at community level, the CAPA.

The MSFP implementation logic and as a pathway to impact, can be described as follows:

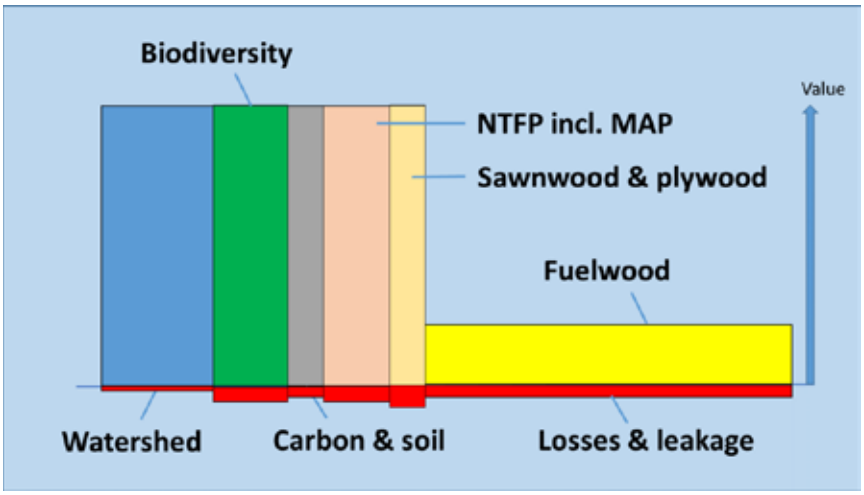
- SFM builds on social capital at community level, and adapts to changes, be they biophysical, social, or cultural - and including migration and inclusion;
- improvement in subsistence availability and use of fodder, litter and fuelwood;
- improvement in availability and use of timber;
- improvement in availability and use of non-wood forest products;
- improvement in availability and use of ecosystem services;
- sustainable forest resources;

- inclusive livelihood development;
- climate compatible development.

SFM is a unifying principle tying together all the MSFP forest activities. All the legal modalities of forest management have their respective specific regulations and guidelines for management to guide them to SFM principles and practical implementation. Interventions supported by MSFP include the recent updating of the Inventory Guidelines for Community Forestry, a major effort to guarantee evidence based sustainable practices.

C. Value Potential of Nepal's Forests

Figure 13 is an illustration of the full range of value chains based on Nepal's forests. On the most general level, one can safely conclude that all of the component parts of the aggregate value chains can be sustainably managed, and the value of the components and the total value can be enhanced.



Source: MSFP, GDP study, value chain studies

Figure 13. Approximate Aggregates of Forest-based Value chains

However, all of the aggregate categories of Nepal's forest-based value chains are presently suffering from varying degrees of sustainability issues. These include deterioration of some of the watersheds (water related environmental services for downstream users) – even though there is ample scope for creating payment for environmental services (PES) schemes. The same is true in the case of biodiversity, where excellent efforts have already been made, including the establishment of the protected areas, the buffer zones, the Churl Presidential Conservation Programme, and the Chitwan-Annapurna Landscape.

The carbon sequestration service is presently suffering from degradation of the biomass in the forests, and the carbon in soil, although the forest area seems to have stabilized. However, the REDD+ process that attempts to monetize and incentivize the carbon sequestration is well positioned to reverse negative changes. Nepal is well on the way to creating this complementary value chain. The general degradation of the stem wood volume in the forests of Nepal is presently reducing the supply potential of mechanical wood products, such as sawn wood and plywood – and in this issue, SFM is a prerequisite for a turnaround.

The sustainability issues of the NTFPs are closely linked to the biodiversity losses. On the positive side: a number of NTFPs have been identified and highlighted for protection, domestication, cultivation and for the development of processing, products and markets. There are excellent opportunities to enhance the markets and value chains of NTFPs - for many species, there are possibilities to expand the collection (extensive margin), and for others, opportunities exist for domestication and cultivation (intensive margin). For all of the product categories, there are excellent opportunities to improve the products and processing – the value addition. For many of the end-use categories and many species, production can be increased in the medium term future, and enhanced exposure to high market demand will lead to increased overall value.

Non-transparency, corruption, black markets, inefficient marketing and logistics organization, as well as hindrances, obstacles, excess bureaucracy and barriers to trade, all reduce the net value of forest products. This is because they make the end product expensive and reduce the supply by leaking, absorbing

and stealing from the value which is due to the local people (managing the resource), and from the resource rent due to the government (owner of the resource base). From the forest-based value chains, the latter is presently a low rent capture of the GoN.

There are many reasons to promote transparent markets and to support the upgrading of the most profitable and most sustainable value chains. With increased transparency, a more competitive price can be achieved, which can bring potential gains to all stakeholders in the chain.

On occasion, it is very useful to look at the value chain from the point of view of the product life cycle. Different products and species are at different stages of their life cycle. It is here thought that the origin of a successful value chain most often comes from an informal domestic use - but, of course, nowadays this can come from a laboratory as well. Depending on the life cycle, the product (or service) may be in the need of (i) just being discovered, (ii) opening of a market, (iii) making the existing market more transparent, (iv) domestication and cultivation of the species, (v) industrialization of the processing, (vi) commercialization of the market, or (vii) scaling up and scaling out of the production.

Thinking of any programme, especially of a major one like MSFP, it is necessary to consider a variety of value chains. This is important even on a local level, such as through the MSFP Clusters in order to reach a number of districts. However, even a district development programme needs a variety of viewing angles to value chains. This means that an effort such as "one district - one product" is inherently insufficient from any balanced development point of view. There is a very small likelihood that such an approach would succeed in isolation - even a chosen favorable "flagship" product is likely to sink if the range of human needs, the range of opportunities, and the sustainable sourcing are not jointly considered.

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Value chain papers from the MSFP implementing partners:

1. Value Chain Analysis of Selected Forest Based Products of Rapti Area, Rupantaran Nepal, April 2014
2. Value Chain Analysis of Forest Products in Koshi Hill districts of Nepal: Challenges and Opportunities for Economic Growth; RRN/Forest Action, December 2014
3. Value Chain Analysis of Non Timber Forest Products in Baglung district (Allo, Chiuri, Lokta and Stinging Nettle), LIBIRD/SANGAM, 2015/16
4. Value Chain Analysis of Non Timber Forest Products in Myagdi district (Allo, Lokta, Stinging Nettle, Timur), LIBIRD/SANGAM, 2015/16
5. Value Chain Analysis of Non Timber Forest Products in Parbat district (Allo, bamboo, furniture, Lapsi), LIBIRD/SANGAM, 2015/16
6. Value Chain Analysis of Selected NTFPs (Chiraito , Lokta, Allo, Dhasingre and Bambo) in Ramechhap, Okhaldhunga and Khotang, ECARDS, 2016

Please note: nos. 1 and 2 are published and can be found on the MSFP website (www.msfp.org.np – under Publications_Publications of Implementing Agencies), while nos. 3 to 6 currently remain internal documents; for copies of the later, please contact the implementing partner directly.

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