



**Feasibility Study of Non-Timber Forest Products (NTFPs) and Medicinal and  
Aromatic Plants (MAPs) Processing Industry  
(ENGINEERING PART REPORT)**

**Submitted to:**

**Lumbini Province Government  
Ministry of Forest, Environment, Tourism  
and Water Supply  
Lumbini Province, Rapti Valley (Deukhuri)**

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## 1. INTRODUCTION

Nepal's forests cover almost 45% of the land (DFRS 2015) and significantly contributes to local livelihoods and national economy. The Ministry of Finance estimated that the contribution of the agriculture, fishery and forestry together is around 23.9% in 2021/22 (MoF 2022). FAO estimated that the forestry sector alone contributed to 3.5% of the Gross Domestic Product (GDP) in 1990, which linearly decreased to 0.6% in 2011. The estimation, however, has limitations due to unavailability of published statistics (FAO 2014) but shows a very low GDP contribution compared to the forest cover and available forest resources in Nepal. Another study estimated that the forestry sector generates 1,30,000 full time jobs (99,000 from private sector and 31,000 from community forestry user groups (MSFP 2014). Conservatively, the same study estimated that forest-based SMEs could generate more than US\$ 8.7 billion and 1.38 million workdays through 400,000 sustainable full-time equivalent green jobs.

Forest supports different types of enterprises in Nepal, and significant capital is invested in this sector. The total estimated investment by private entrepreneurs in the forestry sector was about NPR 32 billion (USD 320.6 million<sup>1</sup>) in 2013 (excluding direct foreign investment in ecotourism), of which the highest investment came from the timber processors and manufacturers, with 59% of the total investment. The investment made in NTFP enterprises, ecosystem services (mainly ecotourism), and forest bioenergy is estimated to be about NPR 5.48 billion (USD 54.9 million), NPR 6.56 billion (USD 65.7 million), and NPR 42.9 million (USD 0.43 million), respectively (MSFP 2014).

While the demand for forest products has been increasing in the recent years, promotion of the existing and establishment of new enterprises, including small and medium enterprises (SMEs) have been generating income and employment for individuals at various nodes of the value chain, beyond production for instance, producers, collectors, investors, and processors among others. In some cases, the benefits are limited to certain seasons in a year, while for others, the enterprises operate throughout the year. Moreover, forest products vis-à-vis forest-based enterprises (FBEs) are reported to support the resilience and livelihood enhancement of local communities in various regions of the globe (Cavendish 2000). SMEs play a major role in economies in developing countries. They represent about 90% of businesses and more than 50% of employment worldwide.

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<sup>1</sup> USD 1 = NPR 99.8 for year 2013 (Source: Nepal Rastra Bank)

Further, formal SMEs contribute up to 40% of national income (GDP) in emerging economies. It has been estimated that 600 million jobs will be needed by 2030 to absorb the growing global workforce, which makes SME development a high priority for many governments (The World Bank, undated).

Non-timber forest products (NTFPs), usually referred to as minor forest products, are any goods that can be obtained from a forest that are not wood (Ahenkan and Boon, 2011). NTFPs are considered important globally as they can contribute to proper nutrition as well as food security. Global sales of Plant-based pharmaceutical goods are dominated by the Asian and European markets, with an average of US\$20 billion sold annually (Greunwald,1999). Nonetheless it is improbable that a solitary medicinal plant product can yield revenues exceeding a few hundred million dollars, with the majority of sales occurring for less than US\$ 10 million annually (Laird and Gullen,2002). They are vital in adding income to the families, thus improving rural livelihood. In rural indigenous communities, they may be able to guarantee food insecurity and lessen malnutrition (Shrestha, 2020).

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NTFP based enterprises that have high foreign demand can contribute to national income as well. NTFPs promote conservation activities and support biodiversity (FAO, 1995). NTFPs offer an opportunity to practice sustainable forestry in conjunction with agriculture. This can alleviate the local pressure to overharvest timber. Developing countries can benefit largely from the employment and income generation from NTFPs and this holds the potential to alleviate rural poverty (FAO, 1993; Ghimire, 2006). According to several studies (Wiersum and Ros-Tonen, 2005; Mukul et al., 2010; Kar and Jacobson, 2012), one of the most important ways to promote sustainable forest management and strengthen the local economy is through the use and promotion of non-timber forest products.

In Nepal, many tree species can be grown that give multiple products (Khanal, 2006). Diverse landscape of Nepal ranging from tropical climate of the Terai to the alpine tundra of the high Himalayas has made it suitable to grow a variety of NTFPs. NTFPs, mostly Medicinal and Aromatic Plants (MAPs), are considered high value commodities. Medicinal Plant species play a

major role in the traditional healing systems found in developing nations, which have been long ingrained in the history and cultural traditions of the populace. They have been particularly useful in rural areas of country like Nepal where the majority of people roughly 80% receive their primary healthcare (WHO 2011, UNEP 2012, Sathiyaraj et.al 2015).

While the total impact of the forestry sector to national GDP at present is approximately 15 percent (Banko Janakari, 2004), NTFPs alone are estimated to contribute 5 percent to the national GDP (ANSAB, 1999). As a result, there are now more plant species with ethnobotanical values. The Medicinal and Aromatic Plant Data Base of Nepal (MAPDON) includes 1624 species recognized as having ethnobotanical worth (Shrestha et.al,2000). According to Rawal 2004 (quoted from Malla and Shakya, 1984), Nepal's flora includes approximately 1000 economically significant species (14% of the nation's vascular plants), including 440 species of wild food plants, 71 species of plants that yield fiber, 50 species that are used as fish poison, and 30 species of trees that yield fodder. Out of these, over 100 MAP species are now being used for profit. Approximately 189,000 people work in this subsector, contributing between 15% and 50% of their household income, according to ANSAB (Asia Network for Sustainable Agriculture and Bioresources) (Karki and Bhattarai, 2012; MSFP, 2014). According to the Department of Forests (2016), NTFPs contributed 6.56% of the royalty received from the forest sector. Nepal trades about 150 NTFPs on the global market (Shrestha et al., 2020). Nepal trades around 10,000 to 15,000 tons of NTFPs annually in the international market. Edward (1996) also made reference to the harvesting of over 100 different species of non-timber forest products (NTFPs) from Nepal's high mountains and mid-hills, which are primarily exported to Indian markets. Nepal's tropical zone (below 1000 m) has 49% of the country's MAPs, followed by the subtropical region (1000-2000 m), temperate region (2000-3000 m), sub-alpine region (3000-4000 m), and alpine region (above 4000 m) with 7% (Malla and Shakya, 1986). The high mountains command higher prices because of their high value (potency) but low volume NTFPs. The number of NTFPs in Nepal is estimated to be greater than 700 plant species (Khanal, 2006). Nepal trades around 10,000 to 15,000 tons of NTFPs annually in the international market. These NTFPs represent around 100 species. Most of the NTFPs (95%) are collected from the wild and most of the collected NTFPs are exported to India (90%) for processing in raw form. Amala (*Phyllanthus emblica*), Atis (*Aconitum heterophyllum*), Chiraito (*Swertia chiraita*), Tejpat (*Cinnamomum tamala*), Guchhi-chyau (*Morchella conica*), Jatamansi (*Nardostachys jatamansi*), Jhyau (*Parmellia* species), Kutki (*Picrorhiza kurroa*), Pipla (*Piper*

*longum*), Ritha (*Sapindus mukorossi*), Sugandhawal (*Valeriana officinalis*), Sugandha-kokila (*Cinnamomum glaucescens*) and Timur (*Zanthoxylum armatum*) are the major NTFPs traded to India (Poudel, 2007). NTFPs traded are used as food, spices, condiments, herbal medicines, bast fibres, fodder, leaf litter, manure, tannins, dye stuffs, gums, resins, incenses, aromatic herbs, oils, rattan, canes, bamboos, and construction materials (Edwards, 1996; Shrestha, 1999). The price received by NTFP harvesters in Nepal is, on an average 32 percent of the final price given by Indian industries raw materials (Edwards, 1996).

Limited research and assessment have been done on various aspects of commercializing NTFPs in Nepal because individuals extract NTFPs from the wild and trade it via different marketing channels and multiple traders (Kanel, 2000). Due to the exploitation of forest products in an unscientific way, there has been a decrease in Nepal's NTFP base. Lack of good supervision and management in collecting and trading NTFPs has made them vulnerable to extinction (Acharya, 2000). Besides, there is a lack of systematic analysis on NTFP based processing units to ensure sustainable supply of processed products. Also, the fact that ongoing processing units are managed in small scale and without utilizing their optimum capacity to produce value added NTFP products. Majority of processing units are either managed by CFUGs in a smaller scale, or private sector in the Lumbini province.

In this context, the provincial Ministry of Forests, Environment and Irrigation aims to organize an in-depth assessment on existing scenario on availability of NTFP within the province, and suggest possible large scale processing unit with operational modality.

## 2. STUDY AREA



Figure 1 : Lumbini province with districts

Lumbini province has a of 13.1% of Nepal’s GDP. Overall growth rate at purchase price is 7.5% for Lumbini compared with the national average of 7.1%. The agriculture and forestry sectors (combined) have a 16% share in Lumbini province (CBS 2019).

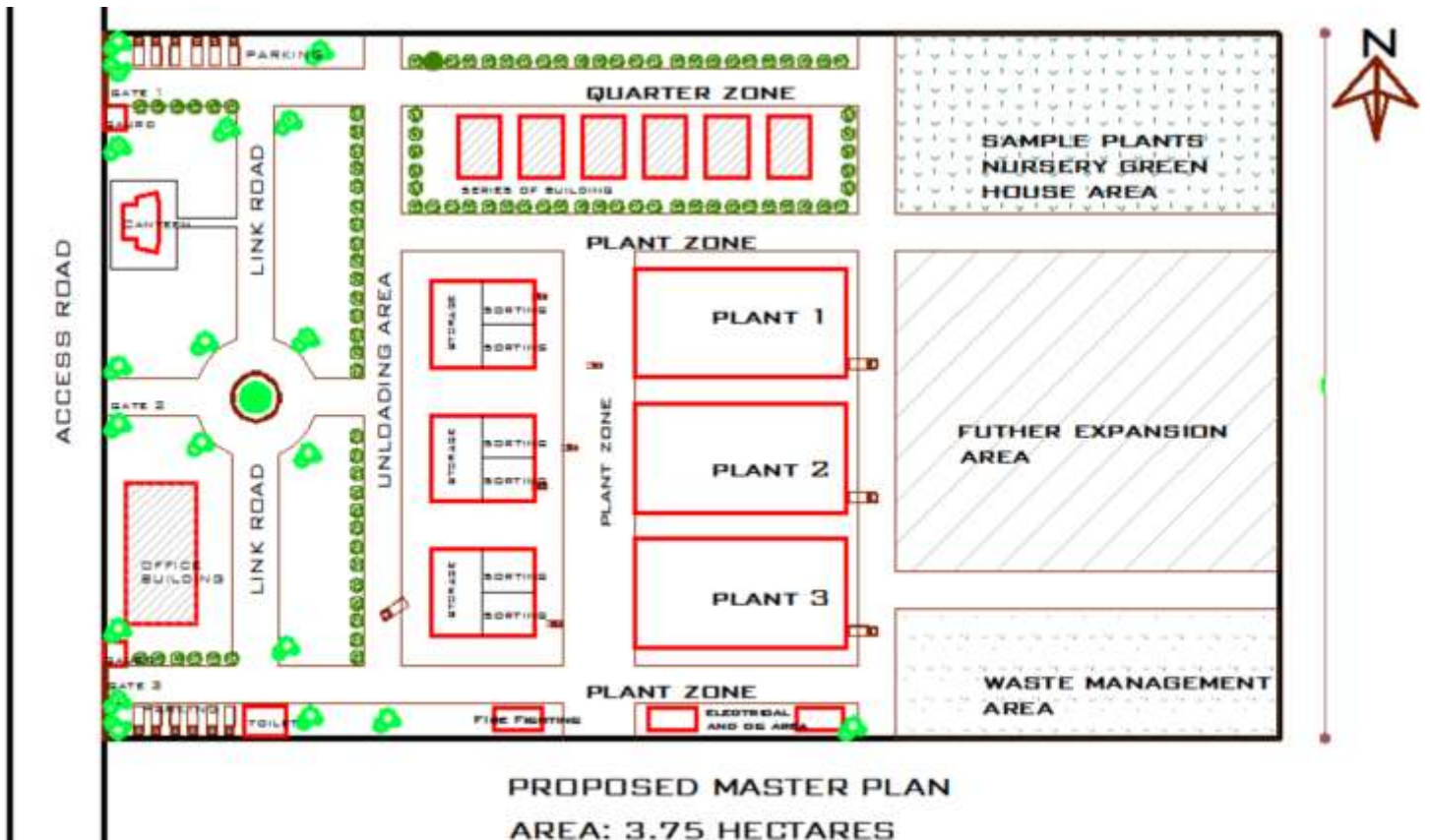
According to the Human Development Report for 2019, the Human Development Index (HDI) of Lumbini Province is 0.563 which is slightly lower than the national average value of 0.587 (NPC 2020). Likewise, in 2019, Lumbini Province has the fourth highest multidimensional poverty index (MPI) at 0.078 which is above the national MPI of 0.074 (NPC 2021).

Database available from the District Cottage and Small Industries Offices, the number of forest-based enterprises (FBEs) in Lumbini province are 3,385 (Development Vision Nepal, 2022). However, all these enterprises are not functional at the time of this assessment.

### 3. MASTER PLAN DEVELOPMENT

Non-Timber Forest Products (NTFPs) and Medicinal and Aromatic Plants (MAPs) Processing Industry is proposed approximately on 3.75 hectares land at the district of Banke in Lumbini province. Topographically, the whole industry expands in flat land having following elements.

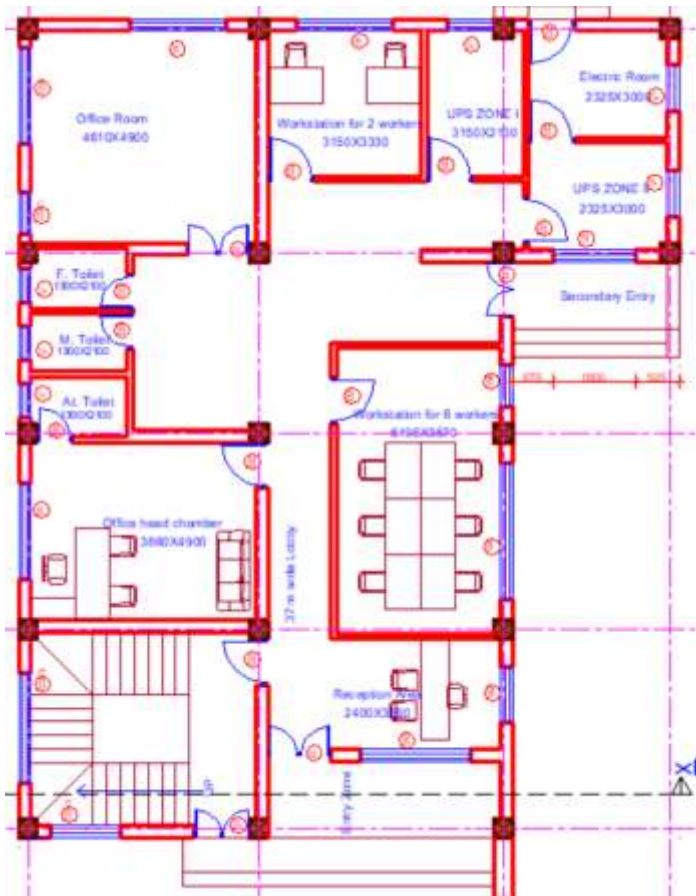
1. Main Gate
2. Guard House
3. Parking Area
4. Café
5. Garden area
6. Walkways
7. Public Toilet
8. Collection Area
9. Machine Hall
10. Quarter Area
11. Expansion Area





These 3.75 hectares land has is proposed on 150m breadth and 250m length dimension, where the main entry is from west part of the plot. This industry can be reached from three gates depending upon the purpose of the mobility. The gate number one is dedicated for the residential zone, the central gate, gate number two is used only on specific occasions whereas last gate is proposed for intake and outlet of the resources and products.

After crossing through the gate number 1 and 3, there is a provision of single storey guard house of plinth area of 17 sqm. This place not only controls the people and vehicles flow but also records and monitors the circulation. The same road continues to the large vehicle parking zone where container and trucks are parked whenever needed. Along the parking, there is a public toilet. It is 30 sqm in area with male and female wash room. There are 3 urinals and a toilet in the male compartment and 2 toilets in female compartment with wash basin facilities.

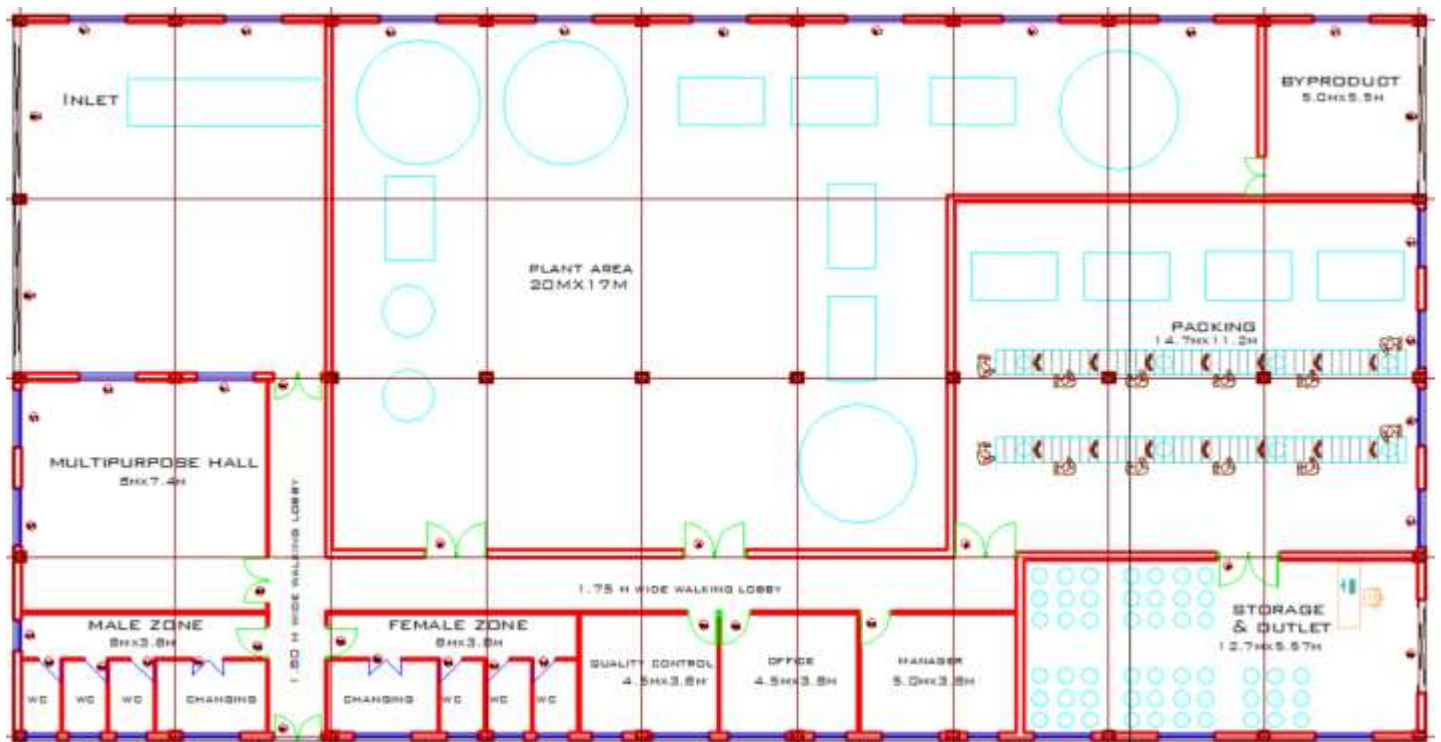


In between gate number 3 and 2 there is a 3-storey office building having a plinth area of 208 sqm. The total space capacity for the workers can extends upto 20 nos. The upper floor has meeting and 1BHK apartment as staff quarter.

Similarly, in between gate number 1 and 2 there is a canteen for the workers with 20 seating capacity. This is a composite structure where the cooking area is build using RCC and brick masonry whereas the dining area is build using post and beam with GI sheet roofing. Before reaching the collection area, there are interconnected link roads and garden spaces to buffer the different zones.

The central part of the industry is the collection zone, where there are 3 similar truss structures. This structure is approximately 21mX18m in sizes. The front part of the structure is designed for the storage of the raw materials and back part has 2 sub-divided area for sorting those elements.

Another phase of the industry is situated across the road from the collection area which holds the main plant and machinery. This open connection between these zones helps the comfort and ease work flow. There is separate entry for the workers and separate inlet for the resources before reaching the machines. So, the workers will enter from the long side of the building. Entering the main door, male and female workers have their own changing and toilet area. There are other areas like multipurpose hall, quality control, offices, main plant packaging area and outlet portion as well which is as shown in figure.





#### 4. PROJECT COST

**ABSTRACT OF COST SUMMARY SHEET FOR COMPLETE PROJECT**

S.N.	Description	Number Of Units	Amount	Remarks
<b>A</b>	<b>MACHINARY COST</b>	3.0	9,000,000.00	
	<b>Total (A)</b>		<b>9,000,000.00</b>	
<b>B</b>	<b>CONSTRUCTION OF SOLID WASTE RESOURCE MANAGEMENT SITE</b>			
1	Main Plant Block	3.0	50,386,033.75	
2	Collection Hall	3.0	38,976,172.06	
3	Office Building	1.0	18,621,661.78	
4	Toilet Block	1.0	2,132,433.43	
5	Cafeteria	1.0	2,386,921.65	-
6	Guard House	2.0	1,687,881.64	
7	Entrance Gate	3.0	1,692,158.88	
8	Building Resident	6.0	84,000,000.00	
9	Boundary Works	1.0	6,793,045.37	
10	Land Development Work	1.0	3,330,129.20	
11	Road Pavement Works	1.0	93,743,454.07	
13	Sanitary Work all complete	1.0	13,991,828.42	
14	Electrical Work all complete	1.0	13,588,141.07	
15	Firefighting Cost ( 3% )	1.0	10,209,895.84	
	<b>Total (B)</b>		<b>341,539,757.16</b>	
<b>C</b>	<b>General Works</b>			
	Insurance of personnel, plants and equipment @0.5% of B		1,707,698.79	
	Third party Insurance @ 0.5% B		1,707,698.79	
	Laboratory Test		30,000.00	
	<b>Total (C)</b>		<b>3,445,397.57</b>	
	<b>Total ( A+B+C ) =</b>		<b>353,985,154.73</b>	<b>D</b>
	<b>Price Adjustment Contingency @ 10% of D</b>		<b>35,398,515.47</b>	<b>E</b>
	<b>Contingency (work charge and others) @ 5% of D</b>		<b>17,699,257.74</b>	<b>F</b>
	<b>VAT @13% of (D+E)</b>		<b>50,619,877.13</b>	<b>G</b>
	<b>Grand Total (D+E+F+G)</b>		<b>457,702,805.07</b>	

From the table above, total project cost is estimated to be 45.7 crores Nrs.

5. PROJECT PROPOSED 3D IMAGES

