Linking Medicinal Plant Production with Livelihood Enhancement in Bangladesh: *Implications of a Vertically Integrated Value Chain*

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Abstract: *In this paper, we analyse the value chain for medicinal plants produced by village-based marginal farmers and homestead growers whose livelihoods are significantly supported by the commercial scale production of several plant species. We also suggest an improved value chain system through economic coordination that links production with the enhancement of the producers' livelihoods. A field-based investigation was carried out in Natore district of northwest Bangladesh where a total of 160 farmers and households from eight villages, located within two unions, were engaged in the production of medicinal plant species. The research gathered explanations for the resultant improvements in livelihoods and the wider acceptance of such unconventional agricultural practices in the locality. The findings revealed that the primary and wholesale secondary markets were mostly dominated by middlemen who cause inflated prices due to lack of competition in the medicinal plants value chain. A closer linkage between the producers and processors through vertical integration in the value chain could result in a multitude of benefits to both the producers and processors of medicinal plants in terms of price, quality, lead time and overall control of the supply chain.*

Keywords: *Medicinal plant production, livelihood, value chain, vertical integration, middlemen and wholesale*

1. Introduction

In Bangladesh, ninety percent of the medicinal plants are wild sourced (Ghani, 1998; SEDF & IC, 2003). Out of approximately 5,000 species of indigenous and naturalized phanerogamic and pteridophytic plants growing in the country, more than a thousand of them, including many food, vegetable, beverage, spice and ornamental plants, contain medicinally useful chemical substances (Mia, 1990). Growing in the forests, jungles, wastelands, and along roadsides, the types of medicinal plants in Bangladesh are varied. A total of 546 medicinal plants that occur in the country have been counted thus far (Yusuf et al., 1994). However, this list is not exhaustive since it is believed that many other medicinal plants also grow there, but have not yet been discovered or identified (Said, 1995; Ghani, 1998).

Medicinal plants used in traditional medication systems, such as the *Unani*[1], *Ayrvedic*[2] and *Homepath*[3]

systems practiced in the Indian sub-continent, are usually gathered by collectors from wild sources, who typically live near the areas in which plants grow, in an attempt to support their subsistence. The cultivation of such plants specifically for livelihood purposes has traditionally not been a common practice. The first initiative to cultivate medicinal plants as an income-generating activity took place in India during the Second World War, when an acute scarcity of drugs led to the cultivation of a good number of species (Chopra et al., 1958). In response to growing demand by the drug manufacturing industry and also to reduce pressure on species collected from the natural wilderness (Lambert et al., 1997), various government and industry initiatives to produce medicinal plants through cultivation were developed in different parts of the world. Such initiatives were observed in China (Schipmann et al., 2002), India (Uniyl, 2000), Guatemala (Eid, 2000), South Africa (Dold & Cocks, 2001) and in some European countries (Lange, 1998). In Guatemala, a notable livelihood-focused venture was undertaken in which formal institutions successfully introduced medicinal plants into the traditional farming system to provide farmers with a regular income (Eid, 2000). In Bangladesh, other than some anecdotal evidence of homestead growing plants (which has remained largely unrecorded), no notable example of medicinal plant production through cultivation has been cited prior to the 1990's. In the late 1990's, a *Kabiraj*[4] in Laksmiipur Kholabaria *union*[5], under Natore Sadar *upazila*[6] in northwest Bangladesh, became the pioneer in linking medicinal plant cultivation with the livelihood security and enhancement of rural inhabitants.

Along with many other stakeholders interested in linking medicinal plant production and income generation, the WWF (2002) argues that primary producers are likely to consider high yielding medicinal plants that are responsive to economies of scale, fast-growing, and demanding less space as economically attractive. Further, cultivation will be particularly advantageous for community members where there are long-standing partnerships and contractual arrangements to supply manufacturers. In this respect, Hamilton (2004) considers the cultivation of medicinal plants as attractive to relatively well-off people with better access to land, financial capital, and information. He holds the view that the virtually landless and other disadvantaged sectors of society would fail to benefit from such cultivation. Our study challenges Hamilton's view by examining whether cultivation and homestead growing of medicinal plants are gaining ground among the marginal farmers and households that own only a meagre piece of land. The paper also attempts to verify the WWF's position with regard to the suitability of potentially cultivable species.

Although several studies have been carried out during the last decade to investigate markets and the associated value chain of wild-collected, medicinal plants extracted for commercial purposes (Balick & Cox, 1996; Olsen, 1997; Kuipers, 1997; Laird, 1999; Laird et al., 2003; and Thompsen et al., 2006), the literature on the market perspectives of cultivated species is still limited. Only limited discussions on the livelihood implications and marketing aspects of cultivated medicinal plant species are available; contributions to these areas include the works of Lange (1998), Harnischfeger (2000), Eid (2000), Bodeker (2002) and Schippmann et al. (2002). Hamilton (2004) observed that various actors are involved within the medicinal plant market system and associated value chain. They include producers (collectors or growers), traders of various types, manufacturers and consumers. In most cases, he found that the structure of the value chain is poorly integrated, with no or nominal vertical links, and it is usually secretive (Laird, 1999). Kop et al. (2006) has identified several factors responsible for such a poorly coordinated and obscure market chain, such as market access and transaction problems, information gaps, lack of reliable buyers, and discriminatory and unfair pricing. The tangible challenges faced by small-holder farmers in the upstream value chain relate to five specific areas: market information, capital and skills, volume, quality, and consistency of supply (KIT et al., 2006). In the Indian context, Uniyal (2000) asserts that for farmers cultivating medicinal plants, there can be many obstacles inhibiting success. He cites the lack of knowledge of cultivation and post-harvest techniques for some species and the lack of availability of good quality planting material as the two major constraints in this regard. The existing literature thus reveals that the problems and challenges inherent in the medicinal plants value chain are versatile and multiple: poorly integrated, lack of market access, information and knowledge gaps, unfair pricing upstream, and lack of capacity at the producer level.

In this context, this study, therefore, aims to lay the foundation for a better value chain that would try to offset aforesaid problems. We were encouraged by the examples of KIT et al. (2006), where they showed through 19 case studies how development organizations helped farmer groups to improve their income and empower the value chain through vertical and horizontal integrations. In this paper, we argue that development promoters (agencies, donors, NGOs, research organizations) who work to enhance the livelihoods of the poor can play a catalytic role in enabling farmers to increase their level of competitiveness and diversify both products and markets for incremental benefit. These goals can be achieved through better coordination in the value chain system. The objectives of the study are twofold: i) to examine the livelihood concerns for medicinal plant production; and ii) to map the existing medicinal plant value chain in order to find an improved value chain system that would link the production directly with the producers' livelihoods enhancement.

The study initially seeks to determine the importance of the value chain as a production and marketing approach, as well as its significance for improving the livelihoods of the primary producers. In describing the study area and the methodology, the results of the study concerning the livelihoods and the prevailing value chain are presented. Then the study presents an analysis of the driving factors that relate medicinal plant production with livelihoods, the inherent strengths and weaknesses of the existing value chain, and the options available for improving the existing value chain system. In conclusion, the paper offers a recommendation concerning how a new value chain system could be developed that would integrate producers and processors for their multiple benefits, with implications for livelihoods improvement, industry development, and improvement of biodiversity as associated benefits.

2. Value Chain Analysis and Its Significance

Value chain analysis is one of the most useful methodologies for understanding how markets operate for a particular good (Kanji et al., 2005). It also helps conceptualize the value-adding activities through which a product passes from the initial production stage to final delivery to the consumer (Kaplinsky & Morris, 2001). Mapping the chain also enables identification of the key actors and their roles in the system, and measures can therefore be determined to improve the chain structure through exclusions, inclusions or building bridges.

In considering an ideal value chain for the medicinal plants produced by rural communities, an industry-community partnership has been advocated by Kop et al. (2006). Some analysts have registered public-private partnership as an efficient and commercially beneficial value chain mechanism for the producers and manufacturers of agricultural products (e.g., Roekel et al., 2002). However, by observing real-world market value chain scenarios involving different commodities in different parts of the world, Schmitz (2005), in his guide to value chain analysis for policy makers and practitioners, concludes that "mere matchmaking between producers and processors makes value chain a buyer driven one which tends to be exploitative, extracting as much resources and demanding lesser price from supplier." In such a situation, Karki (2000) recognizes a great role for a bio-partnership that involves an 'honest broker' between industry and the producer community. In Northern India, Nautiyal and Nautiyal (2004) observed that collaboration among farmers, research organizations and industry created a sustainable value chain for medicinal plants.

Based on business management literature that considers different types of buyer-seller relationships, we would like to argue that some of the mechanisms employed in developing and sustaining institutional relationships may also apply equally well to defining the medicinal plant value chain. Lummus (2004) offers a particularly useful list of different types of relationships that are most commonly developed to integrate the fundamental value chain players into effective and productive arrangements. The list includes the following types of relationships: contracts, quasi-vertical integration, tapered vertical integration, cost plus agreement, joint ventures and strategic alliances.

USAID (2006) has placed a special emphasis on conducting a value chain analysis of medicinal and aromatic plants for a host of reasons. These include multiple interrelated development goals that relate to increased resource productivity and biodiversity conservation (i.e., nature), improved standards of health and nutrition (i.e., health), economic growth

through the development of a competitive industry (i.e., wealth), and local empowerment and good governance (i.e., power and decision-making capacity). In achieving such goals, the importance of a strengthened relationships between primary producers and product manufacturers is underscored: they can facilitate learning and information sharing, and build greater industry competitiveness, while removing barriers to the sustainable use of natural resources and effective natural resources management. By examining pilot schemes involving medicinal plants in India, Singh and Swanson (2003) have asserted that the proper organization of medicinal plant cultivation and management would result in highly remunerative returns both in financial and economic terms for the small-scale growers. In addition, cultivation can be commercially attractive to companies because they then have greater control over quality and supply (Harnischfeger, 2000).

The implications of an efficient and integrated value chain are multi-fold. It enables primary producers not to remain merely as passive suppliers but to become active participants who are motivated to manage their resources, reinvest and innovate. It removes market access barriers for the primary producers, which are seen as key constraints to the eradication of rural poverty (Hellin et al., 2005). An integrated value chain system also results in better commercialization of the products produced by the rural poor, which translates into greater opportunities for their generation of income (Giuliani & Padulosi, 2005). This integration in the value chain becomes effective if non-value added costs and activities along the chain can be eliminated (Baker, 2002).

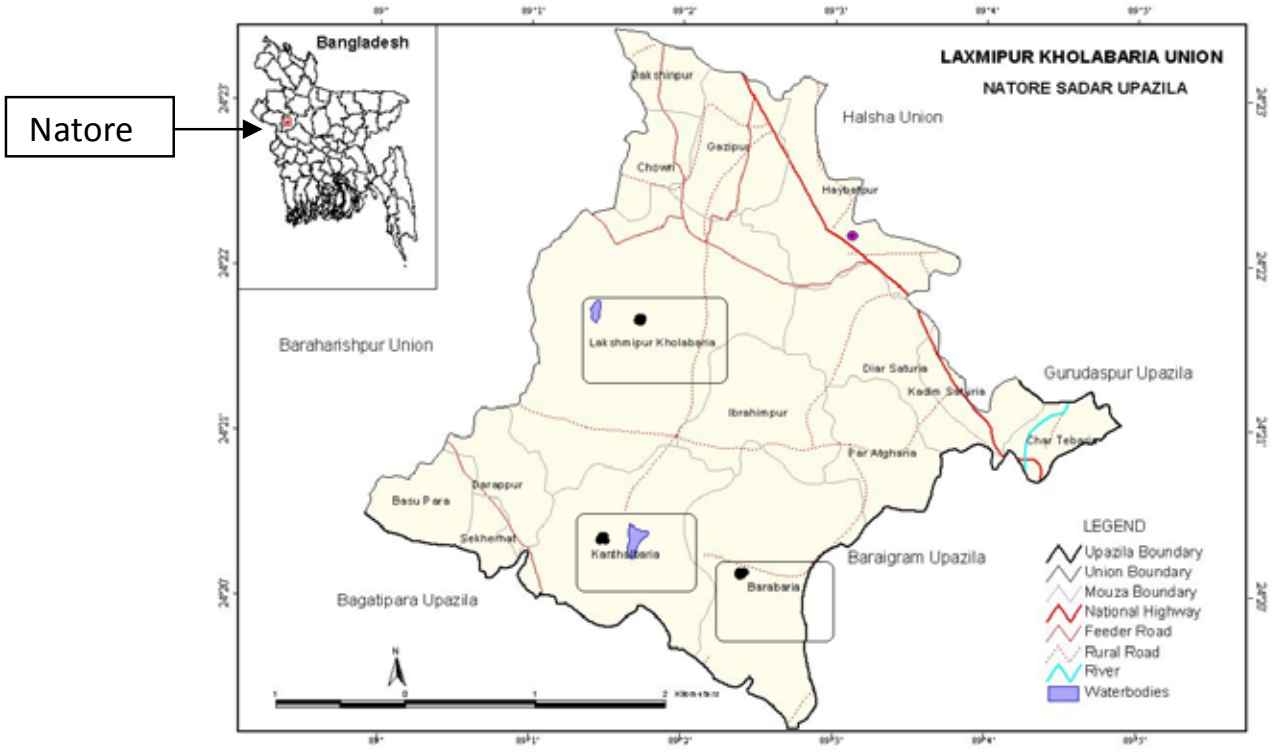
From the existing literature, it is evident that an improved value chain bears great significance for producers' livelihoods through reducing poverty and inequality at the producer level and by contributing to social sustainability, which Brinckmann (2004) views as a prerequisite to ensuring environmental sustainability. In the real-world context, it is critical that the current state of the value chain be thoroughly mapped and assessed since it would enable the formulation of new ideas for significant progress in related problem areas.

3. Study Area

The study was conducted at sites located at 24° 24' 50'' N and 88° 55' 48'' E, in two different *unions* within Natore Sadar *Upazila* (see Fig.1), in the Rajshahi *division* of northwest Bangladesh. The study area has 67,852 household units and covers a total of 401.29 km². The population of the area is 369,136, with males comprising 51.65% and females 48.35%. By religion, Muslims make up 89.83%, Hindus 9.68% and others 0.49%. The latter are mostly *Santal* and *Buno* ethnic nationals (with a population of about 4,353). Around 70% of the population of the area depends on agricultural activities (BBS, 2006).

The study area belongs to the Ganges (i.e., known as Padma in Bangladesh) floodplain and is comprised of 29,925 hectares of cultivable land and 9,736 hectares of fallow land. The climate of the area is generally characterized by tropical monsoons, with high temperatures, considerable humidity and moderate rainfall. The hot season commences early in March and continues till the middle of July. The maximum mean temperature is about 34°C during the monsoon months (April to October) and about 12°C during the winter. The highest rainfall is observed during the months of the monsoon. The annual rainfall in the district is about 1,448 millimetres (source: www.banglapedia.com).

The population in the study villages is mostly poor[7] and, on average, 40% of the total families are extremely poor[8] (Cuvelier et al., 2003). Among the villagers, it is mainly the marginal landholders and/or the poor who are involved in medicinal plant production. Around 30 different types of medicinal plants are grown in these areas. However, the cultivation of *aloe vera* (Gritakumari) is most popular, while other species include *asparagus racemosus* (Shotomuli), *Scoparia dulcis* (Misridana), *Bombax ceiba* (Shimulmul), *Ipomoea digitata* (Bhuikumra), *Andrographics paniculata* (Kalomegh), *Withania somnifera* (Arshwagandha), *Ecobolium Viride* (Nilkantha), and *Ecolobium Species* (Rajkantha)[9]. These are cultivated predominantly as commercial species and have already been established as lucrative cash crops for the communities (IC & SEDF, 2003; BRAC, 2004).



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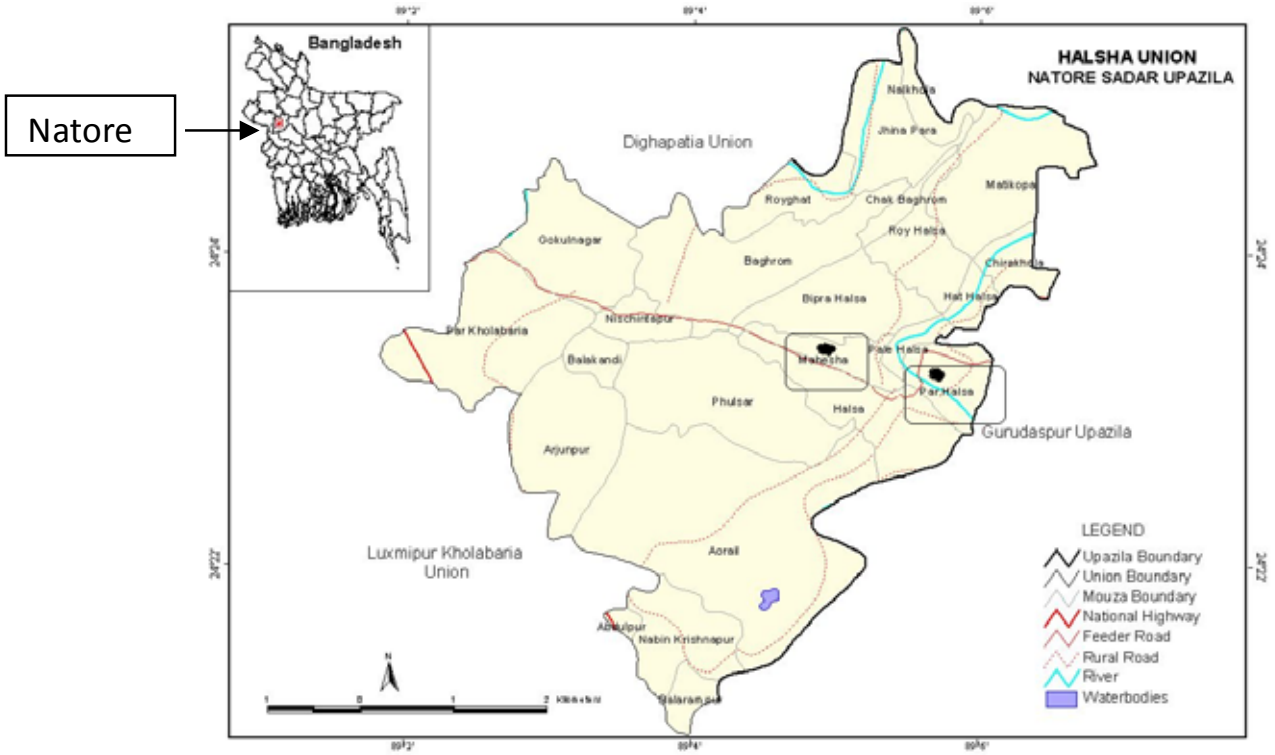

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Figure 1. *Maps showing study villages at Laxmipur Kholabari union (a) and Halsha union (b) in Natore Sadar Upazila, Bangladesh.* **Source:** *Center for Natural Resources Studies (CNRS), Dhaka*

4. Methodology

4.1 Livelihood Study

In our study, we selected five villages in the two unions and procured data using field observations of different activities pertaining to planting, irrigation, fertilization, harvesting, packaging, and primary processing in relation to the production of medicinal plants. We also conducted a livelihood survey through interviewing 30 households (located in five villages) which grow medicinal plants by using a structured questionnaire. Through the survey as well as semi-structured interviews with key informants, we gathered data on species in cultivation, land quantity, income derived from medicinal plant harvest, species selection, and overall livelihoods benefit. Apart from direct interviews, we also organized periodic 'focus-group discussions' with several participants to learn about their success stories and the reasons why they are involved in medicinal plant production. We also attended (as a participant observer) a few biweekly meetings of the local cooperative (Laxmipur Khulabaria Oushadi Krishak Samity - a farmer organization in the union) to gain an understanding of the growers' concerns about the management and marketing of their produce.

Additional information on medicinal plants, socioeconomic and market systems and livelihoods data was derived from a local NGO called Landless Unity Society Training Rural Employment (LUSTRE) working with medicinal plant communities. Data procured from LUSTRE was also triangulated by cross checking with household responses and by asking key informants (LUSTRE, 2005). We also visited several medicinal plant-based micro enterprises and primary processing centres in the area to get a better understanding of the primary processing activities of local traders and middlemen as well as to gather information on buying and selling prices at the primary processing level.

4.2 Value Chain Study

The Handbook of Value Chain Analysis (VCA) outlined by Kaplinsky & Morris (2001) was considered very useful for analysing the value chain in order to assess the contributions made by community members engaged in primary production as well as the benefits they derive. The information required for VCA ranged from obtaining qualitative information on how the chain 'functions' to quantitative data on the prices and costs borne by different actors in the chain (Kanji et al., 2005). It was difficult to obtain this information systematically from a particular source, and therefore, we decided to combine information procured from various sources, including public statistical sources, development organizations and NGOs, published work, and interviews with key informants and organizations possessing special knowledge of the industry as well as other major actors in the chain. This type of approach helped us to study the existing value chain.

The absence of a network of firms producing medicinal plants leaves no scope for any central data bank or inventory in Bangladesh. Moreover, key industry representatives are often reluctant to provide information on their prices and costs (particularly commercial firms, which prefer to protect their data from competitors and from outsiders). All that necessitated lengthy and costly field investigations of farms, markets, inputs and trade. In spite of such difficulties, a list of industry representatives was prepared based on information from the Drug Administration of Bangladesh, and the *Ayurvedic, Unani and Homeopathic Federation* of Bangladesh. Farmers, producers, *paikers*[10], *beparies*[11], wholesalers, processors, manufacturers, distributors and retailers were interviewed through purposive sampling along the chain to obtain data on actors, activities, prices, facilities, and the market situation. In order to map the industry value chain, we had discussions with key informants such as industry experts, development specialists, and the NGOs associated with medicinal plants and agro-forestry sector development.

To figure out the middlemen's impact on the value chain, a total of nine middlemen at local (Laxmipur-Kholabaria) and sub-regional (Natore and Bogra) levels and 12 wholesalers at regional levels (Rajshahi and Dhaka) were interviewed to obtain data on their 'cost of goods sold (COGS),' which includes purchasing price, transportation and labor cost. At the wholesale level it also involves the cost of storage. Prices of seven species at primary producer, middleman, and wholesale levels were obtained and then COGS at middlemen and wholesale levels were deducted in order to obtain gross margin as a percentage of producer's price – which gives an indication of price setting power of middlemen and wholesalers. The cost of transportation, storage and

labor for all these seven species were calculated based on self reporting from middleman and wholesaler in order to determine the COGS.

5. Results

5.1 Production and Livelihoods

The mode of medicinal plant production in the study area is either homestead farming or field cultivation. A total of 65 acres of land is estimated to have been under cultivation for the production of ten species. According to the producers and the local traders, if the present trend of increased cultivation practices continues, the production area will likely double within five years since every year some new farmers enter into medicinal plant cultivation and new villages are added as producing communities. At the same time, species diversity could be richer in the future as ten species are already being cultivated by the farmers as livelihood supportive cash crops, while twenty varieties of other species are being grown on a smaller scale. A conspicuous observation was that there were no large landholding farmers. The largest landholder among the cultivators in the area was found to have dedicated only 40 decimals[12] of his lands for *aloe vera* production, while the smallest piece of land used in the production of Misridana and Bhuikumra was only 0.5 decimal in size. The following Table 1 gives an account of the species-wise range of land area that each farmer dedicated to growing medicinal plants.

Table 1. *Species-wise range of land distribution in medicinal plant production in the study villages of Laxmipur-Khulabaria and Halsha Unions (n=30).*

Latin Name	Local Name	Decimal per Houshold	Total acres
Aloe vera	Ghritakumari	1.0-40.0	38.00
Bombax ceiba	Shimulmul	1.0-13.0	6.50
Asparagus racemosus	Shotomuli	0.5-12.0	5.80
Scoparia dulcis	Misridana	0.5-10.0	5.75
Withania somnifera	Arshwagandha	1.0-5.0	3.0
Rauvolfiasarpentina	Sarpagandha	0.5-4.0	2.0
Andrographis paniculata	Kalomegh	2.0-3.5	1.35
Ecobolium Viride	Nilkantha	0.5-10.0	1.20
Ipomoea digitata	Bhuikumra	0.5-1.0	0.90

Figure 2. *Production of Shotomuli in the homestead of a poor household.*

Among the 30 interviewees, it was found that farmers owning relatively larger land areas were reluctant to expand their cultivation; that is, they were not willing to dedicate more land to medicinal plants. The reasons revealed by them were: i) they were mostly producing *aloe vera* and it is a labor-intensive crop requiring frequent care, and they themselves could not manage beyond 50 decimals; ii) hiring labourers was costly and they were not technically efficient with enough production knowledge; and iii) as these farmers were relatively new in medicinal plant cultivation, they felt that the risk of crop failure for natural or other reasons was high.

Conversely, people owning lesser amounts of land or having only homesteads dedicated as much land as possible to medicinal plant growing, sparing only their dwelling sheds. Two reasons were identified as leading them to make such a production decision. First, they found that per decimal productivity in medicinal plants was higher than with any other crops or species they had previously grown (In many cases, it was observed that vegetables and spices were replaced by medicinal plant cultivation in homesteads, while in the case of field cultivation, rice, wheat, ground nuts, mustard and other traditional crops were replaced by medicinal plants). Second, the land or homestead was virtually barren as a fallow area and now they were exploiting the opportunities that had arisen out of medicinal plant production.

53% of the respondents agreed that their livelihoods improved with income generated from medicinal plant cultivation (though only 27% or 8 respondents revealed their livelihoods were completely dependent on medicinal plant production), while 20% replied that it was rather moderately supportive to their livelihoods. However, 27% of the respondents said that the cultivation of medicinal plants did not help their livelihoods significantly, i.e. the contribution of medicinal plants was inadequate for their subsistence. As most of these cultivators (27%) are extremely poor, medicinal plants growing brings benefits to them, although the marginal contribution is not significant to their livelihoods. This is because the total amount of cultivated land is very limited and the quantity of harvest is very meagre.

Table 2. *Percentage of total land in medicinal plant production by households with different land capacity and average years of experience (N=30)*

Land capacity	Household nos.	Average land in medicinal plant production (%)	Average no. of years in production	Increase in Profit (Producers' self reported)[13]
≥ 100 decimals[14]	3	22	2	30-60%
50-99 decimals	5	34	3	50-90%
20-49 decimals	9	41	5	70-130%
< 20 decimals or (homestead only)	13	62	2	No comparison possible[15]

The selection of medicinal plant species by the communities is dominated by the short-cycle factor of the cropping period. An early harvesting period was found to be an important consideration for farmers of medicinal plants in choosing the species to be cultivated. One of the reasons *aloe vera* was among the most popular species was that harvesting began after eight to ten months. Other species in cultivation that are already popular among the communities have an invariable one-year harvesting period except *asparagus racemosus*, which takes more than 24 months for its roots to mature for use.

As stated earlier, in the five study villages of Lakxmipur- Kholabaria *union* and Halsha *union*, the total number of growers whose livelihoods were more or less dependent on medicinal plants was around 160 households. All 30 participants in both the *unions* were asked about the extent that the cultivation of medicinal plants was contributing to their livelihoods. In reply, among them, around

5.2 Value Chain

Following Craig (2000), we divide the actors in the value chain into two categories, i.e. upstream and downstream members. An upstream member provides the raw materials or finished goods that are put into a business process. The downstream members consume the output of the process.

The upstream value chain members of the Bangladesh medicinal plants industry were comprised of input suppliers, primary producers and processors, brokers and traders (which include local *paikers, phariahs*[16], regional and sub-regional *beparies*), and wholesalers, while in the downstream there were the manufacturers, distributors, herbal doctors (*Kabiraj, Hekim*[17]*, Baiddaya*[18]), retailers (mainly herbal dispensaries) and consumers. Manufacturers are the key members in the downstream, performing the core business process of transforming materials into products.

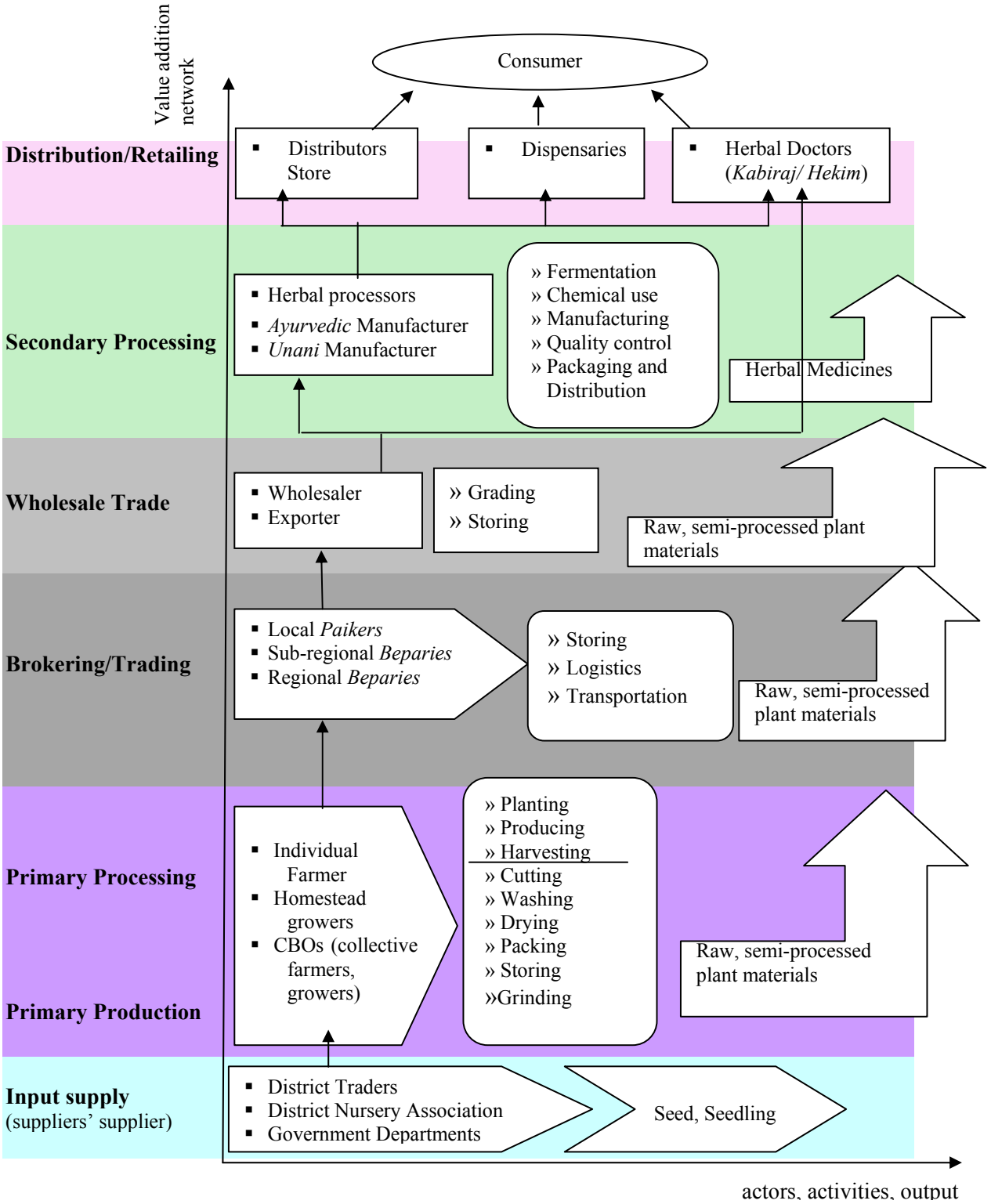

Figure 3. *Medicinal plant value chain and productive networks in general for cultivated and homestead grown medicinal plants in Bangladesh.*

The medicinal plants grown in the two *unions* are marketed through *bepari /paikers* and wholesalers' purchasing agents (Fig. 4). These middlemen are usually very proactive and approach the growers beforehand to ensure their purchase. They offer advance money to growers for assured supply, invest in transportation, and maintain good liaisons with the wholesalers. Usually these people distort price information through manipulative communications both with the downstream and upstream actors of the value chain. Despite the active and dominant presence of the middlemen in the chain, outputs from primary processing to the wholesale level remain the same, i.e. raw, semi-processed plant materials.

Price investigations on seven top selling plant materials in the studied area revealed that prices were inflated. This was mostly at the middleman and wholesale levels and without any product differentiation or value addition. The exceptions are nominal transportation and labour costs (which are 5-10% of their purchasing price except *aloe vera*) at the middlemen level, while at the wholesale level, incremental cost components included direct labour and storage, which constitute around 5% of the buying price.

Along the entire chain, it was observed that the profit margin at the middleman level ranged from 59% to 139% and at the wholesale level it was 22% to 90%, as opposed to the cost of goods sold by the middlemen and wholesalers respectively. Under the present value chain and market systems, processors of medicinal plants buy products which are 109% to 358% higher than the primary producers' selling price (see Table 4).

Figure 4. *A farmer is packing aloe vera leaves to be handed over to a Paiker (local trader) sitting nearby.*

Table 4. *Prices of seven top selling medicinal plant species (grown in the study area) at primary producer, middleman, and wholesale levels, showing associated costs, profit margins and value addition.*

Species	**Primary Producer (Tk./kg.)**	**Middlemen**				**Wholesale**				**Cost incurred by Middlemen &Wholesalers** (tk./kg)	**Value added by Middlemen &Wholesalers** (tk./kg)	**Value added/ Gross Margin as percentage of primary producer's price**
		COGS[19] (tk./kg)	Selling Price to Wholesaler (tk./kg)	Net Profit (tk./kg.)	Profit Margin in percent of COGS	COGS (tk./kg)	Selling Price to Processor (tk./kg)	Net Profit (tk./kg)	Profit Margin in percent of COGS			
Aloe vera	4	4.6	11	6.4	139%	11.6	17	5.4	47%	1.20	11.80	295%
Asparagus racemosus	25	27.5	60	32.5	118%	63	120	57	90%	5.50	89.50	358%
Ipomoea digitata	10	11	18	7	64%	18.9	30	11.1	59%	1.90	18.10	181%
Andrographis paniculata	10	11	18	7	64%	18.9	32	13.1	69%	1.90	20.10	201%
Withania somnifera	90	94.5	150	55.5	59%	157.5	200	42.5	27%	12.00	98.00	109%
Rauvolfia sarpentina	70	73.5	130	56.5	77%	136.5	200	63.5	47%	10.00	120.00	171%
Bombax ceiba	12	13.2	25	11.8	89%	26.3	32	5.7	22%	2.50	17.50	146%

In the case of *aloe vera,* there was a Farmers Association formed by the growers in these villages (*Laxmipur Khulabaria Oushadi Krishak Samity*), and the association had an *arath* (central sales depot) that controlled the sales price by setting a price level per bail of *aloe* leaves (1 bail= 55 kg) every two months. Sales are highest in the summer (peak season) as *aloe* leaves are mainly used in local drink markets for sherbet making. But in the winter months (November to February) and in the month of *Ramadan*[20], which are the off-peak seasons, sales decline and the price of *aloe* leaves fall drastically. Besides seasonality, prices at the producer level are very often manipulated by the middlemen due to the weak information flow along the chain.

Figure 5. *On Route to the Wholesale Market - a middleman taking consignments of aloe vera leaves from Kholabaria village*

6. Discussion

Several livelihood and market-related factors associated with the medicinal plant producer communities have become more apparent through this study of the adaptation of medicinal plant production for livelihood-supportive cash cropping activities and the associated value chain for the village-grown plant species. Our findings were threefold:

6.1 Driving Factors for Medicinal Plant Production by the Poor

In Bangladesh, around 9% of rural households are landless and 50% have less than 99 decimals of land (BBS, 2006). Conventional agricultural practices that demand chemical fertilization, irrigation, and hired labour render a diminishing rate of return every year due to soil fertility loss and manure scarcity, and therefore are gradually becoming unattractive to the farming communities. Farmers and marginal agro-producers have a latent intent toward diversified or nontraditional cropping that would ease their production constraints and yield an optimum return for their subsistence. Laxmipur-Khulabaria *union* is a glaring example in setting the precedent of breaking the traditional trend of agro-production in Bangladesh. It is clearly evident from the results of our study that virtually landless and smallholders are increasingly inclined toward employing medicinal plant production for their livelihoods security and replacing the traditional species of vegetables, spices and food grains with medicinal plants. The marginalisation of poor people who are left with meagre pieces of land or with only a homestead is one of the major reasons for their choosing medicinal plant production. As many medicinal plants can be easily grown on even poor soil, small pieces of land, fallow areas and homesteads, now these traditionally under-utilized pieces of land are being exploited through the production of medicinal plants. As far as species selection is concerned, it is also apparent from our study results that the livelihood urgencies of the resource poor have led them to choose those species which ensure them quick cash generation. Therefore they are prone to selecting short-cycled species to grow or cultivate irrespective of considering the productive benefit or net cash return from other species with a long gestation period.

6.2 Inevitability of a Better Value Chain System

As the reasons for producing medicinal plants in the locality are mainly driven by aspects of livelihood security, the price benefit to the producers is the most critical among all the factors that have led the communities to cultivate such plants. It was found that the net return from medicinal plant production was higher than from most other traditional crops they used to produce. Nevertheless, these producers are literally entrapped in a complex value chain dominated by middlemen and intermediaries. The value chain as it has been mapped is very long, with as many as six marketing stages (where value addition occurs) involving primary producers, local contractors, regional wholesalers, divisional wholesalers, processors and retailers. Such a long chain contributes to the low prices that primary

producers receive for their products (Riddihough & Jones, 1996).

The vertical linkage or production network in the value chain is noticeably weaker. Wholesalers and manufacturers do not have strong linkages with the primary producers and the flow of market information is non-prevalent between them. Primary producers, i.e. farmers or growers, though, are the principal actors in the value chain but play a minimal role and enjoy the smallest margin of profit. Lacking market intelligence and virtually unaware of the product demand and the identity of potential buyers, these producers are enchained by the local collecting agents (i.e., *Paikers* - local traders, and *Beparies* - traders) and therefore do not possess enough bargaining power to realize a maximum or fair value for their products. The WWF (2000) contends that the longer trade chain and the perceived need to protect information leads to a lack of transparency. The findings of this study substantiated this view since the middlemen, collecting agents, *Paikers*, and *Beparies* usually do not provide information on trade prices and end-use to the farmers or growers of the medicinal plants; rather they often distort market information in order to maximize their profit. It is also clearly evident from the observations that the herbal processors buy from wholesalers rather than directly from primary suppliers because of the optimal quantity and grade of the raw materials they need. A wholesaler-to-processor trading system usually makes product traceability nearly impossible (FAO, 2004). Moreover, there is a lack of trust between the processor and medicinal plant traders, with accusations of adulteration expressed by the processors.

6.3 Towards a New Vertically Integrated Value Chain

The inherent weaknesses in the existing value chain for the medicinal plant products produced in the study area lead us to conceive a new value chain system that would bring industry and the producer community together to create a participatory management and marketing system for the medicinal plant resources of the area. Although it is difficult to generalize conclusions between the level of species and individual chains in the medicinal plant trade, where each 'chain' is distinct, nonetheless some cases can be drawn to learn lessons regarding principles, practices and policies, which could lead to the creation of a sustainable medicinal plant chain in general (Kop & Alam, 2006; Kop et al., 2006). There are examples of closely coordinated medicinal plant value chains already set up in different parts of the world. In Namibia, a development promoter (an NGO, CRIIA SA-DC) provided primary producers of *devil claw* with information and support in production, and ensured them fair market prices. All that enhanced the livelihoods of the primary producers and promoted sustainable harvesting. Cole & Lombard (2000); cited in Hamilton (2004, p.1499), who were associated with that program, claim that:

"*We have been able to demonstrate that by ensuring good prices, by making information available, by creating options, by strengthening their bargaining position and by providing general support, harvesters are taking responsibility for the management of this resource. Compliance with sustainable harvesting techniques.....in Namibia*"

In Patna district of Bihar province in India, an NGO, Agricultural and Technology Management Agency (ATMA), has played a role as a lead agency in linking *vinca rosa* producer communities of the Patna area with two industries (*Baidyanath Ayrved Bhawan and Ayrved Shri Herbals Limited*), and it has been monitoring the partnership arrangement since 2000 (For details see, Singh and Swanson, 2003). Nautiyal & Nautiyal (2004) and Kop & Alam (2006) have illustrated medicinal plant value chains where producers of Kutki (*Picrohiza Kurrooa*) and processors are under a long-term production agreement for the facilitation and monitoring of HAPPRC[21]- an important centre for medicinal plants research in Uttaranchal, India.

Our approach for a better value chain for the studied producer-community would be to create a viable long-term nexus between Producers (based on their supply) and Processors or Processors' Supplier (based on their demand), with the initiative and coordination of a Development Promoter (based on their development, livelihoods and environmental sustainability objectives). In the study area, this partnership development can take place between *Laxmipur Kholabaria Oushadi Krishak Samity* – an organization of the medicinal plants producer community or other CBOs (which could emerge with the guidance of NGOs) and Herbal and Ayurved processors based in Dhaka, Bogra, and Rajshahi.

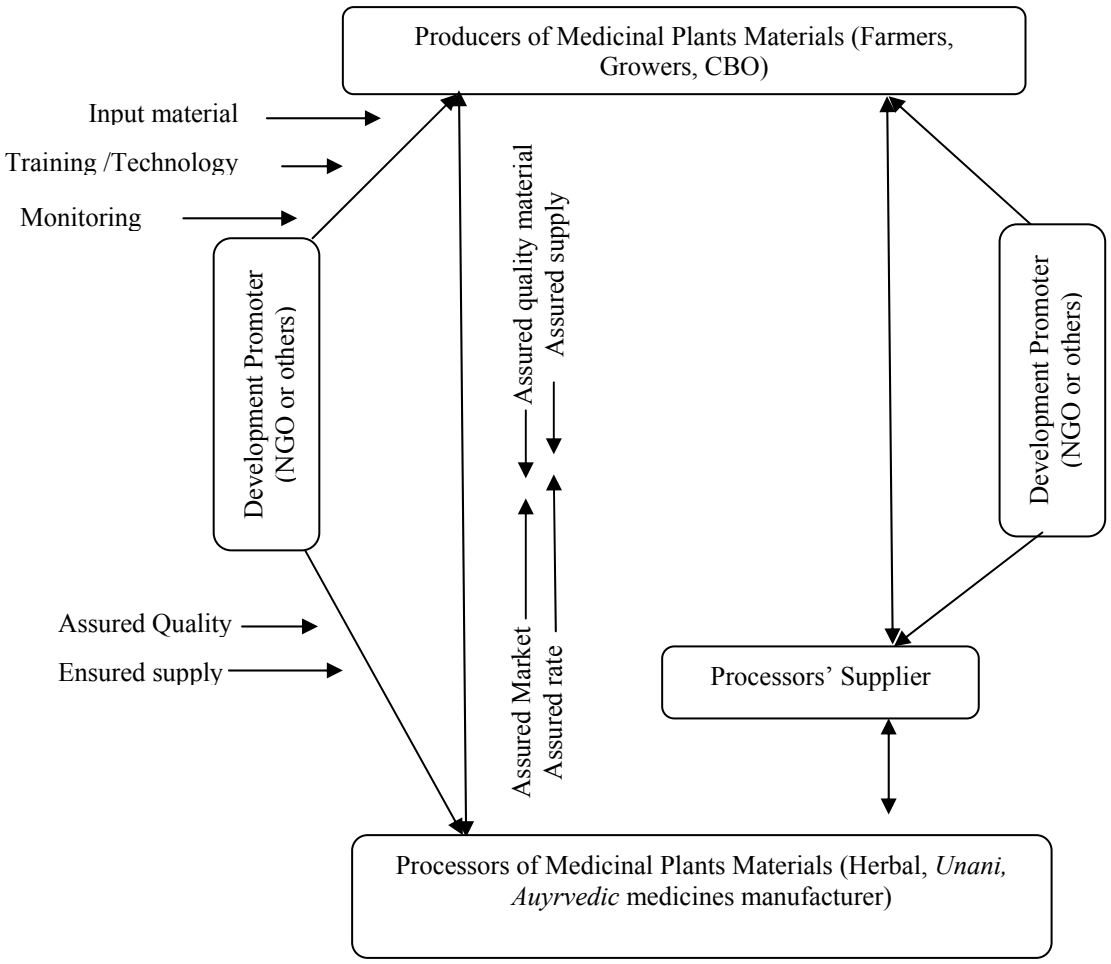

Figure 6. *Proposed 3P-Nexus Model as a vertically integrated value chain for building an industry-community partnership*

Processors from other sectors like cosmetics, food and allopath could also be attracted. A good number of NGOs are operating in the area for livelihood improvement, community development and environmental sustainability. A few of them are working to promote agro-forestry and homestead forestry, including medicinal plants production. Creating a vertically integrated value chain (Figure.6) by forming a 3P (producer, processor, promoter)-nexus could be considered an ideal arrangement to counteract the price setting power of middlemen and wholesale levels.

The integrated 3P-Nexus value chain as envisioned could under certain conditions result in a win-win situation for both producers and processors, and also serve the development agenda of the promoter. There would be only two productive chain players with commercial interests in the value chain network, which could counteract actors (local *Beparies*, *Paikers*, *Phariahs*, regional and divisional wholesalers) with price setting powers by keeping them away from the chain. A vertically integrated value chain could allow the producer community to engage with a committed buyer to secure a constant and reliable supply to the processing industry. Most importantly, it would ensure a fairer price for both the producers and the processors as the price benefit derived by the elimination of middlemen could be shared between them. However, there are manufacturers who buy through their own purchasing agent i.e. would prefers to take the input supply from the nominated and reliable supplier on credit due to their limited working capital capacities. In such cases this value chain model advocates a contractual arrangement between producers and those suppliers (Processor's supplier[22]) who would represent the processor and not assume to the role of aforesaid middlemen.

7. Conclusion

Due to severe population pressure and meagre cultivable land, the rural poor and extreme poor face the dwindling of diverse means for their livelihoods. Unlike Hamilton's (2004) view, we found that the cultivation or production of medicinal plants could play an important role in improving the livelihoods of those poor or extreme poor people owning meagre pieces of land. The attention of poor farmers with small amounts of landholding and the extreme poor who own only the homesteads is being diverted toward nontraditional cropping, i.e. medicinal plants cultivation, which offered them an incremental benefit and, in many cases, a fresh benefit (for those who did not grow anything in the homestead or fallow land earlier). Short-cycled plants have been gaining more popularity among the smallholders mainly because of their underlying need for early cash return – this phenomenon conforms to WWF (2002) hypothesis that stated "primary producers are likely to consider high yielding medicinal plants that are responsive to economies of scale, fast-growing, and less demanding of space as economically attractive". With such livelihoods and alternative income-generating contributions, the addition of new species by these growers both in the fields and homesteads and the increased utilization of traditionally barren or under-utilised lands have also been contributing to enriching the local biodiversity and green cover.

In order to sustain the growth in medicinal plant production, a fair distribution of the gross margin to the primary producers is necessary. In the present value chain system for the medicinal plants, downstream buyers (especially processors and consumers) pay most of their money for middlemen's value additive opportunistic pricing due to inherent weaknesses in the chain. Adopting the 3P-Nexus value chain as proposed could create provision for an increased margin of profits derived from the elimination of middlemen for both the producers and processors. The inclusion of development organizations, particularly the NGOs, as mediators, would be very significant for keeping the nexus viable. Thus, the vertically integrated value chain, with only producers and processors as commercial actors and NGOs as promoters could create a win–win situation both for the producer and the processors in terms of price, quality, supply, and continuous improvement.

The integrated chain, therefore, allows to link producers' livelihoods with the production of medicinal plants, which then inevitably would call for a long-term commitment from all the parties. Indeed, this would be a challenging task. In particular, the development promoters would need to commit to a longer period than usual, the partnership should be strongly monitored, and the chain should be open to adjustment. The role and competency of development promoters in the integrated value chain development would be crucial. There is a wide range of factors and issues that could affect either the producers or the processors under contract. At the same time options to opt out from the arrangement and look for newer contracts would be available to both the parties. Notwithstanding, it is easily conceivable that there would be ample scope for the parties under contract to bring further synergic effects and improvement to the chain by targeting the burgeoning global medicinal plant market that offers differential pricing for organically cultivated, fairly traded, and eco-labeled products.

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End Notes

1 A branch of medical science/ practice that deals with both medicinal plants/ plant parts as well as some essential chemicals in the preparation of medicines. In Unani medicines, no fermentation process is practiced; rather, some chemicals are used as preservatives.

2 A branch of medical science/ practice that deals exclusively with herbal plants/ plant parts as active ingredients in the preparation of medicines. In Ayurvedic medicines, the fermentation process is practiced.

3 A form of alternative medicine that attempts to treat patients with heavily diluted preparations

4 Herbal medical practitioner who deals with *Ayurvedic* medicines.

5 The lowest local government unit; it is comprised of several villages.

6 The lowest tier of formal government administration; it is comprised of several unions.

7 In describing the livelihoods capacity of the people in the study area, Intercooperation defines people as poor who do not have better access to health, education and nutrition.

8 Households having very limited or no livelihoods assets and living in *Guchcha gram* (clustered sheltering village built by government) are defined as extreme poor.

9 A little leafy plant of the *Ecobolium* family; its complete scientific name is neither known to the authors nor found in available literature.

10 The person who buys medicinal plants/ plant parts from collectors or from farmers and sells them to Beparies.

11 The person who buys medicinal plants/ plant parts mainly from paikers and sometimes from collectors or farmers and sells them to wholesalers/ processors.

12 1 decimal = 1/100th of an acre.

13 Producers' self reported increase in profit/gross margin is based on "{self reported revenue from sale of medicinal crops - investment (self reported production cost + self labor)}". Producers holding 100 decimal or more lands (three households) expressed their monetary profits which are 30%, 30% and 60% (a range of 30-60%) higher than that of earlier yield. Similarly, land holders of 50-99 decimals (5 producers) reported their profit increased by 50%, 65%, 70%, 75% and 90% (a range of 50-90%); and the landholders of 20-49 decimals (9 producers) reported a range of 70-130% respectively. As literally nothing was produced earlier on the land of 13 households (less than 20 decimals or homestead) profit increase reporting or comparison did not apply.

14 100 decimal = 1 acre

15 In most cases land holdings of less than 20 decimals were uncultivated or barren earlier, and therefore no comparison is possible with the current return.

16 Middlemen who only negotiate prices between the parties.

17 An herbal medical practitioner who deals with Unani medicines.

18 An herbal practitioner who deals both with plants and spirituality.

19 For middlemen, the cost of goods sold (COGS) includes their purchasing price plus its 5-10% equivalent required as transportation and labor cost; while for wholesalers it is their purchasing price from the middlemen plus around 5% equivalent required for storage and labor.

20 The Muslim holy month when religious people do not eat or drink throughout the day.

21 *High Altitude Plant Physiology Research Centre*

22 There is processing industry e.g. pharmaceutical company who might have its own supplier for various inputs - purchases its materials through that particular trader (because of working capital factor).

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