

THE ROLE OF MEDICINAL PLANTS IN LIVELIHOOD IMPROVEMENT
AND ECOLOGICAL SUSTAINABILITY IN BANGLADESH: *An Application*
of a Participatory Approach to Management and Marketing

by
A.K.M. Shahidullah

A Thesis submitted to the Faculty of Graduate Studies of
the University of Manitoba
in Partial Fulfillment of the Requirements for the Degree
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Master of Natural Resources Management

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ABSTRACT

In the face of threats caused by both anthropogenic and natural reasons, the question of the sustainability of medicinal plants has emerged very strongly in recent times. These plant resources, therefore, have become important domains of intervention and are increasingly attracting the attentions of public and private sector policy researchers, policy makers and development program implementers. In recognition of such importance this research is undertaken to specifically focus on three key aspects of medicinal plants in Bangladesh: i) their local status, ii) the market scenario, and iii) management institutions. First, the focus was on their status; the causes of threats were examined and conversely the measures and initiatives to conserve these medicinal plants and the associated livelihood and economic implications of such initiatives were evaluated. Second, the research critically examined the medicinal plant-based herbal market system, especially to map the industry value chain in function or place. Understanding the market system, value chain mapping, and the analysis of inherent constraints to the existing value chain and the Strengths, Weaknesses, Opportunity and Threats (SWOT) of the medicinal plants sector all provided useful thoughts for developing a participatory approach as an ameliorative step for the medicinal plant industry value chain. The third key aspect covered by the research involved the institutional arrangement in the medicinal plant sector, where the existing ones and their linkages were identified and the options for furthering the institutional strengths from strategic and holistic resource management perspectives were pointed out, where all the stakeholders from local to national levels would have a common platform for participation through representation in order to manage the overall medicinal plant sub-sector.

The field work for this research was carried out from September 2005 to March 2006. The fields involved a diverse array of study sites, i.e. the operational areas of three ongoing projects working on medicinal plants, several wholesale and retail markets of medicinal plants, and production sites and facilities of several micro-, small-, and medium-scale, medicinal plant industrial processors. Rapid Rural Appraisal methods including interviews, Focus Group Discussions, observations, and other participatory techniques were followed with a view to fulfilling research objectives.

The research found that the natural stock of medicinal plants is threatened due to unsustainable harvesting practices and unchecked damaging or unaware activities. Evaluative findings on the activities of three ongoing projects showed that interventions with dual objectives of conservation and development can help offset those threats and also improve livelihood, environment and primary health situations.

Markets for medicinal plants in Bangladesh are not in optimally ideal conditions due to an awkwardly longer value chain entangled with many constraints and weaknesses. Therefore, the

research examined production and management through an industry-community partnership approach that can improve the existing medicinal plant value chain. Nexus among producer, processor, and promoter has been strongly advocated for a more enabled market situation in terms of demand, supply, quality and price, which will result in improved livelihoods and a healthier environment.

Institutions at different levels in managing the medicinal plant sub-sector act within their own peripheral boundaries and have no strong connection with other institutions at the broader geographic level. Both sectoral and national level management lack the required major drive to build the capacity of the institutions, improve process development or enable the market situation. Therefore, the formation of a Medicinal Plant Forum comprising core representation of the stakeholders from across the scales has been underscored and deemed crucial for the better management of the medicinal plant sub-sector.

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Acronyms

AP	Ayurvedic Pharmacy
BRAC	Bangladesh Rural Administrative Council
BARI	Bangladesh Agricultural Research Institute
BCSIR	Bangladesh Council of Scientific and Industrial Research
BFRI	Bangladesh Forest Research Institute
CHT	Chittagong Hill Tracts
CITES	Conference on International Trade on Endangered Species- Flora and Fauna
DAE	Department of Agricultural Extension
FRLHT	Foundation for Revitalization of Local Health Tradition
GFCP	Good Field Collection Practice
HID	Human and Institutional Development
IC	Intercooperation
LEAF	Livelihood Empowerment and Agro-forestry
MAP	Medicinal and Aromatic Plants
PRAN	Programme for Rural Advancement Nationally – a large food processor
SDC	Swiss Agency for Development & Cooperation
SEDF	South Asia Enterprise Development Facility
SEMP	Sustainable Environment Management Program
SIA	Sub Implementation Agency
TCM	Traditional Chinese Medicine
TMP	Traditional Medicine Practitioners
TSM	Traditional Systems of Medicine
VFFP	Village & Farm Forestry Project
VRMC	Village Resource Management Committee

Glossary of Terms

<i>Ayurved</i>	A branch of medical science/ practice which deals exclusively with herbal plants/ plant parts as active ingredients in the preparation of medicines. In Ayurvedic medicines, the fermentation process is practiced.
<i>Bazaar</i>	A permanent market of an area
<i>Beel</i>	A saucer shaped depression, which generally retains water all year round
<i>Baidyas</i>	Herbal practitioner both with plants and spirituality
<i>Beparies</i>	The person who buys medicinal plants/ plant parts mainly from pikers and sometimes from collectors or farmers and sells to wholesalers/ processors.
<i>Chakma</i>	<i>A Buddhist tribe in Chittagong Hill Tracts</i>
<i>Collector</i>	The person who collects medicinal plants/ plant parts from the wild or from farmers
<i>Guccha gram</i>	Government arranged, small clustered village for the homeless, extreme poor
<i>Hekim</i>	Herbal medical practitioner who deals with Unani medicines
<i>Kabiraj</i>	Herbal medical practitioner who deals with Ayurvedic medicines.
<i>Khas</i>	Government owned land
<i>Mantra</i>	Sacred words of spirituality
<i>Pikers</i>	The person who buys medicinal plant/ plant parts from collectors or from farmers and sells to Beparies
<i>Tantras</i>	Sacred and secret arts and methods of spirituality practiced by tribal Buddhist people
<i>Unani,</i>	A branch of medical science/ practice, which deals with both medicinal plants/ plant parts as well as some essential chemicals in the preparation of medicines. In Unani medicines, no fermentation process are practiced; rather, some chemicals as preservative are used.
<i>Union</i>	The lowest local government unit
<i>Upazila</i>	The lowest tier of formal government administration

CHAPTER ONE: INTRODUCTION

1.1 Context and Problem Statement

Plants that have medicinal properties with an optimum active ingredient in some form or another are regarded as medicinal plants. These are invaluable natural resources; they are exhaustible if overused and sustainable if the juxtaposition of present and future needs takes place within the behavioural pattern of various kinds of users.

Bangladesh is situated at the complex interface of the Indian, Himalayan and Southeast Asian biographic regions, and historically it is well-endowed with very diverse complements of terrestrial and aquatic flora and fauna (Rahman, 1999) that include a considerable number of medicinal plant resources. The natural habitats of these medicinal plant resources, mainly natural forests, wild areas and neighbourhoods, have been facing an onslaught since the eighteenth century and consequently a considerable portion of them has already been lost. This has resulted in the loss of wild biodiversity (Rahman, 1999). Factors affecting the loss of biological diversity include: population pressure, natural hazards (such as: cyclones, tidal surges, floods), the overexploitation of biological resources, deforestation, the destruction of habitat, flood control related activities causing the destruction of wetlands, and shifting cultivation in the hills.

Topographically, the country is a vast flood plain lying at the confluence of three great rivers, the Ganges, Brahmaputra and Meghna. Flood plains, consisting generally of alluvial deposits, occupy about 80 percent of the country (FAO, 2004). Climatically, it is a comfortable place with tropical weather and a mild winter, which have facilitated human occupation with rapid growth over the last three millennia (Haque, 1997). Consequently, the increasing needs of a gradually increasing population have rendered poverty and caused pressures to the biotic resources (Khan, 2003), including medicinal plants.

As in many other countries, in Bangladesh medicinal plants are an essential part of traditional health care systems. The country is home to hundreds of medicinal plants growing in wild areas, neighbourhoods and backyards. Yusuf et al. (1994) gave a list of 546 medicinal plants that occur in Bangladesh. However, the inventory is not complete, and many plants with medicinal value are yet to be determined. The *Rangamati* Hill District in CHT still harbours a portion of remote (unexplored) forest.

In the case of most wild medicinal plants growing in Bangladesh, excessive and unregulated exploitation is a common phenomenon, which often jeopardizes their future availability. Most of the local suppliers of the traditional medicine manufacturing companies collect medicinal plants from wild sources and quite often they do it in unplanned and indiscriminate ways which are sometimes so extensive and exhaustive that they solely exploit particular plant species and leave no scope for their regeneration (Ghani, 2003). Thus many plants once found endemic in nature are gradually diminishing and impacting on the overall plant population of Bangladesh. Bangladesh National Herbarium (BNH) has already identified about 97 of such overused and threatened plants in the country (Khan, 1998).

FAO (2004) mentions that specifically, the south-east hilly region and north-east terraces of Bangladesh are rich in medicinal plants. They are collected by local, rural and tribal populations as well as by petty contractors, and in some cases by the forest departments and government co-operations. The over extraction and ignorant activities of these people cause biodiversity loss and resource depletion as many communities are unfamiliar with ecological issues and few currently participate in decisions regarding local natural resources (USAID, 2004). In addition, systematic data on Bangladesh's ecosystems are scanty. Inadequate data and limited local participation lead to poor environmental policies. There are also few people trained in advanced natural resource management. Thus, without sufficient environmental protection, biodiversity in Bangladesh continues to decrease.

While this process of gradual loss of medicinal plants is continuing unabated, the demand for medicinal plants and plant-derived drugs is increasing rapidly with the current resurgence of traditional medicines all over the world (Ghani, 2003). There is unprecedented demand for natural medicines, green health products, pharmaceuticals, food supplements, cosmetics, and herbal pesticides, which is bringing about this alarming loss of plant biodiversity. It is estimated that 70-80% of people worldwide rely chiefly on traditional, largely herbal medicine to meet their primary healthcare needs (Farnsworth & Soejarto, 1991; Shengji, 2001). The global market for herbal medicine is not only large but expanding by 15-20% annually (Subrat, 2002).

Planned or commercial production of medicinal plants is virtually non-existent or in some cases at a very preliminary stage in Bangladesh. Forests and other natural ecosystems are the major sources (around 90%) of the overwhelming bulk of the medicinal plants used as raw materials by around 600 small and medium scale industries of traditional and local medicines. Apart from local feedings of raw materials, these industries again depend considerably on processed and imported plant-derived raw materials that mostly come from neighbouring countries through both formal and informal (illegal cross border) trading. In a market survey, Begum (2002) found that the yearly market size for medicinal plants is US\$ 11m in Bangladesh.

In recent years, the Government of Bangladesh has been emphasizing the need to strengthen these traditional medicine-based healthcare systems (*Ayurveda*, *Unani*, Homeopath) and the conservation and promotion of related plant species in order to take part in the 62 billion dollar global market (GoI, 2000) and enhance local public health. In a bid to give a boost to the exportation of herbal medicines and plants, the government has already set up a business promotion council exclusively for this sub-sector.

Traditional knowledge and skills on these traditional medication systems are transmitted intergenerationally and in most cases orally. But an unfortunate development over the past half century has been that these traditional medicine based systems have largely been neglected by the government. Consequently, the professions based on these systems, e.g., *Kabiraji*, *Hekimi*, *Baiddaya*, are no longer financially lucrative to the potential practitioners. Thus, the traditional knowledge reserve, which is not well documented, is eroding gradually.

At this juncture, it is important to understand the medicinal plant industry structure in terms of its production, growth, trade and associated strengths and weaknesses, in order to point out a more efficient, profitable and sustainable system of marketing and management. Issues relating to marketing, management and conservation call for critical evaluation, especially with a view to converting community and industry level practices into more environmentally or biodiversity friendly ones that generate higher income.

1.2 Medicinal Plant Management and Marketing – Conservation and Livelihood Challenges

The overexploitation of medicinal plants from *in-situ* sources is certainly posing a threat to natural resources. A combined effort by those concerned with the conservation of medicinal plant species or the healthcare systems dependent on them will be crucial to ensuring the sustainability of the resources and healthcare (TRAFFIC, 1999). Moreover, the loss of traditional methods in resource management and the lack of an appropriate institutional arrangement have had an adverse effect on the people's (primary producers') control over resources on which they depend for their sustenance (Jodah, 1991). There is a lack of diverse opportunities for income generation in rural Bangladesh. Livelihood revolves around agricultural cultivation and the exploitation of common property natural resources. Since the over-extraction of natural resources poses a threat to biodiversity, reconciliation between income generation (development) and conservation will be a realistic step to underpinning the goals of sustainable resource management and at the same time improving livelihood security.

Sustained and coordinated efforts are needed to transform unsustainable practices of medicinal plant collection from wild sources to more ecologically sustainable, socially acceptable and economically equitable production and utilization systems (Parotta, 2002). A cross scale approach to bringing together collectors, buyers, regulators and local communities, who have hardly interacted before, would be a challenging but significant task in pointing out the problems associated with the extinction and depletion of the medicinal plant reserve in nature. In this respect, it is critical to bring together stakeholders so that they understand their distinct perspectives and comprehend the need to collaborate and co-operate to address the conservation of medicinal plants. In most cases, the whole production to consumption chain of medicinal plants, which is intermediary-driven, needs to be readdressed in such a way that an increased margin of benefit to the primary producers will encourage them to promote the practice of sustainable yield.

The loss of biodiversity and the associated knowledge systems is a serious concern expressed by those with an interest in conservation and development (Gadgil et al., 1993). Knowledge of medicinal plants embedded in rural and indigenous culture is

rapidly disappearing as every year, the sum total of human knowledge about the types, distribution, ecology, methods of management and methods of extracting the useful properties of medicinal plants declines rapidly. It is the continuation of a process of loss of local cultural diversity that has been underway for hundreds of years (Hamilton, 1997). The urgency and need to protect this fast disappearing medicinal plant-based traditional knowledge cannot be ignored, especially in the rural areas and hilly regions of Bangladesh where it is still abundant. Exploration of this traditional knowledge on medicinal plants is crucial in order to promote the exchange of information about medicinal plants and conservation concerns as well as to improve the co-ordination of conservation efforts through sharing of experiences and lessons learned. Working with traditional medicinal practitioners to identify threatened medicinal plants and to understand important plant properties, their usage, and potential economic value can significantly benefit the understanding of conservation priorities and resource use. As the very survival and success of the medicinal plant industry lies in the easy and sustainable availability of sufficient quantities of medicinal plants, it is also crucial, for the long term viability of the medicinal plant sub-sector, to find out ways to bridge the gap between the awareness of local communities and user-bodies regarding environmental threats and the potential endangerment of medicinal plants.

TRAFFIC (2002) has the view that, in today's world with economic globalization, medicinal plant projects should be based on a sound understanding of the trade situation at local and international levels. Baseline research is essential to develop appropriate and scientifically based strategies. Market research will allow people to identify species in trade, ascertain trade volumes and dynamics, identify source areas and end markets for plants and processed products, and, most importantly, contribute to assessing the impact that utilization and trade have on the status of medicinal plant species in the wild.

The subsequent steps after the conservation and diversification of production are the challenges of creating a competitive economic value chain for any product to be sustained commercially and accepted globally. In this respect, it is very important to develop appropriate market and product strategies for the medicinal plant-based products in order to meet both the local and global trends for standardized quality. SEDF (2003) found that the lack of expertise and knowledge in setting standards and quality

parameters in traditional systems of medicine, as well as inadequate processing and storage facilities, are contributing to the poor marketability of medicinal plant-based products of Bangladesh. Karki (2000) and Vedanand (2002) laid the emphasis on a market-responsive production system in order to sustain cultivation, homestead plantation, and other ex-situ and in-situ efforts to produce medicinal plants that also support both environment conservation and livelihoods. However, they did not elaborate on any specific criterion or standard of such a market-responsive production system. However, I believe a market-responsive production system must entail several key characteristics, such as an internationally standardized and environmentally friendly production procedure, and a standard *marketing mix* by the manufacturer and marketer of medicinal plant-based herbal products: e.g., Product – green, organic, Price-competitive, Place-appropriate distribution channels, a time and cost efficient value chain, Promotion-awareness across the chain, i.e. from producer to consumer, and Packaging - attractive, eco-friendly, eco-labelling, fair trade labelling. Therefore, delving out appropriate devices is a major challenge in managing medicinal plants resources, regardless of whether marketing (in other word ‘utilization’) and conservation co-exist through a livelihood-enabled production system.

1.3 Research Purpose

Having conceptualized the nature and complexity of the problem and associated challenges in promoting and managing medicinal plant resources, the research focused on the environment, livelihoods, primary healthcare, market, and institutions in order to comprehend the glaring issues of the medicinal plant sub-sector. Therefore, with a view to the aforesaid context and perceived problems and challenges, the purpose of this research is:

To examine the implications of medicinal plant conservation and production in fostering the environment, livelihoods, and primary healthcare; and to justify the significance of a participatory approach to management and marketing that can lead to a more effective, efficient and enabled value chain and management strategy for the medicinal plant industry.

CHAPTER TWO: MEDICINAL PLANT CONSERVATION, UTILIZATION AND MANAGEMENT - A REVIEW OF LITERATURE

2.1 Introduction

Under the context and problems stated above and having specified the research purpose, the research reviewed the global literature on medicinal plants with a special emphasis on South Asian contexts. Since this research is a pioneering work on Bangladesh medicinal plant management, marketing and associated livelihoods aspects, the absence of a local inventory of literature on the topic compelled me to view the Bangladesh perspective based on regional and international premises and experiences.

Divided into three sub-sections, this chapter provides an account of concepts and issues relating to the use and conservation of medicinal plants based on a critical review of relevant literature. In order to provide the general background, the first section briefly reviews the role of medicinal plants and their significance. By elaborating on the nature and extent of threats to medicinal plants, the second section attempts to critically examine the contemporary issues and various possible means for their conservation for biodiversity protection, as cited in the available literature in the field. The final (third) section delineates relevant marketing strategies and institutional arrangements that are being advocated and in some cases practiced by different conservation and development organizations, thinkers and planners.

2.2 Medicinal Plants- their role and significance

2.2.1 Evolution of plants as drugs

'Health is dearer than wealth' as quoted by Hamilton (1997); so, the value of medicinal plants is more than what it is in the marketplace, i.e. it can be said to be essentially infinite. Human beings have been utilizing plants for basic preventive and curative health care since time immemorial (Holley & Cherla, 1998). As many as 35,000 – 70,000 species of plant have been used at one time or another for medicinal purposes (Farnsworth & Soejarto, 1991).

From historical records, the human use of plants or floral parts to enhance physical and spiritual well-being goes back thousands of years and is difficult to date

precisely (WWF, 2000). However, from those records, it is apparent that most of the early people, such as the Assyrians, Babylonians, Egyptians and ancient Hebrews, were familiar with the properties and use of many medicinal plants (Ghani, 2003). The practice of medicine using medicinal plants flourished most during the Greek civilization, when historical personalities like Hippocrates (born 460 BC) and Theophrastus (born 370 BC) practiced herbal medicine. The *materia medica* by Hippocrates listed around 400 medicinal plants and later the encyclopaedic work of Discordius, '*De materia medica*' (published in 78 AD), which featured about 600 medicinal plants, have been regarded as the forerunners of all modern pharmacopeias and authoritative texts on botanical medicine. In the Middle Ages, the great Greek Pharmacist-physician, Galen (131-200 AD), wrote about 500 volumes describing hundreds of recipes and formulations containing a large number of medicinal plants. He was the first person to describe the procedures and methods of preparing therapeutic recipes, including the ingredients of both plant and animal origins (Claus & Taylor, 1965). This doctrine, expatiated by Galen, has been the basis of allopathic and homeopathic systems of medicine practiced today.

The earliest known Chinese pharmacopoeia, the *Pen Tsao*, attributed to the legendary emperor Shen Nung, appeared around 1122 BC; this authoritative work discovered the medicinal use of many plants. The use of medicinal plants in Europe in the 13th and 14th centuries was based on the *Doctrine of Signatures or Similars* developed by Paracelsus (1490-1541 AD), a Swiss alchemist and physician. According to this doctrine, all plants possessed some sign, given by the Creator, which indicated the illness, symptom or diseased organ for which they were intended. A common example of this doctrine includes Ginseng - *Panax ginseng* (Murray, 1994).

The Arabian Muslim physicians, like Al-Razi and Ibn Sina (9th to 12th century AD), brought about a revolution in the history of medicine by bringing new drugs of plant and mineral origin into general use. Enriching the original Greek system, *Al-Kamun* of Ibn Sina laid down the foundation of modern western medicine (Mian & Ghani, 1990). The medicinal plants used by the Australian aborigines many centuries ago also added to the global stock of medicinal plants. The South American countries have provided the world with many useful medicinal plants, grown naturally in their forests and planted in the medicinal plant gardens. The African people have been depending on plant-based

medicines more than any other continent's people.

As far as the south Asian data concern, the earliest mention of the medicinal use of plants in the Indian subcontinent is found in the *Rig Veda* (4500-1600 BC), the oldest book in the library of mankind. This book provides much information on the medicinal use of plants in the Indian subcontinent. There are more than 8,000 plant species in South Asia with known medicinal uses (Switzer and Karki, 2003). Thus historically it is evident that South Asia is home to many rich Traditional Systems of Medicine (TSM). The *Ayurvedic* system (dates back to 5000 BC) along with the *Unani*, *Siddha* and *Tibetan* systems, remain important sources of everyday health and livelihood for tens of millions of people (Switzer et al., 2003). Medicinal plants, including trees, shrubs, grasses and vines, are central resources for the raw materials used in these traditional health systems. Modern allopathic medicine is also using extracts and agents from many medicinal plants.

2.2.2 Role of medicinal plants and their significance at the local level

The role of medicinal plants is immense to public health as these plants form the basis of traditional or indigenous systems of healthcare used by the majority of the population of most developing countries (Bodeker, 1997). The importance of medicinal plants as sources of therapeutic agents and contributors towards health care programs and economies of both developing and industrialized countries is well established (Wheelright, 1974). According to the World Health Organization (WHO), over 80% of the world's population relies upon traditional plant-based systems of medicines to provide them with primary health care (Bannerman et al., 1983). Fransworth & Soejarto (1991) and Shengji (2001) also echoed the same with their estimation that 70-80% of people worldwide rely chiefly on traditional, largely herbal, medicine to meet their primary healthcare needs. In the developed countries also, some 25% of prescriptions are filled with drugs whose active ingredients are extracted or derived from plants (Boerdeker, 1997). In South and South East Asia, including China, traditional systems of medicine use thousands of plant species to treat malaria, stomach ulcers, and various other disorders. Medicinal plants are used at the household level, especially by the women taking care of their families, at the village level by medicine men or tribal

shamans, and by the practitioners of classical traditional systems of medicine, such as the *Ayurveda*, Chinese medicine, or Japanese *Kampo* system (Bannerman et al., 1983).

Medicinal plants are socially acceptable employment avenues for women. Traditionally, women have been the mainstays of medicinal plant-based activities and micro-enterprises because the products and activities thereof easily fit within the average daily needs and work schedules of women. These typically include medicinal plant raw materials that are collected, dried and transported to the market. Medicinal plants have also been used to develop family-based health and livelihood oriented enterprises in rural areas. Many traditional healers have been running medicinal plant-based health care systems to earn their livelihoods. *Arya Vaidya Sala* (AVS) and *Kabirajghar* in South Asia are excellent examples of combining business and traditional medicine services. Such industries not only strengthen the social fabric, but also help: a) preserve the traditional medical knowledge, and b) provide easily adaptable enterprising opportunities for unemployed youth and rural poor who can learn the trade from their parents and peers and earn not only their livelihood but also contribute to the society (Karki., 2000). In Bangladesh, these health systems are essential to people of rural communities, *Adivashi* (aboriginal), *Pahari* (hill dwellers) and tribal origin, because of the lack of formal primary health care networks. Many traditional treatment centers exist in the rural areas, typically operated from the home of healers such as *bone-setting centers*, *herbal centers for mentally derailed people* and a *snake-bite herbal centers*.

The contributions of medicinal plants can be divided into three different but mutually inclusive philosophies and forms of application. These are associated with popular or folk medicine, alternative medicine and modern western medicine (WWF, 2000). Popular or folk medicine is a non- or little institutionalized, individual, family or tribal use of medicinal plants. It is the oldest form of medicinal therapy that has survived in most countries until the present day. Even in the highly industrialized countries one may still find some rural women or men expert in herbal lore, who walk through woods and pastures and collect medicinal herbs for their own, their families', the monastic or local use (Hamilton, 1997).

Alternative medicine like *Ayurveda*, *Siddha*, and *Unani*, where therapeutic agents are derived from plants, contribute not only to the public health of developing countries

but also to the developed ones. In such systems skilled physicians or Traditional Medicine Practitioners (TMPs) concoct the medicinal plant mixtures individually, considering both the disease and the constitution of the patient. The use of such alternative medicines has become increasingly popular in the developed world. For example, one in three Americans have at some time used unconventional medical therapies according to a national telephone survey published in the *New England Journal of Medicine* in 1993. In another survey conducted in 1994, it was found that 60% of doctors had at some time referred patients to practitioners of alternative medicine. In response to the overwhelming interest in alternative therapies, many of the prestigious allopathic medical institutions have also had their importance recognized; an example is the National Institute of Health in USA, which created the Office of Alternative Medicine in 1991 to provide the public with information on alternative treatments and to assess those therapies which have proven successful (Kolata, 1996).

Modern allopathic medicine too owes an immense debt to medicinal plants. One in four prescriptions filled in a country like the United States are either a synthesized form of or derived from plant materials (Lambert et al., 1997). Even many drugs are directly extracted from plants and others are made from the transformation of chemicals found within them. However, Mendelsohn & Balick (1995) believe that there are undoubtedly many more secrets still hidden in the world of plants from which the modern medicine system can benefit. Still in the 21st century world, in most developing countries, especially in rural areas, what comes first to the mind of people, parents or patrons when faced by most illnesses, is to seek out some plant species or plant material as an agent to alleviate the illness. Therefore, the place and importance of medicinal plants both to the local people and to most systems of medicine is insurmountable.

2.2.3 Medicinal plant-based marketplace

The markets, specifically the international markets for medicinal plants, have always been very large. The industry is complex with little vertical integration. Laird (1999) finds it difficult to analyze data relating to the medicinal plant markets as a large number of small and medium-sized companies in the industry are hesitant to share data. Wholesalers are also hesitant to provide information for fear that companies might try

and bypass them. Moreover, cross-trading between companies is commonly practiced, adding to the difficulties of understanding the trade (Dennis, 1998). In most cases, manufacturers do not know the original sources of their medicinal plants. Most manufacturers in Europe and North America buy from large wholesalers, some of the biggest of which are in Germany.

The largest global markets for medicinal plants are China, France, Germany, Italy, Japan, Spain, the UK and the US, while Japan has the highest per capita consumption of botanical medicines in the world (Laird, 1999). In the US and Europe, the trade has typically been growing at an average of 10 % per annum, partly because of the popularity of alternative treatments and partly because there is increasing official recognition of the benefits of traditional medical systems involving herbal preparations.

Conservative estimates put the monetary value of the medicinal and aromatic plant (MAPs) related global trade at over 60 billion USD as of 2000 (Govt. of India, 2000). With the increasing popular demand for medicinal plants, both in South Asia and internationally, this trade is expected to grow to 5 trillion by the year 2050 (FRLHT, 1996). The market in China is large and shared between public and private ownership. Thirteen of the top companies producing Traditional Chinese Medicines (TCMs) are listed publicly on the domestic stock exchange. Fourteen are state-owned. China's total output of medicinal plants from both cultivated and wild-harvested sources is 1.6 million tonnes (Kuipers, 1997). Overall sales of botanical medicine products in China in 1995 were estimated at US\$5 billion (Laird, 1999).

The botanical medicine market in Japan in 1996 was estimated at US\$2.4 billion with a rapid sales growth in recent years as Japanese doctors increasingly incorporate TCM as a complement to western medicine. In 1983, 28% of doctors used TCM, but by 1989 this figure had risen to 69 per cent (Laird, 1999). Besides China, India is a major exporter of raw medicinal plants and processed plant-based drugs. Exports of plant-based crude drugs from India in 1995 were valued at US\$53.2 million (Lambert et al., 1997).

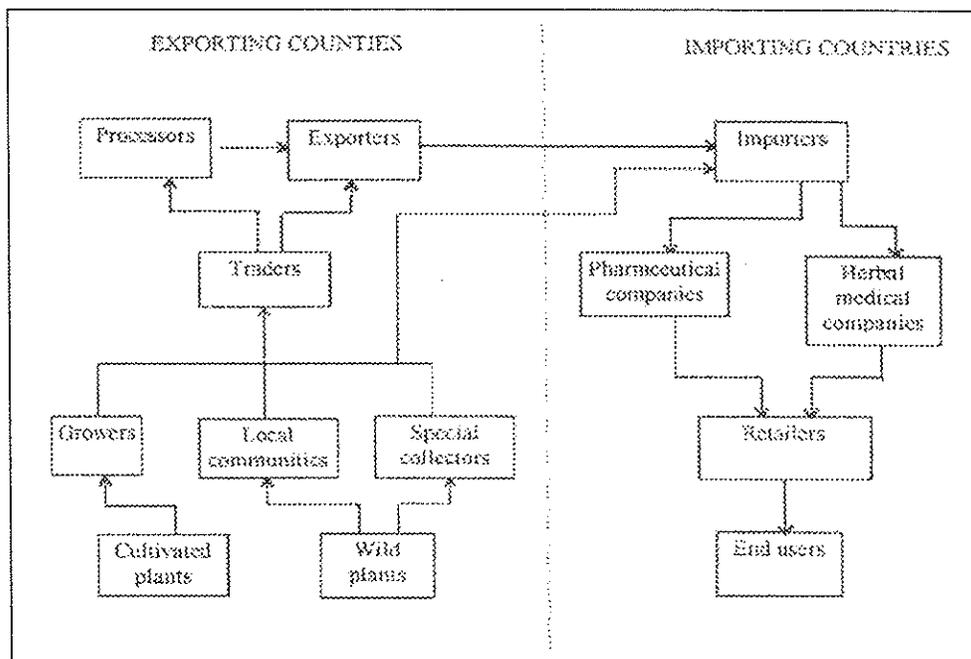
Europe is a major world trader in medicinal plants. At least 2,000 medicinal plants species are traded, of which two thirds (1,200-1,300 species) are native to the continent (Lange, 1998). About a quarter of global imports of medicinal plants each year are into Europe. In 1992-96, imports to Europe came from more than 120 countries, with

60 per cent of the material coming from outside Europe, mainly from Africa and Asia. Between 1985 and 1995, the average annual growth rate in the European market was 10 per cent, with 4.4 million tonnes imported in 1996 valued at US\$1.3 billion. Germany is the leading European importer while France, Italy, Spain and the UK are among the other 12 importing countries that depend on bulk quantity of plants from Asia and Africa (Lange, 1998). Meanwhile, Germany has a large re-export trade. Between 1992 and 1996, Europe exported an average of 70,000 tonnes of medicinal plants annually, 20% to non-European destinations, mainly North America.

The trade structure in Europe is complex and dominated by a few wholesalers, however, the structure of the trade varies from country to country, as does the definition of products (Lange, 1998). In looking at the common marketing and distribution channels, in producer countries generally the plant material is bought from collectors and cultivators by various types of traders, including local dealers, village cooperatives and district traders. It is then passed on to wholesalers, manufacturers or directly to retailers. The wide range of manufacturers involved can include those engaged in the production of pharmaceuticals, extracts, cosmetics, foods and coloring agents. The number of outlets for medicinal plants reflects their diversity of uses (Lange, 1998). The material of a species which has entered the wholesale or manufacturing sectors may have originated from various harvesting areas within countries, or it could even have been imported. This makes it very difficult to identify the sources of materials and impose quality controls.

The lengths of trade chains and the perceived need to protect information lead to a lack of transparency. A direct consequence is that those located at the start of the chains (producers and collectors) possess little idea of the market value of the medicinal plants which they are supplying, nor have the means to discover the value added from source to end-use. In India and Nepal, some NGOs are working to make market information available to collectors in order to give them (those collectors) more bargaining power. The lack of transparency means that it is difficult to influence the trade easily in order to improve the sustainability of the sources of medicinal plants (WWF, 2000).

Chart-2.1: Movements of plant materials traded internationally (Source: WWF, 2000)



Though it is evident from the above findings of Lambert et al. and Fransworth et al. (1997), Lange (1998), Laird (1999), that the market is growing and demand is increasing for medicinal plants, there is a little discussion on the growth of supply sources. Moreover, with a resurgent global market, the developments in the local marketplaces of medicinal plants are still largely unknown. The factors and policies that can create an enabled market situation for those primary producers who are literally ignorant of the value chain based on their produced goods are also largely missing in the global literature on the medicinal plant market.

2.3 Medicinal Plant Conservation & Biodiversity Protection: Issues and Approaches

2.3.1 Threats to medicinal plants periling biodiversity

Threats to the global stock of medicinal plants have been an increasing concern to conservationists as well as resource users. Uncontrolled trade, the over-exploitation of wild plants, destructive harvesting techniques, and the destruction of the natural habitats of the plants are mainly causing such threats. The nature, extent and impact of these factors vary and so do the degrees of threat in different places and countries. However, causes rendering this phenomenon are discussed below:

Global trade for medicinal plants at an annually increasing rate is a major threat to the sustainability of these resources and eventually to the biodiversity. Apart from traditional medications, medicinal plant use has increased and diversified steadily in the last few decades, not only in cookery and popular and modern western medicine but also in different fields that are alien to medicine, such as the cosmetics and dye industries. In Europe alone, about 2000 plant species are traded commercially as medicinal or aromatic plants (Lange, 1998). The renaissance of herbal and alternative medicine in recent decades is increasing this trade volume day after day. A considerable number of plant materials harvested from the wild or from cultivation enters the international market every year and the volume of trade is increasing. These are mostly exported to industrialized countries that only rarely use their own natural medicinal plant resources and increasingly restrict the use of their own plants. Imports to European and North American countries or other industrialized countries like Japan primarily come from Asian countries such as China, Hong Kong, India, Pakistan, Nepal, Sri Lanka, Bhutan, Bangladesh and African countries such as Namibia and South Africa. So, it is obvious that the supplying countries, in lieu of foreign exchange, become prone to more trading and the depletion of their own resources while the developed countries have banned trade or restricted trade of their own species but buy the same from the developing countries.

Regulation is another important factor. The absence, lack or weakness of it can lead to a worsening situation with respect to the viability of the plant population or their natural base. Pant (2002) indicates that one reason why medicinal plants have become increasingly threatened has been the weakening of customary laws that traditionally have regulated the use of natural resources. Such laws have proved often to be easily undermined by modern socio-economic forces. Many European countries, obliged to follow the Convention on International Trade on Endangered Species-world Flora and Fauna (CITES) and Convention on Biological Diversity (CBD), have further developed national and regional regulations in order to address conservation issues and problems. For example, Bulgaria has introduced a quota system that controls the collection of over 20 medicinal plant species by a preceding authorization (Lange, 1998). The UK Wildlife and Countryside Act (1981) prohibit the uprooting of any species of wild plant except by landowners or other authorized people. Poland lists species of medicinal plants that

cannot be collected without permit, and Italy passed a law in 1931 which regulates the collection of medicinal plants. This stipulates that permits for the commercial collection of listed species will only be issued to people who hold degrees in herbalism from schools of pharmacy. A permit is needed in the Democratic Republic of Congo for the collection of *Rauwolfia* species. Permits are required for the commercial collection of all species of vascular plants in the state of Western Australia, even by landowners.

Unlike this, in most developing countries, the absence of effective regulation or of its application, combined with a lack of transparency in trade makes the effective protection of endangered species even more difficult. The aromatic rhizomes of *Jatamansi* (*Nardostachys grandiflora*) and *Kutki* (*Picrorhiza kurrooa*) are prized in Asia, where their essential oils are used as base ingredients in medicines and cosmetics. Populations of both species have declined in parts of their ranges as a result of trade pressure. Both species are listed in CITES Appendix II, but there is still major illegal trade across the Nepal and India borders because of the difficulty of enforcement (Mulliken, 2000).

Species specification is also not well practiced in most developing countries. Often, single species are not registered in trade lists, which contain only families or groups of species. Identification on the species level is therefore very difficult or impossible. This applies to exports as well as imports. Begum (2002) registered that one of the difficulties in regulating international trade is the inadequate labelling of medicinal plants for custom purposes in Bangladesh. For example, medicinal plants are imported in Bangladesh under the label of 'spices'. Besides, many plants enter trade under a code number, which specifies only a product group. These product groups may comprise many different plant species; therefore, a conclusion about the plant species being traded is hardly possible (Özhatay et al., 1998).

Habitat destruction is considered the principal threat to all living species including medicinal plants. Almost everywhere in the world, humans have a strong impact on the natural habitats of plants and animals – in high Alpine regions as well as on coast-lines, in deserts as much as in rain forests (TRAFFIC, 1999). Hamilton (1997) also mentions that the most serious proximate threats to medicinal plants generally are habitat loss, habitat degradation and over harvesting. Habitat destruction can affect medicinal

plants in many different ways. The most direct effect is the immediate extinction of species in a certain region by the destruction of the ecosystem. Obvious examples are the increasing number of 'slash and burn' clearings in the rainforests of South America, Africa and Southeast Asia (Hamilton, 1997). Moreover, the soil in such areas, once deprived of natural vegetation, becomes prone to uncontrollable erosion, particularly if it is not allowed to regenerate back into forest. Thus, the vegetation previously native to a certain area disappears irreversibly, and with it the medicinal plants.

The destruction of mangroves in many developing countries for aquaculture, cultivation or other purposes causes loss to the wetlands and coastal plant species. It is now indisputable that the world climate has been changing with increasing speed during the last hundred years mostly due to anthropogenic intervention (UNEP, 2007), and, with the change of climate, changes in habitat structures accompany the process which eventually affect species that have a very limited range of tolerance towards climatic factors. Because of the speed of these changes, some species do not have enough time (seen in geological dimensions) to migrate to other regions and habitats (Hachfeld & Schippmann, 2000).

Over-Exploitation of the wild stock of medicinal plants is another common phenomenon posing a serious threat to the medicinal plants. Traditionally, medicinal herbs have been collected and used locally. People had a small quantity of dried medicinal herbs in store, but collection as well as use reflected the local needs only. Due to the extension of trade relations accompanying urbanization and technological enhancement, medicinal plants have entered trade on a larger scale. Individuals, families or groups started to subsist on the collection of wild herbs and on the medicinal plant trade. Therefore, medicinal plants have become a commodity and obtained an isolated value that is, in many cases, no longer connected to their original function. This development has led to reckless over-exploitation of many medicinal plants, motivated by the benefits of a short-term profit to be gained by exploiting the resource while neglecting all considerations of sustainability.

Genetic erosion and changes are also causing threats to the medicinal plant species or plant properties. Other than the natural genetic process and erosion (mutation, speciation and evolution), humans are also inducing genetic changes by mutation.

Induced genetic changes in medicinal plants through cultivation and the development of varieties often are intended to intensify the concentration of certain compounds. The changes and the subsequent adaptation to the newly created conditions - unlike in nature - take place very quickly, often within a few years. The desired results are achieved in the beginning, but the equilibrium of the plants is often disturbed. Medicine can use these plants to isolate the desired substances to treat symptoms, but in the long-term, the healing power of these plants is questionable. Moreover, genetic erosion among wild plants is very poorly documented (WWF & IUCN, 1997). There would seem to be little doubt from theoretical considerations (Holsinger & Gottlieb, 1991; Menges, 1991) that many medicinal plant species that have been listed as threatened, and indeed others that have not, must be suffering from genetic erosion now, or will do so in the near future. There is no reliable estimate for the number of medicinal plants that are globally threatened, but they are variously calculated as 4,160 or 10,000 (Vorhies, 2000). In many countries (e.g . Bangladesh), IUCN is preparing a red list by identifying endangered medicinal plant species. Meanwhile, Bangladesh National Herbarium (BNH) reports 105 medicinal plants as threatened locally in Bangladesh out of the 546 species identified.

However, of all the above reasons that are contributing to the depletion of medicinal plants from the natural stock, there is no direct mention as to what threat is pervasive and in what kind of social context and why. If we try to find out the root cause of the indiscriminate extraction of medicinal plants, I believe that in most developing country perspectives, poverty-driven livelihood causes can be singled out for creating unusual stresses on biotic resources including medicinal plants.

2.3.2 Conservation issues

Due to these threats and the growing importance of Medicinal Plants, their conservation is receiving increased attention in view of the resurgence of interest in herbal medicines for healthcare all across the globe. Owing to the shortcomings (side effects and non-holistic nature) of modern allopathic medicines, there has been a renewed interest in natural materials and approaches to healthcare since the mid 1980s, coupled with recognition that technology alone cannot solve the pressing healthcare needs of the world population (Tempesta & King, 1994). As such there is widespread interest in

promoting traditional health systems to meet primary healthcare needs. This is especially true in South Asia, as the prices of modern medicines spiral and governments find it increasingly difficult to meet the cost of pharmaceutical-based healthcare. Throughout the region, there is strong and sustained public support for the protection and promotion of the cultural and spiritual values of traditional medicine (Switzer et al., 2003). So, the subject of medicinal plants has aroused strong feelings and brought many conservation issues (discussed below) onto the table.

Biological and ecological issues are considered prime issues and conservation proponents are most concerned about them. As a result of growth, exploitation, environmentally unfriendly harvesting techniques, the loss of growth habitats and the unmonitored trade of medicinal plants, the genetic biodiversity of traditional medicinal herbs and plants is continuously under the threat of extinction and has come into the forefront of policy makers and drawn their attention as a burning issue. Many medicinal plant species have already gone extinct, e.g. Silphion or Silphium (which was used as both medicine and spice and was endemic in Egypt), while a good number are estimated as either globally or locally endangered. So, the conservation of these threatened taxa to combat biodiversity loss and resist resource depletion is obviously an urgent need.

Protection of traditional knowledge based on medicinal plants, which is supposedly disappearing fast, is another major conservation issue. Traditional and indigenous knowledge and practices about the medicinal plants are weakening and, in many cases, vanishing altogether. Hamilton (2003) noted that every year, the sum total of human knowledge about the types, distribution, ecology, methods of management and methods of extracting the useful properties of medicinal plants is declining rapidly. It is a continuation of a process of loss of local cultural diversity that has been underway for hundreds of years. In South Asia particularly, rural, especially indigenous people, have rich local health traditions and traditional healers have been practicing traditional medicines for hundreds of years. If proper values can be added to the traditional medical knowledge-based health practices and subsistence-oriented medicinal plant applications, apart from saving the traditional knowledge, a large number of jobs can be created even in the rural areas. Thus the conversion of socio-cultural traditions and indigenous knowledge into livelihood means and economic opportunities also has the advantage of

preserving the rapidly eroding cultural knowledge and practices which are increasingly threatened due to globalization and the homogenization of people and communities (Karki, 2002). It will also certainly promote the imparting of family-level knowledge in traditional medicine-practicing families in the indigenous and rural societies where this knowledge is dwindling due to the lack of economic incentive.

Adequate provision of quality healthcare is increasingly drawing the attention of state level health policy makers since it is threatened by declines in traditional medical knowledge and related plant resources. Until recently, in most countries (particularly in South Asia), national healthcare systems have devoted all, or nearly all, their resources to the promotion and delivery of Western Medicine, while ignoring other traditions. This is now changing, and more so in some countries (e.g. China and India) than others. The lack of official recognition and associated support has implications for conservation, because such recognition can raise the status of practitioners at the village level. Since such practitioners are generally the most knowledgeable people about plants in their communities and have an intrinsic interest in their conservation, an increase in their authority has the potential to greatly assist the improved management of plant resources (Hamilton, 2003). In this respect, the integration of indigenous knowledge into the formal healthcare system is a preferred option that has been voiced by many proponents of traditional medicines. Meanwhile, there is also the question of how best to develop traditional systems to meet modern challenges, as the environment in which the traditional medical practitioners are operating today is not the same as in the past (Craig, 2002).

Ensuring livelihood security for those who are dependent on the local biodiversity, in this case on the extraction and trading of medicinal plants, is another fundamental issue that conservation approaches should look into. Many people living in and around the areas where medicinal plant species are prevalent, collect and sell medicinal plants in their raw form for their livelihood. People in tribal communities are more dependent than others on medicinal plants for both primary healthcare and livelihoods. Most existing policies and programs relating to these areas do not address the needs and priorities of traditional resource users at the grass-root level (Agarwal & Narain, 1990).

Building knowledge systems, learning and information is considered a major task of conservationists in order to create opportunities for the sharing of knowledge to encourage learning (Hamilton, 2001). Documenting information on the value, conservation status, and use of medicinal plants in healthcare is an important conservation exercise needed to effectively accomplish the conservation objective. Many countries such as Bangladesh do not have any precise knowledge of the current consumption and projected future demands for the medicinal plants that are locally used. In the absence of such information, informed decision making with regard to conservation or improved production of medicinal plants is severely impaired (Ghani, 2003).

Indigenous intellectual property rights has been a concern as many consider that a kind of theft of local or indigenous intellectual property is taking place, given that the traditional uses of plants as medicine can be useful guides for the development of new drugs (Holmstedt & Bruhn, 1995; Balick & Cox, 1996). A large number of patents have been granted on genetic resources and knowledge obtained from developing countries, without the consent of the possessors of the resources and knowledge. There has been extensive documentation of intellectual property rights being sought over resources “as they are,” without further improvement (e.g., US patent No. 5,304,718 on *quinoa* granted to researchers of the Colorado State University; US Plant patent No. 5,751 on *ayahuasca*, a sacred medicinal plant of the Amazon) and on products based on plant materials and knowledge developed and used by local or indigenous communities, such as the cases of the *neem* tree, *kava*, *barbasco*, *endod* and *turmeric*, among others (Shahai, 2002).

The concept of *access and benefit-sharing* has evolved after the UN Convention of Biological Diversity (CBD)-1992, which assumes that the exploitation of the right of the knowledge holder, irrespective of the way it is determined, will be ensured through a process of fair and equitable benefit-sharing. Kaushik (2002) asserts that the most relevant issues regarding the conservation and sustainable use of biodiversity and associated traditional knowledge (TK) are the prevention of bio-piracy and misappropriation of TK, systems of protection of TK, and the means of fair and equitable sharing of the benefits arising out of the utilization of biological resources and associated TK.

Policy issues certainly command the significant attention of the policy makers in world bodies and national governments, who are dismayed that the conservation of such important plant resources in both national and global contexts is not supported and governed by adequate national and global policies. With regard to the South Asian (particularly Indian) perspective, Vedanand (2002) observes that issues related to conservation and development have the least priority. There is a certain amount of apathy, illiteracy and an unscientific outlook at all levels of policy making in the government as the budget allocated for this sector is meagre compared to the budget for similar sectors like irrigation, agriculture and public works.

2.3.3 Conservation strategies

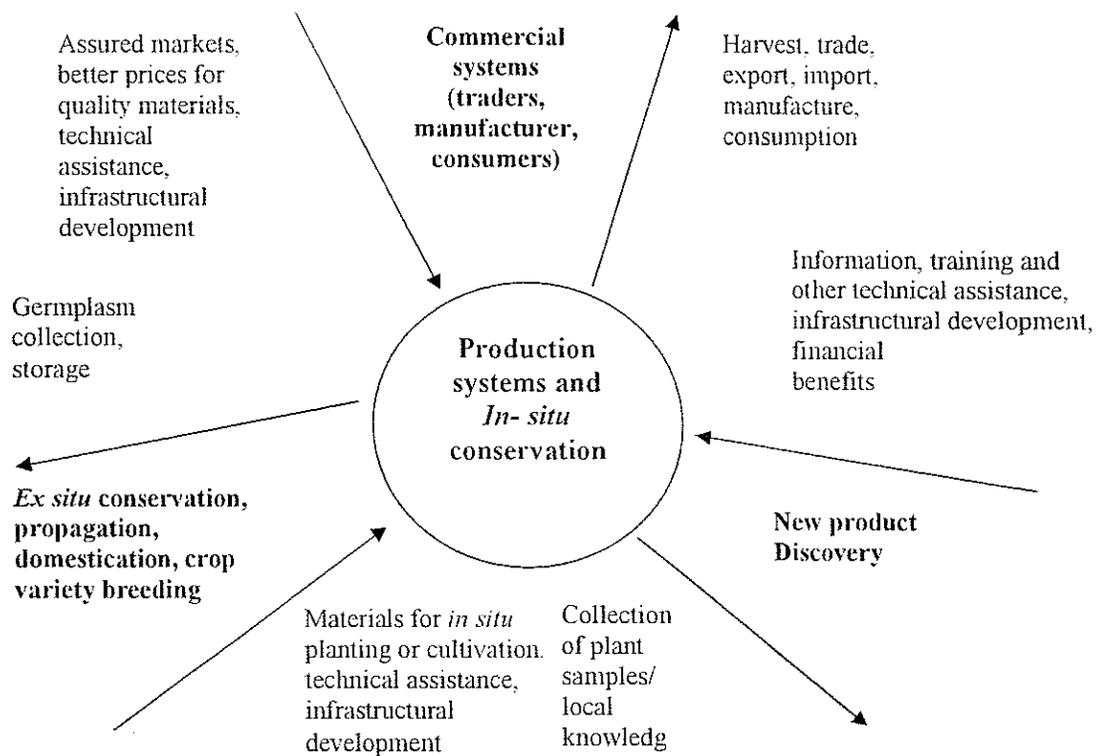
Lange (1998) mentioned that, in order to ensure the conservation and sustainable use of medicinal plants, the major areas of focus are *in situ* and *ex situ* protection; the enhancement of cultivation efforts; improved management of wild populations; public awareness; trade monitoring; national and international legislation; law enforcement; regulation; better information about wild-harvested plants; and the certification of plant material from sustainable sources. CBD (Convention on Biological Diversity) endorsed an eco-system based approach for the conservation of medicinal plants that considers the merits of system thinking as it encourages lateral thinking, inter-disciplinarity and prioritization (see the 12 principles of the eco-system based approach of CBD). Though the systems involved in medicinal plant conservation tend to be complex, with many variables and many types of actual or potential stakeholders, WWF-UK recognized four sub-systems: (1) production systems and *in situ* conservation, (2) commercial systems, (3) *ex situ* conservation, propagation, domestication and the breeding of crop varieties, and (4) new product discovery, though actually all can be closely connected.

The production system and in-situ conservation approach is to ensure that the populations of species of plants and animals continue to grow and evolve in the wild, in their natural habitats. Such *in situ* conservation is achieved both by setting aside areas as nature reserves and national parks (collectively termed "Protected Areas") and by ensuring that as many wild species as possible can continue to survive in managed habitats, such as farms and plantation forests (IUCN-WHO-WWF, 2003). As a strategy

to sustain medicinal plant resources, it involves a range of possible actions and ways of application, such as the identification and effective protection of vegetation associations that contain a high density of vulnerable medicinal plant species and where commercial exploitation is taking place, the phasing out of the harvesting of medicinal plants, the restriction or seasonal restriction of certain species, sustainable harvesting, etc. (Aumeeruddy, 2000; Tuxill & Nabhan, 2001; Cunningham, 2001a; Hamilton et al., 2003).

However, only secure rights to land or the collection of medicinal plants, combined with appropriate local management systems, can enable the harvesting controls needed to keep populations at a sustainable level. Otherwise, poverty and insecurity about the ownership of land and resources will lead to the overexploitation of vulnerable species, not least because of high commercial demand (Srivastava, 2000).

Chart- 2.2: Sub-systems involved in medicinal plants conservation indicating needed feedbacks, adapted from International Plant Conservation WWF-UK, 2000



The cultivation of medicinal plants is widely viewed not only as a means for meeting current and future demands for large volume of production of plant-based drugs and herbal remedies, but also as a means for relieving harvest pressure on wild populations (Palevitch, 1990; WHO et al., 1993; FAO, 1995; Lambert et al, 1997). Cultivation can provide numerous advantages over wild harvest for the production of plant-based medicines, including reliable botanical identification, steady sources of raw material, standardized or improved genotypes, and controlled post-harvest handling (Leaman, 2001). However, various factors influence the feasibility of cultivation, its impact on conservation and by whom it is best undertaken. If the volumes required and market prices are both high, then cultivation is more likely to be economically feasible. The introduction of medicinal plants into home gardens is seen as a useful means of providing accessible cures for common ailments and supplementary income (Schippmann, 2001). Medicinal plants have been introduced successfully into traditional farming systems in Guatemala, providing regular incomes to farmers (Eid, 2000). If cultivation is to be introduced, then there can be many problems inhibiting success. For instance, in the Indian subcontinent there is a lack of knowledge of cultivation and post-harvest techniques for some species, and a lack of availability of good quality planting material (Uniyal et al., 2002). If a species has not previously been in cultivation, then domestication may be needed, which can prove a difficult, expensive and lengthy process (Kuipers, 1997). There should be public funding for domestication programs for those many species of medicinal plants which are highly endangered but which economically or otherwise are unlikely to become domesticated. It has been proposed for the Eastern Cape Province of South Africa that faster-growing species are most suitable for communities, but that the cultivation of slower-growing types of plants is best undertaken by statutory bodies, such as the Department of Environment and Forestry, or by private companies (Dold & Cocks, 2001).

Approaches to commercial systems are being favoured by conservationist interested in medicinal plants because the pressure of trade is responsible for so much medicinal plants endangerment, and also, more positively, because of the opportunities which engagement with industry and consumers present. Conservationist can engage in various strategic ways such as by helping to formulate and promote appropriate

standards, supplying relevant information to the parties involved (collectors, growers, traders of various types, manufacturer and consumers), and also by putting parties in touch with each other. Because of the connections between different parts of the commercial systems, it will often be productive to work simultaneously with different types of stakeholder. Thus, it can make sense to work simultaneously both with producers (to improve their management systems) and manufacturers (to make their purchasing of raw materials more conservation-friendly). In any event, what is vital is that changes in the behaviour of those at the 'top' of the trade chains (e.g. traders, manufacturers and consumers) feed back to the production level. Otherwise efforts will have been in vain (Hamilton et al., 2003).

Approaches to ex-situ conservation, propagation, domestication and breeding of crop varieties are the other strategies to conserve medicinal plants gaining popularity in many places. In *ex situ* (outside natural habitat) conservation programs, either the seeds or vegetative parts of the rare medicinal plants are usually collected from the wild and then grown to get an adequate supply of material for their cultivation by the farmers.

Botanical gardens, quite commonly found attached to schools, museums and other institutions, consist of specimens of medicinal plants species and play a significant role in conservation. Through developing propagation and cultivation protocols and undertaking programs of domestication and variety breeding, such gardens can stimulate the necessity of conservation among people and also protect certain species (Shengji, 2001). Seed-banks offer a more attractive way of storing the genetic diversity of many plants *ex situ* than botanic gardens, at least in terms of cost (except for species with recalcitrant seeds) (Heywood, 2000). Seed-banks can also reintroduce endangered species from *ex situ* collections back into natural habitats. There is progress in this field in India, where four gene-banks have been established specifically for medicinal plants. They produce considerable quantities of planting materials for conservation and production purposes. Sharma (1998) suggests that it is imperative to establish gene-pools in the form of Arboretum, National Parks and Botanical Gardens in different eco-climatic zones to achieve the genetic improvement of the potential cultivars and improve their resistance to diseases and for their profitable cultivation.

Approaches to new product discovery are conservation approaches in the sense that they augment the plant population with known medicinal properties. Several stages are involved in the process of prospecting the chemical properties of plants to discover drugs or other novel products. The isolation of chemical fractions for automated screening is done, e.g. *in vitro* testing of activity against cell lines. Promising results lead to further tests, including perhaps clinical trials, and these may result in the development and licensing of marketable products. As an alternative to chemical screening, there is growing interest today in screening extracts from plants for genetic information, a branch of science set to grow spectacularly (Laird, 2002).

Raising public awareness is an important task for conservationists noted by Ghani (2003). The public should be made aware of the value of medicinal plant resources and their role in public health. The ecological, social and economic importance of medicinal plants should be communicated through appropriate and effective communication channels. These will help people to realize the importance of the conservation and sustainable management of natural forests and other biodiversity-rich habitats. Raising this type of public awareness would play a significant role in the conservation of medicinal plants in the concerned country and it is so important for the continued survival and production of valued plant drug resources (Parotta, 2002).

2.4 Conservation Consumption Nexus- Rethinking Marketing Strategies and Institutional Roles

2.4.1 Market, livelihood and sustainability concerns

Sustainable development and biodiversity conservation, essentially the link between the commercial, consumptive use of wild species, has been a focal point for much of the current debate or development-conservation dilemma. More specifically, it is at the center of two often conflicting points of view regarding the best strategy for future conservation efforts. One sees the for-profit motive leading inevitably to overexploitation and biotic impoverishment, and the other embraces the “use it or lose it” dictum; however, most conservationists would probably contend that the best strategy is a mixture of these two approaches, with one or the other to be favoured depending on the

circumstances (Freese, 1997). Regardless of what conservationists think or debate about, the reality is that much of the world depends on wild species for an array of products, whether for food, fibre, or medicine. Thus, in many cases, the question is not *whether* to use wild species, but rather *how* to move from a system of use that is clearly not sustainable toward one that is better (Fa et al., 1995). That raises the issue of striking a strategic balance between commercialization and conservation or the maximization of private and public goods, with a special emphasis on ecological sustainability. The way commercialization evolves in a particular region can greatly influence how raw materials are harvested, marketed, used and conserved. If done properly, it can create positive change among the business entities to promote sustainable extraction and usage both at the community and company level (Karki, 2001).

Medicinal plant trade and enterprise benefits a complex chain of individuals and companies, ranging from primary collectors or producers to end-users. The benefits include the generation of income for individuals, households and local communities and the easy availability of local remedies that maintain and enhance health. With the growing popular demand for medicinal plants, both in South Asia and internationally, the trade is expected to grow at an estimated rate of 10-15% per annum, and the collection and processing of medicinal plants contribute to millions of workdays of employment a year (GoI, 2000). Unfortunately, while demand is rising, inequitable trade practices have meant that only a small margin of the profits from medicinal plants trickle down to the collectors and harvesters. In almost all the countries in the region, highly developed illegal trading networks control and operate the bulk of the raw medicinal plant trade, through lax border controls (Karki, 2003). Despite this, no regional collaboration in implementing international covenants relating to biodiversity exists to stem this growing illegal market.

The expansion of unregulated and inequitable trade and commercial use of medicinal plants poses a major threat to both biodiversity and the local people's healthcare system in the South Asian region. Local communities tend to collect the highest value or most popular plant species, leading to over-harvesting or species extinction. Even when medicinal plant species are safely cultivated, with mono-cropping systems, local biodiversity can be weakened. Moreover, as 95% of medicinal plants are

harvested and collected in the wild, the alarming levels of deforestation and ecosystem degradation in the region are also contributing to a decline in medicinal plants (Bajaj, 1997). Combined, all of these factors have severely reduced the availability of medicinal plant ingredients as well as the overall environmental sustainability of the region.

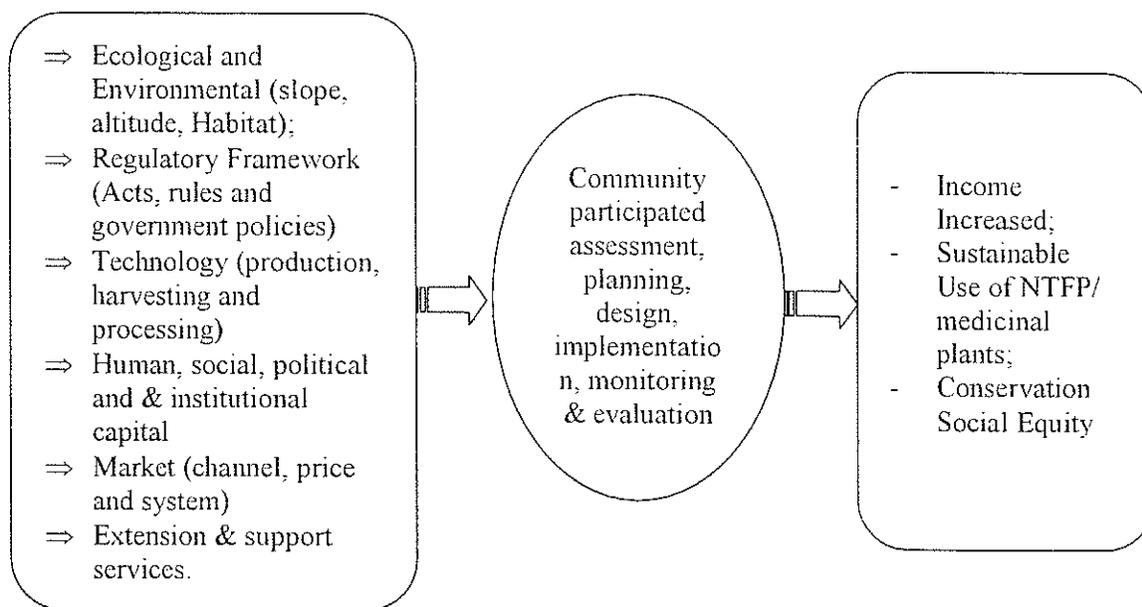
Kanel (2000) recognized that the lack of market information and enterprise promotion is responsible for widening the apparent contrast between the conservation and marketing of medicinal plants. Many of the NTFP (Non-timber forest products) collectors are poor and live in isolated areas. In these places, illiteracy and poverty are widespread. Supporting them with marketing information such as price, quantity demanded, etc. could increase their bargaining power. Similarly, training on record keeping and other capacity building could increase their negotiating and bargaining power. Olsen (1997) also emphasized the role of government in providing public goods and services such as marketing information and infrastructure for the NTFP-dependent communities.

These indicate that the existing trade of medicinal plants and NTFPs has direct impacts on the quality of management that is currently not available due to lack of information in the local community as well as among other members of the supply chain who are involved in the management and marketing of medicinal plants. There are always risks of overexploitation due to the unknown and haphazard market flow of the products. Therefore, information has become important for all kinds of stakeholders, who could use it for appropriate trade and wise management. It would serve them well to have access to spatial information regarding medicinal plant resource availability and market trends for better management planning in the future (Karki, 2002b).

Singh (2002) stressed that the medicinal plant sub-sector in South Asia needs a new thrust and direction by defining a set of parameters to design and develop a people-centered, livelihood-focused, and market-oriented production-cum-conservation system. This sub-sectoral development framework needs to recognize both the potential and the challenges faced by the medicinal plant sub-sector and to plan a holistic program. Under this new framework, biodiversity-enhancement and livelihoods-improvement goals need to be treated as an integral part of the operation. The previous development paradigm, which assumed that the conservation of biodiversity could be possible only by making the collectors adopt methods and practices of sustainable use and through equitable

benefit-sharing among the stakeholders, does not seem to have been well implemented in actuality (Karki, 2003). Ecological and environmental factors, regulatory mechanisms, technology choice and costs, market information, and the availability of professional extension and support services may be the key variables to examine. The Sustainable Livelihood Model by consortia of donors can be illustrated.

Chart-2.3: Conceptual Framework of NTFP Management addressing both development and conservation (Courtesy: CECI, Nepal)



A group of donors including DFID, IFAD and UNDP (2001) are promoting a community-based NTFP management framework that has a holistic approach to conserving natural resources and protecting the livelihood interests of the people dependent on these resources. They term it the 'Sustainable Livelihood Approach (SLA)'. This conceptual model denotes the proposed interface between community-based, NTFP/medicinal plant resource management factors and the desired end-results through community-based interventions. The aim of the model is to specifically benefit the NTFP, including medicinal plant-dependent communities, and the sustainable management of the resources of benefit (medicinal plants/NTFP), as conceptually illustrated in the model. The relationships amongst the key variables are also indicated therein.

The model has to be applied, analyzed and refined to suit the specific conditions of South Asia. It is a recent evolution in the international development paradigms and it has been said to offer an opportunity to launch poverty reduction efforts by taking an all around view of the circumstances of the poor, as they themselves view them, rather than jumping to early conclusions and immediately proceeding to conduct an isolated and in-depth analysis of particular attributes. Moreover, several possible approaches to link biodiversity conservation and commercial consumptive use for livelihood security are discussed below:

The market-responsive production system as enunciated by Karki (2002a) will help this development-conservation reconciliation process to a significant extent. The new market-oriented medicinal plants and the NTFP production model need to build strongly on available knowledge and the experience of all the national and international partners. It should, among other things, take into consideration various guidelines developed by the WHO and IUCN, in particular, the Good Agriculture and Field Collection Practices (GAFCP) developed by the WHO. The model will require the synergy of research, education, and production as well as the active involvement of experienced market and enterprise players and the introduction of new partners, i.e. organic production certifiers, leading all players into a new dimension of sustainability. As in most South Asian countries, policies and legislations are archaic and need reforms and amendments to facilitate the certification, labelling and traceability of herbal products. The eventual success of the model will be determined by the following criteria and benchmarks: a) remuneration to the small farmers that generates sustainable income, b) equitable distribution of the returns to the investment; c) soil-quality augmenting farming practices; d) environmentally sound resource management systems, and e) safeguards to the interests of the traditional stakeholders, especially the collectors, women and ethnic minorities (MAPPA, 2004).

Organic Certification & Accreditation of the medicinal plant-based products and the production system are very important from the international marketing perspective. Proper inspection and certification systems are indeed essential for developing internationally recognized and acceptable organic products to meet the global market standards and quality. Olsen (1997) indicates that local or national legislation and policy

are needed to support such production and certification systems. Special emphasis will be required to ensure this aspect of support systems to the production sector, including contacts and joint ventures with certification and accreditation bodies from potential international trading blocs like the EU.

Value addition and the setting up of SME structures based on business platforms are essential for the long-term success of the market-oriented production system. The opportunities of organic production premiums need to be explored and if realized should be passed on to the producers through Fair Trade practices. Premiums may vary for different products, as productivity differences will exist between organic and conventional production systems¹. Ramkrishnan (1992) came up with the idea that value addition from the primary level producers is the best way to ensure sustainable economic development and conserve resources, as less harvesting and reduced pressure on the resources are the automatic results of value addition. Shahai (2002) suggests that local communities should be trained to do simple, first and second degree processing to add value. Cleaning, sorting and selecting the material, sun or shade drying, cutting and powdering are examples of the simple procedures that will add value to the products and give the same income for less volume of collection.

Socially responsible business practice is highly advocated by development experts, where voluntary initiatives from commercial entities need guidelines on corporate responsibility, the environmental and social auditing of companies, and the independent certification of the social and environmental aspects of production processes. It was also felt that there was a need to develop and implement policies and best practices, with individual companies, enterprises and trade associations pledging to purchase raw materials from recognized and sustainably managed sources as and when they become available. Similarly, mechanisms have to be developed and enforced to ensure: a) the sustainability of raw materials (e.g., as per the policy in Northern India, where the registration of the collectors and cultivators of medicinal plants is compulsory), b) adequate financial and human resources to improve the training, motivation and

¹ (example given by Biosys: Rose Geranium oil: production cost 15-30% higher for organic production with a price premium of 40-50% to the producer)

technical capacity of harvesters and cultivators, and c) fair compensation to local communities for practicing responsible resource management practices (MAPPA, 2004).

Private investment in the Ex-situ cultivation and domestication of medicinal plants, especially by applying organic farming protocols, has great scope, especially for accessing international markets, which would certainly open up avenues for income generation and contribute to the conservation efforts of medicinal plant species. Maikhuri (2002) recommends that private investments should target or combine existing cash crop cultivation or other market-oriented options, a range of non-land-based investments and the development of small and micro-enterprises in the areas of organic certification platforms, depending upon the available opportunities and local conditions.

The supply chain or chain of custodian approach is another important aspect of medicinal plant conservation and poverty reduction strategy that denotes the promotion of a thriving high quality organic market chain – both nationally and internationally. A market chain includes all the actors that contribute to adding value to a given primary product (in this case, medicinal plants; see SLA Model Figure). The value or commodity chain approach emphasizes the importance of horizontal coordination among the operators at a given level of the chain as well as of vertical coordination mechanisms between successive levels (cash market, future market, contracts, forward contracts, etc.). It also highlights the importance of a conducive environment as a critical condition for the value chain to grow and be competitive, i.e.: (a) favourable natural conditions for producing diverse products, (b) the presence of other inputs such as research & extension support and other factors of production which are critical for technology adoption, (c) a stable political and macroeconomic policy environment as well as sectoral policies that provide adequate incentives for the commodity chain operators to invest and allocate their scarce resources in medicinal plant conservation/cultivation and derived products, and (d) the willingness of the government and the private sector to practice liberalization and fair trade practices (Karki, 2003).

Gaining comparative advantage with the medicinal plant products is of paramount importance to ensure that i.) the produced herbal products are or can become competitive in international markets, ii.) the market environment in which the key actors of the value chain are made to operate provides the incentives for further growth, and iii.)

producers and manufacturer have to be willing to adopt improved and organic technology to compete internationally (Singh, 2002). However, to achieve this dual goal of biodiversity conservation and development, Karki (2003) considers Technology Transfer as the greatest challenge in terms of the development and supply of technology. Pertinent questions he posed are:

- a) Who will pay for research and development investments?
- b) How will the improved technology be transferred?
- c) Which conservers/cultivators will be targeted and how will poor tribal people have access to it?
- d) In order to ensure sustainability, who will bear the cost of technology dissemination?
Addressing these issues will require a stepwise approach that includes:
 - an assessment of the market demand at the key levels of the commodity chain;
 - an assessment of the level of the competitiveness and comparative advantage of the medicinal plant products ;
 - an identification and prioritization of key bottlenecks in the commodity chain;
 - a cost-benefit analysis of various options to reduce the key bottlenecks identified previously along the commodity value chain;
 - strategic planning and institutional arrangements for improving the performance of the market value chain for high-quality medicinal plant products.
 - a market study to assess:
 - o the size of the final market for the various medicinal plant products at regional, national and international levels;
 - o the identification of market niches with high growth potential;
 - o the level and type of competition in these niches; and
 - o this market study should be based on the analysis of secondary data, interviews with knowledgeable experts, and small-scale surveys for specific market niches.

2.4.2 Management of medicinal plants: institutions and their significance

Institutions set the life line for management. Conservationists often argue that in order to promote the sustainable management of Medicinal Plants there should be suitable institutional set-ups in favour of the major devolution of management authority to the local stakeholders, including the collectors and users. Support and facilitation would be required of the government agencies, NGOs, academia and private sector companies in terms of information sharing, technical inputs and the enunciation of local perspectives (Karki, 2001). The FAO Forestry paper (1998) identified that in most

developing countries (e.g. India, Bangladesh and Nepal) the lack of an effective institutional framework for an inter-sectoral approach to environmental decision-making and the lack of comprehensive policies with adequate public participation are the principal factors affecting integrated resource management.

Traditional formal institutions are no more adapted to management for resource sustainability, because they do not necessarily fit into the present context of change characterized by the strong relations established today between global views and needs - here, concerning biodiversity conservation in national parks - and more local views and cultures (Aumeeruddy et. al., 2004). Ghimire et. al. (2004) asserts that in the case of commercial collectors, the medicinal plants have a transaction value depending on factors that are beyond the local context. This view stresses the need to work across scales - local, national, and international - with different stakeholders along the supply chain in order to sustain commercial harvesting. In this regard, probably the most appropriate concept of institutional arrangement in the field for the management of natural resources that benefit the commons is elucidated sagaciously by Berkes (2002) in what he termed 'cross-scale institutional linkages'.² He basically pronounced that there is a need to design and support management institutions at more than one level, with attention given to interaction across scales, from the local level up to what he calls 'cross scale interactions' to refer to linking institutions both horizontally (across space) and vertically (across levels of organization).

With a view to the above, the reorganization of institutions responsible for natural resource management is necessary to address resource management problems. The local people, especially those whose livelihood depends on forests and NTFPs (in this case, medicinal plants), needs to be better informed and involved actively in resource management planning and implementation. And again, there is a need to foster cooperation, coordination, communication and sharing of information between and among various resource management agencies (both government and NGOs) and users

² Cross Scale institutional linkages mean something more than management at several scales, isolated from one another. Issues need to be considered simultaneously at several scales when there is a coupling of interaction between scales.

(Private Industries, Manufacturers, Traditional Medicine Practitioners, and Traders) or to pursue integrated extension approaches (Jain, 2000).

Under such kinds of arrangement, local community participation is crucial and has been widely advocated in the recent past through a number of international environmental and policy documents such as "Our Common Future", "Caring for the Earth" by IUCN in the 1991 "World Development Report" (World Bank) and "Agenda 21" by UNCED in 1992. Illustrating the Forestry, Forest Biodiversity & Governance of Bangladesh perspective, Nishat (2002) indicated that the Forestry Department should now focus on the development of community-based resource management mechanisms by updating the institutional framework and decentralizing decision-making mechanisms by involving the local people.

Potential community-based resource management approaches have been disregarded until recently on the premise that local people lacked the capacity to manage resources on their own. Centralized bureaucracies assumed absolute control over all natural resources and usurped local control, which partly exacerbated environmental degradation in many countries. Bromely and Cernea (1989) rightly observe that resource degradation in developing countries, while incorrectly attributed intrinsically to "common property systems," actually originates in the dissolution of local-level institutional arrangements, whose very purpose was to give rise to resource use patterns that were sustainable. Over the years, the continuous erosion of communal ownership, uninterrupted access rights to resources and an absence of desirable incentive structures can also be blamed for contributing to a rapid loss of biodiversity. Furthermore, the limited success of centralized approaches in achieving effective sustainable resource management at the local level lately has provoked the desire for community-based approaches. This failure can be attributed to the lack of relevant information on local resource conditions, the lack of local input and support, and the failure to motivate local communities to participate in the management of the environment (FAO, 1998).

In pre-colonial times, many natural resources, including pastures, wastelands, forests, fishing grounds, ground water, water points (wells, rivers, lakes), were sustainably managed by local people under common property systems organized around specific units of social organizations (clan leadership, local chiefs, or spiritual leaders).

These common property systems were later usurped by the governments on the premise that local people were ignorant and incapable of managing them on a sustainable basis (Bromely and Cernea, 1989; FAO, 1998). Added to this were technological changes, increasing population pressure and resource scarcity, which encouraged resource overexploitation and alternative land uses (Karki, 2000). Many common property resources gradually disappeared due to the integration of local communities into larger economic and political systems and the substitution of traditional authority with politically oriented leadership (Bromley & Cernea, 1989).

This breakdown of common property systems has had serious environmental repercussions, including over-extraction of plant resources, over-fishing, overgrazing, deforestation, land degradation and biodiversity loss. One of the plausible strategies to address these problems is to revitalize common property regimes. This would require legitimate local responsibility and decision-making authority and institutional mechanisms. This is also important because common property regimes foster a community-based approach, one that is less likely to emerge under the state or private property regimes (Karki, 2001).

A compelling reason for supporting community resource management is its importance for the poor. Rights to common property resources are all that separates the landless and rural poor from destitution. The involvement and participation of local communities in development projects and policies improves their intent. Participation also fosters improvement in socioeconomic conditions, creates a sense of resource ownership and strengthens the capacity of individuals and communities to mobilize and help themselves, thus minimizing dependence on the state (Agarwal & Narayan, 1990). Furthermore, the current call for participatory resource management approaches has two fundamental reasons (Berkes, 2002). First, there has been a rise of stakeholders and civil society in general throughout the world. Some would say it is an inevitable development throughout the world. Some would say it is an inevitable development of the post-modern age, like globalization. Second, participatory approaches have come to dominate management because the very nature of complex environmental problems [as Levin (1999) recognizes, nature is complex, and similarly Berkes (2002) says that natural process are seldom linear and predictable] requires a different participatory approach; as

Ludwig (2001) puts it , the age of management is over. Thus there has been a realization that government policies and programs are unlikely to succeed unless the local people are supportive. The relevance of this approach is high for managing dispersed and extractive resources such as medicinal plants or other non-timber forest products. Community-based resource management systems have several advantages over top-down bureaucratic approaches, the major one being its long-term sustainability. The lower cost of the activities, higher technical efficiencies of resource use and lower externalities are other benefits (Karki, 2001).

2.4.3 Partnership building as a marketing and conservation tool

Partnership building between and among the stakeholders can be an effective and efficient mechanism to manage medicinal plant resources. Berkes (2002) advocates multi-stakeholder bodies that link multiple user groups and interests, local and regional, with the government, and provide a forum for conflict resolution and negotiation among users (Berkes, 2002) for managing natural resources. This form of management body involves the communities who live in the project area or where resources are to be managed. In the case of commercial medicinal plant collection in Bangladesh, where approximately 90% of medicinal plants are collected from the wild (mostly government owned lands), and in many areas the tribal hereditary rights are predominant in extracting resources, and finally as local traders and pharmaceuticals industries have now a major stake in the process, forming multi-stakeholder bodies by linking all the stakeholders to managing the medicinal plant resources in a sustainable fashion can be a timely approach.

On the other hand, joint or co-management (another form of cross scale linkage) can be broadly viewed as policy and program initiatives or institutional arrangements that allow governments, donors, private-sector interests, and NGOs to collaborate with communities in managing resources. Since this approach is still an evolving and dynamic process, which Berkes (1995) terms as *adaptive co-management*, it is important because it highlights two key processes: i.) sharing of management power and responsibility through multiple institution linkages that may involve government agencies, NGOs, and other communities and ii.) feedback, learning and building mutual trust among the partners.

Collaborative, joint management and partnership-based initiatives are gaining popularity as a means of soliciting the participation of forest-dependent communities in the sustainable management of public domain forests, especially in South Asia (Karki, 2000). However, the major challenge in such ventures is the reluctance of government bureaucrats to relinquish authority to local communities, particularly where they think this would threaten their control over the resources. Gilmour and Fisher (1991) observe that in Nepal District Forest, officers showed great reluctance to release effective control of forests to user-groups; they handed over management responsibility but retained the powers and authority over the exploitation and sale of forest products. Similarly, Saxena (1996), in describing the constraints to joint forest management (JFM) in India, highlights several limitations. For instance, government policies hamper JFM initiatives, and legal and organizational frameworks for JFM remain weak and controversial. Also, there is no built-in mechanism to develop the capacity of the local JFM committees to enable them to gradually assume the role of the de-facto custodians and managers of their forest resources. However, regardless of possible setbacks, community-based resource management systems and joint management ventures have provided encouraging results in some states of India and if the local people, i.e. the villagers, are accommodated in the management decision making and implementation process there would be synergistic effects (Nayak & Haque, 2006). Apart from India, other examples include Nepal and Sri Lanka (Gilmour & Fisher, 1991).

As part of a partnership venture, the Bangladesh Forest Act of 2000 (amended) incorporated Social Forestry related principles but rules are yet to be framed. Some achievements have been made in integrating local community in benefit-sharing of social forestry activities but a lot more needs to be done. Research and training is another area that needs to be addressed more seriously. Albeit in reference to the amendment, Nishat (2002) pointed out that the scientific approach to the Protected Area and Ecologically Critical Area management is still largely missing (Nishat, 2002), and management regimes based on such an approach are critical for the sustainability of resources in such areas.

The Medicinal and Aromatic Plants Program in South Asia (MAPPA), formerly known as IDRC Medicinal Plants Network (IMPAN), formulated a new mechanism with a

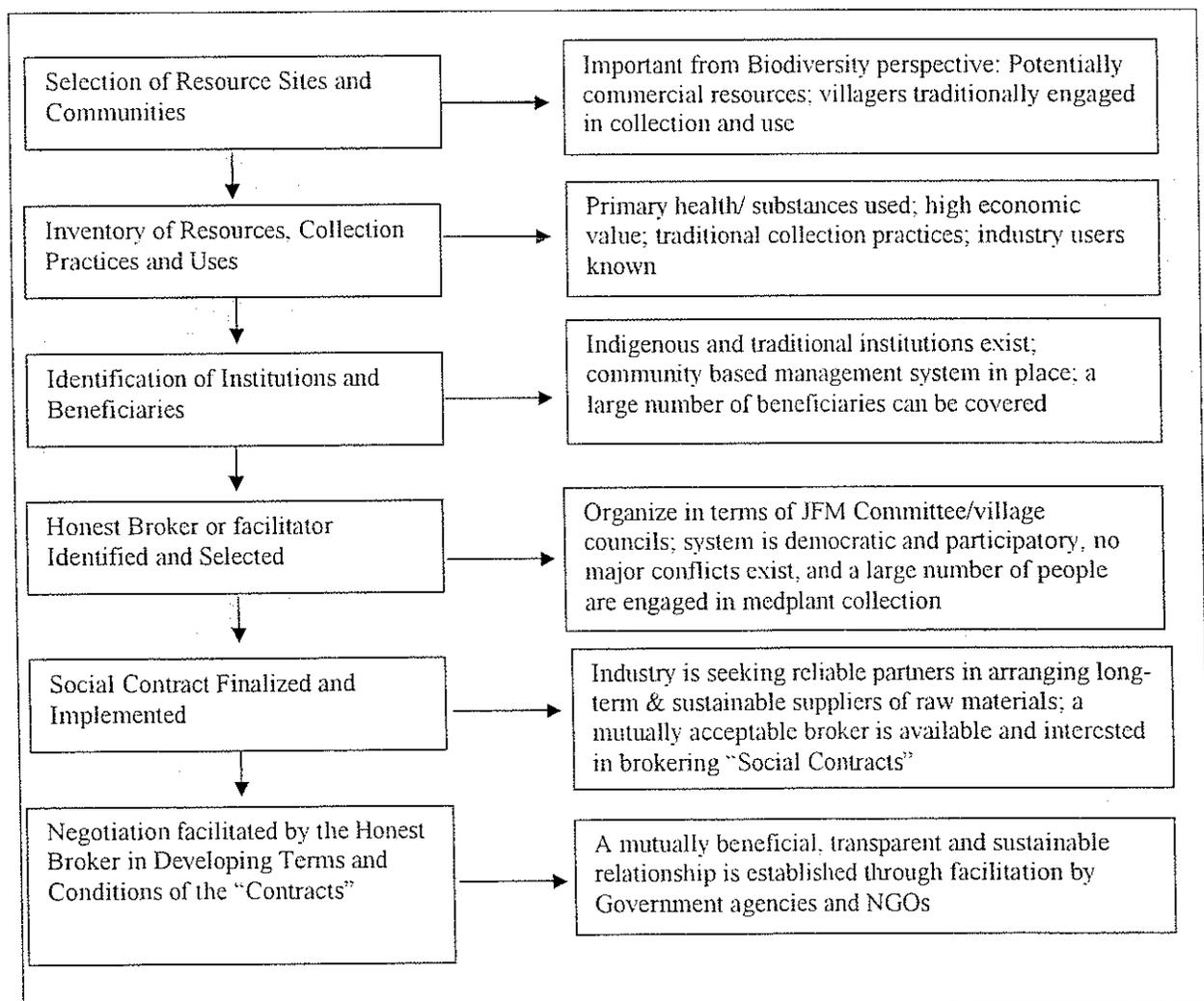
view to developing an economically, socially, and environmentally beneficial and sustainable medicinal plant sector in the South Asia region. It proposed the development of close and enduring relationships among all the stakeholders involved, the majority of which is formed by industry and forest dependent rural communities. Hence they incorporated in their work the idea of an “industry-rural community partnership” whereby herbal drug companies and local communities collaborate for mutual benefit on a sustainable and equitable basis. The underlying significance of such a partnership is mainly to maintain a sustainable supply source in the face of increasingly unreliable markets for medicinal plant raw materials, which is important for a process that has been largely secretive and inefficient and frequently exploitative (Holley & Cherla, 1998). It is with this opportunity in mind that the idea of ‘social contracts’ with local resource communities is being put forward by the MAPPA.

The basic concept of ‘social contract’ or ‘bio-partnership’, as mentioned above, is that equitable and sustainable relationships are formed which satisfy the short and long term needs and interests of both parties to the extent possible. The term ‘social contract’ was first coined in the sixteenth century by the philosopher John Locke, in his work, “On Liberty”. The ‘contract’ referred to was the implied agreement between citizens and their government, where citizens voluntarily turned over some of their freedoms and accepted certain rules in order to also experience certain benefits, such as the protection of property, social security, and the like. This willingness to become party to such a ‘social contract’ was referred to a century later by the philosopher de Tocqueville as ‘enlightened self-interest,’ or the recognition that one gained overall by arrangements that sometimes seemed to constrain one at the moment. To make sense of such an agreement in the context of the plant-based drug industry, it will likewise be necessary for the industries involved to begin to follow certain practices regarding the collection and harvesting of medicinal plants, which, if followed by a large enough number, will actually increase the productivity of the entire sector and hence develop the growth opportunities of each firm in the long-run (Karki, 2000).

‘Social contracts’ or ‘Bio-partnerships’ are thus symbiotic relationships between industry and local communities/ resource-poor people in an interdependent fashion. In India, the idea has been propounded by the M.S. Swaminathan Research Foundation

(MSSRF), Chennai, in order to empower the poor farming communities, especially the women, tribal peoples, and small farmers, so as to give them an equitable share of the benefits from the common pool resources (e.g. forests, grazing land, etc.) on which they depend. The main aim is to first empower the communities with better knowledge, skills, and information so as to gradually train the poor people involved in the collection and cultivation of medicinal plants to utilize sustainable harvesting, primary processing, marketing, and packaging. This will create eco-jobs and thereby enhance the livelihood security of the poor people. Multiple possible benefits can be realized on a sustainable basis if a long-term contractual arrangement can be worked out between the families of a particular resource community and interested industry or industries.

Chart-2.4: A suggested Strategy for Developing Social Contracts between Industry and the Resource Communities. *Source- MSSRF, India, 1995*



The process of building 'social contracts' or 'bio-partnership' involves a number of sequential steps starting with general discussion between the parties concerned. The initiation can generally be based on past and ongoing relationships or through facilitation by an 'honest broker' such as a NGO, community-based groups, Village Committees, and User Groups, Research and training agencies. The motive for industries to enter into contractual agreement will be the improved prospect of ensuring regular and reliable supplies of quality raw materials. Similarly, the attraction to the rural communities to enter into the contract will be the likelihood of ensured markets at fair prices, with possible gains in technology transfer to help achieve the sustainable management of their herbal resources and the development of their community. The successful establishment of an industry-rural community partnership, first of all, will require a liberal amount of goodwill and the commitment of physical and social resources on the part of industry. They need to reach out to the poor farmers, tribal and women collectors and win their trust first before rural communities will express their trust and join the partnership.

In order to maintain effective social contracts between parties, MAPPA enlisted a set of roles and responsibilities for the Industry and the Communities. Three projects in India and one in Nepal are already operating under the guidelines of social contracts and are achieving the desired results. The roles and responsibilities of industry and communities are as follows:

Responsibilities of Industry	Responsibilities of Community
<ul style="list-style-type: none"> • Not to deal with an individual member of the community in sourcing raw materials but to deal with the duly assigned community representative through the establishment of some transparent mechanisms; • Not to provide economic support to local communities which do not practice sustainable harvesting methods or those engaging in NRM practices which might be environmentally destructive or unsustainable; 	<ul style="list-style-type: none"> • To establish a long-term relationship only with those industries which are clearly dependent for their continued survival and economic viability on the conservation of natural resources, especially medicinal plants; • To undertake to supply raw materials of the required quality and quantity, and according to the schedule agreed upon with the industries; • To engage in the development of activities which would provide

<ul style="list-style-type: none"> • To make the concerned communities aware of the real value of medicinal plants in enhancing health and livelihoods; • To help carry out inventories, valuation, consumption and marketing studies in the villages where they have a long term interest in sourcing raw materials; • To commit itself to the practice of conservation and the adoption of sustainable principles and ethics of good business enterprise; • To establish standards for collection processing and manufacturing practices; • To provide training and buy-back guarantees to the products at a fair price. 	<p>widespread and equitable benefits to the local communities;</p> <ul style="list-style-type: none"> • To identify and monitor threats to the environment (in association with honest NGOs or similar institutions) and develop a framework, in a participatory manner, which describes how they plan to address the threat over time, using an action- oriented approach; • The NGOs involved as the “honest brokers” should be familiar with the village situation and should be trusted and accepted by local communities. They should be known to have a good track record in the use of a participatory approach to project implementation, and should have actively been involved in such activities in the past; • During the setting up of medplant-based primary processing enterprises, the selection of products, processes and end-products should generally be compatible with industrial needs, standards, and quality.
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Since development comprises the integrated development of people’s health, protection of the environment, and provision of livelihood security to the poor, industry and private sector should shoulder this social responsibility to solve both their short and long-term problems in the process. In recent times several workshops and conferences in South Asia concerning Medicinal Plant conservation have highlighted this partnership mechanism of MAPPa and it is gaining popularity among conservationists of this region.

2.5 Summary

It is obvious from the above discussion that recognition of the importance of medicinal plants is crucial for society, the environment, and the economy. Most of the studies throughout the world by different researcher, scholars, conservationists and organizations have stressed the fact that these plant resources have to be conserved through sustainable management approaches. Not to mention, such sustainable approaches require pre-examining the existing process of medicinal plant collection, production, distribution and consumption. Notwithstanding studying such prevailing activities, one has to delve out the factors that can work as an incentive or preventive measures to redress the activities or the extent to which they are subversive to the natural existence, growth, availability, and above all sustainability of medicinal plants in that particular area or region. If, however, a particularly compelling livelihood situation makes it difficult for resource planners and decision makers to debar, restrict or regulate the user groups from exploiting these resources, then a mechanism to replenish the natural stock has to be invented and adopted for the sake of protecting biodiversity. One notion in business is that 'reducing cost for the same output maximizes profit'. The idea can be replicated here as well as the principle that 'reducing the use of medicinal plant resources through improved organizational and marketing mechanisms will enable the same yield or more financial or medicinal benefit will help sustain these resources and at the same time reduce the loss of biodiversity'. Such mechanisms may call for the institutions responsible for the management and sustenance of medicinal plants or natural resources to constitute new management institutions, reshuffle the pattern of existing institutions, or quest for development-environment reconciliatory policies based on adaptive management principles.

Medicinal plant-based products, i.e. mainly herbal products, especially in the developing countries, have not flourished and attained many of the standards and quality required to attract the high-end global markets. Therefore, thinking or rethinking marketing strategies to enhance the current situation of surplus benefits, in terms of both reduced pressure to input resources and maximizing profit margins, is always a permeable policy that leaves immense scope for resource planners.

CHAPTER THREE: OBJECTIVES, RESEARCH METHODOLOGY AND STUDY SITES

3.1 Introduction

Social research calls for a systematic approach, conceptual guidelines and the application of specific tools and techniques to accomplish the objectives and gain the desired results. In recognition of the context and challenges stated in the first chapter and having consulted the global literature on medicinal plants, which shed adequate light on those problems and challenges, the research set the objectives and appropriate methods to obtain information and data to fulfill those objectives.

This chapter, therefore, delineates the objectives of the research, and then the conceptual framework of the research and detailed research methods, including the field research techniques and sources of data. This chapter also outlines several fundamental and specific research questions which guided the study in order to delve out the principal concerns as per the objectives. The chapter also elucidates study sites and the rationale for selecting them.

The objectives of this research were three-fold:

- i. **To examine the local level status of medicinal plants, their production and supports to livelihoods and primary healthcare.**

The research determined the existing causes as to why medicinal plants species are gradually depleting from nature. It also focused on various practices and measures, ranging from primary production to consumption in the study areas, that impact on biodiversity and local livelihoods. Management initiatives at various levels to redress these problems are also examined in the light of this objective.

- ii. **To analyze the national level medicinal plant market system and industry value chain and determine options for improving the supply chain through partnerships between industry and the producers' community.**

The study attempted a comprehensive overview of the existing medicinal plants and the plant-based herbal market system in Bangladesh, where it tried to identify the role

of medicinal plants in the market system, the structure, and various dimensions of that plant-based industrial market. The industry value chain and SWOT are analyzed to find out improved management and marketing approaches.

iii. To identify existing formal and informal organizations, and examine cross-scale linkages between them in order to enhance and strengthen public policy options and management strategies.

The study identified the key institutions involved in the management of medicinal plants and then determined the extent of involvement of the organization located at the community level in the project sites that were studied. It also attempted to indicate the linkages and institutional interplays at various spatial levels. Then it pointed to possible institutional arrangements for addressing the sectoral strategic management problems.

3.2 Conceptual Considerations

3.2.1 Participatory Methods and their Relevance

The field investigations of this research were done using a 'qualitative research' approach. Within the purview of qualitative research methods, where Rapid Rural Appraisal (RRA) and Participatory Rural Appraisals (PRA) are widely practiced by the researchers, I analyzed the pros and cons of using both RRA and PRA as tools and ways to collect field data. Upon analysis, I determined the RRA methods to follow based on the fact that the research was initiated by the ideas and guidance of a development agency (IUCN), and in recognition that the goal of an individual researcher (myself) to fulfill nested academic obligations very much dominated the research mindset rather than a prior assessment of the community needs and urgencies.

The focus of RRA is not community driven and the research outcome is less likely to benefit the communities directly or immediately. However, a brief comparative review of RRA and PRA was done to examine the justification of using such methods in my research and to dispel confusions and debates concerning these methods.

Table 3.1: Potential differences between RRA and PRA

<i>RRA</i>	<i>PRA</i>
<ul style="list-style-type: none"> ▪ Responds to needs of development workers and agencies ▪ More emphasis on efficient use of time & achievement of objectives ▪ Communication and learning tools used to help outsiders analyze conditions and understand local people ▪ Focus of RRA decided by outsiders ▪ End product mainly used by development agencies and outsiders ▪ Enables development agencies and institutions to be more “participatory” ▪ Can be used purely for “research” purposes without necessarily linking to subsequent action or intervention 	<ul style="list-style-type: none"> ▪ Responds to needs of communities and target groups ▪ More emphasis on flexibility to adapt to time frame of community ▪ Communication and learning tools used to help local people analyze their own conditions and communicate with outsiders ▪ Focus of PRA decided by communities ▪ End product mainly used by community ▪ Enables (empowers) communities to make demands on development agencies and institutions ▪ Closely linked to action or intervention and requires immediate availability of support for decisions and conclusions reached by communities as a result of the PRA

Adopted from: FAO Corporate Document Repository, 1996

Given such a context or primary background of this research, which confined it within the peripheries of RRA practices, other attributes (as pointed out by McCracken, Pretty and Conway at IIED in their work on RRA in 1987, and FAO Fisheries Department in 2004) underlying RRA methods that guided this study were as follows:

Structured but flexible

RRA is a structured activity requiring careful planning, clear objectives, the right balance of people involved and a good choice of tools and techniques for use in the field. At the same time, it is flexible enough to respond to local conditions and unexpected circumstances. Moreover, constant review of progress helps the researcher to understand and identify new information, and the focus of the RRA can be redirected based upon such information.

Integrated and interdisciplinary

RRA helps “outsiders” learn about rural conditions by looking at them from many points of view. This means having people participate with a variety of different technical and scientific skills and a balance of different institutional outlooks. This requires an integrated development approach which cuts across institutional and disciplinary boundaries.

Awareness of bias

Researchers and development workers who are trying to understand rural conditions can be biased by their urban attitudes, their own professional and personal priorities, the type of transport they use, and the language they speak. The people researchers talk to can be biased as well by their limited experience, their customs and beliefs and their own interests as well as those of their families. RRA seeks to avoid biases by being **aware** of them and by being **systematic** in taking into account different points of view and different sets of interests.

Accelerating the planning process

RRA tries to shorten the time it takes to get from knowing nothing about an area or a situation to deciding what development interventions might be best for that area by using key informants and careful observation and by exploiting the knowledge and experience of local people. The information produced is analyzed “on the spot” and presented in a form which is more easily used by planners and which can be discussed and understood by local people themselves.

Interaction with and learning from local people

Whatever the purpose of the RRA, it **must** involve the people who are the intended “beneficiaries” of any eventual development activities. RRA should give them the opportunity to describe their lives and conditions. The people carrying out an RRA must be prepared to listen to local people and learn from them. Participation by local people can take many forms but any RRA will involve intense interaction between researchers, planners, traditional and formal authorities and local people.

Combination of different tools

The RRA approach uses a combination of communication and learning tools. These tools help outsiders to observe conditions in a concise but systematic way. They also allow local people to present **their** knowledge, concerns and priorities to outsiders. The combination of different tools and techniques builds up a more complete picture where different viewpoints can be compared and contrasted. The systematic cross-checking of information collected in different ways by different people and from different sources can increase accuracy and comprehensiveness.

Iterative

During an RRA, what has been learnt is constantly reviewed and analyzed in the field. This is usually done in workshops carried out at regular intervals. This means the focus of the RRA, the tools used and the people talked to can be adjusted constantly.

Guided by the above principles under the qualitative research paradigm, in order to attain the objectives of the research, I developed a set of questions (as my *key research questions*). However, an interactive adaptive approach (Nelson, 1991) allowed me to often modify my methods and questions to maximize efficiency and ensure the validity of the results. With the light shed by the interactive approach I also made modifications to the planned scope of the study in order to come up with significant conclusions that enunciated a better market and livelihood provisions or policies both for medicinal plant producers and processors. Thus, as the vital instrument to delve out facts and figures, I eventually used the following key research questions.

3.2.2 Specific Research Questions

Objective-i: Threats and Measures

- What are the factors responsible for the depletion of medicinal plants from nature?
- What are the conservation initiatives undertaken by the existing medicinal plant projects?
 - *In-situ* Conservation, and
 - *Ex-situ* Conservation Initiatives

- Is there any attempt to retain the traditional knowledge on medicinal plants?
- What are the primary healthcare implications of the studied project activities?
- What are the medicinal plant production-related activities in the project areas?
- What are the impacts on livelihood of medicinal plant production?
- What type of initiatives contributed to the promotion of medicinal plants in the studied areas?
- What and how are the harvesting, primary and secondary processing related practices?

Objective-ii: Market system and Value Chain

- What are the uses of medicinal herbs as healthcare products?
- How is the nature and dimension of the medicinal plant-based herbal market system in terms of
 - Market context
 - Market size
 - Market demand
 - Market supply
- How diverse is the medicinal plant-based industry value chain?
 - Who are the actors?
 - What are their activities?
 - How does the productive network function within the value chain?
- What is the marketing mix of the existing herbal manufacturing companies?
- How can the industry value chain be improved given its inherent constraints and weaknesses?

Objective-iii: Institutions and Management

- What institutions are involved in managing and promoting medicinal plants?
 - What is the management scenario at the local scale in the studied areas?
 - Are NGOs, Development Organizations and Sectoral bodies involved in medicinal plant management and promotion?
 - What are the government institutions that deal with medicinal plant resources?

- What are the cross-scale institutional linkages prevailing in the studied medicinal plant projects?

Therefore, with the above specific research questions in the aforesaid three objectives, the approach of the research was two-tier, i.e. case study and market study. The concepts and the rationale of adopting such an approach are described below.

3.2.3 Two-tier Explorative Approach

3.2.3.1 Intervention Projects as Case Studies

The case study, as a viable research tool, has been gaining popularity among social science researchers and therefore the frequency of using case studies has increased (eg. Baker & Zigmond, 1995; Callahan, 1996; Ballard et al, 1997) since the 1980s. Nowadays it is regarded as a convenient and meaningful technique to capture a time-framed picture of subject organizations, groups, communities or individuals that can be construed to evaluate their characteristics and performance. Case studies also appeal to people because they have what might be termed 'face-value credibility' as they provide evidence or illustrations with which some readers can readily identify (Bachor, 2000).

Yin (1984) defines the case study research method as an empirical inquiry that investigates a contemporary phenomenon within its real-life context. It is used when the boundaries between phenomenon and context are not clearly evident. Multiple sources of evidence are used. In such considerations, the overall scenario of programmatic activities of any development scheme at a given context and timeframe and their impacts due to intervention can be taken as a case (e.g. the production of medicinal plants and livelihood improvement—*the case of Natore, Bangladesh*).

In a situation where activities relating to medicinal plant conservation and livelihood supportive production are going on, the project planners and implementers might assume that these are contributing substantially to the wellbeing of the environment and reducing poverty, as these activities have already been initiated by themselves and in most cases the community people are persuaded to accept and follow their programs. Despite such an assumption by development partners, I believe there is need for a 'third eye' that would attempt to evaluate whether the project activities are

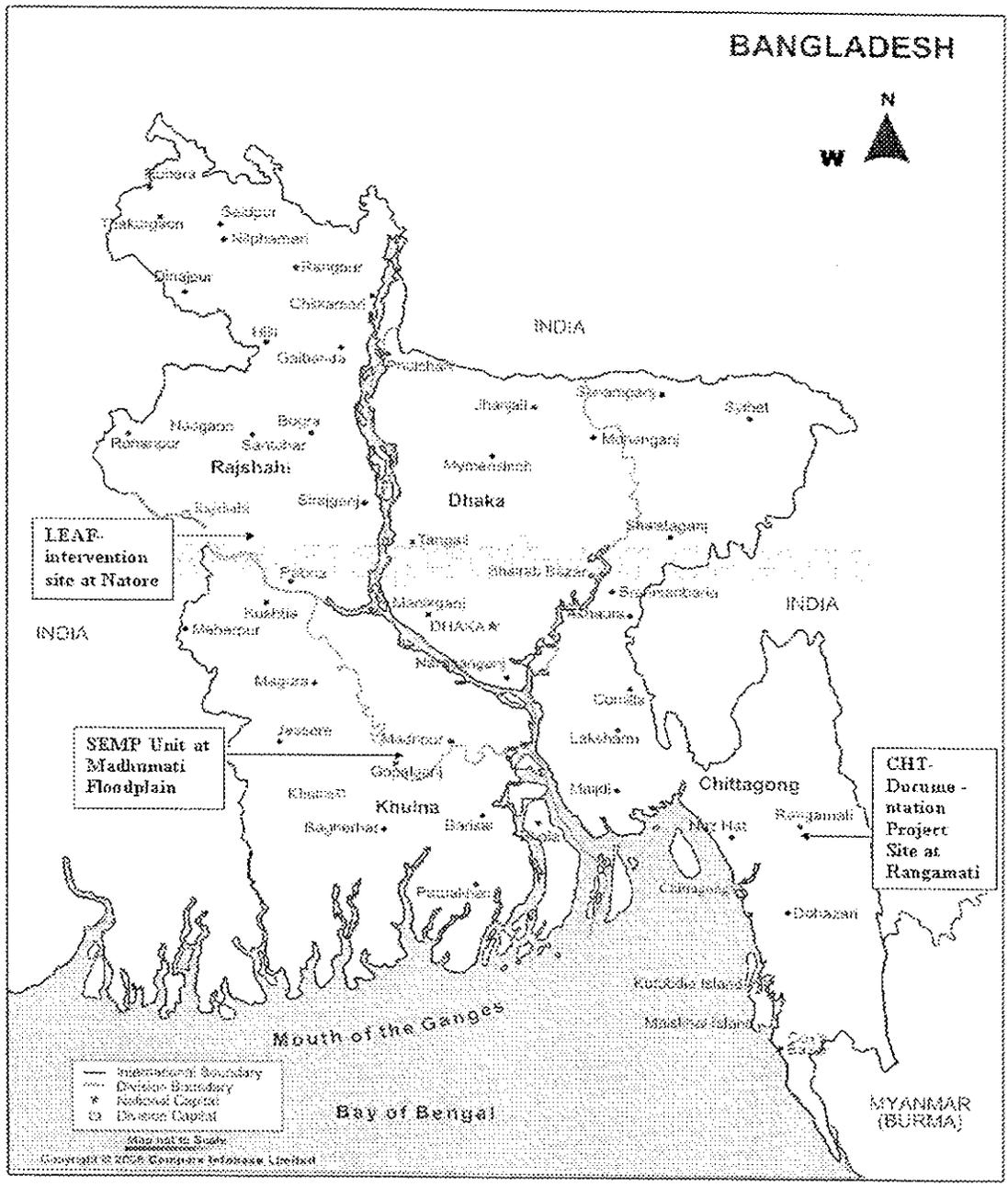
technically, economically, and environmentally feasible and whether the benefits of such activities can be directed towards particularly poor or extremely poor groups in the community. With case studies, aspects like community dynamics, land tenure, the causes of success or failure experienced by individual growers or farmers come out spontaneously in causal discussions. They also help to provide special attention to and allow conversations with 'invisible groups' in the community, such as women and old people, who would normally be difficult to contact (FAO, 1996).

As in many other developing countries, many grass roots level local or regional development initiatives in Bangladesh are embedded in the programs and activities designed, developed, and implemented by development agencies like NGOs, ENGOs and INGOs, which are thousands in number and largely funded by foreign donors. There are allegations that donors insert their own agenda in the programs, and therefore, it is often a debate whether the donor-driven action lines or planning is always serving the community purpose. With such presumption or other, this research studied SEMP, LEAF, and CHT project activities on medicinal plants for the following principal reasons:

- the widening and deepening of understanding (or learning significant lessons) based on the outcomes, implications and impact of these projects (short and long term) and thereby conceptualizing the underlying conditions of their success;
- the nature and extent of the benefits that are pouring forth or trickling down from these projects activities to the environment and rural economy; and
- the relevance, achievement, sustainability, and way forward of such programs in similar contexts.

Therefore, the research examined three ongoing projects dealing with medicinal plants. These were: i. Livelihoods Empowerment and Agro Forestry (LEAF), implemented by Intercooperation (IC), ii. Sustainable Environment Management Program (SEMP), with IUCN as one of the implementers, and iii. Chittagong Hill Tracts Medicinal Plants Project (CHT), implemented by Bangladesh National Herbarium (BNH). The projects are operating in the Rajshahi, Khulna and Chittagong *Divisions* of Bangladesh.

Two of the projects gave scope to find out relevant data on the production, marketing, and management aspects of medicinal plants, while another offered an



Map 3.1: Studied projects sites located in different parts of Bangladesh

opportunity to understand the conservation initiative and documentation of traditional knowledge. I did extensive field work with a view to fulfilling the research objectives at two sites (Natore, and Gupalganj), while observation and discussion with project field facilitators and a *Baidya* were done at the remaining site (Rangamati) through a short visit.

3.2.3.2 Market Study and Value Chain Analysis

Apart from using the case study approach as stated above, this research has studied the specific characteristics of the herbal market in Bangladesh and the associated medicinal plant value chain in place. The market study allowed me to understand the market context, and to determine the market size, demand, supply and marketing mix practices prevailing in the herbal market system of Bangladesh. However, it is the 'medicinal plant industry value chain' associated with the market system that I considered most useful to study in order to assess the benefit and contribution of the community people engaged in primary production and to examine the prospect for an improved value chain as a better approach to the management and marketing of medicinal plants than existing ones. The whole value chain was critically examined from input supplier to the final consumer level, which enabled the study to come up with thoughts on better approaches on the marketing and management of the medicinal plants. It was necessary to understand the productive network, along with the constraints and opportunities of the medicinal plant sub-sector, for considering an improved value chain in which the key stakeholders of the medicinal plant industry would be involved in an participatory management approach.

The information required for Value Chain Analysis (VCA) ranges from qualitative information on how the chain 'functions' to quantitative data on the prices and costs borne by different actors in the chain, none of which is easy to obtain. Therefore, I had to piece together information from various sources – public statistical sources, grey literature (from different development organizations and NGOs) and published work, interviews with key informants and organizations with knowledge of the industry, as well as interviews with key actors in the chain (Kanji et al., 2005).

In Bangladesh, there is little official data available on the medicinal plant supply chain, and the absence of a network of firms producing medicinal plants leaves no scope for any central data bank or inventory. Moreover, key industry participants are often reluctant to provide their prices and costs (particularly commercial firms that prefer to protect their data from competitors and sometimes from NGOs), all of which necessitated lengthy and costly observation (of firms, markets, inputs and trade) by me. In spite of such difficulties, a list of industry participants was prepared (from the Drug

Administration of Bangladesh, and *Ayurvedic, Unani and Homeopathic Federation of Bangladesh*) and the participants were interviewed through purposive sampling along the chain, including farmers, producers, *pikers*, *beparies*, wholesalers, processors, manufacturers, distributor and retailers.

Recently VCA has been used to analyze the chain from the points of view of low-income producers and employees, and to explore the implications posed by the functioning of the chain for their livelihoods and wellbeing and as levers for poverty reduction. The manual produced by McCormick (2000), and the guide developed by IDRC for VCA are indeed useful attempts to adapt the methodology to carry out research on industry value chains in particular. Yet, it is clear that methodologies need to be considerably refined to include intangibles, incentives, hidden information, flows of capital and risks before the precise comprehension of the levers for change can be indicated by VCA alone (Kanji et al., 2005).

3.3 Field Research

The field research was conducted from September 2005- March 2006 sequentially in all three study sites of the ongoing projects, several wholesale and retail markets of medicinal plants as well as production sites and facilities of several micro, small and medium scales industrial processors of medicinal plants. Project-wise summaries of the field investigation conducted at different sites and a description of the market and trade surveys conducted at different points of the medicinal plant industry value chain are given below:

3.3.1 Three intervention projects

3.3.1.1 Livelihood Empowerment and Agro-Forestry (LEAF) at Natore

In order to understand the primary idea of the LEAF project activities I had to consult background information on the program. Documents pertaining to the program and several technical reports available on LEAF activities were provided by the IC Dhaka office and IC regional office at Rajshahi. Pre-established contacts with IC personnel through IUCN helped get me introduced to the functionaries of the LEAF program at different levels.

The local NGO (LUSTER) field facilitators were very instrumental in familiarizing me with the community members and the respective medicinal plant producers. In order to get access to primary data from the 5 villages under the two *unions* selected as a study site, I stationed myself at the nearby town of *Natore* and used to visit the site everyday. A field observation of the activities pertaining to planting, irrigation, fertilization, harvesting, packaging, and primary processing was made to gain a practical idea of how these function. Then I conducted a livelihood survey through interviewing 30 households in five villages in which farmers or households are active in growing medicinal plants. Apart from many interviews done while carrying out observations, focused discussions took place with several participants to delve out the issues and facts concerning livelihood. Such focused discussion helped develop a couple of cases on success stories involving farmers and growers of medicinal plants. Moreover, having obtained verbal permission from the *Laxmipur Khulabaria Oushadi Krishak Samity* - a farmer organization in the *Union*, I attended a couple of meetings of the cooperative (one held in the *Union Council* Office, with the *Union Chairman* also attending the meeting) to gain an understanding of their activities and concerns.

Then I visited several medicinal plant-based micro enterprises and primary processing centers in the area to gain ideas on the primary processing activities of *Pikers* (local traders) and middlemen as well as information on the buying and selling prices at that level. However, much information came from informal discussions and observations. Once good trust was developed with several *samity* members and medicinal plant cultivators, I used to sit with them in the local tea stall in the evening and discuss medicinal plant-related matters among other topics and I would note down vital information. I collected primary field data pertaining to species in cultivation, land quantity, livelihood benefit, and related cultivation and primary processing practices through semi-structured interviews with the farmers and households of that area. However, similar information I had gathered from LUSTER was also triangulated in the meantime.

3.3.1.2 *Sustainable Environmental Management Program (SEMP) at Gopalganj*

At the Madhumati floodplain site, semi-structured interviews with ten local plant-

based healers (*i.e Kabiraj*) and discussions with medicinal plant specialists responsible for implementing field program were the primary means to gain comprehensive knowledge on status and the role of medicinal plants as well as the impact of the SEMP project on improving the present situation in the project areas.

Having been advised and directed by the IUCN Dhaka office to reach its implementing partner's (BCAS) office at *Satpara- Vennabari* in the *Gopalganj* district, where the project site office is located, I found the location most suitable upon arrival. After being introduced to the BCAS officials and community people, I viewed the villages in *Satpara* and had some initial discussions with community people like the school teachers, *Kabiraj*, *Union Parishad* Members and community leaders to gain information regarding the impact, awareness, and significance of the project activities on them.

However, the BCAS field facilitators were the key persons who helped me to critically understand the project operation at the site and familiarized me with the various site-level stakeholders of the project. In the SEMP project's approach to medicinal plant conservation through community participation, village-level CBOs called VRMC (Village Resource Management Committee), which were formed through the project, play the vital role. My introduction to the committees in several villages and my presence at two of their meetings was very helpful in conceptualizing the project initiatives, the nature of activities and their effectiveness.

The project field facilitators then familiarized me with different conservation sites and conservation measures that included *in-situ* and *ex-situ* conservation initiatives. Different on-site awareness campaign tools (billboard, signboard, wall magazines) were seen in the project area and discussion with the community people revealed that they enjoyed folk dramas on medicinal plant conservation awareness and viewed awareness exhibitions. I benefited immensely from some project documents, one of which provided a list of medicinal plants species in the project area, their use and details on the traditional healers that practice herbal medicines for their livelihoods. With the help of that list, 10 *Kabiraj* were identified in the *Satpara* and *Kadambari* areas and interviewed gradually with a semi structured questionnaire. At the same time, community nurseries, seed-bed,

and the project managed medicinal plant nurseries (used as mother stocks) were observed, with the assistance of project field facilitators.

3.3.1.3 Chittagong Hill Tracts at Rangamati

Initial project information and documents were gathered from the BNH office at Dhaka to have an idea of the project activities. Two of the BNH experts engaged in the project: one specializes in medicinal plants and the other, a taxonomist, briefed me about the overall project objectives and goal. Then a short three-day visit was paid to the site, where two days were spent with the field data collectors to review their raw data and to gain a better idea of the feedback from *Baiddyas* and the species available in the area. The field collectors in fact gave me access to their raw data, i.e. the responses they had received from the *Baiddyas* on the causes of loss of medicinal plant species in the CHT area and on the gradually increasing constraints they are facing in their profession. I took notes on the feedback from various *Baiddyas* in response to the field facilitators' investigations. However, apart from gaining ideas from the field collectors, I was able to talk to a *Baidhya* practicing herbal medicine within the project office compound at *Kathaltala* in Rangamati town.

3.3.2 Herbal market and medicinal plant industry value chain

At the initial stage, available literature which is basically a market study and a sectoral analysis report by development organizations were consulted for self-organization. Some data from those studies considered issues that were not covered by this study due to time and resource constraints. In order to obtain an estimate of the gross trade volume of medicinal plants at the national level, this study had a questionnaire survey with 18 *Unani* and *Ayurvedic* medicine processors of different sizes: what it terms MSMEs (micro, small, and medium enterprises)³. From each system (*Unani* and *Ayurvedic*), 4 micro, 3 small, and 2 medium firms were interviewed respectively (15 located at Dhaka, and 3 at *Natore*, Rajshahi). The average size-wise figures derived from those data were extrapolated across the *Ayurvedic Unani* sector where 230 micro

³ This categorization is done as per World Bank SME Department definition. The SME Department of the World Bank works with the following definitions: micro-enterprise up to 10 employees, total assets of up to \$10,000 and total annual sales of up to \$100,000; small enterprise- up to 50 employees, total assets and total sales of up to \$3 million; medium enterprise – up to 300 employees, total assets and total sales of up to \$15 million.

enterprises and processors, 115 small processing units and 18 medium sized secondary processing factories are currently operating out of a total of 499 among all sizes⁴. In some cases, the audited financial statement of the respective company was analyzed to validate data and figures.

To understand the market supply sources and the production networks at early stages, I used participatory techniques such as: semi structured interviews, discussion and direct observation at the village level (i.e. Khulabaria and Kathalbaria at *Natore*, Digirpar at Bogra). Besides, discussions and interviews were held with *Pikers* (local traders) at Khulabaria and with *Beparies* (traders stationed at district or divisional levels) at Natore and Bogra Towns. Interviews and observation of the wholesale market in (Chalkbazar, Dhaka) and a questionnaire survey with the above 18 companies helped to get data relating to the market and industry, especially on trade volume and species number and quantity.

In order to map the industry value chain, the study involved discussions with key informants like industry experts, development specialists, herbal processors (secondary processors), primary processors and producers, growers and farmers, and the NGOs associated with medicinal plants and agro-forestry sector development (i.e. Intercooperation, LUSTER, BCAS, NACOM, BNH and DEBTEC). In addition to this approach and set of techniques, the study relied on fundamental literature, 'a manual of value chain analysis for policy makers' and a 'guide to improve value chain'. Above all, experience from field studies at the SEMP and LEAF sites and analysis of the market system through the questionnaire survey method were immensely helpful in gaining an idea on the overall value chain functions. The analysis of the value chain was conducted when all the herbal industry actors, like the primary producers and their suppliers, primary processors, intermediaries, secondary processors, herbal product manufacturers, marketers, distributors and retailers, were understood, after the field study, observation and interviews had been completed. Thus, with all these methodological works, the study

⁴ The records with the Drug Administration of Bangladesh (DAB) show that 295 Unani and 204 Ayurvedic factories are registered as of 2006 and around 146 are currently inoperative, the registration status of most of which (inoperative ones) are already suspended. Homeopath factories (77 registered and 59 operative) are not taken as a sample because of the special nature of the herbs and low volume of medicinal plants they use. The number of enterprises under each category was derived from the study conducted by the Bangladesh Council for Scientific and Industrial Research (BCSIR), 1997, and also based on the categorization of Ayurvedic, Unani and Homeopath Association authority.

was able to analyze the value chain concept, point out the constraints and weaknesses of the medicinal plant industry value chain, and identify the SWOT (strengths, weakness, opportunity and threats) of the industry.

3.4 Summary of Data Collection Techniques and Methods

The data collection from the above project operations and marketplaces revolved around the three objectives of this research and were guided by the specific research questions developed beforehand. Though the already described field research methods gave the idea on data collection methods, I believe a summary on the perceived issues, adopted techniques, and sources used, corresponding to the objectives of the study, will help facilitate comprehension of the research methods employed.

Objective i: Local Level Status- threats, conservation initiatives, livelihood role

Pertaining Issues	RRA Techniques and Sources of Data
<ul style="list-style-type: none"> ▪ Threats to medicinal plants 	<ul style="list-style-type: none"> ▪ Secondary data such as reports and book reviews from Intercooperation and IUCN sources ▪ Key informant interviews at all the project sites ▪ Group discussions at the community level at SEMP and LEAF ▪ Direct observation, discussions with project field facilitators, consulting their survey feedbacks and then triangulating at all three project study sites.
<ul style="list-style-type: none"> ▪ Conservation initiatives 	<ul style="list-style-type: none"> ▪ Direct observation of detailed project activities concerning medicinal plants at SEMP and LEAF project sites ▪ Key informant interviews at all three project sites, especially with project implementers at regional and national levels ▪ Review of project documents and reports by IUCN-BCAS, LEAF-IC, and BNH
<ul style="list-style-type: none"> ▪ Community needs and capacities in medicinal plant production 	<ul style="list-style-type: none"> ▪ Household surveys with producers at LEAF project site ▪ Focus group discussion (village based) at LEAF project site ▪ Key informant interviews at all three project areas ▪ Triangulations
<ul style="list-style-type: none"> ▪ Cultivation, Harvesting, 	<ul style="list-style-type: none"> ▪ Direct observation of the field homesteads, and processing facilities at LEAF and observation at the

Processing of medicinal plants	<p>SEMP intervention site</p> <ul style="list-style-type: none"> ▪ Transects in the producing zones ▪ Household surveys with growers and farmers at 5 villages in LEAF site ▪ Key informant interviews with project implementers and experienced growers and farmers ▪ Focused discussion on individual cases (success stories and background history) with several growers ▪ Focus group discussion with local village resource management, and producer community organizations at LEAF and SEMP sites
<ul style="list-style-type: none"> ▪ Usage, importance, and livelihood 	<ul style="list-style-type: none"> ▪ Semi structured interview with the Traditional Medicinal Practitioners, industrial users, and specialists, at all the project sites ▪ Secondary data - reports and book review ▪ Household survey and individual case study with farmers and growers at LEAF site

Objective ii: Market System and Value Chain- analysis and improvement consideration

Pertaining Issues	RRA Techniques and Sources of Data
<ul style="list-style-type: none"> ▪ Context, size, demand, supply, marketing mix 	<ul style="list-style-type: none"> ▪ Secondary data review from SEDF and Intercooperation study ▪ Questionnaire survey with micro, small and medium processors using medicinal plants as primary raw materials ▪ Key informant (specialist and industry experts) interview ▪ Direct observation
<ul style="list-style-type: none"> ▪ Value Chain and productive activities 	<ul style="list-style-type: none"> ▪ Key informant interview and secondary data review ▪ mapping of chain network with sequence of interviews ▪ direct observation and semi structured interviews at local, retail, and wholesale markets ▪ questionnaire surveys with the industrial processors

<ul style="list-style-type: none"> ▪ Chain improvement considerations 	<ul style="list-style-type: none"> ▪ Secondary data review (global literature foundation on value chain improvement) ▪ Key informant interviews with a specialist, producers and industry experts ▪ Questionnaire survey with processors ▪ Focus group discussion with producer community ▪ Focused discussions with development partners and project implementers
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Objective iii: Management and Institutions- identifying linkages and policy options consideration

Pertaining Issues	Technique and Sources of Data
<ul style="list-style-type: none"> ▪ Local and Community Level Institutions 	<ul style="list-style-type: none"> ▪ Semi structured interviews with the community members at SEMP and LEAF study sites ▪ Key informant interviews with project field facilitators and representative of community organizations at both SEMP and LEAF ▪ Venn diagrams showing membership, spheres of influence, overlaps, locations and relative importance of different institutions ▪ Flow charts of organizational structure and mapping of areas of responsibilities of different stakeholders at both SEMP and LEAF
<ul style="list-style-type: none"> ▪ Development support agencies 	<ul style="list-style-type: none"> ▪ Secondary data review from Intercooperation, IUCN ▪ Flow charts of organizational structure and mapping of areas of responsibilities of different stakeholders at both SEMP and LEAF ▪ Key informant interviews
<ul style="list-style-type: none"> ▪ Government institutions 	<ul style="list-style-type: none"> ▪ Secondary data review from Intercooperation, IUCN ▪ Flow charts of organizational structure and mapping of areas of responsibility of different stakeholders at both SEMP and LEAF ▪ Key informant interviews

3.5 Data Analysis

Qualitative data, which the study mainly dealt with, were analyzed through thematic sorting and logical build up, narrative analysis and content analysis (Rupley &

Wilson, 2004). In order to attain the desired results from the market survey data, I extrapolated average sample data across the sector. The survey data were processed through appropriate computer aided software (Microsoft Excel) for ranking and categorization. Statistical analysis, i.e. frequency distribution, was followed to find out species most used by the industrial users. Interviews were transcribed for analysis later, but were not recorded, as many people were uncomfortable with being recorded.

3.6 Description of Reviewed Projects and Study Sites

3.6.1 Livelihoods, Empowerment and Agro Forestry (LEAF)

LEAF started its operation in 2004, with a key message, “encouraging and equipping small farmers to take responsibility for their own development.” The purpose of the LEAF project was to contribute to the poverty reduction of small and marginal farmers and households of the north-western part of Bangladesh through the development of human and institutional capacities and a better management of their resources, particularly land, along with an exploration of approaches to address extreme poverty. The project worked through four main action lines, which were: i. improvement of the knowledge and skills, ii. strengthening farmers’ organizations, iii. promotion of the enabling environment, and iv. promotion of rights and social issues.

The LEAF had a poverty focus targeting small and marginal farmers’ households, and, in addition, it considered integrating the extreme poor, such as indigenous communities, women-headed households and the landless into the program. With the central theme of the project, ‘to encourage farmer organizations to take charge of their own development,’ it tried to enable farmers to identify their development priorities and then implement joint plans; it subsequently linked them with service providers and local government agencies; encouraged and equipped them to exploit the market; and thus developed a critical mass of joint actions by farmers through interactions among geographically close groups.

As mentioned above, the projects operated in the north-western Bangladesh in Rajshahi Division and activities covered 106 *Unions* and 37 *Upazillas* (sub-districts). These areas under the *Rajshahi* Division are characterized by small and marginal farmers, which represent more than 50% of the rural population, and mostly live under the poverty

line. In terms of livelihood assets or capitals, they own few assets and have limited capacity to resist natural or social shocks. The large majority of households including the 'virtual landless' depend on their homesteads for about half their requirements in food and cash (Huda, 2005). This income is achieved through agro forestry – the mixed cultivation of diverse species of trees and crops along with the rearing of poultry and livestock.

Among these 37 *Upazillas*, four were found where homestead and infirm cultivation of medicinal plant species are prevalent as cash crops and support the local livelihoods to various extents. In Natore Sadar *Upazilla*, however, *Grithakumari (Aloe Vera)* is being cultivated as one of the major agricultural crops. The cultivation of other important medicinal plants like *Shotomuli (Asparagus recemus)*, *Shimulmul (Bombax ceiba)* and *Bhuikumra (Ipomea digitata)* are gradually taking place and gaining popularity over other species among the farmers and growers (especially homestead growers). In the Pirgacha *Upazilla* of Rangpur district, *Chai (Piper cubeba)* has been growing. A good number of farmers (reportedly around 50) are growing this species since the 1980s and it is one of their major cash crops.

Similarly, in Ranishenkal *Upazilla* of Thakurgaon district, *Basak (Adhatola vasica)* and *Nagarmutha (Cyperus Rotundus)*, and in Haripur *Upazilla* in Rangpur, *Nagarmutha (Cyperus Rotundus)*, are being produced by a good number of households. Given this scenario, in terms of the most number of species being produced in the area and the intensity of project activities, the *Natore Sadar* site was found to be the most worthwhile one for study purposes.

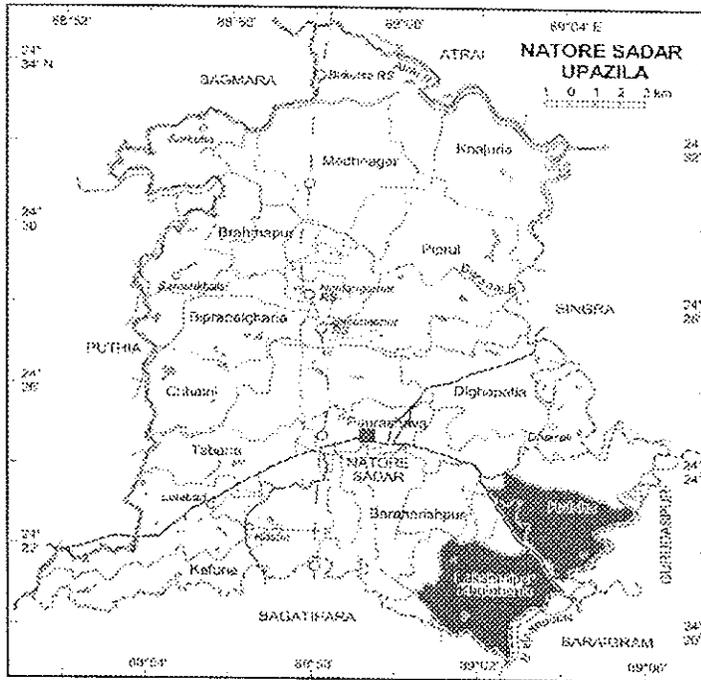
Medicinal plant-producing communities at the Natore site are based in two *Unions*, i.e. Laksmipur-Kholabaria and Halsha, and are mostly poor. On average, 40% of the total families (around 2,000) are extreme poor in the villages under these *unions* (LEAF, 2004). The villagers, mainly the poor portion of the community, are involved in medicinal plant production where cultivation of *Gritakumari (Aloe vera)* is popular while other species, including *Shatamuli*, *Misridana*, *Shimulmul*, *Bhuikumra*, *Kalomegh*, *Arswagandha*, *Rajkantha*, *Nilkantha*, etc., are also being cultivated.

In order to assess the production, processing, and local management of these medicinal plants and the livelihood pattern of the people producing medicinal plants, the

geographical coverage of the site studied by this research is shown in the table below:

Table-3.2: Geographical coverage of the study site at Natore

<i>Upazilla</i>	<i>Union</i>	<i>Village</i>	<i>Participants</i>
<i>Natore</i>	Laxmipur Kholabaria	Borobaria	8 Producers/households
		Kathalbaria	6 Producers/households
		Khulabaria	8 Producers/households
	Halsha	Parhalsha (<i>Guchchgram</i>)	4 Producers/households
		Mahesha (<i>Guchchgram</i>)	4 Producers/households
One Upazilla	2 Unions	5 Villages	30 Producers/Households



Map-3.2: Natore Sadar Upazilla, highlighting the Laxmipur-Kholabaria and Halsha Unions (study site-1)

3.6.2 Sustainable Environment Management Program (SEMP)

As a signatory to Agenda 21 at the Earth Summit, Bangladesh has already put high priority to environmental plans and programs, including the integration of the environment in development planning with a view to achieve a balanced growth. In this

regard, SEMP is considered as an important initiative at the field level (Khan, 2003) that came into effect in October 1998 and continued till December 2006. SEMP aimed at sustainable environment management, sustainable human development and a breakthrough in the poverty situation affecting poor sections of the society. It envisaged interventions in different sectors of the country's economy in order simultaneously to bring about an improvement in the country's deteriorating environmental situation and to improve the financial base of the poor, particularly of the poor women.

SEMP consisted of five theme areas, namely: i. policy and institutions, ii. participatory ecosystem management, iii. community-based environmental sanitation, iv. awareness and advocacy, and v. training and education. There are 26 components (projects) under these theme areas. With these components SEMP was designed:

- to prevent and reverse the trend of environmental degradation as well as to promote sustainable development;
- to benefit the grass-roots level population in the eco-specific intervention areas;
- to support community capacities for the sustainable management of environmental resources; and
- to strengthen the capacity of the public sector on policy development in support of enhanced community participation and the sustainable management of the country's environment and natural resources.

The program, funded by UNDP Bangladesh, is being executed by the Ministry of Environment and Forests of the Government of Bangladesh with the help of 21 Sub-Implementing Agencies (SIAs). One of the SIAs, IUCN Bangladesh is implementing the 'Community Based Haor & Floodplain Resource Management' component (out of a total of 26 SEMP components), which falls under the Participatory Ecosystem Management theme area.

The Community Based *Haor* & Floodplain Resource Management component of the SEMP project being implemented by IUCN has field activities in *haor areas such as Pagner & Samuar-Dakuar haor* in *Sunamganj* District, and *Hakaluki Haor* under the Moulvibazar and Sylhet districts; and in floodplain areas such as *Padma-Jamuna Floodplain* (Arua and Gopinathpur Beel) in *Manikganj* District, *Madhumati Floodplain*

3.6.3 Chittagong Hill Tracts (CHT) Medicinal Plants Project

The project is titled “*Survey and Identification of the medicinal plants of Chittagong Hill Tracts, exploration of their medicinal properties and uses, and publication of a monograph.*” The Ministry of Hill Tracts Affairs (MHTA) along with the Ministry of Environment and Forest (MoEF) are implementing the project with Bangladesh National Herbarium (BNH) under MoEF as the main executing body responsible for the operation and maintenance of it. The project commenced operation in July, 2004 with the following objectives:

- Inventory, proper identification, and collection of the samples of medicinal plants used by the tribal people of CHT through botanical survey.
- Preservation of voucher specimens of all medicinal plants of CHT in the Bangladesh National Herbarium as reference materials, and conservation of rare and endangered medicinal plants species.
- Preparation of a pictorial monograph on medicinal plants including those used in ethnic culture.
- Creation of awareness among the tribal people about the importance of medicinal plants, their proper uses in primary healthcare and about their conservation.

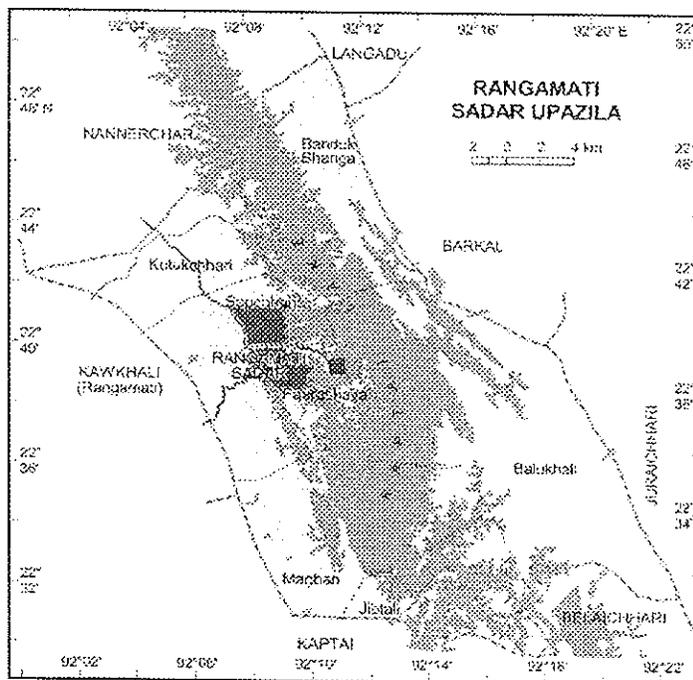
This enumeration and documentation program, operating in the three hill districts (Rangamati, Khagrachari, and Bandarban by CHT project), will continue till 2007. These three districts possess the largest tropical rainforest in Bangladesh, which includes a vast amount of medicinal plant resources. The majority of the tribal communities in the country inhabit the area and depend on herbal treatment for their illnesses and primary healthcare.

Herbal medicine prepared by the herbal practitioners (*Baiddyas*) has been the only source of treatment of the tribal people for their primary healthcare due to their independent culture, the poor transport system in the remote hilly areas, and the lack of modern treatment facilities. People of this region are dependent on natural resources not only for the treatment of different diseases but also for their livelihood. But in order to adjust themselves with the passage of time, tribal people are getting educated and choosing various alternative means of livelihood instead of their traditional occupations,

like *Jhum* cultivation, fishing, and hunting. Many tribal people are quitting their forefathers' occupation and are getting involved in different developmental works of the region.

As the knowledge of these *Baiddyas* is mostly unrecorded, this is being lost when they quit their occupation. The destruction and alteration of natural habitat in the Hill districts is a very common phenomenon due to different types of development activities. As a result, many plant species have become threatened and endangered. Considering these phenomena, this project is striving to record the traditional knowledge from *Baiddyas* on herbal medication system in the hill districts. Special attention is given to the recording of yet undocumented traditional knowledge of medicinal plants and their uses, and to identifying unknown medicinal plants and their status.

With guidance and assistance from BNH, I visited the Rangamati office to understand the project activities. The *Sapchhari* area (highlighted in the map below) nearby the district headquarters was observed from where the field collectors of the project started their enumeration in this district.



Map 3.4: Rangamati Sadar Upazilla, highlighting the observed *Sapchhari* area (study site-3)

CHAPTER FOUR: PRODUCTION AND PROMOTION OF MEDICINAL PLANTS AT THE LOCAL LEVEL

4.1 Introduction

It is evident from the review of literature in the preceding chapter that medicinal plants bear immense significance for healthcare, livelihoods and the environment. There is an increasing level of attention globally to sustain the valuable species. However, nature and the dimension of threats and problems associated with medicinal plant resources and their management is context-specific in many cases. For example, medicinal plants growing in floodplains might be vulnerable to extensive flooding while plants in alpinies and mountains may be vulnerable to climatic variability or extensive anthropogenic interventions. The research therefore examines the local level scenario of medicinal plants in Bangladesh in three selected study sites with particular focus on production and conservation.

This chapter focuses on the first objective of this study with its analysis, presentations and descriptions. The objective is:

To examine the local level status of medicinal plants, their production and supports to livelihoods and primary healthcare.

The chapter starts with the identification of the nature of threats to medicinal plants in terms of resource loss and other associated effects, and at the same time examines the conservation strategies and other measures undertaken and practiced by concerned stakeholders that categorically help conserve biodiversity. Since the research is subject to taking into account the activities of three ongoing projects with respect to medicinal plant conservation and livelihood improvement, the prevailing scenario of project sites has been brought forward in the discussion. It also insinuates the importance of documenting medicinal plant-based traditional knowledge. The major focus of the chapter is, however, on production-related activities of medicinal plants and their role in income generation in the studied project areas.

4.2 Nature of Threats versus Conservation Initiative of MP Resources

In all three project areas, the study paid particular attention to evaluating the measures or activities of the project implementers that positively contributed to the conservation of medicinal plant species. However, before turning to the project initiatives, the study intended to identify the causes of depletion of medicinal plants in the respective areas.

4.2.1 Threats

In Madhumati Floodplain and CHT, medicinal plants were found mostly to occur sporadically in nature and to grow wild, while in the LEAF area at *Natore* the major portion of the plants are grown through cultivation. In most places it was observed and reported that the species grow in the wilder land, forest land, bushes in the homestead, in backyards along boundaries, in bamboo grooves, on marginal lands and canal banks. Such places were the sources of 85% of the local medicinal plant supply (IC-LEAF, 2003), yet are rapidly losing their natural stocks and thus the sustainability of the plant species in the future is threatened. Interviews and focus group discussions with medicinal plants specialists and field staff, and interviews with 10 *Kabiraj* helped identify the following reasons as being responsible for the depletion of medicinal plants from the nature:

- Indiscriminate collection and commercial exploitation
- Unchecked deforestation
- Ignorant activities (not knowing the plant and its properties)
- Weeded out for making fences and firewood
- Damage by cow and goats
- Flood
- Absence of regeneration and reproduction

As per discussions and interviews, of all the above causes, indiscriminate collection and commercial exploitation were found as the prime causes contributing the most to the depletion of medicinal plants from the natural stock. Therefore, based on the above reasons, threats to medicinal plant resources are discussed under two categories, i.e. i.) Collection Practices and ii) Other human and natural induced stresses

4.2.1.1 Collection Practices

The *Kabiraj* in Madhumati Floodplain and *Natore* sites revealed that in the past they were self sufficient in terms of collecting medicinal plants from local sources, but nowadays they are becoming increasingly dependent on external supplies because of the exhaustion of local species due to indiscriminate collection. Inadequate knowledge and one time temporary gains by the collectors are the main reasons responsible for indiscriminate collection practices. These collectors normally inherit their knowledge of identification of plants, uses, collection and processing from their ancestors. Among them some individuals acquire knowledge and skills by working for a period of time with the traditional collectors and become involved in their own business. A few big collectors also train local people in the identification of certain species, primary processing and drying of medicinal plants and develop them as their local agents or suppliers. Sometimes the workers of a processing factory collect the available medicinal plants from their respective areas and supply these to the factory.

Based on discussions with collectors and CHT project field workers, as well as the IC study, different types of collectors engaged in the extraction process of medicinal plant resources can be categorized as below:

Traditional Collectors- They can be also called year round collectors who collect and supply medicinal plants throughout the year and their livelihoods are more or less dependent on the income from medicinal plant collection. They have a considerable professional outlook in extracting plant resources in a relatively sustainable way as these people think of gaining their future income, as well, from the same source. Moreover, due to long term collection practice, they possess better knowledge in species identification and the uses of plant parts.

Seasonal Collectors- They collect and supply only during the high seasons. Usually the rainy season and autumn are the times when species are more abundant in their natural habitats than any other period of the year, and that makes seasonal collectors active in their mission to collect medicinal plants from nearby wild areas and forests. These collectors are not considerate enough to practice sustainable collections. They are also not very knowledgeable in identifying the plant and plant parts.

Occasional Collectors- This type of collectors collect and supply in their leisure time. Usually when marginal day labourers and agriculture workers around the medicinal plant-growing areas become jobless in the lean seasons of agro production, they try to make their livings by collecting medicinal plants from nearby wild areas at those times. However, their collection practices are not sustainable because of the poor skills and knowledge they possess in terms of extraction and plant identification.



Photo courtesy, BNH

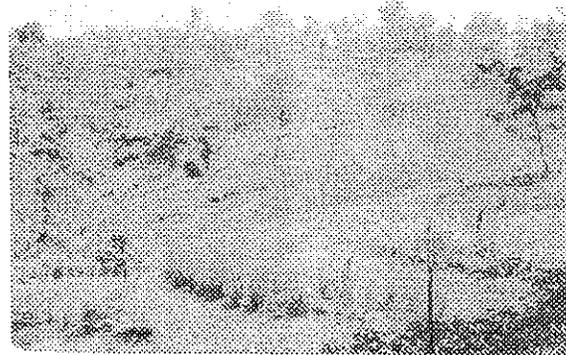
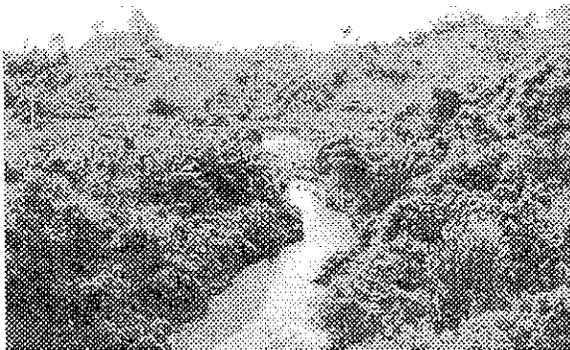


Figure 4.1: The above figures shows several occasional NTFP collectors approaching towards the forest in *Khagrachhari* who collects medicinal plants among other forest products, while the photographs below show a relatively undisturbed and biodiversity rich sustainable forest area where a good number of medicinal plants exist in the left, and in the right an extensively exploited area from which a good number of species are gone.

Inter-district Collectors and Collecting Agents- This type of collector includes the collecting agents employed by wholesalers or processors. In some cases they themselves are the *Pikers* (local traders) of the medicinal plants. They move to different plant growing areas and extract plant resources based on their commercial interest. These people reportedly influence forest department people in order to maximize their yield and

benefit irrespective of good field collection practices (GFCP) or good collection practices. They are the ones most responsible for causing harm to the natural stock. They are good at identifying plant species and properties but obviously not sincere enough to consider their sustainability. Such collectors normally gather information about the location and availability of species and then proceed to inspect the area themselves. After preparing the necessary small tools and equipment to extract the species, the collector then returns to the site with labourers or by himself and proceeds with the collection (source: IC study on Medicinal Plants Marketing in *Rajshahi Division, 2005*)

4.2.1.2 Other Human and Nature-induced stresses

Unchecked deforestation is rampant in Bangladesh due to habitat fragmentation, urbanization, and development activities. In all the study areas it was found that the increased population needed additional homes for accommodation and land for cultivation, and is recovering and converting wastelands, backyards, bamboo groves, bushes and jungles into homes and farms, thereby causing the gradual diminish of medicinal plants occurring in natural habitats.

Most of the medicinal plants are not recognized and known to most rural people, and as a result very often the herbs, shrubs, and smaller plants are cleared by them as weeds or supposedly non-productive plants. *Kabiraj* in the floodplain area reported that they noticed many households having a good number of medicinal plants around their home land cut these to make fences around their yards and to use as firewood to cook food with dried leaves and branches. In bushes, wastelands and canal banks, people usually graze their cattle, and as a result, in many instances, plants occurring in such areas are either eaten up or damaged by them. In almost all the cases, regeneration, replantation, reproduction, or re-occurrence did not take place for the revival of the natural stock of medicinal plants which had earlier been endemic. Apart from such causes, in the Madhumati floodplain there is a vast area of low land that submerges in flooding and remains under water for a good period of time (three to four months); consequently many species that occur there naturally die due to such long water logging.

4.2.2 Conservation Initiatives

All three projects have focused on the sustainability of medicinal plant resources. The LEAF and SEMP project components that deal with medicinal plant species undertook the challenge of addressing both conservation and livelihood issues together, while the CHT medicinal plant project laid more emphasis on documenting traditional knowledge. Different initiatives by LEAF and SEMP that play a critical role in sustaining local flora, supporting local livelihood through agro-forestry expansion, and building the socio economic capacities of the respective communities are deemed as conservation strategies that indeed have been significant steps for ecological sustainability as well. These initiatives by the SEMP and LEAF projects which address the above three aspects relating to conservation and livelihood are identified below:

4.2.2.1 In-situ initiatives

Floral Sanctuary: As a primary means to establish sustainable ecological status and conserve wild plant species in the Madhumati Floodplain area, the SEMP project has established Floral Sanctuary in the *khas* lands of *haor* basins. A total of 12 sanctuaries have been demarcated as protected areas, including in different biodiversity sites with more than 10 hector areas. Meanwhile these areas have started showing natural succession and native rare species are regenerating in the areas with protection.



Figure 4.2: Shows one of the conservation areas in *haor* site at *Madhumati* Floodplain

Plantation: Under SEMP, plantation took place in all the floodplain areas including the Madhumati floodplain. This plantation initiative, which is neither a purely *in-situ* nor *ex-situ* strategy, has taken many forms in the project areas. Many wide and uncultivated lands, including the front and backyards of educational institutions, have been brought under an afforestation program. Compact block plantation, with varieties of species in the cultivable wastelands, and roadside strip plantation have been carried out and are considered effective initiatives for environmental amelioration. Religious places like churches, temples, mosques, *haat* and *bazaar* were brought under plantation, and under social forestry, homestead plantation, and plantation at river and canal banks were also done. The SEMP Madhumati floodplain site office reported that at this site there has been 43 km of plantation with more than 100 species. The species include *Arjun*, *Haritaki*, *Bahera*, *Neem*, *Amloki*, *Tetul*, *Gab*, *Kathal*, *Am*, *Jam*, *Hijal*, *Jambura*, *Kotbel*, *Chambol Sisso*, *Boron*, *katbadam*, *Jalmander*, *Krishnachura*, *Pepe*, *Payara*, *Telikadam*, *Lebu*, *Bilombi*, etc., which are plants or trees with medicinal values.

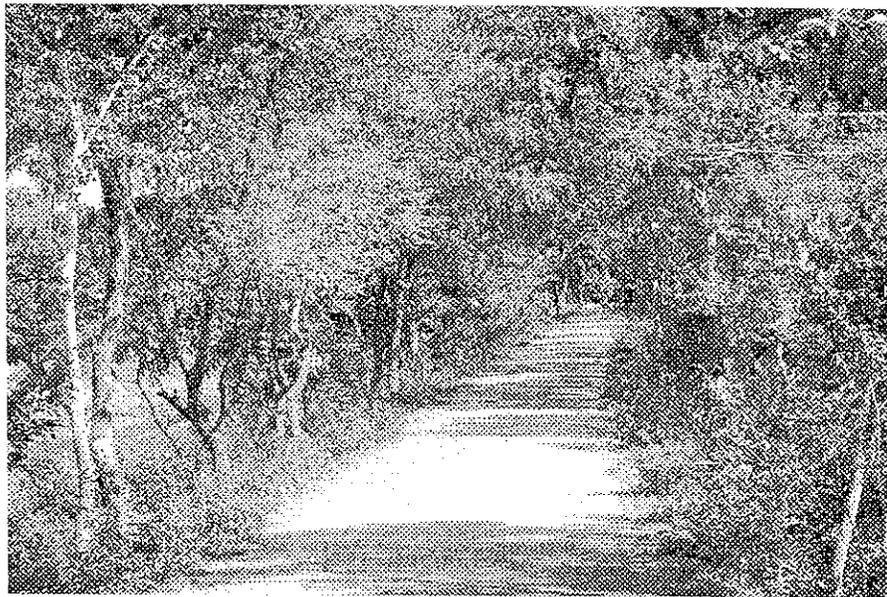


Fig 4.3: Road side plantation at Madhumati Floodplain

Swamp Forest Restoration: This is another measure by SEMP in the *haor* and *floodplain* areas having numerous wetlands in the form of rivers, canals, and *beels* lying along raised lands. These raised lands were naturally covered with wetland plant species and used to be a good habitat for many medicinal plant species. These swamp forests

have almost disappeared and few such patches of the remnant trees still bear witness to the once-rich swamp forest of yore. Under SEMP many of such patches have been restored with physical intervention, erosion proofing measures, and canal excavations. Now, with the restoration of such swamp areas, it is believed that species will regenerate and sustain in their natural habitat, enabling *in situ* conservation of biodiversity.

Riparian vegetation regeneration: This is another in-situ initiative by IUCN-SEMP to conserve biodiversity in the river banks where many medicinal plants are occurring naturally. This was done through the protection of fallow areas along river banks and adjoining areas with erosion proofing measures.

Among the activities of the LEAF project that are more production-focused approaches to upgrading the agro-forestry situation, with the aim of improving local livelihoods and in the process conserving biodiversity as well, a couple of approaches can be categorized as *in situ* conservation strategies:

i. Restoration of the fallow areas around homesteads and encouraging the farmers to plant medicinal plant species of economic value was found to be one of the important drives by the LEAF. In the study site at *Natore*, LEAF along with its PNGO formed one or two farmer groups in each of the villages, depending on the number of households. Then, through knowledge sharing and land use discussions, it determined and assisted in restoring and preparing land that is unused or not well used by a particular farmer. *Kumra*, around pond sides, is another initiative by LEAF that helps conserve species with medicinal value. The project encourages local *Kabiraj* to plant rare and endangered species such as *Bisallakarani* and *Telikadam* around their ponds.

ii. Homestead plantation and gardening of medicinal plants have been very common activities among almost all the households in the study area. The LEAF project constituted TFG (Tree Farmers Group) with its earlier component of VFFP and helped individual households to plant medicinal plants in their homestead.

The following figure shows land that was barren for years but now with the LEAF initiative it is producing a good variety of *Arshwagandha*:

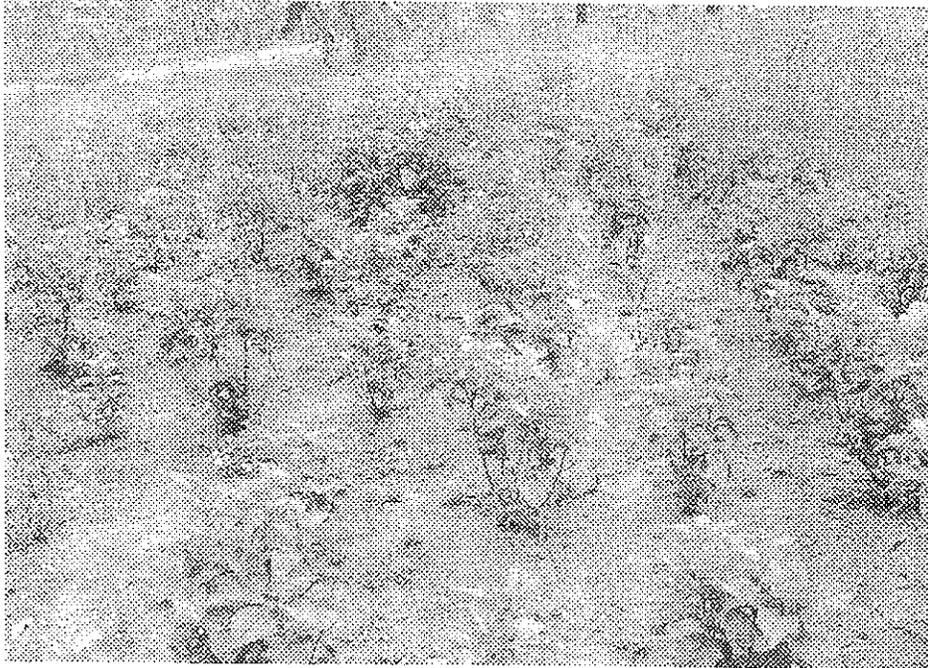


Fig 4.4: Arshwagandha plantation in a land that earlier used to be barren, at the LEAF project site

4.2.2.2 Cultivation

Cultivation in the study area is helping biodiversity conservation on two accounts; *first*, the extent of afforestation and green plantation is increasing with the increased cultivation of plant species and, *second*, it is helping reduce the pressure on the wild areas for the same species. In the five villages of the LEAF Natore study site, a total of 160 farmers are cultivating around 10 varieties of medicinal plants. Among these, though, two particular species, *Aloe vera* and *Shatomuli*, are being cultivated intensively, however, with the increased knowledge and market awareness farmers are cultivating new species each year. Initially, cultivation in this area started with only *Aloe vera* in 1995 but at present cultivation of 10 species and the pilot cultivation and seedbed of another three species are found to be in place.



Figure 4.5: An Aloe vera field in Kholabaria, Natore

4.2.2.3 Ex- situ conservation

Approaches to *ex- situ* conservation as a strategy for helping gradually protect eroding ecosystems and for conserving the endangered and rare species of medicinal plants have been undertaken in the *haor* and floodplain areas by IUCN under the SEMP project. Under this project, demonstration plots dedicated to nurturing and raising valuable medicinal plant species have been established in all project areas, including the studied Madhumati floodplain. Among other *ex-situ* conservation measures taken by the projects, the following initiatives are deemed to be effective with regards to medicinal plant conservation and supporting community livelihood:

Seed bank: A seed bank is a tool for *ex-situ* conservation of plants and genes. A seed bank is only applicable with seeds of long viability. But many indigenous practices have the ability to store seeds of even very short viability. For *ex-situ* conservation of plants and genes, the SEMP project sought knowledge on indigenous technologies from the community knowledge leaders to store seeds as part of the participatory action. Then at a common place there have been a few seed-banks established as part of demonstrations in the project areas, including the study area.

members of LEAF are contributing to conserving species through nurseries and supplying required saplings to the medicinal plant cultivators.

Community Nursery: The community nursery concept is a unique approach towards livelihood development as well as the conservation of local species. This micro-entrepreneurship effort has offered many-fold opportunities. In Madhumati floodplain there have been 28 community nurseries. The project, having formed village-level 'Village Resource Management Committee (VRMC),' helped VRMCs to develop nurseries either under individual or group ownership. VRMC members get saplings from the nursery for plantation.



Figure 4.7: A medicinal plants nurseryman showing and explaining about the species identity and properties

Seedlings of more than 50 species are produced in these nurseries. The species mostly included plants with medicinal properties, like *Arjun, Haritaki, Bahera, Neem, Amloki, Tetul, Hijal, Jambura, Kotbel, Chambol, Koroi, Sisso, Boron, katbadam, Jalmander, Krishnachura, Pepe, Payara, Telikadam, Lebu, Bilombi, etc.* To promote plantation in

homesteads and as part of the motivational effort, the seedlings raised in nurseries have been distributed among community people including VG, VEC and RMC members. In Madhumati floodplain, 454 group and VRMC members receive saplings and these plants are planted in 62 sites. Through plantation, a particular species can be reintroduced in the locality. One such experience has been Panibaj, also known as Bias (*Salix tetrasperma*). It is a native species which was depleting away because of its relatively lower utilization potential. Now plantation of the species has re-established its place in the project area. Apart from the above initiative, 21 more plots have been raised in the compounds of schools, colleges, and other public establishments where small botanical gardens have been established with mostly medicinal plant species.

4.2.2.4 Awareness-raising

The raising of awareness is an effective measure that helps the conservation of useful species and biodiversity. SEMP developed a participatory action plan that engages the community effectively to implement their objectives of sustainable environment management. It held community level awareness meetings and workshops where emphasis was given to medicinal plants and their conservation value. One of the significant initiatives by SEMP has been the establishment of *Eco-Clubs* with the inclusion of youth. The inclusion of youth initiative was taken to ensure the sustainability of the medicinal plant conservation initiative through generations. Moreover, environment-related days were observed in the educational institutions with spontaneous participation from local people. Awareness-raising materials were developed and disseminated by SEMP, such as billboards and signboards, wall magazines, leaflets, folk dramas, and exhibitions on environmental issues and degradation.

Similarly, raising awareness through campaigns is one of the major initiatives by the CHT medicinal plant project as well. The project has incorporated three awareness-raising workshops with the traditional tribal healers and herbal practitioners in the three hill districts, i.e. Rangamati, Khagrachari, and Bandarban. The main focus of the awareness campaign is conservation, however, the proper use of plant species and knowledge sharing are other concerns.

4.3 The Status of Plant-related Traditional Knowledge and Documentation

4.3.1. Observation and overview

As mentioned in the earlier part of this study, among the three ongoing projects on medicinal plants that were observed, the CHT Medicinal Plant Survey and Identification project deals mainly with the documentation of traditional knowledge. As a matter of fact, traditional wisdom has hardly been institutionalized in Bangladesh. The knowledge and practices of primary healthcare and healing treatment methods of tribal communities, especially of the people in CHT, are virtually undocumented. There is no formal arrangement or institution to train and nurture this knowledge in the locality. The institutional mechanisms for the dissemination or extension of the knowledge and practice are also absent. In such a context, apart from maintaining an inventory of medicinal plants in the region, recording the use and efficacy of these plant populations is indeed a noteworthy initiative of this project. Factors that rationalize this project initiative and the probable outcomes of ongoing activities are discussed herein:

The Treasure of Knowledge is on the Wane

The CHT region is known for its wild forest resources, and is one of the most bio-diverse areas of the Indian subcontinent, and rich in rare medicinal plants as well. People in this region traditionally depend on herbal medicine practices. Sadly, these traditions are being practiced less and less frequently (BodyTree, 2004). While at this study site (Rangamati Sadar office of the CHT project), I looked at the field notes of the project field workers; from their field notes and from my discussion with them, I surmised the overall scenario of traditional medicine system: 'the knowledge base is just threatening to vanish away'. Some excerpts from the project field workers notes are included below, which may give a brief account as to why recording is needed.

As told by several *Baiddyas* to the interviewers of the CHT medicinal plants project:

"I had this knowledge of plants and healing methods from my father and grandfathers ... It is a long process (takes years, even 10 to 20 years) to master the knowledge and spirits of Tantra and Mantra. If you don't completely devote yourself to this business of mastering the knowledge, forgetting all other jobs, you won't be able to be a Baidhya".

"Nowadays as the profession doesn't give enough money for a viable livelihood, it is no more attractive to our boys, and they are not willing to devote so much to learn it. If you don't have love and devotion for this you don't master the knowledge".

"Many of the plants we use as drugs are no more, these are vanished as forest trees are cut by different groups like, Pahari, Bangali, Shanti Bahini, Government people, etc.; ... small plants and big trees are like brothers. If you cut the big brother (tree) the small brother (herbs) also vanishes in the process"

"Nowadays, we need to buy many herbs from Baxirhat Bazar, Chittagong to continue our profession as we are unable to find herbs or plants in the forest around our locality. The other day, I searched for hours and went up to a long distance to find some herbs but I couldn't. But earlier we used to find these easily around our locality."

Therefore, the reduced number of patients, coupled with the difficulty in obtaining raw materials, makes the practice of *Baidhya* almost unsustainable. These *Baidhyas* usually preserve the following knowledge;

- Plants and their medicinal properties
- Planting or harvesting time to get maximum medicinal value
- Parts to be used
- The preparation or mixture
- Why and how to use (for what ailments, doses and usage)

Very little of their knowledge is documented. Some of the *Baidhyas* reportedly have their own written manual (in *Burmese* language or *Aracanese* dialect) but if their sons or nearest ones are not into the profession they do not reveal it to anybody. Hardly anyone can see the book or manual let alone use it to be aided for documentation purposes. Therefore, as the family level imparting of knowledge is not taking place it is not being transferred intergenerationally. However, it is assumed that their tailor-made local pharmacopoeia is a kind of *Mogha Shastrya*, which contains a convenient mixture of *Unani* and *Ayurvedic* principles.

Conserve the Species or Lose the Knowledge

The most widely used species, e.g. *Boch*, *Datura*, *Chitra*, *Kal jira*, *Grhitokumari*, *Punanarva*, *Kalo holud*, *Sharpagandha*, and *Arjun*, in the preparation and practice of medicine are becoming increasingly rare and difficult to procure for such reasons as the

rapid destruction of the neighbouring natural forests (mainly prompted by organized illicit commercial logging), bureaucratic complications and harassment (e.g. by the Forest Department), and inaccessibility and difficulties in communication and transportation. It is noted that in the study area, i.e. in Rangamati Sadar *Upazilla*, there are several public nurseries developed by the Forest and Agricultural Extension Departments, however, these nurseries do not serve the purposes of local herbal doctors for their medicinal herbs and plant requirements. The *Baiddyas*, who want to ensure a sustained source of quality seeds and seedlings, badly feel the absence of a central propagation nursery (Khan & Rashid, 2006).



Photo source: DFID, Dhaka

Figure 4. 8: In the figure above, a tribal *Baidhya* is seen at a home in CHT area getting prepared to treat a patient there with his instant medicament

Discussions with couple of specialists in Bangladesh National Herbarium (BNH) who are also consultants for the project and responsible for implementing it reveal that there is virtually no formal or informal institutional and external or government support so far for the development and promotion of indigenous medicinal plants and the knowledge system in the study area as well as in the project areas. *Baiddyas* do not have any organized platform like *Unani* or *Ayurved* practitioners, and therefore they are unable

to voice their demands and problems or to share and exchange ideas and information.

The Wind of Change

From my discussions and observations, I also surmise that local people nowadays prefer 'modern' allopathic or homeopathic medications as these are increasingly available in local *haat* or *bazaars*. Due to developmental activities, the road system has improved over the years and people are finding it easier to reach towns (District towns and *Upazilla* towns) or even Chittagong city than before. At the same time, with an improving literacy rate among the tribal people, many of them do not believe in nor are enchanted by the *Tantras* or *Mantras* practiced by most of the *Baiddyas* besides herbal practicing. As a result, as time goes by, more and more people are losing faith in *Baiddyas* and diverting to other forms of treatment, especially allopathic ones.

4.3.2 Evaluation of the CHT project activities

Drawing the above scenario from my observation based in the field work, discussions with the local field collectors, and comments from the specialists, this research hereafter attempts to evaluate the CHT medicinal plant project activities on the following aspects:

Documentation by local Field Collectors: Involving the local tribal people has been the most appropriate initiative by the project as the project personnel document medicinal plants of CHT. Among a total 24 project personnel, 20 are from different tribal communities (mostly *Chakma*) working in three hill districts. With the active participation of them, the existing medicinal plants in these areas are being systematically documented and recorded. Due to their familiarity with local *Baiddyas*, language and the plant-occurring areas, these field forces are providing appropriate input to the project in identifying the plants and recording their various properties and uses.

Awareness-building in the Hill Districts: In line with one of the objectives (creation of awareness among the tribal people about the importance of medicinal plants, their proper uses in primary healthcare and about their conservation), the project organized a motivational and awareness-raising campaign through district level meetings and workshops in the three hill districts. Through these workshops, *Baiddyas*, Headmen,

and medicinal plant users were communicated the objective and methodology of the project. As a result, confidence developed between project workers and the targeted community members. A training workshop with *Baiddyas* and Headmen has also been an important tool for creating awareness about the conservation and sustainable use of medicinal plants.

Preserving undocumented knowledge: As there is no complete inventory and documentation of indigenous knowledge related to CHT medicinal plant treatments (IUCN, 2004), making an inventory of and identifying the species, their properties and uses is crucial to bridge the knowledge gap. As the *Baiddyas* and their potential inheritors are gradually relinquishing the profession, and as the destruction and alteration of the natural habitat in the Hill districts are very common phenomena due to different types of development activities and encroachment, both the plants and knowledge are threatened. Therefore, the project initiative to retaining the knowledge system is obviously a significant step to record unknown and valuable knowledge.

Identifying species to be promoted: Collecting samples of each and every individual plant and preparing a voucher specimen will certainly help with the proper identification of the medicinal plants as the properties of the plants will be comprehensively and scientifically tested in modern botanical lab at home and abroad. In many cases, plants that do not have medicinal properties are used instead of the genuine medicinal plants, as they look similar. Moreover, proper identification is one of the preconditions for conservation and research. Another most important initiative of the project is to sort out the most economically valuable and highly demandable plant species in that region so that commercial cultivation can be promoted in order to better the socio-economic conditions of the people of these districts.

4.4 Primary Healthcare

4.4.1 Primary healthcare initiatives

LEAF has undertaken a significant pilot program to promote the most important primary healthcare species in *Natore* and *Bogra*. In the initial stage, selected households have been encouraged to grow a limited number of species at their homesteads for their own use and small scale selling. Based on the experience of this pilot initiative, the project plans to extend this program across all its CBOs and Farmer groups in all the

project areas, such as Rajshahi and Dinajpur. With its underlying objective to enhance primary healthcare and livelihoods, the project adopted this program as a strategic approach in order to “embed awareness of how to use indigenous medicinal plants to treat key health problems and to ensure the ongoing supply of correctly identified plant materials from the nurseries.” As part of this strategic approach the project has undertaken the following activities:

Firstly, the basic health problem of the particular project area is identified, and then a short list is prepared of the most relevant species that are helpful for such ailments. Then a booklet (in Bengali) is prepared with the treatment procedures that use these species for these ailments.

Secondly, a healthcare and medicinal plant-production training course is designed. Then the project organizes its CBOs and Farmer groups on the correct identification, production conditions and processes, and the preparation and application of herbal treatments based on the short-listed medicinal plants. A booklet in *Bangla* is provided as a participants’ workbook.

Thirdly, as there will be 1 or 2 representative from each Farmer group, the CBOs in the project conduct a training program and the project ensures that these trained representatives also provide training to the other members of their groups afterwards, who are expected to pass on the knowledge to their family members.

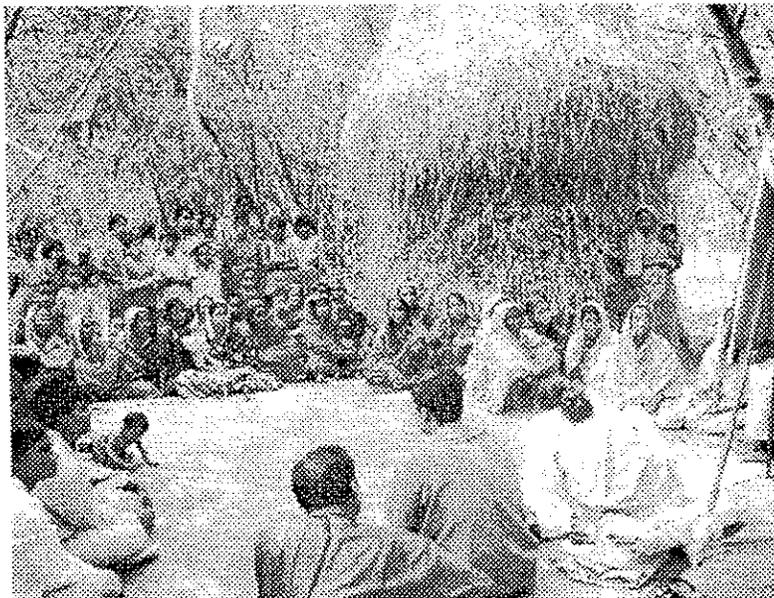


Photo source: LEAF, Bogra Office

Figure 4. 9: LEAF expert along with several CBO members explaining the activities of their Pilot Scheme of homestead medicinal plants garden

In this process, the project conducts 16-20 courses in its operational areas (depending on the area size). In each course there will be around 20 participants. After being trained, each participant will then train another 20 of his fellow group members, in each group of the 350 CBOs and Farmer groups involved in the project. Thus, $(350 \times 20) = 7,000$ household are trained and they are expected to pass on the acquired knowledge on primary healthcare, production, and processing of medicinal plants to their family members (5 members, invariably considering an average family size). Therefore, the number of target beneficiaries is assumed to be 35,000 people in the project areas.

4.4.2 Primary healthcare professional

Meanwhile, a similar program has been conducted by both SEMP and LEAF (independently) in their respective project areas, where the target audience (beneficiaries) were the *Kabiraj* and the Nurserymen. Qualified specialist service providers (herbal doctors employed in Government hospital) engaged by the projects imparted the training programs to those groups. The programs emphasized the following aspects:

- a. Identifying the plant species, their propagation and growing conditions, and the advice and prescriptions they should provide to their customers, patients, and users.
- b. Creating awareness on the traditional use of medicinal plants and upgrading the knowledge base of traditional herbal practitioners (*Kabiraj and Hekim*) in the project areas. Not to mention, those *Kabiraj* and *Hekims* are the significant actors who play the most important role in the promotion of medicinal plants and in production and use at the community level.
- c. Building up and improving the capacities of those herbal practitioners in terms of technical knowledge so that they can alert their community people to conserve these species and motivate them for commercial cultivation and plantation as a means to earn their livelihood.

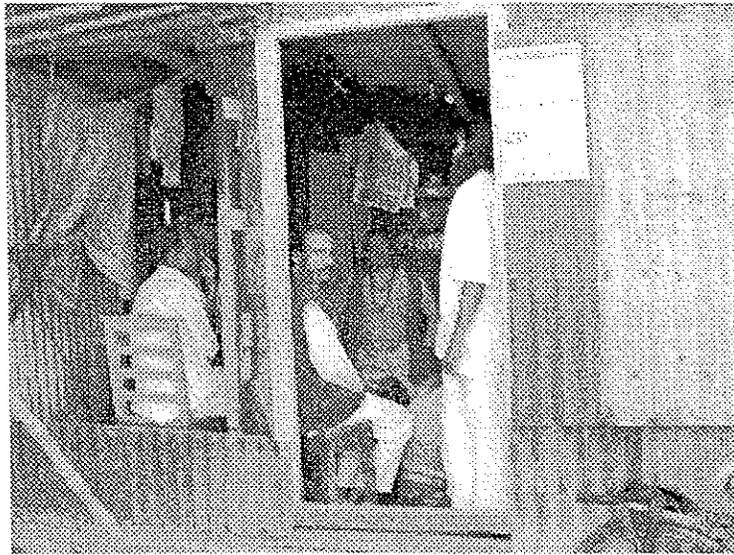


Figure 4.10: A local Kabiraj (beads around neck) encircled with his patients at his small compact dispensary at Kodombari Bazar in Gopalganj upazilla.

Raj Kumar Chandra Barai, the *Kabiraj* in the above picture, received training on the capacity building of herbal practitioners and medicinal plant conservation, which was implemented by IUCN-BCAS. When I wanted to talk to him about the benefit of such training, once I had introduced myself, his first query before I asked him any question was:

“Hey Bhai (brother), will you provide us with training again? We are supposed to have another training in Dhaka. The training that we were provided by IUCN-BCAS was very helpful. I found it useful in terms of gaining more knowledge on herbal treatment, plant properties, their processing, and their importance of conservation”

As a matter of fact, most of these *Kabiraj* working as traditional herbal doctors do not have formal training. Rather, they have learnt the art of herbal medicine from their parents or mentors. Some *Kabiraj* themselves are nursery men, growing medicinal plants for giving treatments to their patients. These *Kabiraj* also prepare and process their own finished products, i.e. the herbal healing agents.

In the Madhumati Floodplain site of SEMP, IUCN-BCAS had two-day knowledge sharing workshops for local traditional healers. In three different places of the

site the same workshop was held and a total of 103 herbal healers spontaneously attended the workshops. Through the workshops, issues relating to medicinal plant identification, conservation and practices were discussed and exchanged among these healers. From their knowledge reserve and experience, these herbal healers identified the most important species to conserve which, according to them, are those that are:

- Mostly used by *Kabiraj* for primary healthcare purposes
- Locally threatened due to overuse or other causes of biodiversity loss
- Vital sources of herbal medicine but cannot be found locally any more
- Needed for the proper practice of traditional treatments

Having felt such scarcity of species and the resulting problem of keeping their profession and livelihood viable, those traditional healers also suggested several measures for the SEMP project to undertake; these are:

- Establishment of demonstration medicinal plots in homestead areas, with emphasis on locally threatened species
- Publication of a medicinal plant species information booklet (inventory of medicinal plants and uses for disease)
- Awareness-raising among the local communities
- Establishment of conservation sites
- Conservation of homestead sites for medicinal species

(Source: BCAS documentations and project report on SEMP from the Madhumati Floodplain Project office)

4.5 Livelihood of the Marginalized People

Though medicinal plant collection was one of the main sources of livelihood for many people in hill districts and tribal communities in Bangladesh, it was, however, not their only means of income. Traditionally, it is the *Kabiraj*, *Baiddyas*, and *Hekims* who in order to sustain their profession had to largely depend on the medicinal plant supply from nature around them. The forest collectors and other collecting people engaged in NTFP collection are not entirely dependent upon medicinal plants. Despite this fact, the livelihood of a large number of marginalized people in hilly regions and the forest

intensive regions of Bangladesh used to benefit immensely from the collection and sale of medicinal plants. But with the depletion of species in such areas due to continuous, unsustainable exploitation by traditional collectors, commercial collecting agents and medicinal plant traders, coupled with deforestation and the diminishing of open access properties, it has resulted that medicinal plants from wild sources make less and less significant contributions to the livelihood of those poor people.

Meanwhile, since the late 1990s (specifically from 1997), two villages in *Natore* District (Khulabaria and Borobaria) initially set the example of developing a solely medicinal plant-based livelihood, i.e. a successful cultivation of *Aloe vera* started by several farmers of those villages in most of their farmlands, which became their principal produce to earn a livelihood. While reports of the sporadic cultivation of different species in different places of the country have been noticed, the farmers in these villages first set true examples in Bangladesh that medicinal plants can be the primary source of livelihood. Apart from the initiatives of those people for medicinal plant production for livelihood, in recent times some development organizations, with the help of NGOs and in participation with local communities, are examining the potentiality of medicinal plant cultivation through pilot initiatives (as mentioned already in the prior section). Therefore the livelihood-contributing aspects of medicinal plants can be looked at from two perspectives, i.e. private initiative and project initiative.

4.5.1 Private Initiative

I would rather call this private initiative at *Natore* in growing medicinal plants through cultivation an abrupt, unexpected, and incidental development. It is abrupt because it was first done out of the whim of a whimsical man, and it is an unexpected and incidental development because he never understood that the cultivation of medicinal plants could be a cash crop and a primary source of livelihood. Now, this entire area of 6 villages in *Laxmipur Kholabaria* Union in *Natore* is called *Oushadi Elaka* (medicinal zone) by people all over north-western Bangladesh. Therefore, no development thinker, no NGO, no agriculturist and no institutional project or program planned or started the organized cultivation of medicinal plants. Rather, the pioneer person behind the creation of this medicinal zone is known locally as "*Afaz Pagla*".

Afaz Pagla ('Afaz' is his name and 'Pagla' means sort of mad or disorderly by nature), a sexagenarian, told me that he used to do so many things in his mid fifties, such as small trading, buying fruits or plants from one area and selling them to wholesalers in other areas or towns, farming, fishing (mainly in the rainy season and autumn), and practiced *Kabiraji* as a part-time profession and more as a hobby (as he used to treat people free of charge). He is highly extrovert and sort of a direct and free thinker and speaker, who loves to do whatever he likes without much hesitation. Because of his random and diversified way of living his life, and his visibly attitudinal disorder and outspoken nature, people of the locality used to call him "Pagla (mad)". He explained that sometime in the late 1980s he was going to buy some betel nut from a remote village and found a cluster of small *aloe vera* in the wild there. Then he bought those *Aloe vera* plants as well and made a seed bed in his homestead with these. He then contacted some *Beparies* (local traders) in Bogra and wholesalers in Dhaka to see whether they would purchase a large volume of *aloe vera*. Having had their consent, in the meantime, he learnt the technique of planting these in field, their rearing and irrigating process. Then he started the cultivation and was able to yield *aloe* leaves successfully from his field. After that he started supplying *aloe vera* leaves once or twice a month to the buyers, and the productivity from his homestead small farm and field cultivation was much higher (4 to 5 times higher) in terms of monetary value in comparison with earlier produced crops. Having been encouraged by *aloe vera* he then started cultivating other species with demand from his buyers. A couple of years later he introduced the cultivation of some more species of medicinal plants - *Shotomuli*, *Misridana*, *Shimulmul*.

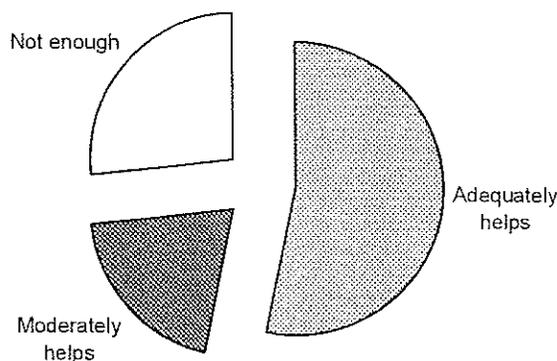
Inspired by his initiative, other farmers in his village started cultivation in the mid 90s, with *aloe vera* as the major species since it was cultivated most. Thus *Afaz Pagla* has been the pioneer and role model of local farmers. Even the local traders engaged in trading and the primary processing of these medicinal plants and plants materials named their business concerns after Afaz Pagla. Two of the three stores located in that 'medicinal plant zone' are named after him.



Figure 4.11: above primary processed medicinal plant materials shop is owned by a trader named Salam Shikder, but he named his concern after Afaz Pagla.

In the five villages studied in *Laxmipur, Kholabaria Union* and *Halsha Union*, the total number of growers is around 160 households, whose livelihoods are more or less dependent on medicinal plants. All 30 participant households in the *Laxmipur Khulabaria and Halsu Unions* were asked about the extent that the cultivation of medicinal plants is helping them to lead a viable livelihood.

Chart-4.1: Role of cultivation in supporting the livelihood of the medicinal plant growers in *Laxmipur Khulabaria and Halsu Unions*



As showed in the chart, in reply, among them around 53% respondents agreed that their livelihood is now better off with income from the medicinal plant cultivation, while 20 % replied it is more or less supportive for their livelihood, however, 27% of the respondents said that the mere cultivation of medicinal plants will not ensure their livelihood security, i.e. it is not enough for their livelihood.

The mode of production is either homestead farming or field cultivation. A total of 60 acres of land is estimated to be under cultivation at present. According to the producers and the local traders, if the present trend of increased cultivation practices continues, then in five years time the production is likely to be doubled. At the same time, species diversity will be richer in the future as 8 species are already being cultivated by the same farmers but on a smaller scale. The following table gives an account of the land area dedicated by each farmer for growing medicinal plants.

Table 4.1: Species-wise land distribution⁵ for medicinal plant production in the studied villages of Laxmipur-Khulabaria and Halsha Unions

Local Name	Latin Name	Decimal per /Household	Total acres
Ghritakumari	<i>Aloe vera</i>	4.0-40.0	38.00
Nilkantha	<i>Not known</i>	0.5- 10	1.20
Shotomuli	<i>Asparagus racemosus</i>	0.5-12	5.80
Bhuikumra	<i>Ipomoea digitata</i>	0.5-1.0	0.90
Kalomegh	<i>Andrographis paniculata</i>	2.0-3.5	1.35
Misridana	<i>Not known</i>	0.5-10	5.75
Shimulmul	<i>Bombax ceiba</i>	2.0-33.0	6.50
Rajkantha	<i>Not known</i>	0.5-2.0	0.50

Mujibur Rahman, an *Aloe vera* cultivator in Borobaria told me that:

“With Aloe vera yield every after 15 days from my field I am now leading a viable life. My college going son assists me in activities like land preparing, planting, harvesting, and irrigation time to time. Ours is a four member family now and we have 2 fields 18 and 12 decimal in size respectively. Earlier I used to cultivate paddy, wheat or mustard in these but with those harvests I was in hardship to lead myself. Now only in winter

⁵ Land distribution data was derived from LUSTER’s livelihood survey and was triangulated with the households survey of this study

when Aloe vera price goes down to tk. 130/bail (55 kg per bail) we feel tough time, but still we can manage since in winter we have vegetables grown in field edges and homesteads and these are cheaper in the markets as well at that time."



Fig 4.12: Mujibur Rahman in his Aloe vera field

One thing is obvious from the observation and discussion, those who do not have considerable land area for cultivation, and are cultivating only in the homestead or in the backyard, cannot completely rely on medicinal plants for their livelihood security. In that case, the quantity of land has a significant role in determining income level, though directly not proportionate to income from the medicinal plant yield.

4.5.2 Project initiative and supports

Both the projects under discussion, i.e. LEAF and SEMP, have focused in some form or other on improving the livelihood of the poor people who depend on medicinal plants. Discussions with the project implementing specialist and field forces, and observations made in the field sites, enabled this study to assess initiatives of these projects on the livelihood significance of the medicinal plants for the primary level growers.

The LEAF project along with a local NGO (LUSTER) that was its partner initiated a piloting scheme in the *Natore* (Lakxmipur Khulabaria and Halsha union) study site in 2003. The main goal of their scheme was to gather an idea and understanding of

how to improve the livelihoods of the extreme poor of these communities. Major activities were to expand *aloe vera* production and marketing along with vegetable cultivation and other non-farm activities. The projects initiatives included producing a leaflet on production technology and uses of *aloe vera*. However, in 2004 the project found that *aloe vera* cultivation had expanded considerably but local management and marketing aspects of the produced plant materials remained weak. Moreover, it was also found that *aloe vera* alone was not sufficient for significant changes of the extreme poor's livelihood. Under the circumstances, LEAF designed a further program, "Addressing extreme poor in *Natore*," with a holistic approach to continue the piloting to find a better way of addressing the livelihood needs of these marginalized people. The core objective of that piloting program was to find out effective and appropriate modalities for supporting the extreme poor, especially in the *aloe vera* cultivator community in order to improve their livelihood.

The intervention mechanism of the LEAF program has proven to be a successful way to facilitate poor households to take initiative for cultivating and planting medicinal plant species and for improving their livelihood within a span of one and half years. Initially, the project facilitated the primarily selected farmers to identify neighbouring extremely poor households from their communities, especially from the *guccha gram*. For the other three villages (except Borobaria and Khulabaria), groups of extreme poor were mobilized from the existing formal and informal groups /organizations (as LUSTER, BRAC, ASA, *Koinonia* and *Grameen* have credit groups in these communities) and also the individual households which do not belong to any group. After identification, the project then facilitated the groups and individuals to diagnose their needs and assisted them to identify the potential options. Being in the much called "*Oushadi Zone*" almost all the group members opted for medicinal plant growing. Then the project assisted them in developing their plan of action, and establishing effective linkages with service providing agencies and individuals. Then the project provided training and accompaniment on the production, processing and marketing of medicinal plants to those selected groups of people in the study area. With the assistance of experienced farmers in the area, the project also educated the people on micro site analysis and homestead space planning in order to ensure improved and profitable

production practices of medicinal plants. The project also extended the flexible credit⁶ facility in order to implement the planned activities by the medicinal plant-growing households.

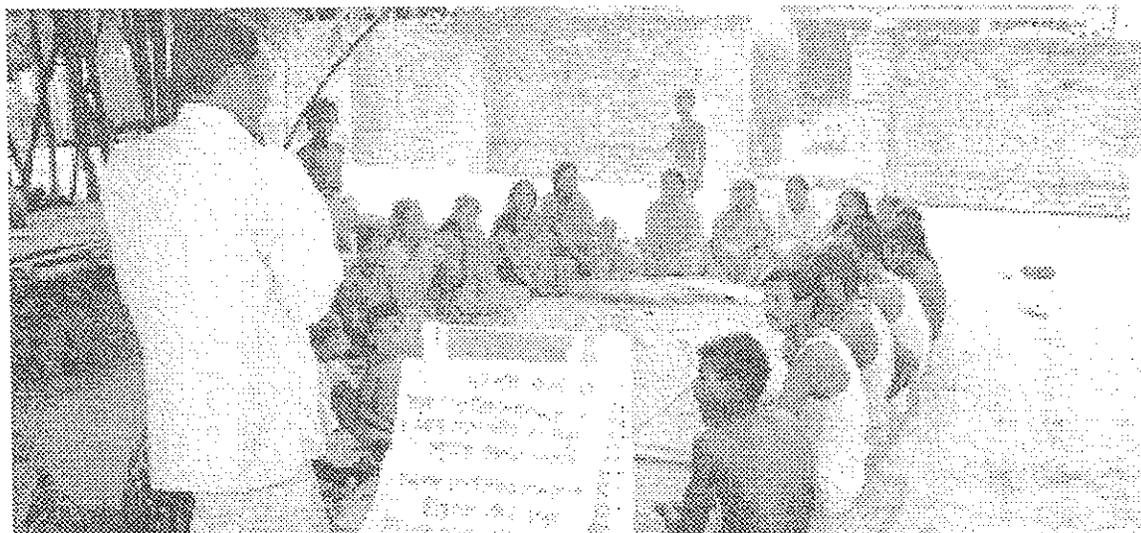


Photo: Hamidul Rahman, LUSTER

Figure 4.13: The above figure shows a diagnostic meeting of the households where an experienced farmer explains the scope and benefits of the project initiative.

The outcome of such an initiative by LEAF is indeed immensely significant in terms of ensuring livelihood security for extreme poor people. I would like to point out several lessons through a case presentation (lessons are pointed out after the case) to illustrate how such a project initiative can change the lot of have-nots and contribute to grass-root level development in order to address extreme poverty. I am going to describe hereunder a success story of a medicinal plant grower that illustrates how a person can get rid of the curse of poverty with a medicinal plant plantation even when left with a meagre piece of land, i.e. the homestead.

The Case of Shahera Khatun:

Shahera khatun is a resident of the village, Kathalbaria, who used to work in a readymade garment factory at Dhaka as a *sewing worker*. She got married to a person

⁶ A non conditional soft loan that is subject to return only if the borrower successfully receives optimum return out of his investment (this type of credit is said to be the first of its kind by any NGO in Bangladesh)

who also worked in the same garment factory as a *production line supervisor*. Her monthly wage was around 1,300.00 taka or US\$ 20.00 (approx). Both she and her husband together earned about 3,000.00 taka or US \$ 46.00 (approx) a month. With this money they suffered extreme hardship trying to live a viable life in the Dhaka city, even in the cheapest place and with the poorest arrangement. Moreover, in that poverty-ridden family a child (her daughter Sheuli) came. Her husband, sensing extreme financial insecurity, asked Sahera to go to the village home and later informed her not to return to him again. Thus she got separated from her husband and did not go back to the job that rendered rather hardship. Now left with only 11 decimals of land at home and with no source of income she was in a world of total despair.

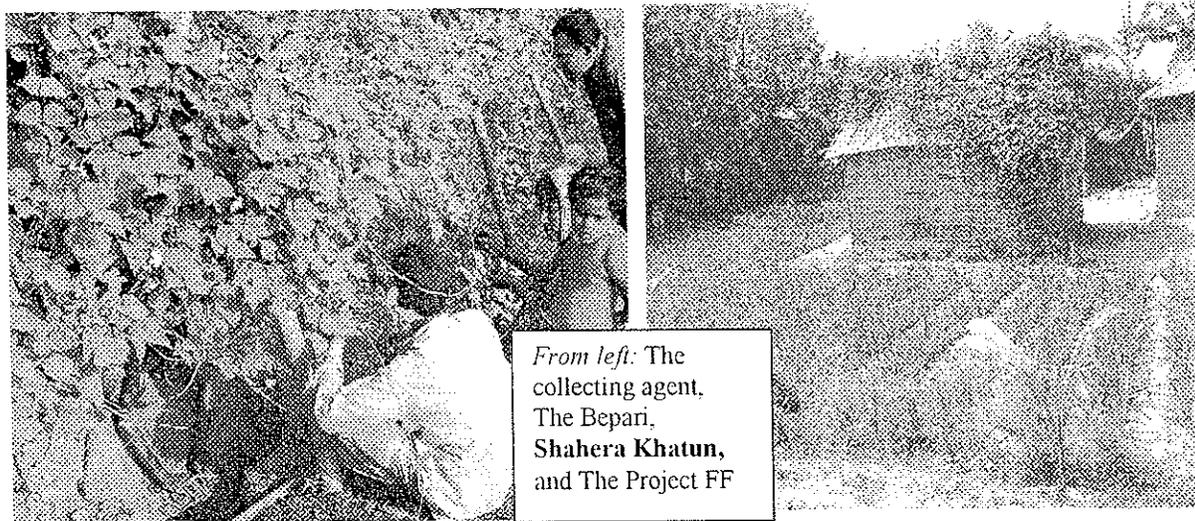


Figure 4.14: A collecting agent employed by a Bepari (Local Trader) uprooting a fully mature Shotomuli, while the Bepari himself (the man sitting in the middle) and the owner of the plants, Shahera Khatun (the lady in the picture), and her child are present on the very harvesting occasion and spot selling moment. The selling arrangement is mediated by the local project field force (the bi-spectacled man in the extreme right) to ensure an appropriate price.

At this point in 2003, she joined the IC- LEAF project's farmers group and opted to cultivate medicinal plants around her homestead on 9 decimal of land, as the remaining 2 decimal is occupied by 2 small houses and narrow yards. With planning from LEAF project Field Facilitators and expert farmers of her group, she was able to develop a plan to cultivate 3 species, i.e. Aloe Vera, Shotomuli, and Misridana, on her small piece of

land. And in 2004 with a non-conditional soft loan from the LEAF project she cultivated all three species as per plan. When I interviewed her in February 2006, by then she had started selling *aloe vera* leaves. She had been selling leaves of *aloe vera* in bails of 55 kg each (standard packaging system practiced) and 8-9 bails each time, twice a month. She has already yielded Shotomuli once and on the very day when I was talking with her, she was selling Shotomuli for the 2nd time. And she reported that she was about to yield Misridana within the next few days.

Having been interested in her survival strategy, I became keen to learn about the very economics of her venture and tried to analyze the cultivation procedure and financial cost-benefit as discussed below:

Cultivation Procedure: To produce *aloe vera*, land needs to be ploughed well and levelled. A 50-cm drainage is made with the spade to form lanes. In between the two lanes, *aloe vera* seedlings are planted, leaving 30 cm between two rows. The drainage is filled with cow dung and the bottom soil of the drain is mixed and thereafter potash and phosphate (chemical fertilizers) are applied. The *aloe vera* seedlings are planted 15 cm apart on mixed soil. The planting time preferred is Bengali months *Kartik* and *Agrahayan* (late autumn season) due to the dry weather and suitable moisture content in the soil. *Aloe vera* plants initially look pale and dry after three months. Weeding needs to be carried out regularly and the lower leaves should be taken out. On the other hand, for Shotomuli she needed to plant the small rhizome and erect it with a stake since it is a climber and needs support to grow upwards. Organic manure such as cow dung has to be spread heavily in the roots of each and every Shotomuli plant. Like *aloe vera*, this also requires irrigation and weeding. Misridana seed is planted around 2 sides of the boundary fences of the plot. It also needs organic manure and stacking to get support. No other care is required. Shahera Khatun usually puts in her own labour for all sorts of activities related to growing these plants. At times, however, she employs hired labour or other group members for plantation, irrigation, weeding and harvesting.

Cost Benefit Analysis:

Cost of production (based on her last 20 months production period):

<u>Items of Cost</u>	<u>Amount in Taka</u>
Land and pit preparation	250.00
Seed material cost	
Aloe vera 5,000 seedlings @ tk 0.60 = tk 3,000.00	
Shotomuli 500 rhizomes @ tk 5.00 = tk 2,500.00	
Misridana 250 gm seeds @ 4/gm = tk 1,000.00	
Total seed material cost	6,500.00
Chemical Fertilizer for Aloe vera	400.00
Irrigation cost	
7 times in last 20 months @tk 160/time	1,020.00
Labour cost	
7 times @ tk 80/time	560.00
Weeding cost	
2 man day/month x 20 months x 80 tk	3,200.00
Yielding cost	
24 yields from present aloevera cropping @ tk 50/yield	1,200.00
Replanting cost after 24 yields	500.00
Post harvesting (none) mostly spot selling	
Miscellaneous production cost	2,000.00
Total cost for 3 species in 9 decimal	<u>15,630.00</u>

Income (benefit) statement based on 36 months harvesting period:

Sales	
Aloe vera	
8.5 bails /yield x 40 yields x tk 200/bail	68,000.00
Shotomuli	
450 plants (supposing 50 damaged out of 500),	
10 kg roots/plant = (450 x 10 x 15 tk/kg)	67,500.00
Misridana	
200 kg x 30 tk	6,000.00
Gross Proceeds from sales within 36 months	<u>141,500.00</u>
Gross profit (Net sales-Production cost)	<u>125,870.00</u>
Net income in 36 months	<u>125,870.00</u>
(having no other investment except self-labour)	
Net income per month	<u>3,496.00</u>

Shahera Khatun already repaid the loan she took from the IC LEAF extreme poor livelihood program. As she told me,

"I am now comfortable with my living. I can afford to eat meat and fish occasionally or even several times a month. This medicinal plants venture with the guidance and

assistance of IC- LEAF project has just gave me a new hope to live. Now I want to save money to buy land to cultivate more.....

In my earlier job in readymade garments I had to live a miserable life, shutki (dryfish), dal (pulse) and aluvarta (potato smash) were the food we used to take all the time with rice, and at times at the end of month we used to take rice with salt only. Having worked 10-13 hours a day even in the weekends what did I get? I used to receive 1200-1400 taka a month.....

Now I am more or less self sufficient and happy, I earn more than 40,000 tk a year from my aloe vera and shotomuli. I want to send my daughter to school for education.”

The Lessons:

Shahera Begum's success story leaves us with the lessons regarding:

- ❖ how the extreme poor can improve their livelihoods through the effective use of their very small and meagre piece of land by employing homestead resource management;
- ❖ how the extreme poor can improve their livelihoods if they are assisted with a small amount of start-up capital and guided for a better exploitation of the market opportunities; and
- ❖ how the needs of the extreme poor can be addressed through the mainstream project activities.

Similarly, SEMP also had activities that directly supported improving the livelihood security of the medicinal plant-dependent people. As observed in the SEMP study site in the Madhumati floodplain area, almost all the households of the area have varied linkages with the natural resource bases. SEMP basically extended financial assistance in the following forms:

Seed Money: An incentive in the form of seed money has been provided to vulnerable women and men of the project areas to enable them to look for alternative income. Mainly the herbal healers received this fund and women interested in medicinal plant growing also had access to this seed money facility.

Environment Fund: Another form of incentive by SEMP was the environment fund. The environment fund was disbursed among the poorest of the poor for generating alternative employment opportunities. The goal of this approach was to support local initiatives contributing towards the environment, conservation and sustainable natural resource

management. Apart from personal grants to healers to expand their medicinal plant garden or related activities, at the study site this fund helped several communities to develop nurseries composed of mostly medicinal plants.

4.6 Production

4.6.1 Cultivation and harvesting practices

In order to have an in-depth idea on the cultivation and harvesting techniques, the study also relied on IC-LEAF's *Natore* site, where eight species are predominant among the cultivars and growers. The cultivation and harvesting practices of different species vary to a large extent. Soil preparation, irrigation or watering, stacking, weeding, and fertilizing are the common activities for almost all the species. However, it was found that apart from using organic manure in the medicinal plant field the cultivators also use chemical fertilizer, like Urea, Potash and Phosphate.

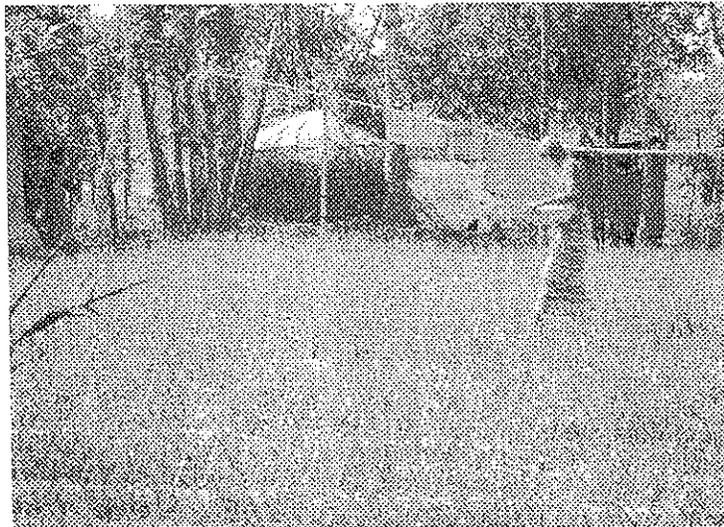


Figure 4.15: A farmer spreading chemical fertilizer in his aloe vera field in Natore

The harvesting period is an important consideration to the farmers of medicinal plants. For *aloe vera*, harvesting begins after 9-10 months, while for other species the period is invariably 1 year, except *Shotomuli*, which takes more than 24 months for its roots to become mature enough for use. The following table gives an idea on the species-wise harvesting period.

Table 4.2: Species-wise harvesting period of Medicinal plants grown at Natore

Local Name	Latin Name	Harvesting period
Ghritakumari	<i>Aloe vera</i>	9-10 months
Nilkantha	<i>Not known</i>	11-12 months
Shotomuli	<i>Asparagus racemosus</i>	24-36 months
Bhuikumra	<i>Ipomoea digitata</i>	12-14 months
Kalomegh	<i>Andrographis paniculata</i>	11-12 months
Misridana	<i>Not known</i>	10-12 months
Shimulmul	<i>Bombax ceiba</i>	11-12 months
Rajkantha	<i>Not known</i>	11-12 months

The equipment and tools used in harvesting are local traditional agricultural tools like knives, shovels, etc. A person was even seen trimming his *aloe vera* plants with the pointer of a ball point pen. On-field packing is done with the bark of banana trees for *aloe vera* and for other species plastic or jute sacks are used. Some of the cultivators were found spreading limestone solution to their fields in order to protect the leaves from pest attack. However, some farmers reportedly use chemical pesticides to resist pest.

4.6.2 Primary Processing

Primary processing for the species observed in the study sites is currently performed by the cultivators and *Pikers*. These processing activities involve cutting, trimming, grading, sorting, and drying. The process is not standardized and subject to variation from farmer to farmer. In many cases it was found that the harvested plant materials are spread over on a ragged mat in the yard of the farmer, where dusts and other polluting elements easily mix with them. Other than this, several farmers were found drying their plant materials on any available surface that included the roof of a nearby building and on a bitumen road. The drying areas are usually not protected from contamination from birds, rodents or insects.

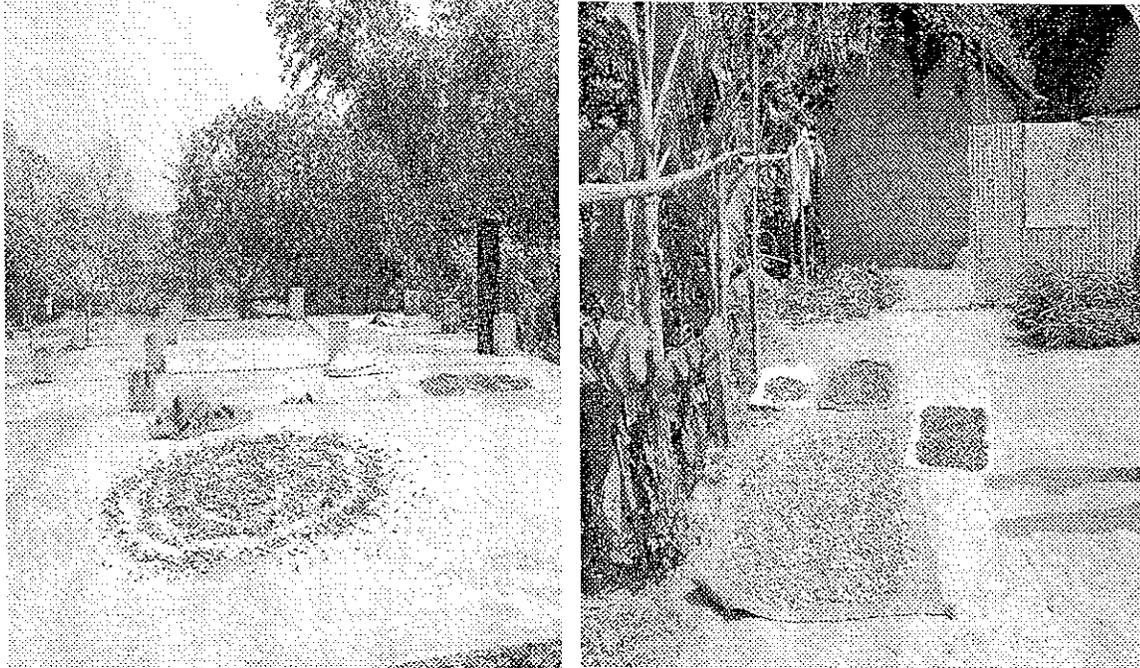


Figure 4.16: leaves, roots, and branches of different medicinal plants spread over different parts of the rooftop of a school for drying. On the right, a household put his materials on the mat for drying in his yard

Another important primary processing activity is storage. As found at the study site, the storage activities are carried out in a substandard manner in many cases. In Borobaria *Bazaar* there are two medicinal plant materials wholesale stores. Ordinary packing with plastic bags was observed as well as open stacking and piling of materials in a noticeably dirty atmosphere. Such careless storing of materials (of dried form or raw) damages the properties of medicinal plants, i.e. the quality of their active ingredients diminishes.

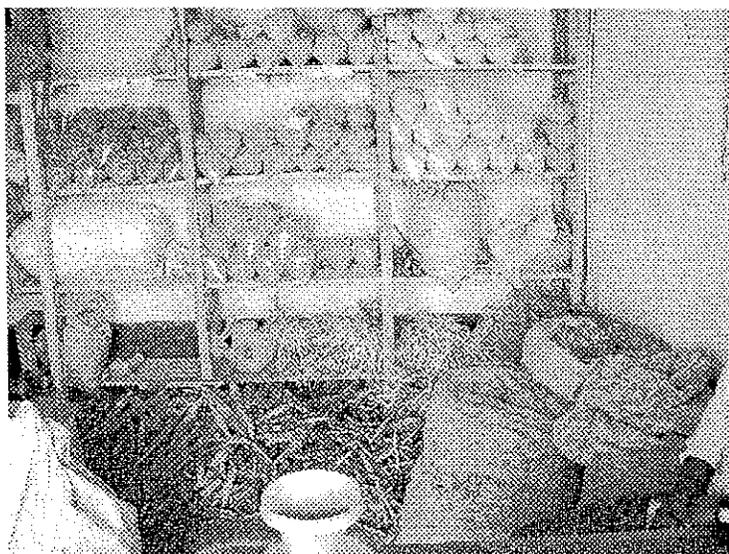


Figure 4. 17: Drying and storage are real problems. The photograph shows *shotomuli*, *shimulmul*, and *voikumra* being stored without any packaging underneath the roof of the shop, unprotected against moisture, microbial contamination or rodents. Many herbs were stored on the floor without any protection. Some other dried materials are just bound with plastic and jute sacks that wait for weeks in the store to be sold.

4.6.3 Secondary Processing

As a matter of fact secondary processing activities for many species start at the production bases. In the study site at 'Oushudi Zone' of *Natore*, there is a grinding or flouring mill where the *Kabiraj*, the *Beparis* or *Pikers* and in some cases the primary sellers get their dried materials grinded into a powdered form for sale or resale. Miserably, with the same milling machine, people of the locality get their spices and other stuffs ground, such as chilies, turmeric, rice and wheat. In order to observe the secondary processing activities, a small-scale home based *Ayurvedic* processor was visited near *Natore* town. I noticed that the processor did not have any idea about Good Manufacturing Practices (GMP) and he did not do any test on the quality of raw materials he took as an input supply from local *Bepari*. He was quite ignorant about the active constituents of the raw materials he was using and about the presence or possibilities of contaminant contents that his raw materials might have. Rather, dried herbs were stored on the floor in paper bags and most were found to be dirty and mouldy.

In order to make his herbal products marketable, other processing activities followed such as preparing extract, fermentation, and bottling. In that factory, extract

preparation was found to take place in plastic drums with screw lids in an adjacent room. The herbs were fermented in molasses according to traditional methods of preparation. Empty bottles were stored in the open air and contaminated with soil (mud) from the yard. No hygienic washing or sterilization facilities were observed.

When asked where he usually gets his raw materials grinded or where the *Beparies* do the grinding of the supplied powdered materials, I was shown the following mill:

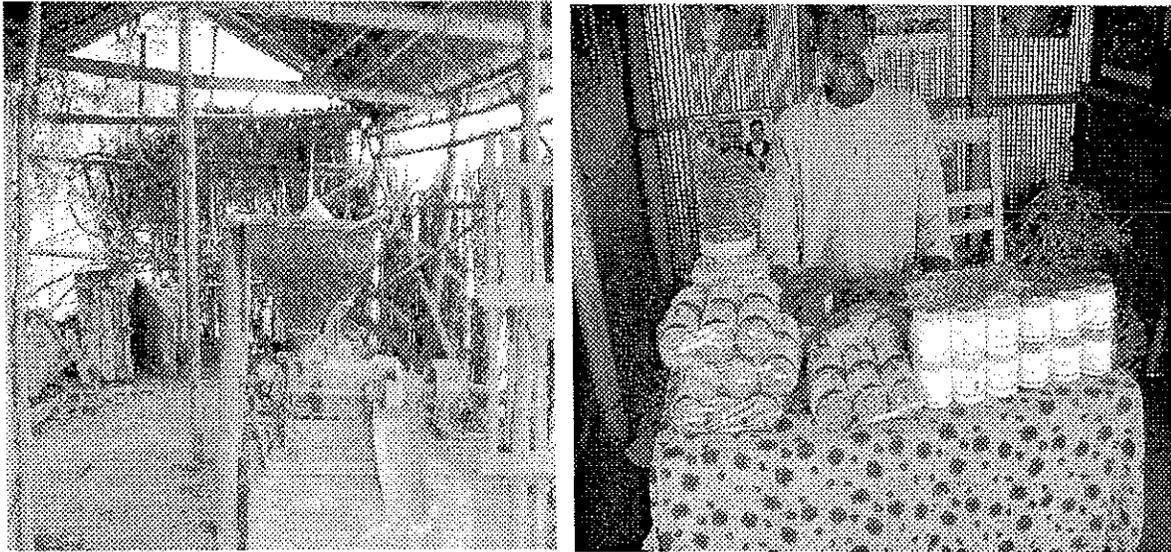


Figure 4.18: on the left, in the above figure, is the mill located in the *Kathalbaria bazaar*, in the 'Oushadi Zone', while on the right, processed (grinding done in that mill) herbal materials are displayed to be sold

After observing this dreadful secondary processing scenario at *Natore*, I then visited a leading herbal-product manufacturing factory in order to gain a further idea on the secondary processing of herbal products by a leading company in the herbal industry. Modern Herbal Group, which has numerous products (more than 50 key products) based on both *Ayurved* and *Unani* formulations, has a factory in Dhaka with modern state of the art technology that produces world standard herbal products. The processing and manufacturing practices are of high standards.

The company follows HACCP procedures in its production system. It has established ISO 9000 management standard and got certified from the ISO authority. These are much needed production procedures for marketing and the internationalization of products of pharmaceuticals, food, toiletries and other categories. Thus the company is producing herbal medicines, cosmetics and food items in the form of capsules, syrup, and tablets.

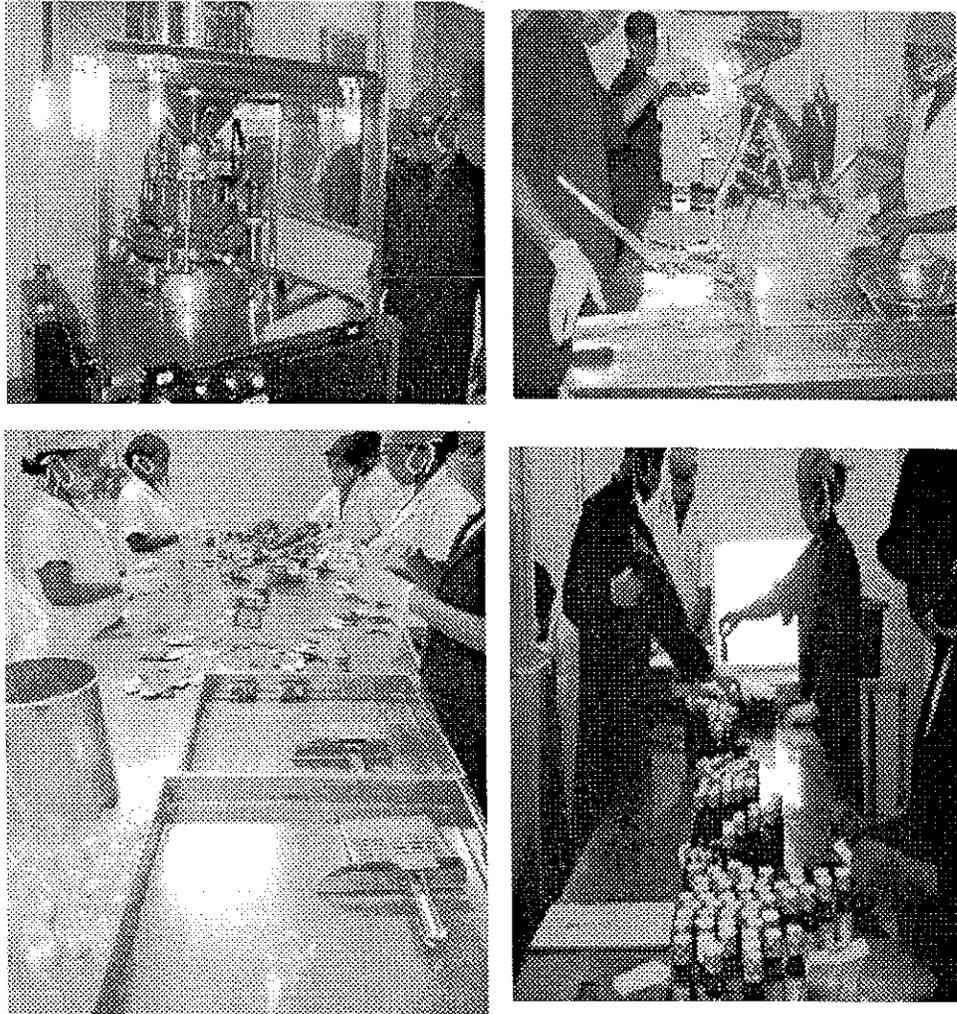


Figure 4.19: Processing cycle at Modern Herbal Group at Konabari, Dhaka. The factory shows filtration, extraction, testing and packaging of herbal products

The following two diagrams give a comprehensive idea of the secondary processing mechanism of herbal products. The first shows the traditional way of

processing medicinal plants in a small scale or mediocre factory, while the second one (that of Modern's) illustrates the herbal approach to processing medicinal plants in a modern state of the art factory.

Chart-4.2: Traditional processing flow-chart of medicinal plants materials⁶

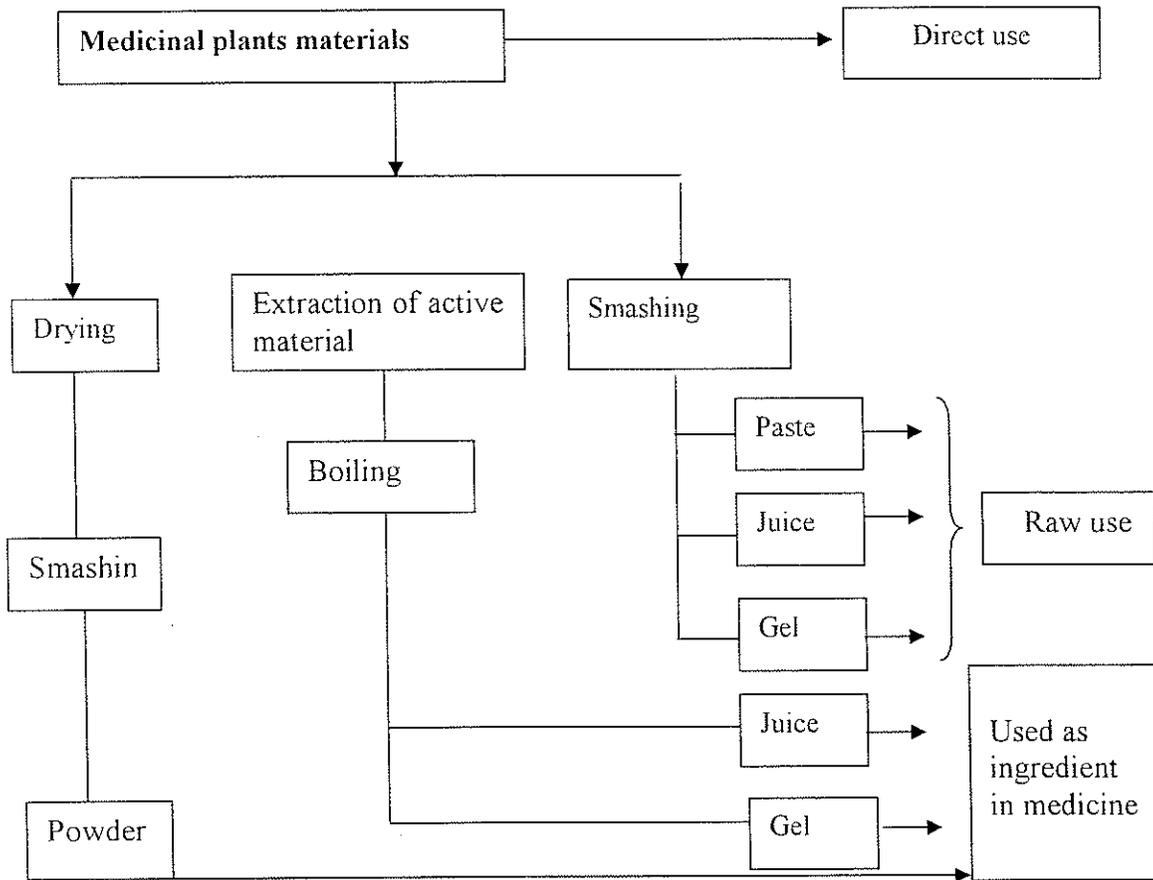
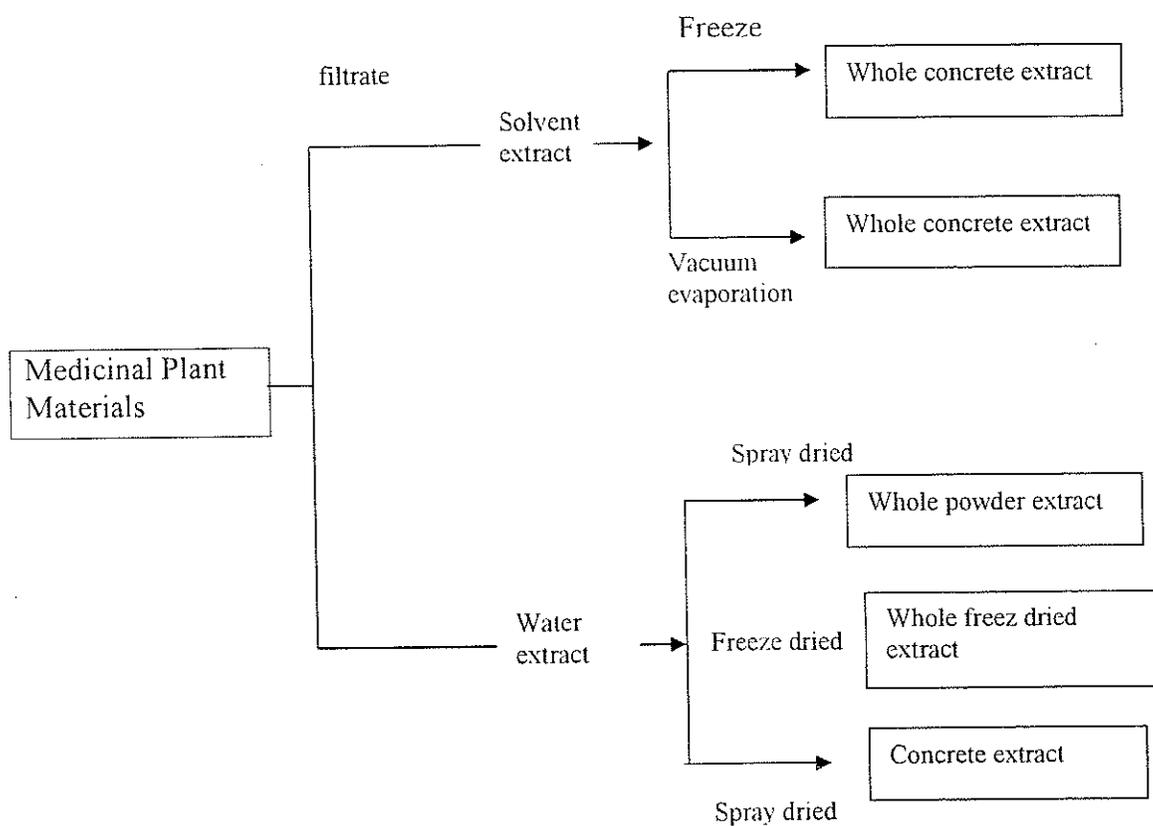


Chart-4.3: Modern Processing flow-chart of medicinal plant materials⁷



⁷ Chart 4.3 is drawn based upon the documents and explanation provided by the Modern Herbal groups on its processing line, while the Chart-4.2 is drawn based on the observation of processing activities and SEMP project documents on Community based 'Medicinal Plants Management' by IUCN-BCAS-NACOM

4.7 Summary

The importance of conserving medicinal plant species is manifold: ecological sustainability, resource conservation and management, livelihood security, and economic development. Though late, the identification of the medicinal plant sector as a priority domain of intervention by the national policy makers to sustain the gradually threatened natural stock through various projects has been a significant step towards development. The drafting of the 'Medicinal Plants Protection Act' in 2005, based upon learning from such projects, also gives the same evidence of the government's sincerity in conserving plant species. The initiatives of different projects in protecting these plant genetic resources as well as in creating opportunities to promote primary healthcare and income generating scope for the small farmers and virtually landless poor, particularly women, are indeed working as an effective approach to redress poverty and promote livelihoods. Notwithstanding, the primary production practices, i.e. homestead forestry and cultivation practices, which are taking place at present are not adequate in terms of global and industry required standards. Primary and secondary processing practices that are taking place at production bases are quite substandard and therefore need serious attention by policy makers at different levels to upgrade the conditions. However, there are some examples of standard processing and manufacturing practices being used by some of the leading herbal processors in the secondary processing level. Coordination of such processors and primary producers in terms of production and management may create synergies for both the environment and the economy.

CHAPTER FIVE: MEDICINAL PLANT SECTOR IN PERSPECTIVE OF HEALTH-CARE AND MARKET SYSTEMS

5.1 Introduction

As observed in the prior chapter, the production and conservation of medicinal plants follow livelihood and primary healthcare focused practices more than a market-oriented, standardized approach to production. The market, with its invisible hand (as Adam Smith describes it), creates room for local supplies and for commercialization and commodification to take place due to the already prevailing demand. Over time a market evolved for medicinal plant materials in Bangladesh, which is mainly recognized as an herbal market nowadays. The study therefore intends to explore the prevailing market system and practices involving locally produced plant materials to examine the value chain. An enabled and better market environment, with a standardized and value added production system, is supposedly a precondition to improving exploitation and a condition of first tier producers. There are many mechanisms through which a market or a value chain can operate. However, this study attempts to find out a market mechanism for medicinal plants in Bangladesh where a strategic balance between production and consumption can improve livelihoods and the environment. With a view to this, the current chapter is set to focus on the second study objective, which is:

To analyze the national-level medicinal plant market system and industry value chain and determine options for improvements in the supply chain through partnerships between industry and the producer community.

Before the study attempts to determine an improved industry supply chain through industry-community partnership, it outlines the existing medicinal plants and plant-based herbal market system in Bangladesh. Apart from analyzing the market position of medicinal plant species, it focuses on the demand-supply scenario, and defines and maps the existing value chain of medicinal plants species in the perspective of the herbal medicine industrial market in Bangladesh. To depict the market system, the present context of the Bangladesh medicinal plant market is reviewed. Then the market size, market demand, and market supply of local medicinal plant resources are identified,

and emphasis is put on sorting out the main (major) species in use in terms of their value, quantity, market share, and demand growth. Particular attention is given to identifying the top ten species among the most used main species, and their present and projected future market positions. The local sources and extent of supply, along with the supply chain dynamics are also identified for understanding the market system. Later in this chapter, the focus is more on analyzing the local medicinal plant industry value chain, where ways to upgrade it for a better market system are considered. However, in order to consider an appropriate and effective measure to upgrade a value chain, the concept of an industry value chain needs to be critically understood. Having identified the chain actors, production level and networks of the chain structure, this chapter provides further conceptual clarity on an industry value chain scope and purview from literature foundation. Constraints or weaknesses adherent to the chain structure as well as the industry situation (especially the strengths, weaknesses, opportunities and threats to the industry) in which the chain operates, are identified and discussed thoroughly. Finally, based on the literature foundation, various ways of improving the value chain are considered. Several ways are hypothesized as per internationally established value chain improvement guidelines to find out the most valid way for the medicinal plant industry value chain perspective of Bangladesh.

5.2 Role and Place of Medicinal Plants as Healthcare Product Components

Islam (2004), a *Hekim* of *Unani* system, reports that in Bangladesh about 20% of the people use modern (what he calls 'synthetic') medicine and another 80% need to be covered by other medicaments in which herbal medicine is playing a significant role.

Other than contributing to the processed, traditional medicine system of *Ayurvedic* and *Unani*, in Bangladesh, medicinal plants contribute to the development of family-based health and livelihood-oriented enterprises in rural areas. Ghani (1998) noted that in Bangladesh medicinal plants are used for the production of both traditional and modern drugs and also for the development of new drugs. The SEDF Study also reveals that a number of allopathic companies have entered or are entering into the herbal medicine sector and are planning to market herbal products through MBBS doctors. Apart from these, major herbal processing companies (such as AP and Hamdard) are

manufacturing and marketing not only traditional medicines with these plants but also producing cosmetic products, dietary supplements and food items (like neem oil, toothpaste, and ginger chew and jam). Some plants are even used to prepare refreshing and energy drinks (such as fresh Aloe-vera drink and AP strong 500).

The primary healthcare usage of medicinal plants has been recorded by several studies, e.g. IUCN-BCAS⁸ (2005), which interviewed 52 herbalists, Mati (2005), Ghani (2003), who almost all tried to identify plant species and their usefulness to a specific disease. However, to get an idea on the role of local medicinal plants in treating important ailments, this study interviewed herbal practitioners at the SEMP Madhumati Floodplain site. The interview findings of this research on primary healthcare usage of medicinal plants in Bangladesh and the IUCN-BCAS species usage study in the Chanda Beel-Madhumati Floodplain area are summarized in the table below:

Table-5.1: Primary healthcare usage of medicinal herbs

Disorder/Ailments	Healing Herbs	Usefulness ⁹	User group ¹⁰	Demand trend ¹¹
Fever (old & new)	Neem, Kalomegh, Bel, Shefali, Jute	√	L	→
Stomach (Dysentry, Diarrhoea)	Amloki, Haritaki, Baher, Jain, Bel, Thankuni, Kurchi, Gulmorich	√√	L, M	↗↗
Gastric Disorder	Amloki, Bahera, Gritakumari, Haritaki, Pathorkuchi	√√√	L,M	↗↗
Sexual Health	Ashok, Ulat Kambol, Lotus, Shimul mul, Talmuli	√√√	A	↗↗
Cough and Cold	Tulshi, <i>Basak</i> , Peepul, Ada shoot, Kontikari, Tut	√√	L,M	→
Skin disease	Neem, Nishindha, Turmeric, kurchi, Apang, Chirota, Anontamul, Kalomegh	√√	A	↗↗
Worm	Pineapple, Kalomegh, Guloncho, Ashok, Dondokolosh, Mehogany, chatim	√√√	L,M	↗↗
Jaundice	Arohor, Pitraj, Pappya, Sugarcane, Dondokolosh, Peepul	√√	L,M	↗↗
Diabetes	Gurmur, Jam seed, Methi, Neem, Goggul	√√	A	↗↗
Asthma	Tut, Ada, Josti madhu, <i>Basak</i> , Kalojira	√√	A	↗↗

⁸ Study on identification use and dodges of medicinal plants by World Conservation Union (IUCN) and Bangladesh Centre for Advance Studies (BCAS) in 2005

⁹ moderately useful- √, very useful- √√, extremely useful- √√√

¹⁰ Poor People and Lower class- L, Lower middle and middle class-M, people from all strata of society- A

¹¹ unchanged or slight increase reported- →, increasing considerably- ↗↗

5.3 Medicinal Plant-based Herbal Market System

5.3.1 Market context

Each year thousands of tonnes of medicinal plants comprising hundreds of species are used by industries ranging from micro to large healthcare manufacturers in Bangladesh. Domestic supply sources fulfill part of the local demand while the major quantity is imported. Dixie et al. (2003) conducted a comprehensive and exhaustive market study where he looked at medicinal plant trade activities at all levels: primary producers, wholesalers, importers, processors, and herbal companies. The most reliable data to come out of this study revealed that around 40% by value and 70% by volume medicinal plant market share is held by Bangladeshi grown plant materials. Meanwhile, besides serving the local market, the records with the Export Promotion Bureau of Bangladesh (EPB) and the UN Statistics Department show that in recent years Bangladesh has also made its mark in the global medicinal plants market. For example, it has exported organic chemicals (many of which are processed and semi processed medicinal plant materials) amounting to US\$ 1.7 million to 20 countries in 2003.

The medicinal plant-based market system is considered a sub-sector of the larger healthcare sector. Karki (2003) treated it as a MAP sub-sector (Medicinal and Aromatic Plants sub-sector), while Dixie et al. (2003) described it as the Herbal Medicine sector. The latter viewed it more precisely as the increasing demand and considerably large volume of global trade (with an annual 15% market growth and around \$ 60 billion turnover in the year 2000)¹² has already built a distinct market niche for medicinal plants, not only in the healthcare market but also in the food and cosmetics markets. Therefore this study terms it as an herbal medicine market. In Bangladesh, this herbal medicine market mainly consists of the *Ayurvedic*, *Unani* and Homeopathic systems. Apart from these, medicinal plants are also used by local medicine practitioners in folk medicine, and for self-treatment purposes. As in the folk and self-treatment systems, commoditization¹³ or a formal market system is virtually nonexistent; this study excludes them from the final analysis.

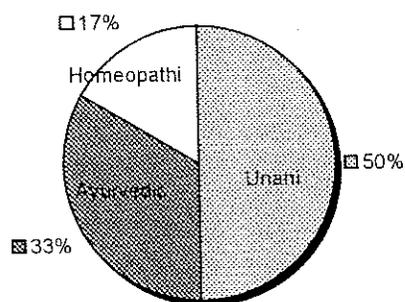
¹² GoI, 2000, medicinal plants taskforce report citing the WTO estimation

¹³ making a product commercially tradable in the marketplace

5.3.2 Market size

A few studies have been conducted so far by individual experts and researchers of development and aid agencies, which mainly estimated the annual turnover of plant species based on the volume traded at the wholesale (secondary marketplace) level. Among the available literature on medicinal plants of Bangladesh, Mian and Ghani (1990) were the first to estimate that the annual use of medicinal plants amounted to more than a thousand metric tonnes when considering only the traditional medicines manufacturing units (*Unani* and *Ayurved* factories). However, with the annual market growth rate compounding 10-17% invariably (BCSIR, 1997) a sectoral study¹⁴ by Dixi et al. (2003) gave the latest annual turnover figure as 17,500 MT (metric ton) of medicinal plants and plant-derived semi-processed materials used in *Unani*, *Ayurvedic*, Homeopath and Self-treatment medications. Based on the reports by the Bangladesh Scientific Research Council (BCSIR), Bangladesh Forest Research Institute (BFRI), *Bangladesh Homeopathic Unani Ayurvedic Federation*, and from the sectoral overview report of SEDF, and considering the growth rates, it is estimated that in terms of value the size of herbal medicines market in Bangladesh is Tk. 3,600 Million (US \$ 52.95) in 2005 where the *Unani* enjoys majority share amounting to Tk. 1800 m (US\$ 26.48 m), *Ayurvedic* 1200 million (US\$ 17.43 m), and Homeopath 600 m (US\$ 8.76 m). Therefore, the market shares held by respective medication systems are as under-

Chart-5.1: Processed Herbal Medicine Market Share in Bangladesh



¹⁴ A study conducted by the South Asia Enterprise Development Facility (SEDF) and Intercooperation on the medicinal plants sector of Bangladesh

As far as the number of species traded in the market concerns, Dixi et al. (2003), registers that collectively some 650 species are used by the herbal medicine sector in Bangladesh. However, apart from all these above information, this study had interviews with the selected 18 companies who ranked most used 10 medicinal plants as their input material in processing drugs gave a total of 27 species name (See Appendix-A). The table below shows the quantity utilization of those 27 main medicinal plants species by existing companies in 2005-

Table-5.2: Market Size of Commercially Important 27 Species

Category	Quantity (MT)	Value (US \$)
Medium	1,392	0.82 m
Small	2,888	1.7 m
Micro	2,028	1.2 m
Total	6,308	3.72 m

A frequency distribution analysis on the results also figures out most used 10 species among these 27 by those (18) *Unani* and *Ayurvedic* manufacturers. It shows that all the companies in *Unani* and *Ayurvedic* sectors use *Amloki* while 8 species are commonly used by more than 70% companies.

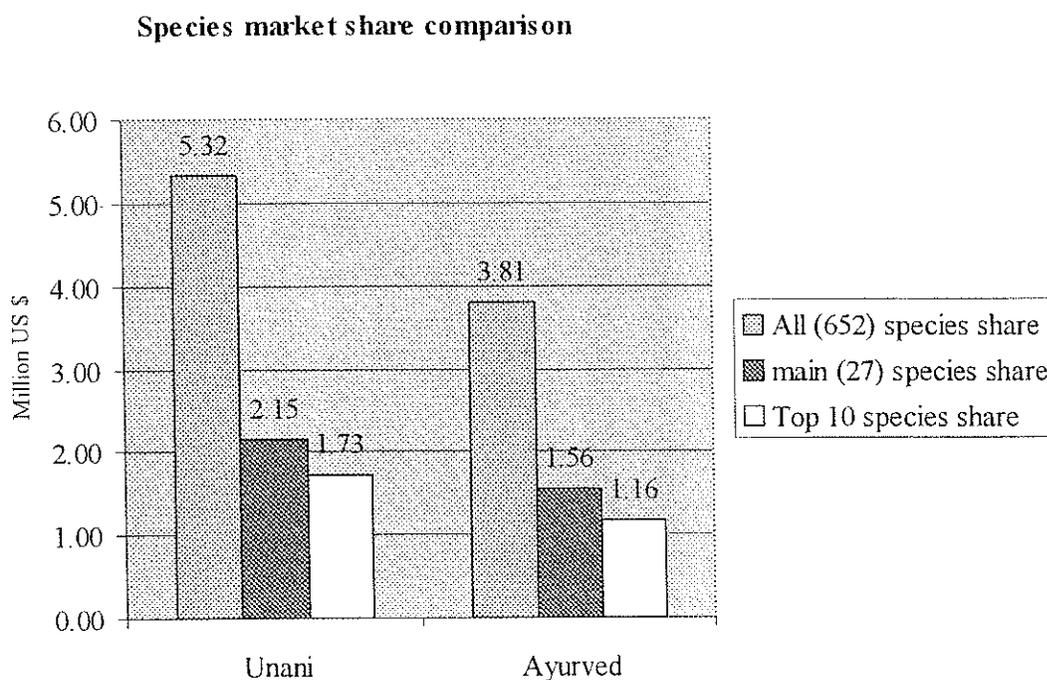
Table-5.3: Frequency of use of top ten species as input by the sample processing companies

Name (Local and English)	Part used as input	Used by	Frequency	Percentage
Amloki (Emblic myrobalans)	fruit, bark, root	<i>Unani-9, Ayurved-9</i>	18	100
Ada (Ginger)	Rhizome	<i>Unani-9, Ayurved-7</i>	16	88.89
Haritaki (Myrobalan)	Fruit	<i>Unani-6, Ayurved-4</i>	15	83.33
Ashwagandha (Winter cherry)	Roots, leaves, fruits and seeds	<i>Unani-5, Ayurved-9</i>	14	77.78
Jain (Sprague)	Fruits	<i>Unani-8, Ayurved-5</i>	14	77.78
Peepul	leaf, root	<i>Unani-6, Ayurved-7</i>	14	77.78
Mutha (Nutgrass)	Rhizome	<i>Unani-6, Ayurved-6</i>	14	77.78
Bahera (Belleric myrobalans)	fruit and bark	<i>Unani-6, Ayurved-4</i>	14	77.78
<i>Basak</i> (Vasak)	leaf, whole herb	<i>Unani-8, Ayurved-3</i>	11	61.11
Bel Shoot (Bael)	Fruit pulp, bark	<i>Unani-9, Ayurvedic-2</i>	11	61.11

Substantiated by Dixie et al. (2003) and *Unani-Ayurvedic*, Homeopathic Association market review it is found that the medicinal plants trade volume of all species in *Ayurvedic* and *Unani* sectors are US \$ 3.81 and US \$ 5.32 Million respectively in the year 2005, and this study found market trade volume of 27 main species and top ten species (shown in the chart below). It is found that 30.5 % market share is held by the top 10 species and the market share figure is 41% for the commercially most demanded species (27 species).

The following chart shows the comparative market shares of all species (652), main species (27), and top 10 species (See appendix A and B):

Chart-5.2: Market share held by top ten species, commercially important 27 species, and all 652 species respectively



5.3.3 Market Demand

Demand for medicinal plants is increasing every year; whether they are used to make a decoction in rural Africa, to extract an alkaloid in Switzerland or as a health food

supplement in the United States, demand is increasing (Kuipers, 1997). FRLHT-India (1996), Fransworth et al. (1997), and Lange (1998) all reported that global trade is increasing by around 10% each year in the major markets, Europe and USA. In the first-ever international conference of its kind in India (in 2004), on livelihoods and trade options in Medicinal Plants and the Herbal Product sector, the WHO reported that the demand for medicinal plant-based raw materials is growing at 15-25% internationally. The following table categorizes the industrial segments where the medicinal plants are in essential demand and in which there is a call for more plant-based raw materials each year, both in the global and Bangladesh domestic markets.

Table 5.4: user groups of medicinal plant materials

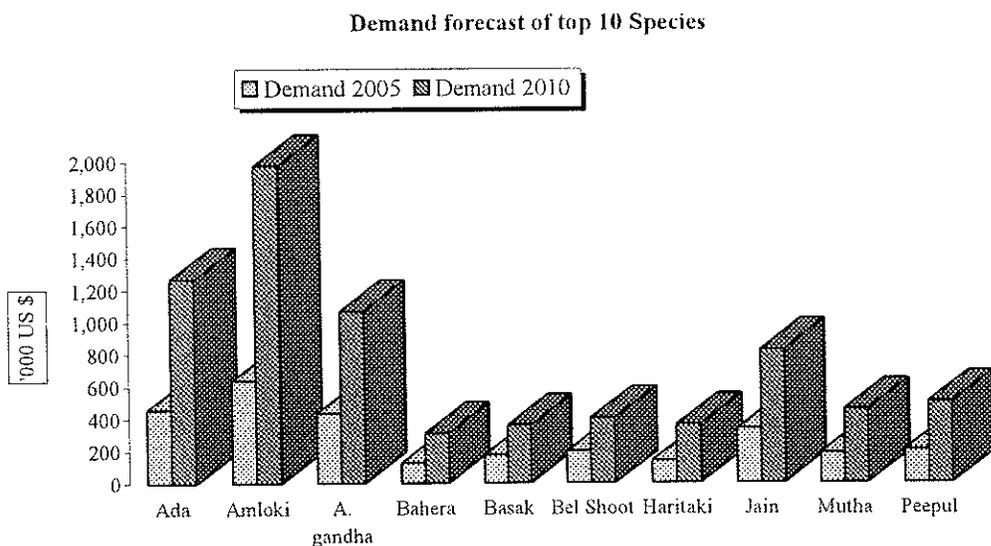
Global Market	Bangladesh Market
<ul style="list-style-type: none"> ▪ Traditional Medicines ▪ Pharmaceuticals companies ▪ Phytopharmaceutical and Homeopathic Companies ▪ Health product companies, and ▪ Alternative practitioners (Silva D, 1997) 	<ul style="list-style-type: none"> ▪ <i>Ayurvedic</i> companies ▪ <i>Unani</i> Companies ▪ Allopathic companies ▪ Homeopathic companies ▪ Herbal Doctors, Self-treatment , and Folk medicines

Consistent with the global market scenario, though the export of medicinal plants from Bangladesh is not remarkable, the demand in the domestic market is increasing every year. More demand for raw materials is being placed by the larger players in the industry (several medium enterprises), as revealed in the analysis. The expected continued, accelerated growth in demand for branded *Unani* and *Ayurvedic* products, and the increasing power and effectiveness of the larger companies, are giving rise to a dominant firm model¹⁵ in the herbal healthcare industry. The demand by major companies for major species was found to have risen by 28% in 2003 (SEDF& IC, 2003). Moreover, the financial statement of 3 companies were studied (2 from medium and 1 from small) to make a comparison of the purchase volume of the main species (27) with the previous year that reflected similar figures. A similar result was found by a UNDP study (2004): the estimated average growth in demand for the top ten species in the

¹⁵ One of the assumptions in the dominant firm model is that the larger firm will enjoy a maximum growth and more raw materials will be demanded than in any other plant industry

Ayurvedic and *Unani* industries was at least 20% a year and this rate was set to accelerate further. Based on this average growth rate for major species, the species-wise yearly growth for the top 10 species is calculated and illustrated in the chart below, showing the market demand for 2005 and the forecasted demand for 2010.

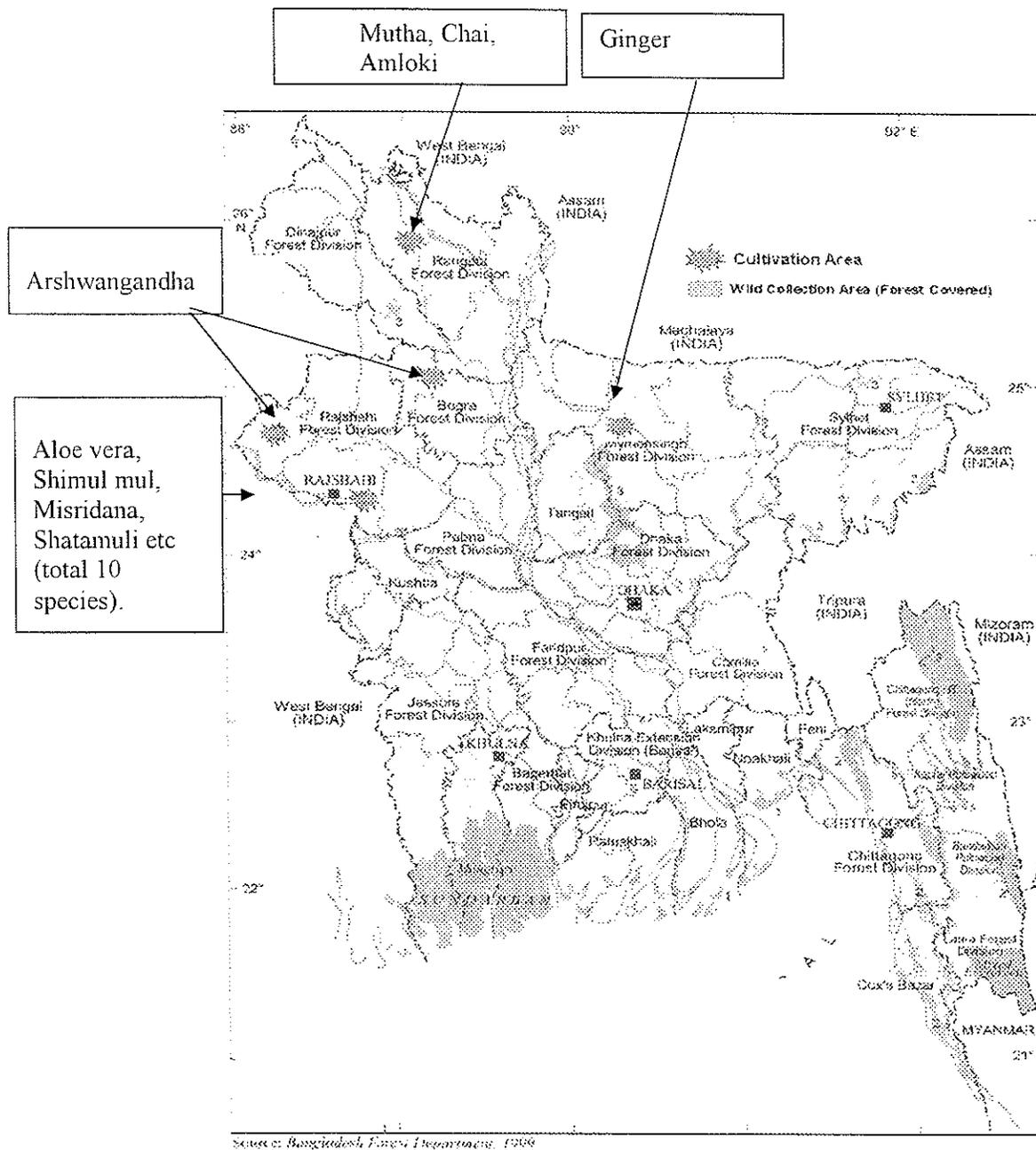
Chart-5.3: Comparison of the existing (2005) and forecasted market share of the top ten species based on the current yearly average demand growth



5.3.4 Market supply

This study shows that 4,730 MT of medicinal plant materials from domestic sources (See Appendix 1 & 2) are being traded yearly in the *Unani* and *Ayurved* industrial markets of Bangladesh through various channels. Wild harvesting has been the main source (95% or more) of the local medicinal plant supply in the market (Ghani, 1990). In recent years, individual initiative in field cultivation (*Aloe vera*, *Shotomuli*, *Shimulmul*, *Misridana* etc. in Natore; *Amloki*, *Ashagwandha* in Rangpur, and there are a few more examples of cultivation) and homestead gardening in different parts of the country have emerged as lucrative agro-forestry ventures through both private and project initiatives. *Ada* (Ginger) is cultivated to a considerable extent in Mymensingh and Chittagong hill tracts areas. Development interventions by the government, NGOs and

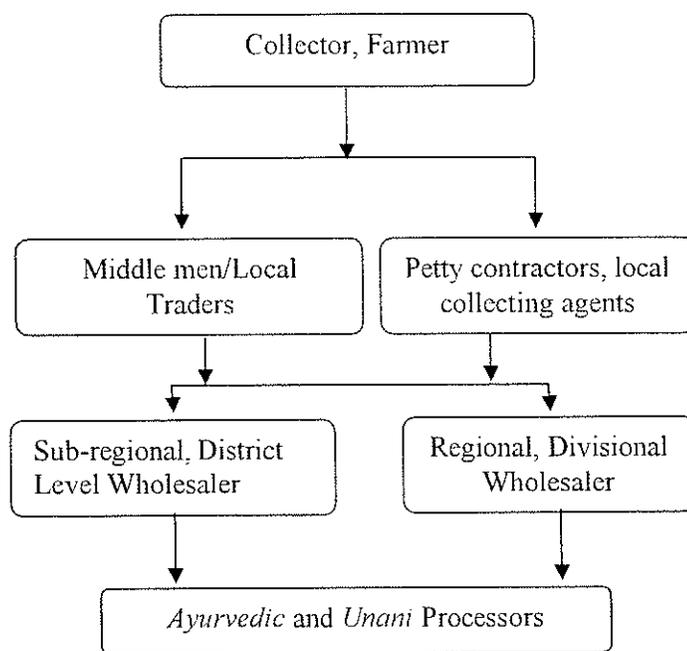
other international development and aid agencies are contributing to growing village farm-forestry activities, which also involve individual and collective farming of medicinal plant species. Therefore, sector experts assume that the supply from sources other than the wild was around 15% in recent years. The map below shows both the cultivation and wild harvesting zones of medicinal plants in Bangladesh.



Map-5.1: Shows cultivation zones and wild collection areas of medicinal plants in Bangladesh

Interviews with the processing companies in the *Unani* and *Ayurvedic* sectors revealed that around 75% of the plant materials they use (in terms of quantity) are of domestic origin. In terms of value, however, they represent 42% of the total plant material cost incurred in a year. An analysis of the year-end financial reports of 4 companies to compare foreign and local purchase volumes of plant materials also supported the figures found in interviews.

Chart-5.4: The supply flow of medicinal plant materials from local sources



5.3.5 Marketing mix

The core ingredients of the marketing mix—the marketing manager’s tactical toolkits—have been examined to get a further and more in-depth understanding of the market system and value chain of the herbal healthcare market of Bangladesh. Apart from the plant-based, pure and semi-processed herb markets in Natore and Bogra, the practices and strategies of two leading Herbal processors and product manufacturers in Bangladesh, i.e. AP (Ayurved Pharmacy) Dhaka and Modern Herbal Group, were examined with respect to the following marketing mix components (known as the 4Ps).

5.3.5.1 Product

In the herbal healthcare marketplace, the exchange of medicinal plants takes place at three levels: Producer to Business level, Business to Business level, and Business to Consumer level. Each and every level of the marketplace generates and innovates a host of products based on the demand and necessity of the buyers and consumers. The following forms of products are observed at different levels of the marketplace:

Producer-Business Level: Raw plants, plant parts (root, rhizome, leaves, flowers, fruits, barks).

Business-Business Level: Semi processed plants parts, paste, powder, juice, gel.

Business-Consumer Level: Pure Herbs, and in other forms, like syrup, dietary supplements, tablets, capsules, jelly, gel, pickles, drinks, sauce and cosmetics items (cream, powder, jelly, oil, perfume).

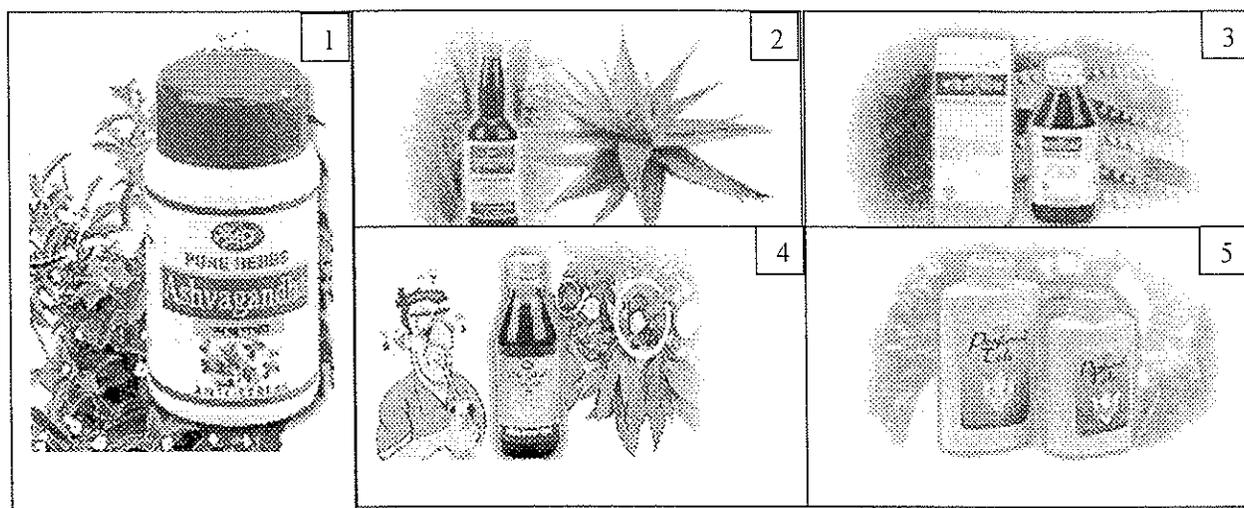


Fig-5.1: Shows the categories and product range of a leading herbal product manufacturer (AP):
1. Pure Herbs 2. Ayurved Syrup 3. Unani Syrup 4. Refreshing drinks 5. Perfume Talc
Photo Source: AP pharmacy, Dhaka

5.3.5.2 Price

The price for the items in the herbal medicine market of Bangladesh is an undefined and strange phenomenon. Discussions with the various actors of the value chain, i.e. farmers, collectors, middlemen, and a wholesaler, revealed that in most cases they do not know the exact value of their products to the buyers. Suppliers in the upstream value chain are virtually unaware of price determinants and various market factors that influence price as

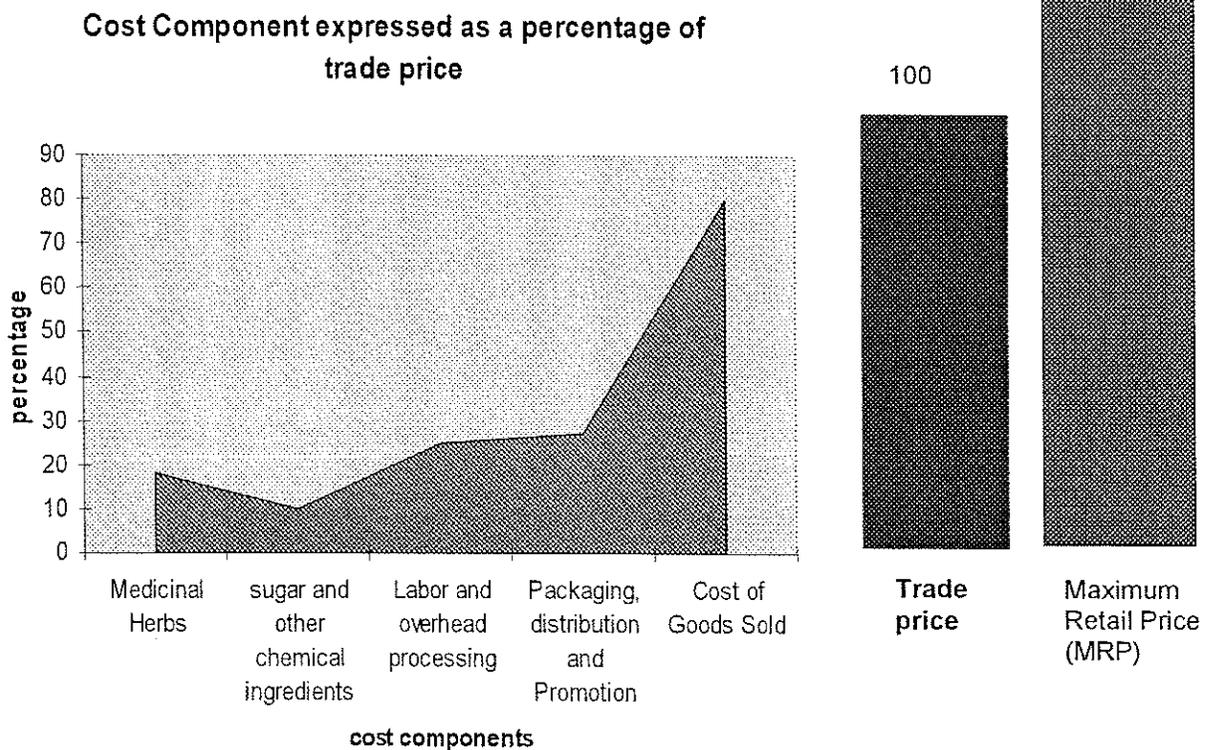
the buyers prefer to keep them in dark on the value and usage of the medicinal plants. Therefore, the price information at different levels of the value chain has become a secretive game and it is difficult to understand the pricing strategies of the actors in different value chains. However, discussions with two fast-selling herbal product manufacturers in Dhaka, and an analysis of their audited

A medicinal plant-collecting agent from Natore reported that he is selling Misridana, Voi kumra powder and Shimulmul to some herbal *arothdars* (wholesalers) in *Khatunganj Chittagong* and *Chakbazar, Dhaka*. The price he charges them is arbitrary. "It depends all on your negotiations, there is no set price level," as he said. For years he has supplied such materials to them but he does not know where and to whom they are supplying these, and what is done with them eventually. At the same time, he also does the same thing with his suppliers; he never lets them know where and to whom he is going to sell these and at what price.

financial statements helped in gaining an understanding of the cost components and price structure for typical herbal products marketed by them. The following graph on the price structure has been drawn based on the analysis of several of their top-selling herbal items.

Chart-5.5: CGS (cost of goods sold) of typical herbal products as opposed to trade price and MRP

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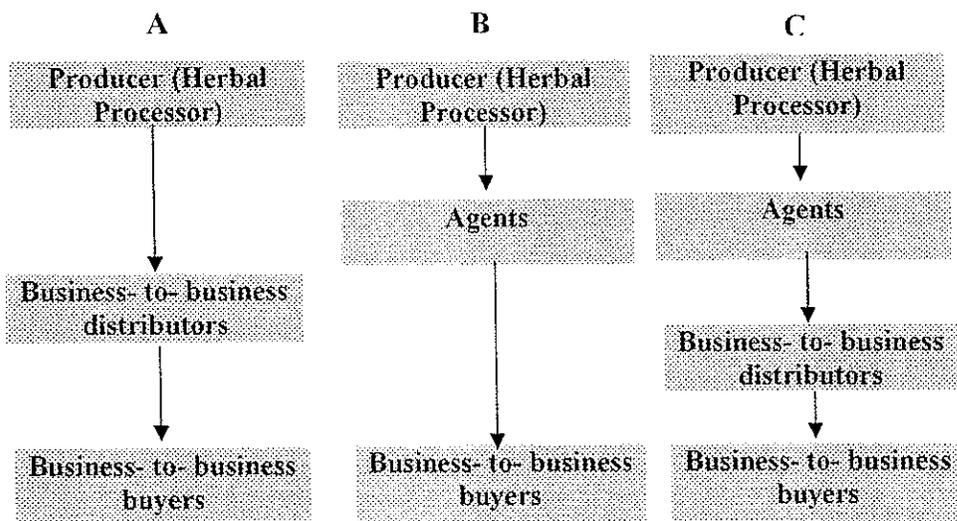
The above graph serves to demonstrate the typical cost breakdown for herbal products being marketed by the local herbal manufacturers. Both the processors, when asked about the cost of raw herbal materials, provided a figure of about 20-22%, while their financial statements showed the raw material cost as 16%. Therefore, combining their verbally stated cost comparison with the selling price, and the cost figure stated in the financial statements, the average was extrapolated to determine the cost of goods sold.

Thus it was determined that the processors spend 18% on purchasing medicinal herbs, 10% on sugar and other chemical ingredients, 25% as labour and overhead costs, packaging including bottles, labels, caps and containers, along with distribution, and promotion costs account for 27%. It was found that the processors charge a 20% mark-up on average for the items they are trading. Down at the end of the value chain, the distributors and retailers share a 40% profit margin for selling the goods to the customers.

5.3.5.3 Place

The distribution (place) ingredient in the marketing mixes of the 18 herbal processors and marketers studied was found to flow through a combination of producer to business and business to business channels to reach the consumers. Also depicted in the value chain map, the direct distribution channel, where products are sold directly from producer to consumer, is non-existent in the herbal market system of Bangladesh.

Chart-5.6: Types of distribution channel in place in the Herbal Healthcare Market



In the above figure, distribution channel type A involves an industrial distributor to facilitate exchanges between the producers and customers of herbal products. A *business to business distributor* is an independent business organization that takes title to products and carries inventories. In the herbal market of Bangladesh, such distributors are usually merchants and wholesalers of traditional medicines that are stationed throughout the country at different geographic segments of the herbal market, i.e. *ganj, thana, district, division*. The following figure shows a distributor of Hamdard (*Unani Medicine*) stationed at *Bogra Town*.



Fig- 5.2: An outlet of an exclusive distributor of products of a leading Unani medicine company

In channel type B, it was evident that the manufacturers of herbal products employ an agent. This agent or representative is an independent business person or entity who sells complementary products of several producers in assigned territories and is compensated through commission. Acting as a sales person on behalf of the producers, such an agent has no latitude, or very little, in negotiating prices or sales terms. They sell products at the MRP price set by the manufacturers. Usually the big herbal companies in Bangladesh like AP, Hamdard, and Jayson Natural Products market their products through such a channel.

In channel type C, it was found that some companies, e.g. the Modern Herbal Group, employed both an agent and a distributor between themselves and the organizational customers. This channel seems appropriate for companies that have a vast array of products and want a comprehensive geographical coverage for their products in

the domestic markets. Moreover, such a distribution channel contributes to a reduced selling cost and the least number of sales forces.

5.3.5.4 Promotion

The promotional activities carried out by the companies present in the herbal market of Bangladesh are mainly targeted at the domestic customers. Leading herbal companies, including the ones studied (Modern and AP), promote their products with the usual market promotional tools, like brochures, catalogues, fair participation, advertising in electronic and print media, billboards, and sales forces. However, there is a mixed perception about herbal products among the consumers due to informal and opportunistic marketing and promotion by many inefficient herbal companies and practitioners. Discussions with *Kabiraj* and experts revealed that many people do not rely on herbal treatment because many unscrupulous persons, presenting themselves as *Ayurved* and *Unani* practitioners, mislead people in treating every possible disease.

Among the two companies studied, it was found that apart from its usual promotional practices through media and distributors, Modern Herbal promotes its products through a personal selling mechanism that they call a “MXN Marketing Plan”¹⁶. AP Pharmaceuticals, however, has a strong presence in the electronic and print media to promote and popularize its products in the local consumer markets. Meanwhile, both the companies have established quality systems in production and management in order to standardize their products and to penetrate the competitive global export market. HACCP and ISO systems for production and management are already established at Modern Herbal, whereas AP is practicing Total Quality Management (TQM) and is going to establish ISO and HACCP systems soon. Both companies believe such standardizations will help promoting the image and reliability of their products in both the domestic and international markets.

¹⁶ An organized multilevel consumers’ networks which promotes the products to the subsequent potential consumers to get incentives

5.4 Value Chain

5.4.1 Actors

Craig (2000) divides the actors of the value chain into two categories: upstream and downstream members. An upstream member provides the raw materials or finished goods that are put into a business process. And the downstream members consume the output of the corporation or company business process. Within this definition, the upstream value chain members in the Bangladesh medicinal plant industry are comprised of an input supplier, primary producers and processors, brokers and traders, and wholesalers, while in the downstream are the distributors, herbal doctors, herbal dispensaries and consumers. Manufacturers are in between, performing the core business process to transform materials into products.

Input Suppliers are the primary actors in the value chain. As most of the plants are collected from nature, the role of the input supplier is not that major in the overall productive network. However, in the case of cultivation, the initial actor in the value chain is the input supplier who provides seeds and seedlings. Other inputs include fertilizer and pesticides, which are generally very rarely used. Usually the sub-regional (district) and regional (divisional) level traders, district nursery associations, and relevant government departments provide the inputs.

Collectors and Growers are the primary suppliers of the local plant materials. Most plants are harvested from the wild by collectors, while some species are cultivated by individual growers and through collective efforts as well. People involved in collection are traditional collectors, herbal doctors (*Kabiraj, Hekim*), factory workers, and marginal labourers. Many of them collect all year round while others do it seasonally.

Pikers (Local Traders) and Beparies (traders) are the ones usually stationed in the big markets near the plant-growing or collecting areas who buy or take the supply from the collectors and growers. *Beparies* buy both from *pikers* and even directly from local collectors or growers through collecting agents or *Phariahs*. These *Beparies* are located in relatively important commercial hubs, i.e. in sub-regional (district) and regional (divisional) marketplaces.

Wholesalers buy primary-processed medicinal plants from *Beparies* and also from

middlemen (collecting agents). They are stationed at important regional trade hubs and supply to the *Ayurvedic*, *Unani* manufacturers and processing labs. Herbal doctors (*Kabiraj*, and *Hekim*) and retailers also get supplies from them.

Ayurvedic and Unani processors are the eventual users of medicinal plant materials for manufacturing herbal medicine. Usually, they procure from the wholesale market stationed at the regional (divisional) level. At times they also buy from *Beparies*.

Retailers, Herbal Doctors (Kabiraj, Hekim), and Distributor shops are the actors stationed in the consumer market, taking supplies from *Unani, Ayurved* manufacturers, and also from wholesale markets. They sell to the consumers or to their patients (in the case of herbal doctors).

Consumers, as the final actor in the value chain, are dependent on local *Ayurvedic, Unani* distributor shops and other retail herbal dispensaries for buying herbal medicines.

5.4.2 New and potential entrants

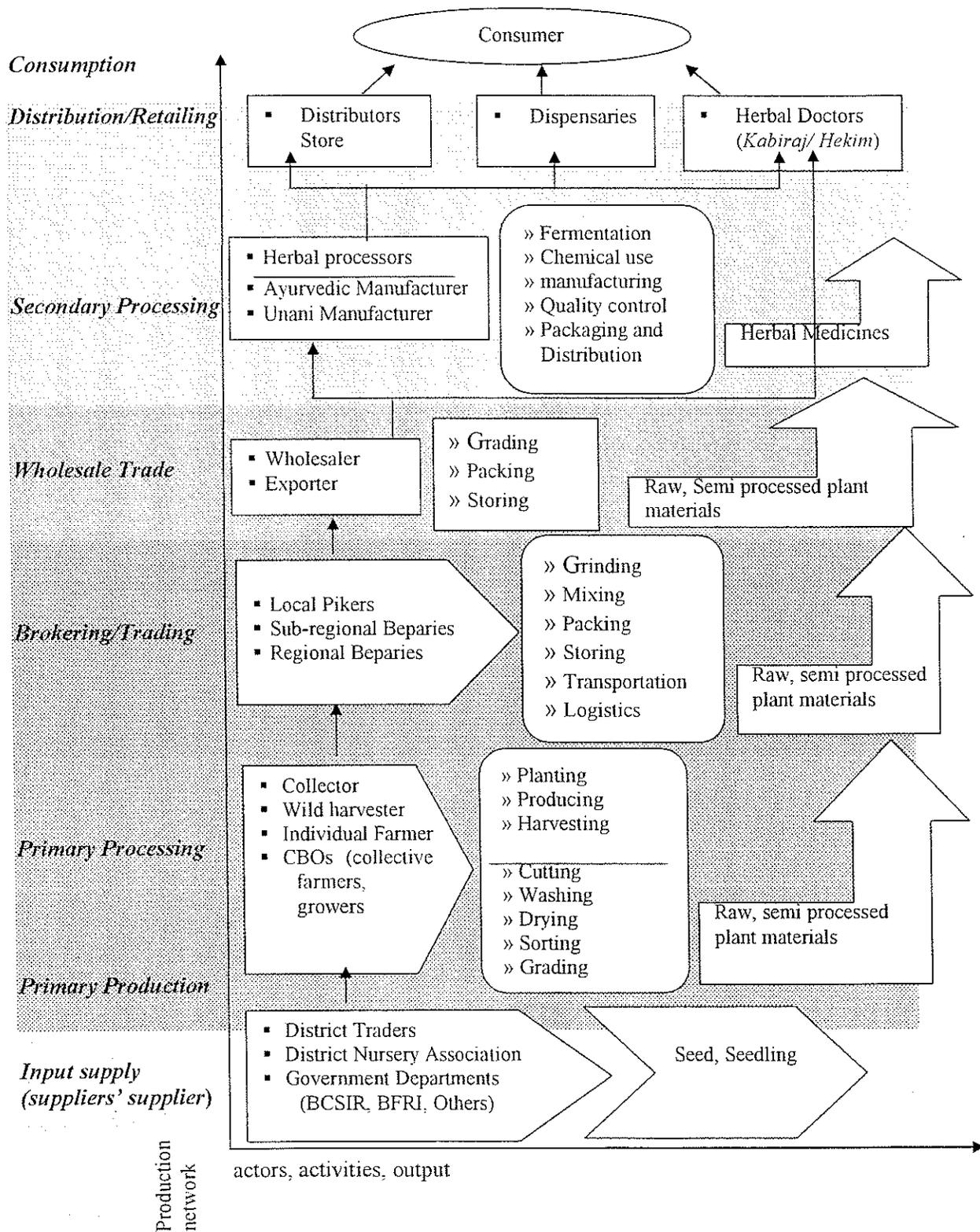
Apart from *Ayurved* and *Unani* processors, a recent development in the industry is the entry of allopathic manufacturers in the medicinal plant value chain that falls structurally in the secondary processing level of the chain. Considering the increasing global demand for herbal medicines as well as their increased popularity among the domestic urban consumers, allopathic industries are researching the possibilities of adding herbal items to their product line. Discussions with Square Pharmaceuticals revealed that they are already in a position to launch herbal 'cough syrup' and several other allopath manufacturers like ACME Laboratories, ACI and Jayson Pharmaceuticals Ltd will soon enter the herbal market with a number of products. Square even opined that they might need a supply of 700 tons of *Basak* and *Arswagandha* leaves in a year in order to meet their raw material requirements for the item soon to be launched. Meanwhile, LEAF is talking with Square Pharmaceuticals to examine the possibilities of establishing a buy back (forward selling) arrangement for the *Arswagandha*.

5.4.3 Chain Map

Having studied the market scenario and observed the field activities and operations of the

medicinal plant industry, and based on the actors identified above, the study mapped the entire value chain.

Chart-5.7: Medicinal plant industry value chain and productive networks



The chart above also depicts the production networks, productive activities, actors, output and sheds color on the grey areas.

5.5 Improved or Alternative Industry Value Chain- Scope and Opportunities

5.5.1 The value chain concept

The value chain is a relatively new concept that has evolved since 1985. There are many studies (by UNIDO, USAID) in the contemporary literature describing and defining value chains of different industrial sectors (such as textile, Footwear, Furniture, and healthcare). The usefulness of value chain analysis has been demonstrated in studies of industries as varied as fresh fruits and vegetables, garments, and automobiles (Dolan and Humphrey 2000, Gereffi 1996, Humphrey 1999). Analysis of the value chain is viewed as a detailed understanding of the actors, linkages, and value-added at each stage of production and distribution, and is a necessary underpinning for meaningful efforts to upgrade an industry (McCormick, 2000). However, prior studies in defining or elaborating the herbal medicine or medicinal plant industry value chain are scanty. There are many market studies (local and international) that mention value chain analyses of the herbal healthcare sector. Different organizational studies (IC, SEDF, and UNDP) on herbal medicine in Bangladesh described the market value chain in their study reports. As a matter of fact, the findings of those studies show that they literally tried only to map the industry supply chain. Interestingly, the universal confusion on supply chain and value chain has been reflected in those works, since theoretically the supply chain is part of the value chain (Craig, 2000).

The concept of value chain was first developed in 1985 by Michael Porter. Though the concept has existed and been popularized for 20 years since then, researchers find it still is an unclear concept (Feller et al, 2006). However, there are literature, guide and policy manuals for value chain analysis to dispel confusions. There are two components of value chain analysis: the industry value chain and the organization's internal value chain. This study looks at the industry value chain. The industry value chain is composed of all the value-creating activities within the industry, beginning with the first step in the product/service development process, and ending with the completed delivery of the product and related services to the end user (Porter, 1985). Thus it links

the entire range of economic activities and actors involved from the completion of a product or service, through the intermediary processes of production and sales, up to its delivery to customers. On the other hand, supply chain management emerged as a concept in 1982, when Keith Oliver coined the term as an integrative philosophy to manage the total flow of goods from supplier to the ultimate user (Clammer, 1990).

Two fundamental differences between supply chain and value chain are:

- i. The supply chain focuses on the activities involved in acquiring raw materials and sub-assemblies, and then getting them through the manufacturing process smoothly and economically; while the value chain management looks at every step from raw materials (including those used by the suppliers' suppliers) to the customer and the eventual end user, right down to disposing of the packaging (WMEP¹⁷, 1996). As the goal of the value chain is to deliver maximum value to the end user for the least possible total cost, it involves the manufacturer, manufacturer's suppliers, and suppliers' suppliers.
- ii. Functionally, value chain management is much more than just optimizing each step in the supply chain. The difference is that the supply chain is unidirectional and focused on improving the efficiency of the flow of goods, while the value chain is bi-directional and has a broader scope, covering the entire product life cycle, services and goods (Craig, 2000).

5.5.2 Chain constraints and weaknesses

It is evident from the field observation and through interviews and discussions with actors in the production network, and from the market analysis, that the medicinal plant-based herbal industrial value chain is entangled with numerous intricacies. These are mainly structural intricacies or chain constraints developed out of the market system or sectoral strategic management problem. These constraints can be pointed out as below:

- i. The value chain as it has been mapped is very long, with as many as six or seven marketing stages (where value addition occurs) involving primary collectors and producers, local contractors, regional wholesale markets, large wholesale markets

¹⁷ The Wisconsin Manufacturing Extension Partnership (WMEP) is a technical and business resource centre to help small and midsize manufacturers improve productivity and compete more effectively in the marketplace. Details at- <http://www.wmep.org/valuechainmanagement.html>

- at the divisional level, processors and retailers. Such a long supply chain contributes to the low prices that primary collectors and farmers receive for their products (Riddihough & Jones, 1996).
- ii. The vertical linkage or production network in the upstream 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. All the medicinal plant wholesalers at *Chalkbazar*, Dhaka and the herbal processors interviewed replied that they do not have any contractual arrangement with any growers or producers for supplying the herbs they need frequently or in bulk quantity. As a matter of fact, without any effective backward or forward linkage, a value chain is literally weak. The value chain emphasizes that vertical linkages are the core of any production process and constitute the relations between input suppliers, manufacturers, distributors and retailers in the industry for a given product or service (Chandani et al, 2006).
 - iii. Primary producers, i.e. collectors or growers, though, are the principal actors of the upward stream, but have a minimum role and margin of profit in the overall value chain. With a lack of market intelligence and virtually ignorant of the product demand and buyers, these producers are enchained by the local collecting agents, *pikers* (local traders), and *Beparies* (traders), and therefore do not have enough bargaining power to realize the maximum or fair value for their products. Not only the primary producers are unaware of market price, but also the wholesalers (as responded in interviews) do not have any idea on the international market price of the products they are trading.
 - iv. WWF (2000) echoed the view that the length of the trade chain and the perceived need to protect information lead to a lack of transparency. This view is found as more than a truth in the upstream chain, where the middlemen, collecting agents, *Pikers* (local traders), and *Beparies* (traders) do not provide relevant information to the farmers or growers of the medicinal plants. Rather, they often provide distorted market information to them in order to maximize their benefit.
 - v. It is also clearly evident from the observation that the herbal processors buy from wholesalers rather than directly from the primary supplier because of the

substantial quantities and broad range of raw material they need. Wholesalers to the processor trading system usually make product traceability nearly impossible (FAO, 2004). In order to be acceptable in the international market or get higher value as a differential product, green products or organic products need eco-labelling. Among the 18 herbal processors interviewed, though 4 of them have ISO and HACCP certifications on their management and processing standards, everyone responded that the practice of eco-labelling is not possible because of the traceability problem.

- vi. As collection is still more common than cultivation, the quality of raw materials varies, i.e. plants from a certain agro ecological zone differ from another zone, which results in discriminatory prices for the same species.
- vii. There is a lack of trust between the processor and upstream suppliers; in particular, the manufacturers do not believe collectors or collecting agents in the case of many species and accuse them of adulteration and wrong identification. Similar barks and leaves for different species are mixed up due to the lack of knowledge or to obtain better pricing (claiming the lower priced bark as the higher priced one).

5.5.3 Industry SWOT analysis

Based on the methodical works mentioned hereupon, the study identified the SWOT associated with the medicinal plant industry, as indicated below:

Strengths	Weaknesses
<ul style="list-style-type: none"> » Utilization of cultivable wastelands » Availability of organic raw materials » Abundant supply of cheap labour » Scope to achieve further cost competitiveness through intercropping » Gradually higher demand in both domestic and international market » Agro climatic suitability for cultivation of many high priced medicinal plant species » Increased interest of rural poor and 	<ul style="list-style-type: none"> » Insufficient data on species, their properties, areas of occurrence, amount of active constituents, extent of exploitation, demand vs. supply quantity » Unsustainable harvesting practices due to insufficient knowledge at the grassroots level » Substandard primary processing of raw materials and crude drugs » Mostly poor production technology (minimal lab to land transfer of technology in the sector) resulting in virtually no value addition at the primary processing stage

<p>marginal farmers in medicinal plant-based agro-forestry practices due to higher return</p> <ul style="list-style-type: none"> » Supportive government policy and increased attention in recent years to develop and foster the sector » Tissue culture technique- increased percentage of active constituents can be certainly derived if tissue culture technique is used » Genetic engineering- improved and insect resistant varieties can be developed through genetic engineering 	<ul style="list-style-type: none"> » Poor price control and market intelligence » Non-existence of forward and backward linkages between producers and processors » Medicinal Plants Conservation Act yet to be in effect, and lack of precise and appropriate promotional policies » Minimal research and development efforts for <i>in-situ</i> and <i>ex-situ</i> conservation and cultivation » Lack of institutional arrangement and coordination for the sector development » Rise of an excessive and exploitative middlemen class in this industrial sector » Lack of knowledge on standard production procedures (GMP, HACCP) and many processors lack working capital for raw materials and limited access to finance
Opportunities	Threats
<ul style="list-style-type: none"> » Further value addition is a great opportunity in the industry at both levels of production, i.e. primary and secondary levels » Establishment of a standard primary processing center in medicinal plant-production zones (such as, Laxmipur-Kholabaria at <i>Natore</i>) » Bridging the gap between industry and community through a participatory management approach, i.e. industry-community partnership, thereby enhancing the industry value chain » New product development through research and analysis » Following fully organic farming techniques, establishing international standard management and production system (ISO, HACCP), and practicing eco- labelling to gain price premium and competitive edge in the market » Improved and quality starting materials, 	<ul style="list-style-type: none"> » Supply source dry out- gradual diminishing of natural stock of medicinal plants due to unsustainable harvesting from the wild and the extinction of species being overexploited » Increased competition from imported sources, especially from India, and lax border trading of plant materials by unethical traders » Disruptive supply capacity of local sources due to potential unsustainable (increasingly higher) demand may result in the intrusion of foreign suppliers » The gradual loss of traditional knowledge based on herbal plant materials » Patent by other countries of innovative, potential or latent products that can be made with indigenous plant materials » Deterioration of active ingredients in the cultivated medicinal plants due to pesticide and chemical fertilizer use » Increased price of chemicals, labour, and

<p>which can lead to overall quality improvement of the herbs and herbal products</p> <ul style="list-style-type: none"> » Strengthening institutional capacities, technological base (setting up testing labs and research centers) » Establishment of a common modern extraction facility for liquid and dry extract for small scale producers » Potential to discover and identify more species with medicinal properties in the wild » Entry of modern allopathic companies in producing herbal medicines 	<p>other input supplies can threaten the competitiveness of herbal processors, especially the <i>Unani</i> ones</p> <ul style="list-style-type: none"> » Sectoral mismanagement by government institutions and political instability in work as a barrier to growth and threat to the sector and its potentiality
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5.5.4 Improvement considerations

Similar to chain constraint and industry SWOT analysis, with the use of the qualitative approach, participatory techniques and literature foundation (such as ‘Handbook for value chain research’ and ‘guide to improve value chain’), the ways to improve the existing value chain are considered. The IDRC Handbook of value chain research by Kaplinsky and Morris (2000) and Readman (2000), in elaborating the idea of value chain benchmarking, suggests four ways to upgrade a value chain. These are:

- process improvement
- product improvement
- functional change, and, finally,
- moving out of the value chain into a new value chain.

Based on the above four ways to upgrade a value chain, the study tries to evaluate all the four ways in the case of the Bangladesh medicinal plant-based industry. I would rather like to hypothesize that any of the ways can help improve the industry value chain. However, an analysis of the acceptability of these hypotheses is presented below.

Hypothesis one: Process improvement within the industry productive network will upgrade the overall value chain.

The Process of production and management in the upstream level of the value chain has come under question in recent years. Ecological sustainability or biodiversity conservation has been the associated concern with the extraction of natural resources for livelihood. Karki (2003) mentions that there is a need to manage and conserve the medicinal plants for sustainable economic development. The best way to achieve this is through local value addition to the products. Responding to global market demand for organic products, the primary level production option for local value addition in the Bangladesh medicinal plant industry is to adopt an organic market orientation of the herbs through Good Agricultural Practice (GAP), as denoted by the FAO, mainly in terms of a cultivation process that focuses on the optimal use of agricultural resources, coupled with environmental concerns, which include guidelines on handling fertilizer and pesticides, farming waste, storage of agricultural chemicals, and handling harvested material. WHO (2003) has developed another guideline on Good Agriculture and Collection Practices (GACP)¹⁸ for medicinal plants, which is more important to take into consideration for a market-responsive, value-added, primary production system. Access to technology by primary producers to correctly preprocess and store plant materials is crucial as most of the production areas are experiencing poor preprocessing facilities or the non-availability of such facilities. As far as the processing at the secondary processor level is concerned, Aziz et al. (2004) hold the view that processing is a critical aspect of herbal production, especially due to the low yield of extracts. New innovative methods such as Supercritical Fluid Extraction (SFE) need to be developed to produce herbal products of higher yield, lower operating costs, and faster production times. Good Manufacturing Practice (GMP) is a code of practice set by WHO that is used by the medical and health-related industries, including the pharmaceutical industry, in an effort to maintain the highest standards of quality in the development, manufacture and control of medicinal products; this is another precondition to add value to the secondary processing level.

Therefore, with this process improvement measure, the industry can achieve:

¹⁸ The organics documentation concerns mainly the transparency of the supply chain while GACP additionally requires documentation about hygiene and product quality aspects

- Value addition at the primary processing level through organic production practice and the setting up of technologically improved primary processing centers (factories) at the primary production bases.
- International acceptance of the products would be enhanced upon adopting WHO and FAO guidelines.
- More production efficiency and higher yield at secondary level extraction through SFE technology.

This measure of upgrading the value chain can be more applicable for large scale individual growers or farmers that have a processing facility of their own or that have secondary processing linkages. Medicinal plant farms like *Kazi and Kazi*, *Hamdard*, *Lizan Herbal* have their own medicinal plant farms or gardens¹⁹, processing factory and marketing network, and are in an excellent position to upgrade their value chain through such an improvement in the process. As a matter of fact, such individual large or medium scale farmers are few, representing less than 3% of the industry turnover of medicinal plants materials. As more than 90% of the plant producers are the petty collectors and marginal farmers in the industry, this process of improvement can contribute only meagrely to upgrading the overall industry value chain. Moreover, a large number of farmers are relying on chemical fertilization and support from third parties like wholesalers, *pikers* and NGOs for seed materials and start-up capital. Therefore marginal farmers as such and petty collectors are not well aware of standardization practices and codes, and standard primary processing mechanisms, coupled with their dependency and financial inability, will not put them in a position to go for a process upgrade.

Therefore, this way of upgrading the value chain will not be an industry wide approach. Rather, it is applicable for individual farm-owning processors. Alternative ways must be examined to improve the industry value chain since the major constraint and weakness of the industry value chain is associated with the length of the chain,

¹⁹ In recent years, i) Kazi and Kazi, an industrial conglomerate, has planted/cultivated medicinal plants on a commercial scale as a backward linkage for the organic herbs department of its chain store (*Mina Bazaar*) and for export; ii) Hamdard, one of the leading *Unani* manufacturer in the Indian sub-continent, has developed a herbal garden at *Sonargaon*, Dhaka; iii) Lizan Herbal, which produces herbal cosmetics, also has its own garden at *Kushtia* and the factory in Dhaka.

ecologically sustainable management, fair price and improved productivity for a more supportive contribution to livelihoods.

Hypothesis two: Product improvement within the production levels (primary and secondary) will upgrade the overall value chain.

Product improvement or introducing new products is another way to upgrade the value chain. With an organic market orientation to the production and supply base, certification and labelling, especially eco-labelling with the traceability of herbal products, will help products find high-end markets and export markets with higher values. Some experts stressed the importance of branding for the herbal products to yield a higher value. In the Bangladesh market, AP and Modern Herbal Co. have their own brands and have developed good quality products that are being marketed mostly in the domestic market. Donnelly et al. (2003) recommend branding of herbal medicinal products for value addition and suggest that the brand should stand for an organic, high quality, fairly traded, sustainably harvested product.

It is obvious that the product improvement measure will again contribute to the upgrade of the farm level value chain, especially for the secondary level producers. This measure will not help develop the capacity of the larger mass of the primary producing farmers and collectors. It will have little impact on the structure or length of the industry value chain and will not contribute to eliminating unwanted actors or to ensuring better pricing for the extreme poor producers of medicinal plants. Therefore, this hypothesis (hypothesis #2) again is not quite appropriate for improving the overall industry value chain.

Hypothesis three: Functional improvement within the productive network will improve the industry value chain.

Functional improvement for a sectoral or industry value chain implies mainly the capacity building, management and networking aspects within the chain. The extraction of medicinal plants from the natural stock is regarded as a threatening function contributing to the degradation of biodiversity. Khan (2003) notes that poverty-induced biotic pressure has made biodiversity conservation a challenge; however, community-

based management of biological resources may be one solution. There are already examples in the developing countries of the sustainable management of natural resources by individual communities. This is an approach conforming to Article 1 of the Convention on Biological Diversity (CBD). In line with these arguments, from a medicinal plant sectoral perspective, Karki (2003) urges the establishment of financially viable, community-owned SMEs for the long-term success of the market-oriented production system. Key partnerships need to be built among the necessary socio-economic, management, quality control and marketing know-how and how-to-do agencies to operate successfully at the national and international levels. Schmitz (2005) also stresses that the functional improvement of an industry value chain largely lies in the application of participatory approaches. Therefore the connotation of functional upgrade underlies the partnerships between the key functionaries in the industry value chain.

Based on the above assumptions that the community-based management approach and partnership among the key actors can greatly contribute to the improvement of medicinal plant industry value chain, it was found that there is a lack of trust between the primary producers and secondary processors. Intermittent and inadequate supply volumes, and adulteration in the supplied materials, have rendered an imperfect chain relation between them. As the processors need a vast array of species and are taking supplies from various sources as per the required input-material quality and properties, many of them had the opinion that a partnership with a particular supplier or suppliers was not the right approach. Despite such views, industry experts and big processors emphasized the fact that, for frequently used and high volume input (like *Amloki*, *Arswagandha*, *Haritaki*, *Peepul*, etc.), if they could establish a partnership that ensured a constant and high quality input supply source, that could be a win-win situation²⁰. However, with the prevailing industry value chain, the network of wholesalers, *pikers* and *Beparies* is so strong that the primary producing collectors and growers are virtually hostage to them and are not capable of establishing relations with the big industries. Another major issue or threat in considering such a buyer-seller marriage is that the

²⁰ Such as Square Pharmaceuticals, which is willing to take more than 300 tons of Arswagandha a year, as was expressed to the IC-LEAF expert and to this researcher as well, provided volume and quality could be ensured by the supplier

buyers, being mostly profit-making business entities, will tend to exploit as many resources as possible and will look after their company interests more than the environmental concerns. Similarly, if sellers, especially collectors or growers of plant materials, are not controlled or managed by a regulatory force or facilitation body, they will tend to seek to gain more money out of a higher yield and thereby destroy the ecological stability.

Therefore all these aspects, i.e. the need for a trustworthy long term relation, a biodiversity friendly trading system, assisting the primary supplier in building network and bargaining capacity, literally leave unanswered the question of how to improve the value chain. Therefore, it is considered that again this hypothesis does not bring a holistic solution to improve the industry value chain of medicinal plant species in Bangladesh.

Hypothesis four: Moving out of the value chain and into a new value chain, where the buyer, seller and intermediary honest regulator will be the key players, is the way to improve the medicinal plant industry value chain of Bangladesh.

Moving out of the existing value chain into a new value chain is the last resort for an industry value-addition productive system towards upgrading the chain system. In order to examine the possibility of a more effective chain structure, this study hypothesized that the proximity of the fundamental chain players²¹ can largely help eradicate the inherent constraints and weaknesses that the medicinal plant-market value chain faces. To test this assumption, both primary and secondary processors, and also the experts, were asked how they viewed the industry-community partnership under the basic terms of quality input supply and a buy-back guarantee from industry, and a quality plant-material supply meeting the industry requirement from the primary supplier community. The response was spontaneous and positive, and almost everyone (more than 95% of the respondents) held the view that it would be a more effective productive approach for the development of the medicinal plant industry. Karki (2003) suggests that such a value chain should be developed with the inclusion of an honest broker in order to

²¹ By fundamental chain players this study means primary producers/processors, and a manufacturer /secondary processors who contribute most in value addition

set and sustain the partnership and to take care of the sustainability aspect of the resources.

The idea was discussed with the *aloe vera* producers at Laxmipur-Kholabaria study site at *Natore* and with two of the leading herbal processors at Dhaka (AP and Modern Herbal), who are planning to launch *Musabbar*²² and other cosmetics products with *aloe vera*. Both the companies supported the idea that reaching a contractual agreement including buy back assurance with the *aloe vera* community could be a good initiative both for them and for the farmers. It could be done with the help and guidance of any NGO or such organization that supports community and is concerned about their livelihood and the environment. Moreover, the processing center at Laxmipur-Kholabaria (the production base) for producing *Musabbar*, and their planned *aloe vera*-based cosmetics, was discussed. The outcome of such an initiative in the value chain will be as follows:

- i. There will be only two productive chain players with a commercial interest in the value chain network.
- ii. Middlemen, including local *Fariah*, *Pikers*, regional and divisional wholesalers, will be eliminated from the chain.
- iii. The *Aloe vera* community will find a permanent buyer while a constant and fair supply source for the companies is being established.
- iv. A fairer price (better than the existing one, with the farmer getting a higher price for his produce and processors paying lower for the raw materials) level will be established.
- v. For better and quality seed materials and capital, farmers can get assistance from the companies.
- vi. The local NGO (LUSTER) can play the role of an honest broker, between companies and the community, which already contributes to livelihood and natural resources (agro-forestry) improvement.

²² Musabbar is a product produced by lacerating *aloe vera* leaves and allowing the exudates to fall to plastic sheeting below the plant, where it dries to form a rubbery consistency

- vii. Due to the economy of scale, such a partnership venture will promote further process, product and functional development or improvement within the value chain.

Therefore, such points of view and observations lead this study to conceive of new thoughts indicating that the value chain needs to redefine its productive network by bringing the fundamental chain players together through an industry-community partnership and by bringing in a third party as the facilitator, which would eventually create a participatory management system for local natural resources. Based on this consideration, this hypothesis is more applicable than any of the other ways hypothesized in the above discussion from an industry value chain improvement perspective.

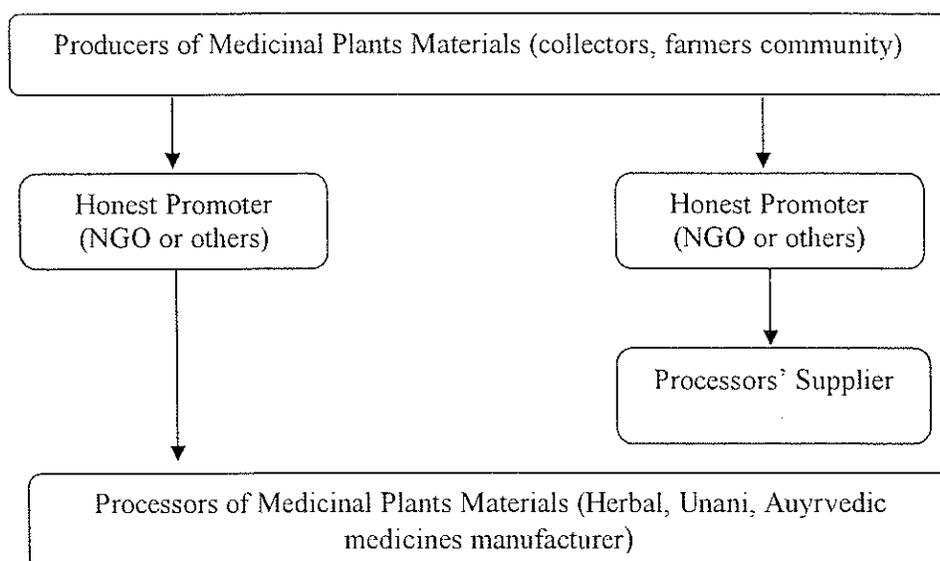
5.6 Industry-Community Partnership as a triangular approach to management, marketing and value chain

From the above hypotheses and based on field observations and discussions, for the value chain to improve within the medicinal plant market system, this study proposes coordination between the manufacturer and primary supplier or processor, which will certainly help improve primary processing (especially drying, grading and storage, as there will be significant knowledge sharing and technical exchanges), correct the identification of species and develop an active ingredient content. As the manufacturers always look for value for money, quality improvement through upgrading the value chain can ensure that value. If the primary producers (community) and industry can be knotted together, several constraints and weaknesses of the chain structure resulting from the intrusion and activities of all the middlemen between primary and secondary processing will be automatically eliminated. The primary level value addition and standardization required by the processor and marketer will take place due to the coordination.

However, one important aspect that should be noted here is that this proximity should not be a match-making between mere buyers (processors) and suppliers (collectors, farmers). The question arises, why? The answer, in a word, is 'sustainability', meaning here the sustainability of medicinal plant resources and concerns for biodiversity

conservation. Schmitz (2005), in his guide to 'value chain analysis for policy makers and practitioners,' having observed the practical-market value chain scenarios of different commodities in different parts of the world, came to the conclusion that 'mere matchmaking (bringing buyers and producers together) is not sufficient' in upgrading the local enterprises' capabilities or the industry value chain of the respective product. The reason for that conclusion is understandable since such a mechanism becomes buyer-driven, where the buyer tends to be exploitative, i.e. extracting as many resources as possible and demanding a lower price from the supplier. Under such a situation, Karki (2000) suggests a bio-partnership that involves an 'honest broker' between the industry and producer community. The honest broker can be a NGO, development agency, research or training agency, or village committee. In order to look at this possibility more precisely in the medicinal plant-market industry value chain in the Bangladesh context, this study observed that there are several such honest brokers working in the medicinal plant sector for its development. In other words, they are mainly working as 'promoters'. So the offhand invention of this study towards a more efficient industry value chain is "3P (Producer, Processor and Promoter)- Nexus". Under this nexus the fundamental chain players, i.e. the primary producers and the processors, will come under a long-term production agreement between themselves, which will be facilitated and monitored by a locally operating not-for-profit organization (NGO, Development Organization) and/or by relevant government departments, like: forest, environment, Agriculture, Science and Industries, or in some cases a recognized research, training or conservation organization. For example, as discussed with the respective parties, to materialize and keep this partnership going at *Natore*, LUSTER, the local NGO that works at safeguarding the interests of farmers, Laxmipur-Kholabaria and Halsha *Unions*, can work as an 'honest broker' between the *aloe vera* community and industries (such as AP, Modern Herbal, PRAN). The schematic framework of this 3P-Nexus model in the form of a new upgraded supply chain will simply look as follows:

Chart-5.8: Proposed 3P-Nexus Model for industry-community partnership



This 3P-Nexus is not a complete value chain as it keeps out some of the upstream and downstream members from the framework. Rather, it is an upgraded supply chain that ensures the cost and management efficiency of the medicinal plant industry. The basic principles of this 3P-Nexus supply chain model mostly follow the practices enunciated in the 'Bio-partnership' by MSSRF (2000) and of the 'social contact' by Karki (2003). Here the main aim is first to empower the communities with better knowledge, skills, and information so as to gradually train the poor people involved in the collection and cultivation of medicinal plants in sustainable harvesting, primary processing, marketing and packaging. The promoter will play the role of facilitator in this process. The motive for industries to enter into a contractual agreement will be the improved prospect of ensuring regular and reliable supplies of quality raw materials. Similarly, the attraction to the rural communities to enter into the contract will be the likelihood of ensured markets for fair prices, with possible gains in technology transfer to help achieve the sustainable management of their herbal resources and the development of their community. The interest of the promoters is to fulfill their development and operational objectives. The guiding principle that the promoter must emphasize is to aim for sustainable harvesting practices for environmental sustainability and an increased margin of benefit to the resource-poor producers to improve their livelihoods. The

processor or promoter can train the collectors or the producer communities on Good Field Collection Practices (GFCP) or Good Agricultural Practices (GAP) so that the value and acceptability of the final products produced out of these primary materials become higher in both local and foreign markets. Moreover, such a venture will create opportunities and enable the manufacturer to put 'Fair Trade Labelling' on the product, as the guidelines of fair trade will be easy to follow under such arrangements.

5.7 Summary

The market for medicinal plant products in Bangladesh is dynamic; it is in a growth stage. Structurally it is diverse, involving petty collectors to big pharmaceuticals as industry actors, and commercially it revolves around a complex (Thomsen et al, 2006) and precarious value chain. It is complex because it involves a good numbers of actors, many of whom play bi-directional and multidirectional roles in the chain; and it is precarious because most of the upstream actors do not know what is happening downstream, i.e. they almost completely lacking market intelligence. Besides, both the principal suppliers and users have to depend on middlemen and intermediaries who hold ample scope to control and distort the market system. Though around 650 species are reportedly on trade in the herbal market of Bangladesh, as revealed by interviews through this study, 27 species are most commonly used and can be said to have a sustainable demand in the market, with an annual turnover of US\$ 3.72 million. The local supply of plant species is quite inadequate and only 12-15 species are commercially grown while the rest is supplied either from wild sources or imported. The marketing mix of the herbal manufacturing companies is mainly formulated by targeting the domestic consumer market. A few of the companies have recognized the export opportunities that exist in the global marketplace and therefore are revamping their marketing strategies to take part in the global herbal market. If the producer communities and the processors of medicinal plants can come to an agreement as per the concept specified in the 3P-Nexus Model, it will render an efficient value chain through vertical integration, an ensured market for the producer, an efficient and reliable supply source for the producers, and above all reduce stress on the wild medicinal plants.

CHAPTER SIX: MANAGEMENT INSTITUTIONS FOR MEDICINAL PLANTS AND PRODUCTS- *LESSONS AND POLICY IMPLICATIONS*

6.1 Introduction

The status of medicinal plants at the local level and the market scenario for locally produced medicinal plants and plant-based products, as discussed in the previous two chapters, bring forth an inherent query: Who manages this medicinal plant sub-sector? The reason for such an auto-generative question is easy to perceive; conservation, promotion, and an improved market or industry value chain system, whatever the means of intervention, have to be acted upon efficiently and effectively; and the actors are the institutions that manage. Therefore, based on that premise, the study recognizes the importance of identifying institutions that are directly and indirectly responsible for managing the medicinal plant sub-sector in Bangladesh. With this goal, this chapter focuses on the third objective of this study, which is:

To identify existing formal and informal organizations, and examine cross-scale linkages between them in order to enhance and strengthen public policy options and management strategies.

With a view to the above objective, this chapter has drawn out the existence of the institutions involved in managing the medicinal plant resources at both local and national levels. Based on the studied SEMP and LEAF projects that are operating at the community level, and having implementers and stakeholders stationed at other spatial levels—*union*, *thana*, district, and national levels—the study has been able to conceptualize the prevailing institutional interplay and thereby draw the possible strategy options for improving the sector.

6.2 Management and Institutions

6.2.1 Management at Local Scale

Local management institutions that particularly manage medicinal plant resources are virtually non-existent in Bangladesh. Prior to 2000, no formal organization existed that played a role in managing or protecting the medicinal plant resources. In 2001,

Intercooperation introduced the VFFP project (Village Farm Forestry Program), which organized farmers to develop TFG (Tree Farmers Group) in their respective project areas to manage agro-forestry activities of the project's direct beneficiaries. As cultivation or plantation of medicinal plants was one of the agro-forestry activities, in the process the medicinal plants were managed locally by those TFGs. In the study sites at *Natore* and Madhumati Flood Plain, there are organizations that have recently moved in managing medicinal plant resources.

At the *Natore* study site, the medicinal plant farmers formed a local organization in 2003 with the name and style of "*Laxmipur Khulabaria Oushadi Krishak Samity*" or "*Laxmipur Khulabaria Medicinal Plants Farmers Association*". This association emerged as a marketing management tool, with an active operation since January 2004. As the farmers found that they were often deceived on the price of their produced medicinal plants and plant materials by the *pkers*, *Beparies*, or their middlemen, the centralized, local management of the selling procedure will help them combat that deception. Seventy farmers became the members of that *samity* (association).

The association has its office at *Kholabaria Bazaar* (in the picture above). Each member contributes Tk 10 as the weekly subscription to the *samity* fund for it to function. The members of the *samity* held bi-weekly meetings on the activities related to the marketing and management of their medicinal plant resources.



Figure 6.1: The above figure shows two of the executives of *Laxmipur Khulabaria Oushadi Krishak Samity* sitting in the office house which is also the *Samity Arath*

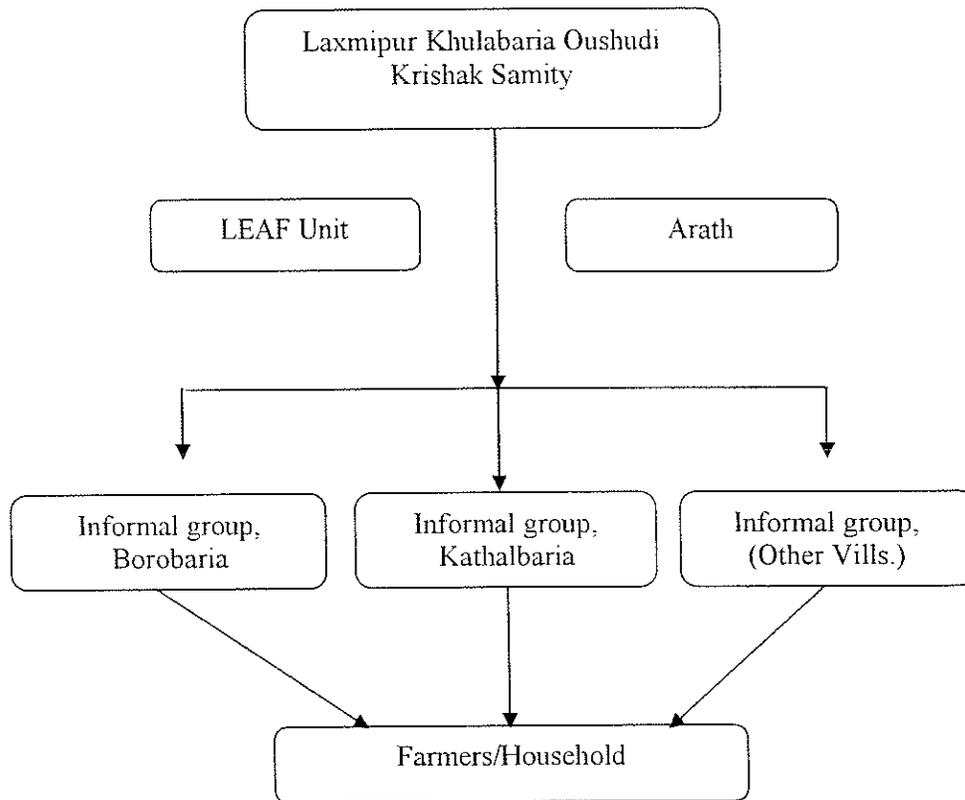
The core functions of the *samity* regarding the regulation of the supply and fair price are as follows:

- A centralized supply system is established by setting up an *arath* (Central Sales Depot) managed by the *Samity* office. Both the buyer and seller have to oblige the *arath's* regulation.
- The *arath* committee with approval from the *samity* sets the price for their plant materials (especially *aloe vera* leaves and *shotomuli* roots, along with six other items produced in the area) every 2 months based on the market demand and seasonality.
- The approaching buyer interested in purchasing *aloe vera* leaves or other products needs to get a serial number first from the *arath* authority with his quantity requirement and then needs to pay the *samity* to have a purchase voucher.
- Farmers willing to selling their product receive a slip from the *samity* with the selling instruction against the purchase vouchers of buyers.
- Any conflict or post-purchase discrepancy between buyers and sellers has to be negotiated with the *samity*.

Now this *samity* has expanded its role. It invites *pikers* and *wholesalers* to its price-setting meetings every two months. It sometimes invites NGO personnel and local farming experts to bi-weekly meetings to discuss cultivation, fertilizing, pest management, or other related issues. As the *samity* is comprised of mainly farmers from the six villages in the Laxmipur Khulabaria Union, discussion with several *samity* members helped this study to identify the emergence of three informal groups inside the *samity*.

Around thirty farmers in the Borobaria village, being the pioneer in medicinal plant cultivation and major players of the *samity*, reportedly tried to be more authoritative, whereas the Kathabaria has around 20 members that are unified among themselves. Other villagers therefore have informally formed a different platform among themselves. Several farmers indicated their suspicion that a major conflict was looming in the *samity* and it might be eventually divided into two groups, i.e. Borobaria and Kathalbaria.

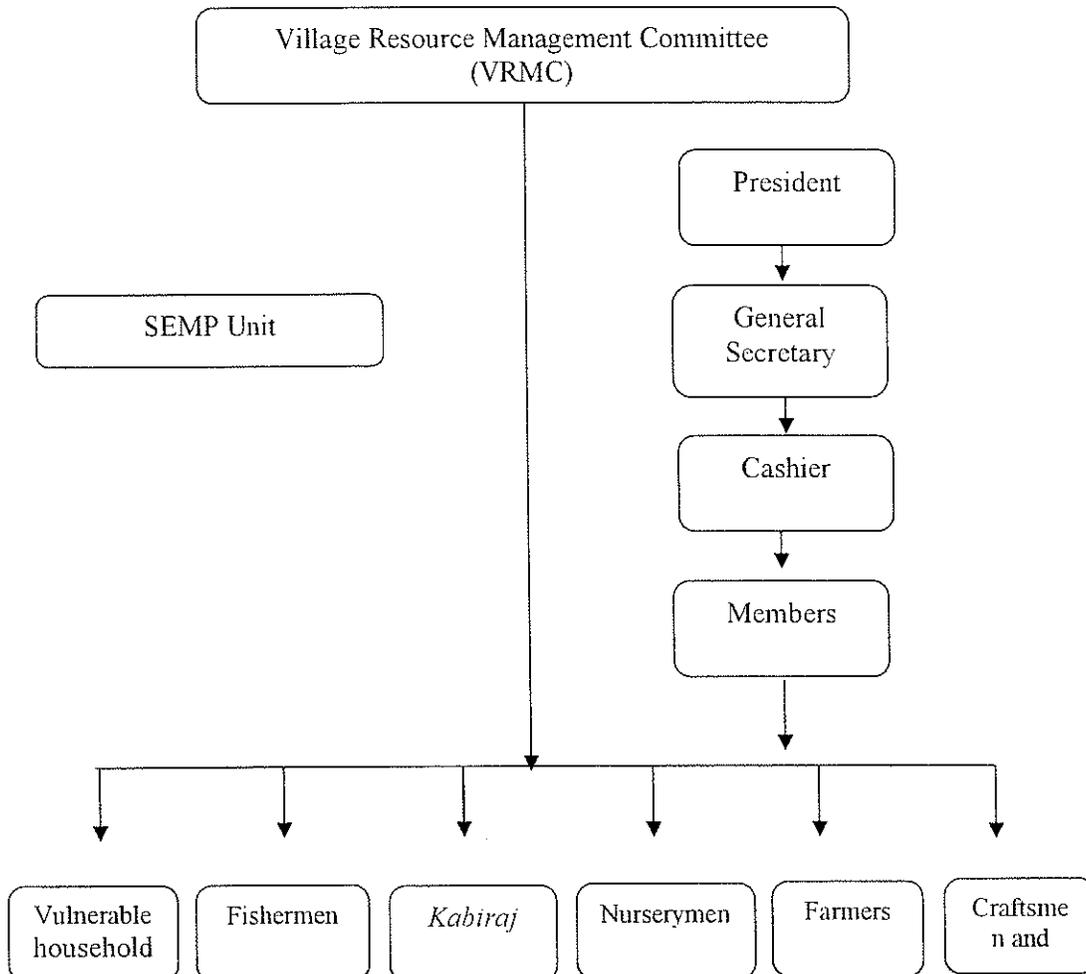
Chart-6.1: The organizational structure of the 'Laxmipur Khulabaria Oushudi Krishak Samity'



At the SEMP project site in the Madhumati floodplain, the local management body for medicinal plant management and conservation was concerned with the facilitation of the partner of project implementing agency (BCAS), and a local organization was formed to manage the natural resources. That is, a village-based organization called a “Village Resource Management Committee (VRMC)” was established in each village of the project area. The members of the organization are people from different professional and self-help groups.

Thus, with the guidance of IUCN-BCAS, all the villages have VRMC comprised of a president, secretary, cashier and members. The VRMC sits every two weeks to decide their course of action, with the presence and guidance of project field facilitators. The *Kabiraj*, nurserymen, and farmers are the ones who take interest and responsibility with regard to the medicinal plant management and production.

Chart-6.2: The organizational structure of the Village Resource Management Committee at SEMP project site in Madhumati Flood Plain

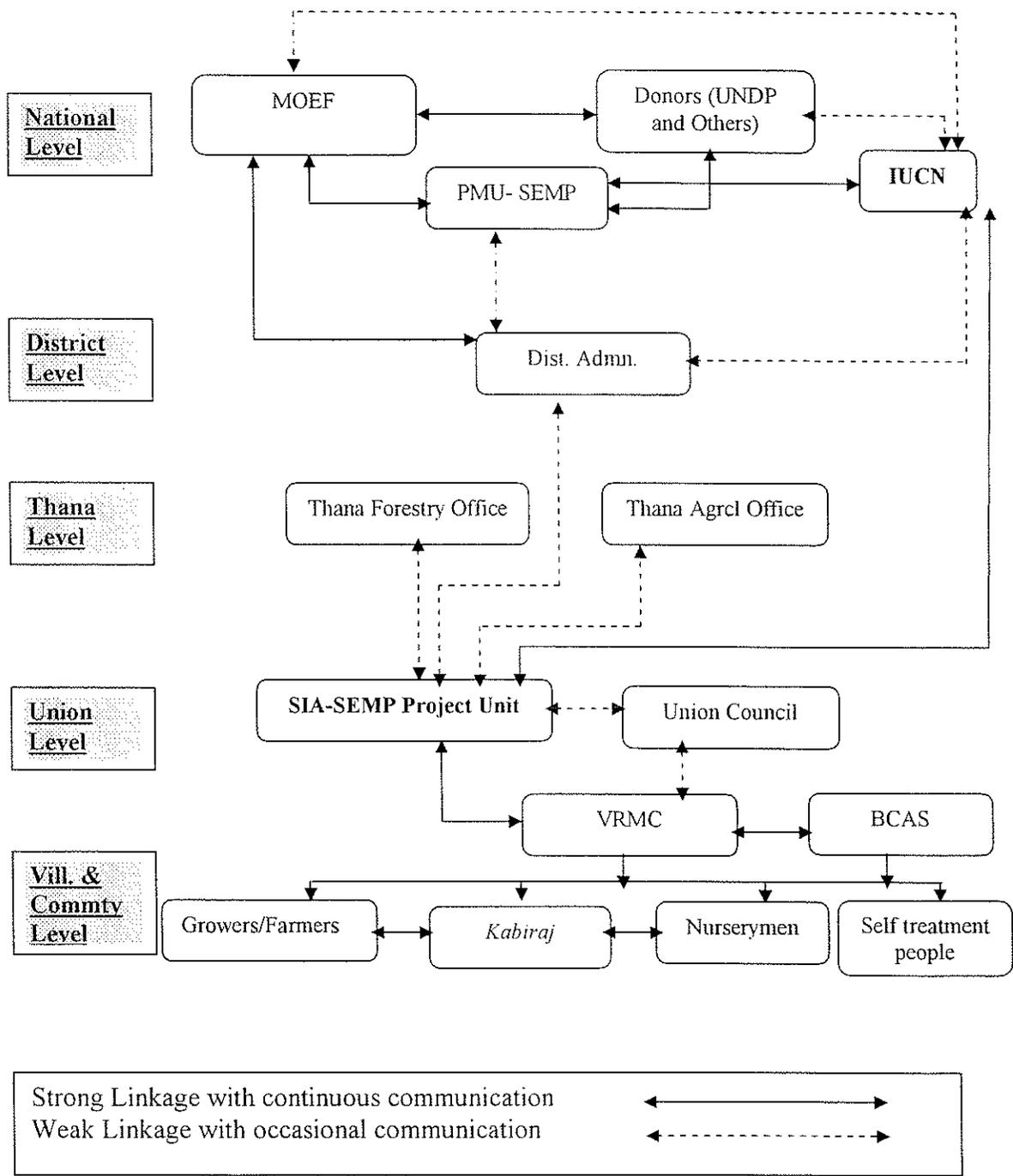


6.2.2 Cross-scale Linkages

Holling et al. (1998) state that issues of natural resource and environmental management are neither large scale nor small scale, but rather they are cross-scale both spatially and temporally, non-linear in nature, and exhibit an evolutionary character. This theory suggests that many development projects require effective and efficient coordination between organizations located at different vertical and horizontal scales if they are to be successful. Cross-scale linkages in resource management have the potential to allow for the meshing or, at least, the accommodation of a variety of different interests held by diverse stakeholders, and for a more robust and extensive management regime to be created since different techniques can be better brought together. Ideally, cooperation across scales can result in a situation where the strengths of one institution can be used to offset the weaknesses of another (Berkes 2002, Oyugi 1985).

In the Madhumati Floodplain site, prior to the introduction of the SEMP program, the implementing organization, BCAS, had activities in the region and was familiar to the communities. It exhibited videos and folk dramas to introduce the project to the villagers besides organizing activities. Due to its established linkages with many villages and the introductory activities of the project, it was able to form VRMCs at village and community levels to manage natural resources, including medicinal plants, with the concerned stakeholders. This collaboration between BCAS and VRMC, with active guidance from IUCN, helped achieve the project goals. IUCN being one of the SIAs of SEMP, it is strongly monitored by the PMU of the project. However, in examining the SEMP Community Based *Haor* and Floodplain Resource Management program's institutional dynamics in terms of cross-scale relations, the following linkages were identified among the stakeholders of the medicinal plant-based resources present at different levels and scales.

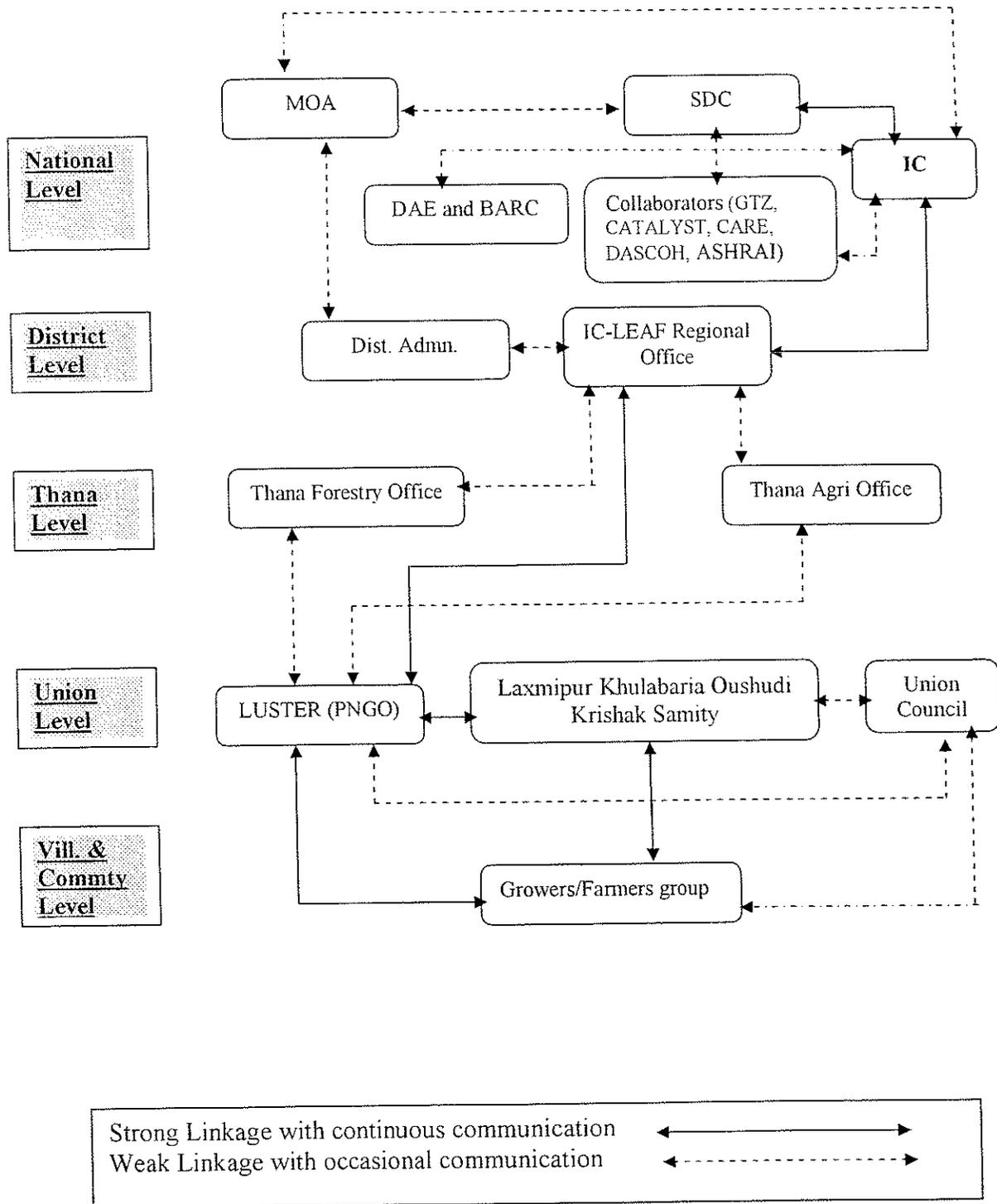
Chart-6.3: Cross scale interaction among stakeholders of community based *Haor* and Floodplain Management Program of SEMP project by IUCN-BCAS



In the IC-LEAF project, the linkages are very strong at the bottom level as there is a pre-existing link between growers, farmer groups and IC from an earlier VFFP project. That link provided a vehicle through which IC's implementing partner LUSTER was able to introduce the project to the communities. Moreover, having operated earlier in the area, LUSTER had a good relation with the communities of *Oushadi Zone* of Laxmipur-Kholabaria, *Natore*. All that helped to establish a strong network of communication among the IC-LEAF regional office at Rajshahi, the project site office at *Natore*, and the community organization '*Laxmipur- Kholabaria Oushadi Krishak Samity*'. As the activities of IC in Bangladesh, with the technical guidance and assistance from SDC and its collaborators, are regionalized, the communication and implementation of activities from the top to the grassroots level is frequent and ample.

LUSTER's assistance to the farmers' organization, i.e. the *samity*, has significantly increased its planning, organizing, communicating and controlling capacity. The combined efforts of both organizations have been vital for the *samity's* bargaining capacity and its marketing strategy for *aloe vera*. Meanwhile, IC-LEAF provided much technical support to the *samity*, including organizing a medicinal plant fair to establish introductions with the potential buyers, providing a soft loan to the new and interested cultivators, and saplings and seedlings of species as start-up capital. BARC and DAE also significantly assisted the *samity* by introducing them to the policy makers and stakeholders of medicinal plants at the national level and also by opening up the market for them. In their national level consultation meetings and policy initiatives, SDC and IC also kept the provision of representation for the *samity* and '*Afaz Pagla*'. However, based on this *aloe vera* cultivar-supporting project, the institutional dynamics of the IC-LEAF actors, in terms of cross-scale linkages, are identified below.

Chart-6.4: Cross scale interaction among stakeholders of IC-LEAF *aloe vera* cultivar support program



6.3 NGOs, Development organizations and Sectoral bodies

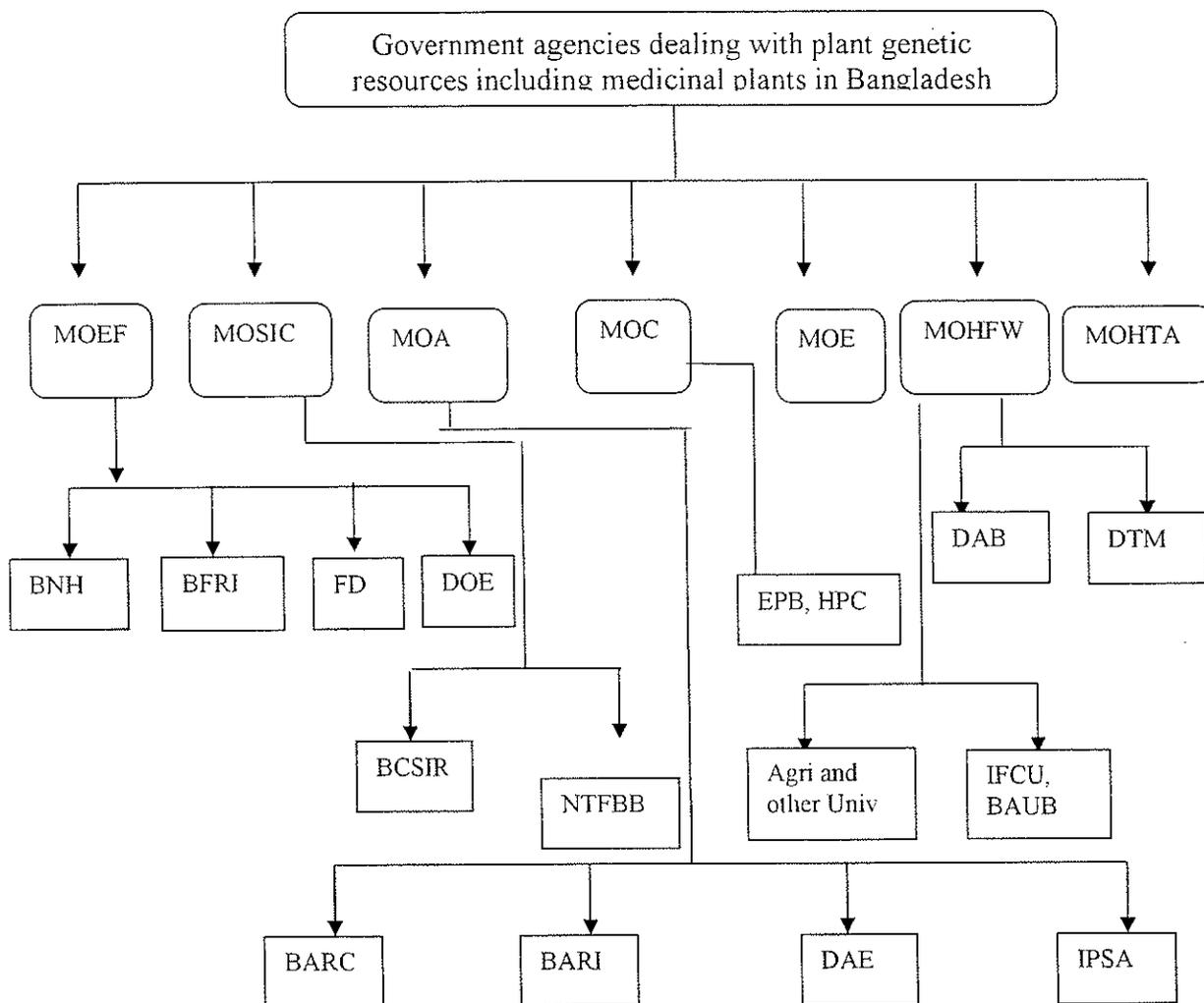
The involvement of voluntary and Not-For-Profit organizations (NGOs) in the development of the medicinal plant sector is a recent phenomenon in Bangladesh. Some of them focus on livelihood improvement through the consolidation, expansion and intensification of the medicinal plant program among the growers, while others focus on developing the capacity of the medicinal plant-based industrial sub-sector as well as the conservation of the species and the retention of traditional knowledge. These organizations have been active with particular objectives on medicinal plant management since 2000. Among such organizations are the Bangladesh chapters of UNDP, SDC, World Bank, CIDA, NORAD, WHO, and FAO, which contribute directly and indirectly at the national level. However, with the assistance (especially financial and technical) from these organizations, various implementing agencies in the field of development like IUCN, SEDF, IC, RDRS, SFADR, and BRAC have undertaken programs on the improvement and sustainable management of medicinal plant resources. There are many grassroots level NGOs working as partners for the aforesaid development agencies in order to implement the programs undertaken by them.

Meanwhile, the herbal sector has its apex body, called *Bangladesh Homeopathic Unani Ayurvedic Federation*, which mainly looks after the interests of the overall herbal industrial sector. On the other hand, both the *Ayurved* and *Unani* manufacturers have different platforms, *Bangladesh Ayurved Parishad* and *Bangladesh Unani Oushudh Shilpa Samity*, respectively, which address the varied needs and problems of their respective members.

6.4 Government Agencies

With initiatives at the private level and with development agencies, the government has directed a number of agencies to work in the herbal medicine sector. The Drug Administration of Bangladesh is responsible for the registration, certification and supervision of herbal medicine processors. The National Herbarium is charged with the responsibility of surveying medicinal plant production and the conservation of endangered species. The Bangladesh Council for Scientific & Industrial Research (BCSIR) is responsible for technology development, while the Bangladesh Forest Research Institute (BFRI) undertakes research. The National *Ayurved* and *Unani* Board is responsible for issues of education. Moreover, organizations such as Bangladesh Agricultural Research Council (BARC), Bangladesh Agricultural Research Institute (BARI), different public institutes like Bangladesh Agricultural University, and the Institute of Forest of Chittagong University are involved in research. However, still there is no government organization exclusively dealing with medicinal plants, though an Institute of Medicinal and Aromatic Plants (IMAP) has been proposed by the Ministry of Health and Family Welfare (MHFW), but it is yet to get the government's nod for approval. In general, the medicinal plants are regarded as plant genetic resources (PGR) in the government agenda and therefore the agencies that deal with PGR are categorically dealing with the medicinal plant resources. The following diagram shows the institutions involved in the management of medicinal plants or related resources:

Chart-6.5: Government agencies dealing with medicinal plants and plant genetic resources in Bangladesh



BCSIR- Bangladesh Council for Industrial Research
MOEF- Ministry of Environment and Forest
MOSIC- Ministry of Science and Information Technology
MOA- Ministry of Agriculture
MOC- Ministry of Commerce
MOE- Ministry of Education
MOHFW- Ministry of Health and Family Welfare
MOHTA- Ministry of Hill Tracts Affairs
BNH- Bangladesh National Herbarium
BFRI- Bangladesh Forest Research Institute
FD- Forest Department
DOE- Department of Environment
IFCU- Institute of Forestry, Chittagong University

NTFBB- National Taskforce on Biotechnology of Bangladesh
BARC- Bangladesh Agricultural Research Council
BARI- Bangladesh Agricultural Research Institute
DAE- Department of Environment
IPSA- Institute for Post Graduate Studies in Agriculture.
EPB, HPC- Export promotion Bureau, Herbal Promotion Council
DAB- Drug Administration of Bangladesh
DTM- Department of Traditional Medicine
Agri & other Univ- Agricultural and other universities
BAUB- Bangladesh Auyurvedic Unani Board

6.5 Lessons and Implications for the Management of the Medicinal Plant Sub-sector

The three projects (SEMP, LEAF, and CHT) enabled this study to find a wide variety of aspects associated with medicinal plant conservation, management, marketing, plant-dependent livelihood and the environment. The essence of the study findings has offered many lessons that have great implications for the management of the medicinal plant sub-sector. These lessons can be cited as stated below:

❖ *Community awareness is key to medicinal plant conservation*

The fundamental ways to conserve medicinal plant species are to familiarize people with the locally endemic medicinal plants and more importantly to make them aware of their value in terms of primary healthcare and environmental sustainability. The message has to be delivered at the community level in order to communicate it effectively to the principal audiences, as those community people are the prime custodians of natural resources and medicinal plant species. Though the initiatives taken both by SEMP and LEAF are localized, the impacts of these are evidently very significant among the people of those communities. These communities are now much more aware of the importance of medicinal plants, the need for their conservation, and the protection measures to be taken to safeguard this natural capital. Earlier, many of them did not know that the plants they were inadvertently damaging were the ones with medicinal properties and that many activities that go unchecked can be restricted with little attention in order to conserve these valuable species. Examples of such ignorant activities include fencing the village home with plants unknown to them, using them as fuel wood, and allowing cattle to damage them. Local people have been immensely helped to learn about the importance of these species through the awareness measures developed by the projects (SEMP and IC-LEAF), the enumeration and development of base line data for locally available medicinal plant species, the publication of a booklet of the most important local medicinal plant species for primary healthcare, the dissemination of information through awareness campaigns like meetings and workshops, a billboard and signboards, wall magazines, leaflets, folk dramas, exhibitions, and knowledge transfer to groups and their

families through training. As a result, the same people are now interested in conserving these plant species and emphasize on the sustainable use of these resources.

❖ *Integration of conservation and income generation is key to project success*

In a developing country perspective, where grassroots level development projects (especially on environmental sustainability) are to work with poverty or extreme poverty ridden communities, an income generating agenda should be primarily placed before the community. (Whatever the core or development objective of the project, it should come later in their mind.) In the instances of these projects, poverty ridden, vulnerable communities had become interested in participating in the project activities when they found some sort of short or long term economic gain out of their participation. Though the objectives of a project are to redress environmental problems and to work for environmental sustainability, mere consciousness on environmental health does not lead the population to act sustainably. Illiteracy is a predominant phenomenon within the communities in rural Bangladesh and results in much unsustainable behaviour *per se*. The value of a rare species and keeping its scope to regeneration is mostly a secondary thought to them. As in the SEMP area, communities are motivated by the expectation that the establishment of medicinal plant plots in the household premises will provide them with an alternative source of income and that motivation will lead them to go for homestead plantation and gardening of medicinal plant species. Similarly, in *Natore*, eight species are in cultivation and some others are in the homestead plantation because of their good demand in the market and rare ones have demand among the local *Kabiraj* practicing herbal medicine.

❖ *The linkage between medicinal plants and traditional knowledge is inextricable*

One of the most glaring examples of medicinal plant livelihood creation is the Laxmipur-Kholabaria 'Oushadi Zone' in *Natore*, Bangladesh. This medicinal plant-dominated area is the brain child of a traditional herbal practitioner (*Afaz Pagal*). Because of his drive and knowledge, the plantation started and flourished; now it supports local livelihoods to a great extent. The SEMP project sagaciously stressed the need for the capacity building of local traditional healers in its intervention areas and the result has

been astoundingly positive in terms of conservation, livelihood and primary healthcare perspectives. Traditional healers have benefited immensely in terms of increased availability from plots at the household, community and private levels, which in turn has boosted their levels of confidence and ensured the survival of their age-old practices and helped the intergenerational transfer of plant-based knowledge among the new practitioners. Such a community-based medicinal plant management initiative has great multidimensional implications, and is worth being replicated from local to larger spatial scales of implementation.

But regrettably the scenario is the reverse in the tribal communities, as perceived by observation, with plant species disappearing from the wild sources at an increased rate and the increased number of *Baiddyas* relinquishing their profession due to the scarcity of once easily available plants. That in turn renders the local people to depend on other, especially modern (allopathic), systems of medication, and the resulting factor is professional detraction by the potential new *Baiddyas*, and the intergenerational practice of imparting knowledge at the family level is being lost. With the diminishing of plant species, the number of *Baiddyas* enriched with herbal knowledge and other *Tantras* and *Mantras* are lessening, and of course the associated valuable traditional knowledge, which is largely undocumented, is vanishing away.

❖ *Collaboration between the community organization and the NGO or development organization creates synergies*

Field experience from the two projects demonstrates that benefits derived from the collaboration of NGOs with the community organizations (LEAF implementation partner NGO, LUSTER with 'Laxmipur Kholabaria Oushadi Krishak Samity' and SEMP-IUCN's implementation Partner Organization, BCAS with the VRMC at Madhumati Floodplain) were, at the individual (farmer or homestead growers) level, an increase in agro-forestry (especially medicinal plants) production, and at the group level, improved capabilities to lead development activities. The VRMC committees at Madhumati Floodplain now develop their own APO (Annual Program of Operations), which was learnt from the guidance of and collaboration with the NGO (BCAS). It is expected that once the project winds up its operation in 2006 the committee will practice

the learned policies and plans in order to implement their programs and actions. Similarly, the local medicinal plant farmer institution (*Oushadi Krishak Samity*) at *Natore* had their constitution, operational policy, marketing strategies, and other bargaining policies developed with the collaboration and active guidance of LUSTER. However, there are arguments that to develop enough self sufficiency and a stronger organizational base such organizations need prolonged support. Cramb & Culasero (2003), and Bolger (2000) argue that since development occurs in small, incremental, time-consuming steps, donor organizations need to consider whether to spread support over numerous endeavours or concentrate their efforts into a few promising initiatives. Self-sufficiency will rarely be attained within three to five years of support; longer time frames of ten to twenty years must be accommodated to produce long lasting effects.

❖ ***Farmers themselves can take responsibilities as actors rather than beneficiaries***

Meanwhile, there is a difference in the collaboration procedure of SEMP and IC-LEAF. In the SEMP project, the VRMC was formed by the project itself. Unlike SEMP, at *Natore*, LEAF did not form any local organization of the farmers, but instead associated itself with the pre-existing farmers' organization. As per IC experience, they believe 'farmers groups or associations formed by projects are seldom self-reliant'. These associations last for only as long as the project because they have been established with a top-down approach. Their cohesion and motivation often lie in financial and material considerations. The implementation of an extension system has to consider the challenge of sustainability in relation to the level of the self-reliance of farmers' groups. So, collaborating with existing farmers' dynamics (in the case of the *Natore* site, the '*oushadi krishak samity*') was considered a better alternative.

A completely bottom-up approach was followed as the means of collaboration by LEAF in *Natore*; the following is the *modus operandi* of that NGO-farmer collaboration:

- Collaboration is made on the basis of farmers' needs not as per the project agenda.
- Activities encompass both technical issues and socio-economic development.
- Farmers' capacities are developed and recognized in needs diagnosis, planning, implementation, follow-up, monitoring and evaluation.

- Farmers are encouraged to be the principal actors of their development and to take the lead in joint activities. (For example, in almost all the community meetings of LEAF, the implementing or partnering NGO facilitator hardly speaks; rather, they facilitate the meetings and the farmers do most of the speaking, giving advice or directing his or her group members, as shown in figure 4.12.)

Thus the farmers become the actors involved in the project program and contribute to the development and adjustment of the concepts, approaches, methods and instruments of the project in order to make them applicable. In some instances, farmer organizations bear partial operational and adjustment expenses. Therefore, the approach used by the development agency (IC) to work with the community organization has enabled the farmers to convert their status from 'beneficiary' to 'actor', which has a long term implication for their self reliance, just as the project indicates.

❖ *Homestead production of medicinal plants play a significant role in the livelihood of the landless*

The CBOs and members of both LEAF and SEMP project areas are small and poor farmers and households. Medium or larger farmers are also represented in the groups but to a lesser degree. In both the projects the needs of these poorest are taken sufficiently, or specifically, into account. As they are landless, there is little scope for agro-forestry; homestead gardening and plantation are promoted by the projects. With the support of the implementing NGOs, the farmers and households developed strategies to use all the possible resources of their homestead to fight poverty. This indicates that the concept of agro-forestry promotion should be changed to that of homestead resource management, as it is more applicable to the communities where many people are landless, i.e. left with only the homestead. In this regard, better assistance should be given to the extreme poor, who are more concerned with getting immediate income than in investing their time and money in activities with mid-term returns. The experiences of initiatives undertaken by such development support agencies as LEAF and SEMP with extreme poor groups, though, indicate this is still at an early stage. While the people indicate that they accept agro-forestry or medicinal plants plantation to fight their

poverty, they still prefer to start with activities giving quick cash because they have day-to-day survival problems. Examples are obvious from both the study sites as it was found that all the species they are planting or cultivating are of short-yield variety. For example, once mature after 8-10 months, *aloe vera* leaves are harvested every 15 days. *Shotomuli* too can be harvested at the period of financial need after it reaches maturity, and interestingly all the 8 species in cultivation at *Natore* have a harvesting time of around 1 year or less.

❖ *Gender promotion is crucial for the sustainable livelihood of the resource poor*

Gender mainstreaming and empowerment have now reached the farmer level. Since the level of discrimination against rural women both in their family and community is particularly significant in Bangladesh, both the SEMP and LEAF projects gave a priority to the empowerment of women as an initial step so that gender balance could be ensured and the women could become equally active. It was evident from the formation of SEMP's VRMC committee that in most of the committees, the leaders are women. Similarly, in the LEAF intervention areas in *Natore*, the local promoting NGO, LUSTER, promoted a policy of 'gender focal points' where NGO staff and female villagers had a good predisposition toward promoting gender balance at the local level. Earlier in the medicinal plant-producing community at *Natore*, most farmers were male, but with the intervention of LEAF, the number of female members has increased significantly and most of the homestead plantation initiatives are being implemented by the females. The project experience has also shown that the female-driven growers or farmer households are gaining self-sufficiency at a faster rate than the male ones because they are prone to savings and keener to reinvest to augment their resource base.

❖ *Community participation is a must for effective medicinal plant conservation and promotion*

In SEMP, the approach to conservation of medicinal plants was participatory. The project was not only based on community knowledge but also tried to make it a community driven initiative, involving the local people of the sites. IUCN, one of the SIAs of SEMP, reported that the overall response to the promotion of medicinal plants at

the SEMP floodplain project sites has been promising. Both common people and herbal medicine practitioners showed enthusiasm in the inventorying of the medicinal plant species of the project sites, as well as the identification of their abundance and threats to their status, and they proposed possible conservation interventions and the promotion of medicinal plant use in a sustainable manner. In Madhumati floodplain, it was observed that the community was involved in the process of conservation from the inception of the project, focusing on experience sharing led by the traditional healers and on reviving their socio economic standing in the community. Moreover, the project maintained a register for each of the central nurseries, including the names of the beneficiaries, their addresses (village, union), plants or plant parts requested, purpose and the advisor (self, family member, *Kabiraj*, etc.). Thus that register book provided a wealth of information from the community on medicinal plants. Moreover, a community register with proper documentation can play an important role or work as a vital document for ensuring property rights and claiming patent rights.

❖ ***Market Linkage is an important precondition for promotion***

Lessons from all three sites indicate that market linkage is an essential step for reviving the practices of herbal medicine and should be achieved through commercial scale production, value addition and effective marketing. The current scale of production, as observed in both the Madhumati floodplain site and in *Natore*, is not adequate for commercial purposes and therefore fails to serve the local market demand for important medicinal plant species, with the significant exception of *aloe vera*. Against this backdrop, a detailed assessment of the potential land availability for medicinal production has to be conducted. In this regard, the LEAF initiative of medicinal plants plantation has set a precedent in finding and assessing fallow or barren lands around homesteads and motivating people to grow or cultivate selected medicinal plant species with commercial demand. LEAF also undertakes the responsibility of finding buyers for those producers since it believes that with the generation of revenue from a non-productive land resource people will be motivated towards plantation and conservation, and the sustainable use of these plant resources will be enhanced in the process.

❖ *Producers and collectors of medicinal plants need to be linked to marketing and management*

The primary producers lack knowledge on marketing and management-related affairs and it would not be fair to assume that they would be good at understanding all aspects of business, from production to marketing and selling of goods. Their bargaining capacity and ability to develop and maintain relations with buyers have to be facilitated and fostered by an honest third party or institution engaged in community development, resource or environmental management. A simultaneous achievement of biodiversity conservation and poverty alleviation in the communities with resource scarcity and limited education is indeed a challenging task, and therefore needs consistent organizational support for incremental capacity development. A fair business partnership with the user groups, by employing third party mediation, can be an effective approach to addressing such weaknesses; therefore facilitation for the long term is needed.

6.6 Management Policy and Strategy Options

Discussions with the private sector entrepreneurs, specialists, representatives of international aid agencies, respective government functionaries, key executives of NGOs implementing medicinal plant projects, and the lessons learnt from this study imply that fleshing out strategies to manage the medicinal plant sub-sector more holistically and with the participation of stakeholders at all levels is needed at this time. As there are institutions present at the national level, district level, *thana* and *union* level, the potential roles that these institutions can play at different levels to upgrade the medicinal plant industrial sector through various possible ways are chalked out below:

6.6.1 Multi-stakeholder body or Medicinal Plant Forum

As identified earlier in this chapter, there are a number of different associations, agencies, NGOs, universities and international aid institutions that are interested or already operating in the medicinal plant sector, but effective communication and networking is evidently absent, i.e. a common platform for all the stakeholders to address medicinal plant-related affairs is non-existent. The nature, dimension and role of the different institutions directly or indirectly involved in the implementation or operation of

the three intervention projects, and the cross-scale linkages of the institutions involved in LEAF and SEMP projects, reveal that there is little communication between the different strata of the medicinal plant sector. Again there is no cohesive relation or productive network among the actors in different stages of the industry value chain who are engaged in medicinal plant production and the processing of plant-based materials. For example, primary producers and collectors are often unaware of what the commercial sector requires, while the processing sector is often relatively disconnected from the production potential and the resources in the field.

Considering this context, it emerged from the discussions that, in order to overcome these weaknesses in communication between sectors, a Medicinal Plant Forum needs to be established. As a matter of fact, out of its direct field experience with stakeholders at different levels, IUCN first raised the need for constituting such a forum. IUCN also suggested for subgroups under that forum because of the varying nature of the different sub-sectors within the medicinal plant sector.

The purpose of the forum would be to enable players to exchange ideas, understand each other's roles, reduce duplication of activities and, above all, be able to chart out priorities and develop an action plan for the development of the medicinal plant sector. Thus, such a Medicinal Plant Forum could play a pivotal role in implementing the government strategy for the promotion of herbal medicines and it could address the need for the various productive actors of the sector to understand each other's roles and to respond to the true needs of the industry.

Meanwhile, as suggested by IUCN, the forum should have sub-groups based on the specific needs of the sector. These sub-groups, however, could be formed into task forces, as mentioned by Intercooperation (IC). Therefore, in line with IC suggestions, this study also supposes that the formation of five such task forces, constituted by institutions located at different scales, would be instrumental in managing the medicinal plant sector more holistically and efficiently. The suggested task forces are:

1. Medicinal Plants Germplasm Taskforce: The institutions that have expertise in Botany and germplasm (seeds and seedlings) development can form this task force. The Bangladesh Council for Scientific and Industrial Research (BCSIR), the Bangladesh Forest Research Institute (BFRI), the Botanical Society of Bangladesh and Bangladesh

National Herbarium (BNH) together can be included in this body. The core function of this taskforce will be to work for the development of germplasm of improved variety of medicinal plants.

2. Medicinal Plant Cultivation Task Force: Such a task force can consist of the Bangladesh Forest Research Institute (BFRI), Grameen Krishi Foundation (GKF), LEAF, Bangladesh Rural Administrative Council (BRAC), German Technical Cooperation (GTZ), Bangladesh Agricultural Research Council (BARC), and the Department of Agricultural Extension (DAE). The focus and core objective of this body will be to develop specific and organic standardized cultivation and harvesting methods and protocols. One of the most important tasks of this body can be to establish WHO guidelines and Good Agricultural Practices (GAP) in medicinal plant cultivation at demonstration plots in order to show "how" to the existing and potential farmers or industrial-scale cultivators.

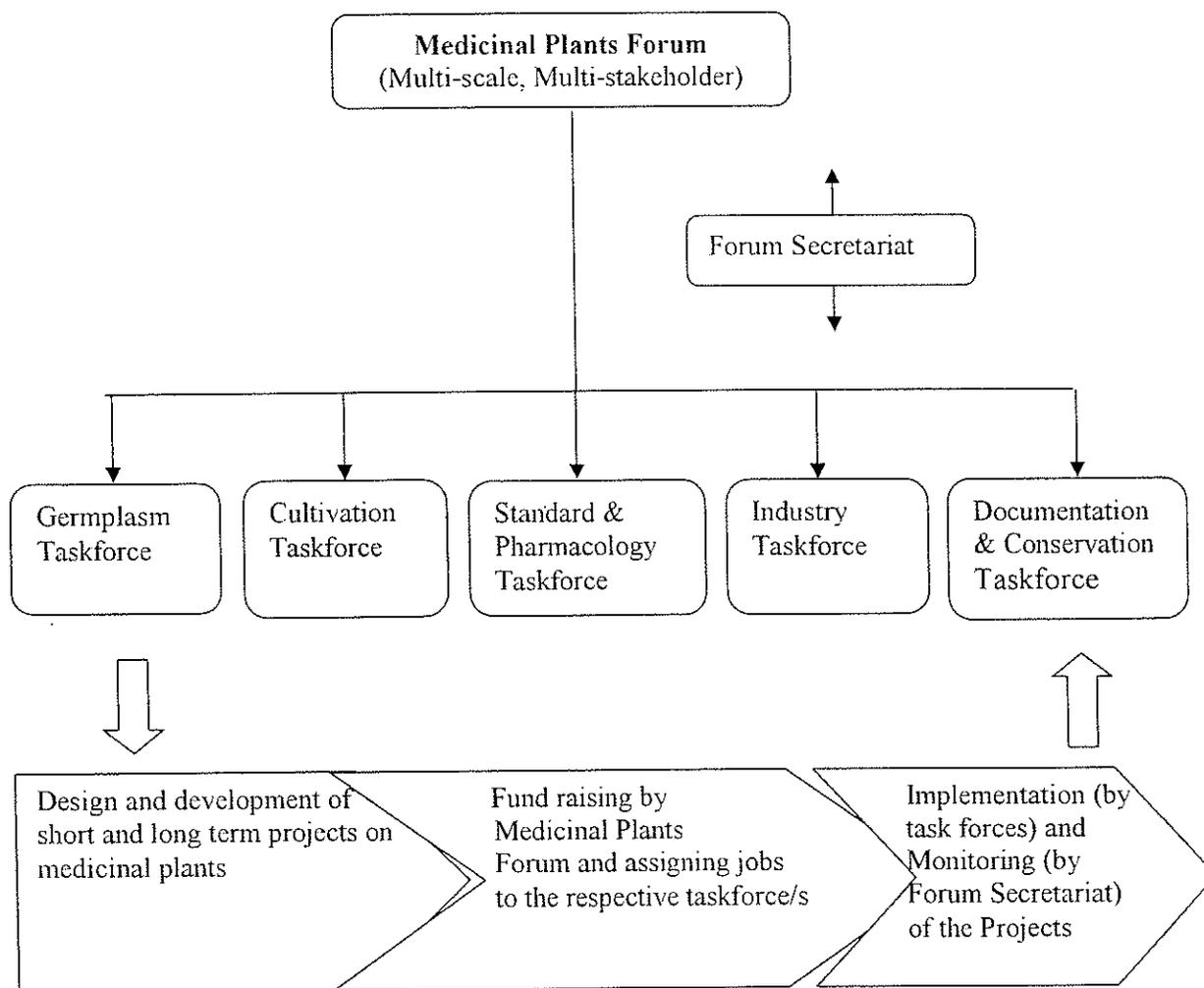
3. Medicinal Plants Standard and Pharmacology Task Force: This would be basically a laboratory oriented body. The main purpose of forming such a task force will be to accomplish phytochemical analysis, and determine the active ingredient in processed and semi processed plant materials and thereby establish the standards. Universities (such as Dhaka University, Agriculture University, Chittagong University), the Department of Chemistry, the Botanical Society, and BCSIR can form such a body.

The pharmacological and medicinal uses of the plants are evolving processes. These organizations along with the Department of Pharmacy, the Drug Administration of Bangladesh, and the Institution of Nutrition and Food Science can look after the pharmacological aspects as well as the medicinal use of the local medicinal plants.

4. Medicinal Plants Industry Taskforce: This task force will mainly focus on establishing guidelines for the manufacturing of natural products, public education, safety, pharmacovigilance, and exploring ways to create a national and international market for locally produced products. This taskforce could be formed with herbal processors and industries interested in the manufacturing and marketing of natural products, such as Hamdard Laboratories, AP, Kazi and Kazi, Square Pharmaceuticals, Jayson Natural Products, etc.

5. Medicinal Plant Documentation and Conservation Task Force: The primary focus of such a taskforce will be to identify, enumerate and document the medicinal plant species. At the same time this task force will work at conserving the traditional knowledge on medicinal plants and their use. This taskforce will also recommend the site and species-specific conservation policies.

Chart-6.6: Proposed Medicinal Plants Forum



Subsequent Tasks

As per Intercooperation’s suggestions and as this study proposes, after establishing the Medicinal Plant Forum and the aforesaid task forces under the forum body, a secretariat should be set up to operate the forum. It would involve a core of active participants with an outer network of interested parties. An important element of the Forum will be to keep

all the parties informed as to developments, ideas, interventions and activities. An effective secretariat will need to disseminate the minutes of any meetings of the forum not only to the active participants but also to other interested parties.

The Forum should be encouraged to identify and prioritize potential short-term interventions, as well as create a longer-term vision for the medicinal plant sector. Once a shortlist of potential short-term interventions has been identified, a study could be organized to recommend which of the short-term interventions are likely to be the most cost-effective and which could produce relatively rapid and effective results and that would meet the longer term programs needed to pilot ideas and create effective networks.

6.7 Summary

Different institutions play their role to different extents in managing medicinal plants resources at different strata of the industry. However, the findings show that the institutional arrangement to manage medicinal plant resources through a holistic resource management approach is not yet in place. In two of the studied projects out of three, there are local level institutions, one formed by the communities themselves while the other is developing with the active guidance of SEMP project personnel. These organizations basically act within their own peripheral boundaries and have no strong connection with institutions at broader geographic levels. The local institution at *Natore* is virtually working as a sales regulatory body, with no major drives in capacity building, in improving process development or in enabling the market situation. On the other hand, the fate of the SEMP-initiated VRMC is uncertain since in most cases the project-initiated organizations are abolished after the project wraps up its operation. Different NGOs, development agencies, and sectoral associations work for the development of the medicinal plant sector. Their activities and the nature of operation are mainly either site-specific or species-specific (such as the CHT medicinal plant projects and Bangladesh Neem Foundation). Effective coordination or networking among them for the sake of the development of the overall industrial sector is not in place. There is no government agency or body that exclusively deals with medicinal plant resources. Though a good number of government institutions are dealing with the plant genetic resources, there is

no specific policy guideline as to how medicinal plant resources will be managed and by which organization and to what extent. Thus there is an obvious institutional vacuum with regard to medicinal plant management, the plant-based industry and sector development in addressing the respective industry issues holistically. Moreover, the lessons learnt from studying the intervention projects, the herbal market, and the institutions imply that for the sustainability of the medicinal plant sub-sector and as a precondition for conservation and sustainable utilization, participatory management consisting of stakeholders from all levels is the right approach. The formation of a Medicinal Plants Forum comprised of a core representation of the stakeholders could be the most suitable strategic option under such an approach.

CHAPTER SEVEN: CONCLUSIONS

Based on its objectives, the research was subject to examining several key aspects concerning medicinal plant management and marketing: the threats to medicinal plant resources and conservation initiatives that help combat those threats and enhance livelihoods, primary healthcare and the environment at the local level; the medicinal plant-based market system and value chain; and the institutions concerned with the medicinal plant management process at various scales. The observations and findings on all these aspects were elaborated in chapters four through six, based on understanding gained through the case studies, the market system and value chain analysis, and institutional settings. Having comprehended such a diverse array of issues, the research indeed had a limited focus on institutions, but it did adequately delve out the relevant management scenarios and institutions to address the objective in a significant manner by examining a sectoral management strategy option. However, this chapter concludes the research by highlighting the comprehensive understanding gained from the study in a concise manner and by recommending specific tasks and future research needs for managing and conserving the medicinal plant resources.

7.1 Overview

It is well known that medicinal plants play important roles in ecological sustainability, livelihood improvement, and economic development. In Bangladesh this importance has been realized in recent times and therefore the promotion of medicinal plant species has only recently been recognized as one of the priority domains of intervention. Planned or commercial production of medicinal plants was virtually non-existent in Bangladesh or in some cases it was developed to only an insignificant extent. Forests or other natural ecosystems provide around 90% of the overwhelming bulk of the medicinal plants used as raw materials, mostly in traditional systems of medicines, whereas some local and modern systems of medicines barely depend on consuming them.

There is a lack of diverse opportunities for income generation in rural Bangladesh. Livelihood revolves around agricultural cultivation and the exploitation of common property natural resources. As the over-extraction of natural resources poses a threat to biodiversity, reconciliation between income generation (development) and

conservation is deemed to be a realistic step to underpinning the goals of sustainable resource management and at the same time improving livelihood security. Therefore, the whole production to consumption chain of medicinal plants, which is dominated by an exploitative market mechanism, needs to be readdressed in such a way that an increased margin of benefit will promote the practice of sustainable yield from the primary collector producer level to the end user of medicinal plants.

With this view, the research was able to specifically focus on the challenges posed by the above problems and premises. Observation and participatory exercises in field sites and in industry clusters of medicinal plants were made to conduct the planned investigations. The field work for this research was carried out from September 2005-March 2006, and involved operational areas of three ongoing projects working on medicinal plants as the study sites. Besides, a survey was conducted with several wholesale and retail markets of medicinal plants, and with production sites and facilities of several micro, small and medium scale, medicinal plant industrial processors. Interviews, FGDs, observations, and other participatory techniques were followed as per the guidelines and methods of RRA.

The primary focus of the research was on the status of medicinal plants at the local level, where it examined the causes of threats to medicinal plant species and conversely evaluated the measures and initiatives to conserve them and the associated livelihood and economic implications of such initiatives. The case studies, i.e. the review of intervention project activities, provided the scope to understand these threats and measures. The research primarily observed that medicinal plants are diminishing from the natural stock due to unsustainable harvesting practices and unchecked or unaware activities. The initiatives of different projects in protecting these plant genetic resources as well as in creating opportunities to promote primary healthcare and income generating scope for the small farmers and virtually landless poor, particularly women, are indeed working as an effective approach to redress poverty and promote livelihood. Among the noteworthy steps to improve both the environment and livelihoods are promoting cultivation and homestead gardening of medicinal plants, and taking other *ex-situ* and *in-situ* initiatives to conserve the species in the project sites observed.

Notwithstanding, the primary production through homestead forestry and cultivation that has proved to be significantly supportive to the livelihoods of the extreme poor is not adequate in terms of industry requirements. Primary and secondary processing practices that are taking place at production bases are quite substandard and therefore need the serious attention of policy makers at different levels to upgrade the conditions. However, examples of standard processing and manufacturing practices are being employed by some of the leading herbal processors in the secondary processing level. The coordination of such processors and primary producers in terms of production, and management may create a win-win situation for them and synergies for both the environment and the economy.

Secondly, the research took a critical look at the existing market system, especially to map the medicinal plant value chain in function or place, which it did successfully by comprehending the entire market scenario and practices. By understanding the market system, value chain mapping and the analysis of the inherent constraints of the existing value chain and the SWOT of the medicinal plant sector all provided useful thoughts towards a participatory approach to the management and marketing of medicinal plants. The research found that the market for medicinal plant products in Bangladesh is dynamic, i.e. it is at a growth stage. Structurally it is diverse, involving petty collectors to big pharmaceuticals as industry actors, and commercially it revolves around a complex and precarious value chain. Primary suppliers and users are dependent on middlemen and intermediaries who hold ample scope to control and distort the market system. Though around 650 species are reportedly on trade in the herbal market of Bangladesh, the study found 27 species to be most commonly used, with an annual turnover of US\$ 3.72 million. The local supply of plant species is quite inadequate and only 12-15 species are commercially grown, while the rest are supplied either from wild sources or imported. The marketing mix of the herbal manufacturing companies is mainly formulated toward targeting the domestic consumer market. A few of the companies have recognized the export opportunities that exist in the global marketplace and therefore are revamping their marketing strategies to take part in the global herbal market. Under such a condition, the study comes up with suggestions for a market-oriented medicinal plant production and management approach through an industry-

community partnership that promotes livelihood security and environmental sustainability, offsetting the weaknesses of the existing medicinal plants value chain. Nexus within producer, processor, and promoter has been strongly advocated in order to eliminate the inherent constraints and weaknesses in the medicinal plants value chain as well as the industry. Besides, such a nexus will contribute to quality standardization, marketing and management efficiency, and conformity to the demands and standards (such as: Organic, Fair Trade, Eco Labelling) often set by the international buyers.

Thirdly, the research examined the institutional arrangements in the medicinal plant sector, where it identified the existing ones and their linkages and pointed out the options for furthering the institutional strengths from strategic and holistic resource management perspectives. Based on the project case studies, the research located different institutions and their roles in managing the medicinal plant sector at different spatial scales. Findings show that the existing institutional arrangement in managing medicinal plant resources is not adequate or does not conform to a holistic resource management approach. There is no government institution at the national level that exclusively deals with medicinal plant resources. In two of the studied projects out of three, there are local level institutions, one formed by the communities themselves while the other developed with the active guidance of project personnel. These organizations basically act within their own peripheral boundaries and have no strong connection with institutions at broader geographic levels. Despite this situation, there are no major drives by the sectoral or national level managements for capacity building of the institutions, process development or functional improvement, and for creating an enabled market situation. Thus there is an obvious institutional vacuum with regard to medicinal plant management, the plant-based industry and sector development in addressing the industry issues holistically. Against these backdrops, the research suggests the formation of a Medicinal Plants Forum comprised of core representation of the stakeholders from across the scales. As a common platform for all the stakeholders concerned, the forum will have a secretariat to function and a management body to address problems and issues relating to sectoral strategic management, marketing, and resource sustainability.

7.2 Recommendations- *Suggested Interventions and Research Need*

As a matter of fact, the medicinal plant sector in Bangladesh has been recognized as a priority domain of intervention. It can be termed as a thrust sector that needs intervention in different forms. Within its limited scope, this study was not able to expand its purview to investigate many other relevant aspects important for and associated with the medicinal plant sub-sector of Bangladesh, such as industry development, export potentiality, social intervention for medicinal plant conservation outside market interests, and species-specific feasibilities of medicinal plant cultivation. In depth research and analytical work on these aspects will certainly give a boost to the present thoughts and planning of the government to revamp the sector vigorously. However, further to the 3P-Nexus value chain model and the Medicinal Plants forum, as set out in this study as participatory approaches to the marketing and management of the medicinal plant sector, several generic interventions, thought out in light of the study, are suggested below. They can be carried out to develop the market system and overall sectoral management capacity. These are as follows:

- i. For medicinal plants to be conserved, *ex-situ* conservation measures need to be strengthened more besides the *in-situ* ones.

With the gradually degraded forest-cover and wilderness areas, the *in-situ* sources are almost exhausted or in an ecological limit, as was observed in CHT, and as reported by the *kabiraj* in the floodplains. Therefore, in order to enrich the species inventory, several *ex-situ* conservation strategies could be undertaken, such as community nurseries, botanical gardens, road side plantation, plantation around ponds and in the riverbanks, gene-pools, and germplasm centers.

- ii. Any conservation and environmental sustainability related programs at the community level should include livelihood improvement elements in order to be fully accepted and practiced by the poverty-ridden communities.

Lessons from both SEMP and LEAF projects insinuated that people are more interested in environmentally ameliorative activities when they see the underlying economic benefit in it. The diversity of medicinal plant species at *Natore* is becoming more enriched each

year as they that find new species enhance their income. Similarly, in SEMP, *kabiraj* and other primary healthcare-related professionals are interested in conserving and protecting the species through individual nursery raising and plantations to survive in their profession.

- iii. Incentives in line with access and benefit sharing, as well as intellectual property rights, should be declared or ensured for the *Baiddays* in the CHT region who are reluctant to pass on their traditional knowledge, and are not cooperating in documenting the healing properties and medicinal values of the plants they practice with.

Baiddays need to be motivated and offered tangible benefits so that they become prone to sharing their knowledge publicly. For example, a product discovery competition for a particular disease can be held at the *Upazilla* or *District* levels in CHT. Awards and prizes including a good amount of cash for the top formulation or formulations will certainly motivate them to unfold the treasure of knowledge that is diminishing.

- iv. The development, articulation, and dissemination of medicinal plant-based information to the potential producers and communities will be extremely helpful for the growth of medicinal plant sector.

In the proposed medicinal plant forum, there should be an information bureau within the forum secretariat with a major task to recognize the production, cultivation, and industrial opportunities of medicinal plant species. Of special focus should be livelihood supportive, short cycle species. The study has indicated that there are at least 27 products (*see Appendix-1 for product list*), for which long-term market opportunities exist. Now segregation is needed as to which of these products are to be selected and promoted strongly. From the trade interviews and from the study of Dixie et al. (2003), it was found that among these there are 6 products (*Arshwagandha, Peepul, Bahera, Dhaifful, Bhui-Kumra, Mouri, Sarpagandha, Shotomuli*) that are mainly (80% or more) imported from neighbouring countries and some 8-10 products are partially imported, i.e. sourced from both foreign and local sources (like *Ada, Amloki, Haritaki*, etc.). The rest are locally produced and the supply comes from local wild collection, cultivation, and homestead production. Therefore, species-wise production, marketing and environmental

feasibilities should be conducted and comprehensive information should be disseminated to the potential growers on those species that have the feasibility of being grown on arable land and, on the other hand, those that are likely to be suitable for improved production in homesteads, field edges and small portions of land. The lessons from India and China, which are advanced in the production of medicinal plants and the manufacturing of herbal products, might be useful in this regard. SEDF (2003) also suggested that the key elements in the short term are the identification of suitable agro-climatic locations, the selection of improved planting material and the development of agronomic practices, based largely on the existing experience in the Indian subcontinent. Such potential products, those which can be grown in field and homesteads and also are short-cycle, include *Arshwagandha*, *Dhaiful*, *Peepul*, *Kalomegh*, *Shotomuli*, *Shimulmul*, *Sarpargandha*, *Jain* and *Cheerota*.

- v. Commercialization for the selected, most used medicinal plants; production has to be streamlined in order to release pressure on the wild sources. Of special focus should be creating export opportunities for those commercialized products, as the local demand can be saturated due to over production.

The wild harvest of medicinal raw materials in Bangladesh is unsustainable. In the longer term, more commercialized production of these products is necessary because commercialization will encourage local production in the fields or homesteads and that will eventually lead to reduced stresses on wild sources for the cultivated and homestead grown species. With a view to that, once adequate information is gained and the feasibility study is done, as mentioned above, elite plant material has to be propagated, and field trials (preferably on-farm) are to be carried out to refine the “best production practices” and prove the financial opportunities offered by individual crops to the potential growers and cultivars. This should be done apart from selecting suitable production locations (such practices have been done by BAI, DAE, and BAU in the case of many agricultural crops like paddy, sugarcane and maize through employing model cultivation, and adopting those model cultivation procedure might be useful in the case of medicinal plants). Under the proposed medicinal plant forum, the sub-forums on cultivation and industry, i.e. ‘cultivation task force’ and ‘industry task force’, should

undertake this responsibility. However, such a program has to take into account several important things like: i. determining the active ingredients of field produced products, ii. the use of organic seed and planting materials, iii. the use of organic manure, and iv. adopting GAP and GFCP, as the demand from the export market puts special emphasis on such production practices. Such export-oriented production practices should be adopted because local demand for particular species can be saturated at any time with the increased production, e.g. *aloe vera* (if processing technology is not introduced and value addition does not occur for product diversification, then based on the demand from only the local sherbet market, further expansion of *aloe vera* production is not feasible). The assistance and cooperation of NGOs, agricultural extension officers, *Beparies* or agricultural departments within the herbal sector can be instrumental in disseminating these practices.

- vi. Establishment of primary processing centers at the medicinal plant-intense areas and cultivation zones, especially for drying, storage and packing, as per pharmacological and scientific procedures is crucial.

There is a clearly identified need for improvement in the primary processing carried out by *beparis* and their collectors. For the trading of primary processed materials, certification on primary processing from respective primary processing center should be made mandatory. However, at the initial stage, such a primary processing facility should be subsidized by the government or a relevant body to encourage better practices by the *pikers*, *beparies*, growers and farmers involved in primary processing because they may not turn up to spend extra processing cost when they can do it on their own following traditional methods (which are sub-standard).

In addition, as advocated by the research, closer linkages between cultivar communities and processors through 3P-Nexus will facilitate the better supply of the raw materials that the processors require, and of the quality and quantity they demand. Elements in this program would involve providing training to growers, collective community growers, and their employed labours. The training program should consist of plant identification, appropriate drying techniques, grading, storage, and packing. This training could be provided under the auspices of 'Honest Broker' (mentioned in the 3P

Nexus Model) or one or more of the medicinal plant processor associations. Also, by working through the associations, support and technical assistance can be provided to processors on such issues as factory layout, operation, products, storage and hygiene.

For example, the need for establishing a primary processing center can be called a crying necessity, especially in the 'oushadi zone' at *Natore*, as the plant materials are currently being processed in quite a substandard manner. IC (2005) suggests the usage of a 'purpose built drying facility' where the BCSIR or BFRI can be contracted to design and build an economical drying device, suitable for milling and packaging options. Financial organizations like Grameen, BRAC, and BASIC Bank can be contacted to establish such a processing center.

- vii. In the secondary processing level, a scientific extraction mechanism should be developed by the processors and product manufacturers.

For the marketability of herbal products, it is crucial to provide capacity building in scientific extraction technologies for the extraction of the raw herbs to use in liquid products and for making dry extracts to use in tablets and capsules. Besides, upgrading management and production standards through HACCP and ISO implementation is strongly recommended for the medium scale secondary processors in order to achieve operational efficiency. Several manufacturers like Modern and AP have already recently adopted such technologies and attained such management and production standards, which the rest of the companies in the industry now need to follow.

- viii. A quality control mechanism needs to be designed whereby the products that the industry produces are monitored to ensure that they contain the specified amounts of medicinal plant materials and have the same active ingredient level.

BSTI (Bangladesh Standard Testing Authority) can conduct this testing if equipped with the necessary testing instruments. Besides BSTI, if the proposed medicinal plant forum is established, the 'standard and pharmacology' task force can be equipped with the necessary technology and authorized to issue product standard certifications based on the material content and manufacturing standard.

- ix. In the case of solely organic products and fair trade practitioners, there should be documentation to ensure full traceability and fair trade certification.

In Bangladesh a new herbal processor, Kazi and Kazi, claims to be producing organic herbal materials and practicing fair trade as it aims to enter into the export market for herbal products. Therefore, in order to gain global competitiveness, it is recommended that herbal product manufacturer adopt the following:

Traceability with Eco- labelling- Apart from its importance in quality improvement, it will increase the marketability of medicinal plant-based products. It includes documentation to ensure full traceability from germplasm to packaged dried plant materials, extracts or finished product. It needs to include internationally recognized organic certification wherever possible, and a certification of analysis from the concerned body (i.e. BCSIR) listing the moisture content, the level of heavy metals, pesticides, herbicides, moulds, fungi, aflatoxins and the level of active compounds according to international pharmacopoeial standards (IC, 2005).

Fair Trade Certification- FLO guarantees that products sold anywhere in the world with a fair trade label marketed by a National Initiatives conforms to fair trade standards and contributes to the development of disadvantaged producers and workers. The companies can obtain Fair trade certification by applying to one of the internationally recognized organization for Fair Trade (Fair Trade Labelling Organizations-FLO) or <http://www.fairtrade.net>, a worldwide Fair Trade standard setting and certification organization. Similarly, there are organic certification bodies like INDOCERT, JAS, NOP, SECO, etc. Such certification practices are already in place in the case of many North American products (e.g. Starbucks Coffee).

- x. A list of species that have proven to be supportive to the livelihoods of the extreme poor owning virtually a homestead or a meagre piece of land should be developed and extensively promoted by the intervention projects in suitable agro-ecological regions and communities.

Based on this study experience, the following species are playing an important role in supporting the livelihood of the extreme poor and can be even grown in the homestead of the landless and will yield a significant amount of cash return:

Arshwagandha: As per the forecasted demand, the market for *Arshwagandha* is growing by 20% annually and could constitute a million dollar market for this species by 2010. It is one of the common and major species being used by all types of herbal medicine processors. At present 95% of this species is imported (SEDF, 2003). As experienced in the LEAF *Arshawagandha* pilot project, it is showing good promise for being grown commercially in the North Western regions of Bangladesh. Poor people even owning only the homestead can plant or cultivate it to have a cash benefit after eight months. Apart from the roots, its leaves, fruits and seeds are also marketable. A large scale production will not only contribute to substituting for national import but also offer potential export.

Shoto-muli: It is the most suitable species to be grown in a homestead. As trade interviews showed, most of the quantity, around 90%, is imported and the market size is growing by 19% annually; this product can be recommended for development. Moreover, observation and case studies in *Natore* showed that homestead cultivation of *Shotomuli* is already contributing to the livelihood of the resource-poor to a significant extent.

Aloe vera: The market for *Aloe vera*, though limited to local sherbet market, is likely to be diversified as demand has been placed by some herbal processors who plan to produce cosmetics with the exudates of *Aloe vera* leaves. Therefore, opportunity exists for producers. Experience from *Natore* showed that it is the favourite species for both homestead and field growers, as after eight months they can yield leaves every 15 days. However, an improved variety of seedlings and organic cultivation practices (since at present chemical fertilizer is used) can further augment the benefit to producers.

Peepul: The demand for *Peepul* is high among the herbal processors and it is increasing by 20% annually. As the major quantity, around 90% (as found in the trade interview), is imported this product was also recommended for development. It is suitable to be grown in a homestead or small piece of land. Good productivity per decimal, with a cropping period of around 10-11 months and the high market value of the yield, will certainly make it an attractive species to the small growers and producers.

Ada (Ginger): It is one of the common species being used and is the 2nd largest product in the markets both in terms of volume and quantity. Other than its medicinal use, it is used as a spice as well. At present more than 60% of the market requirement is imported. This has a harvesting period of 8-10 months and also can be grown in homestead or small piece of land. However, better and organic cultivation procedures should be followed for domestic producers to gain a better market price.

Besides Arshwagandha, Peepul, and Ada among the top ten species, *Amloki* is the most used and most demanded in the market. It has a longer harvesting period and is not feasible for small growers who expect cash return after a relatively shorter period. The agro climatic suitability of Bangladesh is not very favourable for growing *Haritaki* and *Jain*. The production of *Bahera and Mutha* has already just about matched the domestic demand and it is not recommended to be grown commercially by the small scale producers. *Belshoot and Bashak* are the other top species in demand by the allopathic companies. Commercial scale production can be tried on a pilot basis.

However, the observation of this study has not been adequate as it is of limited scope, and therefore, I believe further observation through pilot initiatives could find out more on a number of species that could be grown by the resource-poor in their homesteads and eventually benefit both their livelihood and the environment.

- xi. To support the ecological sustainability of the country, the 'Medicinal Plants Conservation Act' should be placed into effect by the government of Bangladesh soon.

Upon the formulation of rules and regulations that will enable resource and environmental management authorities to redress the existing unsustainable practices taking place in the case of wild collection, the proposed medicinal plants conservation act can protect medicinal plant species from vanishing from the wild and thus enhance the biodiversity situation.

7.2.1 Social Intervention

Other than state level policy intervention and promotion (such as SEMP) and initiatives by development organizations (such as IC-LEAF), other organizations serving to better the environment and promote primary healthcare can play a significant role in the conservation and promotion of medicinal plant species. In Bangladesh, most initiatives to promote medicinal plant species have concerned livelihood and market interest, albeit there are examples outside market interest, where medicinal plants are being conserved and promoted out of social responsibility. The cases of *Gono Ummayan Prochesta* (Community Development Endeavour), and *Gono Sastha Pharmaceuticals* are of two NGOs that are maintaining large medicinal plant gardens with a good number of species. The *Gano Ummayan Prochesta* was found to maintain a charitable herbal clinic by employing qualified *Kabiraj*, whereby a good number of people of that particular area (*Rajoir Upazilla*) are receiving free primary healthcare. The most famous and one of the leading literary person in contemporary Bengali literature, 'Humayun Ahmed', is maintaining a large medicinal plant garden with more than 350 species for the sake of conserving the rare species and to create awareness among people about the importance of medicinal plant species and their conservation. UBINIG (a research organization), and DEBTEC (a NGO) promote and conserve medicinal plant species as their mainstream activities.

Therefore, apart from the interventions mentioned above to strengthen the sector, further research should be conducted to signify the above examples and thereby to find out what role society can play in conserving and sustaining the medicinal plant species in the form of the following initiatives:

Personal initiative- As part of the social responsibility and ethical commitment to the environment and the community, individual initiative in planting medicinal plant species and helping protect the existing ones for their sustainability as well as the environment, can significantly improve the conservation situation.

Community initiative- There are social cooperatives in rural Bangladesh in almost each and every village concerned about the societal interest outside the market-oriented concerns. Such cooperatives, and/ or community-based organizations, once they are aware of the significance and status of the medicinal plants, can also play an important

role in conserving medicinal plants in their respective localities through planting, protecting, and promoting these.

Initiative by Charity organization- Charity organizations devoted to the well being of human beings can undertake the responsibility of promoting medicinal plant gardens at the community level. Apart from primary healthcare services and the dissemination of free herbs to the patients, such an organization can disburse free seedlings or saplings to people and assist in planting or cultivating medicinal plant species in their homestead or field.

Educational and religious Institutions- As part of a social and environmental campaign, educational and religious institutions can undertake a medicinal plant conservation initiative through various programs and can establish a medicinal plant garden in their compounds.

National Movement- In Bangladesh there are many government initiatives for tree plantation like '*National Tree Plantation Week*' and '*Campaign for Tree Plantation*'. A similar movement can be implemented in the case of medicinal plant plantation such as national medicinal plant plantation week or fortnight or month, and a campaign for planting medicinal plants.

Finally, traditionally in Bangladesh (especially in rural Bangladesh), *Samaj* (a local corporate group based on kinship and patronage), as termed by Haque & Zaman (1989), can play a significant custodian role in conserving and protecting common properties natural resources. As it (*Samaj*) is the primary arena within which members interact most extensively and are mutually involved in social and ceremonial networks (Haque & Zaman, 1989), this *samaj* can raise its voice and extend its role against the destruction of useful medicinal plants from open access areas. For example, the tribal headman, or *Shamam* in CHT areas can advise his community members not to indiscriminately destroy plant species which are becoming rare and have useful medicinal properties.

Similarly, the emergence of *Vadrasantan*²³, as termed by Ahmed (1987), in the

²³ educated, socially conscious, and knowledgeable person whom the other members of the community or *Samaj* consider as a think-tank

post colonial era, after the usurper of *Zamindari* system, who usually contributed significantly as opinion leaders to shape up the characteristics of their respective society or *Samaj*, can be seen as a blessing for local natural resource management and related decisions. In most cases, these *Vadrasantans* advise their neighbours and community people on activities (do's and don'ts) and practices on resource management and utilization.

However, rather than being presumptive as to what role the *Samaj* and those *Vadrasantans* can play in protecting the environment and in facilitating the sustainable use of medicinal plants, further study would be an appropriate approach to bring forth new and useful ideas. The inclusion, participation and contribution of the traditional social structure (*Samaj*) and the direction or contribution of the opinion leaders (*Vadrasantans*) might open up new horizons or add to the process of environmental governance in terms of biodiversity conservation and the sustainable use of natural resource management; the provided research should examine the pros and cons of such thoughts.

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APPENDIX-1

YEARLY INDUSTRY VOLUME OF MOSTLY USED COMMERCIALY IMPORTANT 27 SPECIES

	Medium						Small							Micro											
	1	2	3	4	avg. med.(K g/yr)	total in MT	1	2	3	4	5	avg. small Total 6 (kg/yr) in MT	1	2	3	4	5	6	7	avg. micro Total 8 (kg/Yr) in MT					
Ada	7,920	6,400	8,908	7,200	7,607	137	2,400	2,180	2,060		1,560	1,920	1,687	194	882	617	1,191	794	1,014	960		838	960	221	
Amioki	11,480	9,778	9,454	10,804	10,379	187	3,600	2,701	2,701	2,520	3,026	4,051	3,100	356	1,350	960	1,823	1,215	1,553	1,148	1,080	1,320	1,306	300	
Anantamul					0	0		172		178	150	162	110	13	80	96			88			34	37	9	
Arjun	4,800	5,760	3,300	6,460	5,080	91	2,040			1,920	1,684	1,672	1,219	140	720		840		744			984	411	95	
Arshwagar	3,840	3,720	2,675	3,600	3,459	62	1020	1560	1056		1500	1,380	1,086	125	382		516				325	229	363	227	52
Bahera	8,400	7,500	7,200	8,580	7,920	143		3,060	3,204		3,180	3,540	2,164	249		912	920	1016	900	924		832	688	158	
Basak	2,782	2,628	2,936		3,120	56	1080	1200		1140		1272	782	90		300	624		600			480	251	58	
Bel Shoot			6,780	8,640	3,855	69	3,096		3,108		3228		1,572	181	1380	1332		1104	960		624		675	155	
Bhuikumra		4,032		4,944	2,244	40		1668		1188	1068		654	75	360		408		672		396		230	53	
Dhaifful	6,720		6,000		3,180	57	2400		1908			1,440	958	110			816	696		884		374	346	80	
Ekangi					0	0	252		276		204		122	14	84	54		42	60	48	36		41	9	
Haritaki	7,814	6,960	7,500	7,354	7,407	133	2,016	2,028	1,992	2,340	2,780	2,758	2,319	267		1344	1,356		1,524		1016	876	765	176	
Jain		10,800	2,400	10,500	5,925	107	2,640	3,060	3,660	2,652	3,672		2,614	301	1,476		1,464	1680		960	996	1236	977	225	
Kalajira		720		504	306	6	300		264		240	240	174	20		41		60	72	96	108		47	11	
Kalomegh	2,520		2440		1,240	22		720		600		480	300	35	240	168			300			144	107	24	
Methi					0	0	60		48		72		30	3		6			12	24	36		10	2	
Misridana					0	0		336		360	480	348	254	29	192		180	132		120		156	98	22	
Mouri			2040		510	9	1140		1200				390	45		192		172	144		240		94	22	
Mutha	5,040	6,480	6,000	5,400	5,730	103	1,800	1,920		2040	2052	2,880	1,782	205	672		528		624	780		840	431	99	
Neem		1200		1,800	750	14			624	540	732	600	416	48		420		336			384		143	33	
Peepul	1,680	2,400	1,386	1,584	1,763	32	1080	900			720	552	542	62	240		264		180	108	120	144	132	30	
Pudina					0	0		720	360	480			260	30		240		204		168	180		99	23	
Sarpagandha				900	225	4	360		420		480	300	260	30	144	120			96				45	10	
Shimul			1500	720	555	10		324		240		360	154	18		120		168			240	240	96	22	
Shotomuli	3,000		2,400		1,350	24	300		768		900	476	407	47	300		360		300				120	28	
Tulshi			6,000	5,820	2,955	53		1800		1860		1,920	930	107				600			768	888	282	65	
Ulat-Kambol		3,360		3,720	1,770	32	1800		900		1200	1080	830	95		840			360		420		203	47	
Sub Total						1,392							2,888											2028	

Total Medium 1392
 Total Small 2888
 Total Micro 2028
 Total Industry Vol 6,308

Note: Table prepared based on data collected during field work Sept '05 to March '06

APPENDIX-2

VALUE CALCULATION- CATEGORY, SECTOR, TOP TEN, COMMON (27), AND RANKING

Name	AYURVEDIC				UNANI				Combined Qty (Unani+Ayurved) in MT	Combined Value (Unani+ Ayurved) in US \$	Ranking
	Qty/ Month	Yearly Qty	Value ('000 Tk.)	Value US\$	Qty/ Month	Yearly Qty	Value ('000 Tk.)	Value US\$			
1 Ada	12.86	154	8,515		33.08	397	21,842		551	459,904	2
2 Amloki	34.91	419	20,951		35.42	425	21,232		844	639,071	1
3 Anantamul	1.12	13	428	6,477	0.71	9	272	4,120	22	10,597	
4 Arjun	19.60	235	7,043	106,694	7.45	89	2,668	40,421	325	147,115	
5 Arshwagandha	12.66	152	18,212		7.25	87	10,493		239	434,887	3
6 Bahera	32.46	390	5,837		13.58	163	2,452		552	125,587	10
7 Basak	0.00	0	2,287		17.05	205	9,222		205	174,359	8
8 Bel Shoot	0.00	0	0		33.79	405	12,969		405	196,481	6
9 Bhuikumra	13.88	167	2,002	30,325	0.00	0	0	0	167	30,325	
10 Dhaifful	17.05	205	4,503	68,222	3.47	42	929	14,068	246	82,289	
11 Ekangi	0.00	0	0	0	2.65	32	936	14,179	32	14,179	
12 Haritaki	24.81	298	4,755		23.07	277	4,410		575	138,857	9
13 Join	9.39	113	3,926		43.49	522	18,257		635	336,080	4
14 Kalojira	0.00	0	0	0	3.06	37	263	3,990	37	3,990	
15 Kalomegh	0.51	6	181	2,747	6.23	75	2,260	34,241	81	36,988	
16 Methi	0.10	1	20	297	0.20	2	1,176	17,816	4	18,113	
17 Misridana	3.06	37	1,791	27,133	1.23	15	717	10,857	51	37,990	
18 Mouri	0.00	0	0	0	6.23	75	4,127	62,524	75	62,524	
19 Mutha	16.84	202	6,066		17.05	205	6,152		407	185,105	7
20 Neem	1.74	21	414	6,273	6.13	74	1,477	22,382	94	28,655	
21 Peepul	5.31	64	6,314		5.00	60	7,192		124	204,610	5
22 Pudina	2.76	33	1,563	23,681	1.63	20	926	14,030	53	37,711	
23 Sarpagandha	3.57	43	1,906	28,877	0.00	0	0	0	43	28,877	
24 Shimul	3.57	43	3,021	45,766	0.71	9	763	11,562	51	57,328	
25 Shotomuli	7.45	89	3,135	47,492	0.82	10	350	5,308	99	52,800	
26 Tulshi					18.68	224	6,741	102,129	224	102,129	
27 Ulat-Kambol					14.50	174	4,246	64,325	174	64,325	
TOTAL				1,558,471				2,152,407		3,710,878	
								Medium		818,887	
								Small		1,698,956	
								Micro		1,193,034	
								Top ten volume		2,894,942.30	

Note: Table prepared based on data collected during field work Sep '05 to March '06

**PROFILE¹ OF THE TOP TEN AND LIVELIHOOD SUPPORTIVE SPECIES
(RECOMMENDED FOR THE EXTREME POOR)**

ADA

Local Name: Ada

Latin Name: Zingiber officinalis

English Name: Ginger

Plant Habit

Herb, and agricultural farmer

Portion of Medicinal Importance

Rhizome

Uses

Ada possesses stimulant, aromatic and carminative properties when taken internally, and when chewed it acts as a sialagogue. Externally applied it is ruberant. It is of much value in tonic dyspepsia, especially when it is accompanied with much flatulence; and as an adjunct to purgative medicines to correct griping

Estimated Market

Ayurvedic 154 tons, Unani 397 tons-Total 551 tons (yearly).

Value Chain

Farmer Tk 50 /kg (average seasonal), Bepari 65 Tk/kg, Wholesaler 80 Tk/Kg

Users among the interviewed companies

16 companies:

Jayson Natural Products Ltd., Hamdard Laboratories (WAQF), A. H Janakalyan Pharmaceuticals (WAQF), Modern Herbal, Neptune Pharmaceuticals, Alaz Laboratories, Kanaikhali Natore; B.P. Drugs Laboratories, Happy Pharmaceuticals, Kamruz Unani Laboratories, Mukti Aushudalaya, Ayurvedic Pharmacy (AP), Shadana Aushadalaya, Adlab Pharmaceuticals, Masud and Co, Anirban Medical Industries Ltd., Whole Herbomeds, Mukti Ayurved Laboratories

Local producers' profile

Agricultural farmers, homestead growers or household producers

Future Prospects

Ada is a major item. In the past it has been exported from Bangladesh but now it is being imported. There is a good prospect to grow Ada and to make value addition for the farmers through improved processing.

Quality Specifications

Properly cut into pieces, well dried and proper storage

¹ Profile developed, based on Ghani (1998), Market Interviews, and field observations

AMLOKI

Local Name: Amloki

Latin Name: Emblica officinalis

English Name: Emblic Myrobalans

Plant Habit

Deciduous Tree

Portion of Medicinal Importance

Fruit, Bark, Root

Uses

Root bark is reported to be used in ulcerative stomatitis. Bark for gonorrhoea, jaundice and diarrhoea. Fruits are reported to be good for dyspepsia, colic, flatulence, peptic ulcers, leprosy, inflammations, diabetes, cough, asthma, cough, skin diseases, dysentery, intermittent fevers and greyness of hair.

Estimated Market

Ayurvedic 419 tons, Unani 425 tons; Total 844

Value Chain

Farmer 12 Tk/kg, Bepari 20 Tk/kg, Wholesaler 28 Tk/kg

Users among the interviewed companies

All 18 companies:

Jayson Natural Products Ltd., Hamdard Laboratories (WAQF), A. H Janakalyan Pharmaceuticals (WAQF), Modern Herbal, Neptune Pharmaceuticals, Alaz Laboratories, Kanaikhali Natore; B.P. Drugs Laboratories, Happy Pharmaceuticals, Kamruz Unani Laboratories, Mukti Aushudalaya, Ayurvedic Pharmacy (AP), Shadana Aushadalaya, Adlab Pharmaceuticals, Masud and Co, Anirban Medical Industries Ltd., Whole Herbomeds, Mukti Ayurved Laboratories, Seema Dawakhana.

Local producers' profile

Agricultural farmers, homestead growers or household producers, and large industrial producer

Future Prospects

Amloki is a very important herbal item used in various types of medicine. There is a short supply in the local market and the product is being imported.

Quality Specifications

Local products are generally of low quality, poorly dried, less attractive. However, some good varieties have been reported in Chittagong Hill Tract and there is a need for variety improvement.

ARSHWAGANDHA

Local Name: Arshwagandha
Latin Name: Withania somnifera
English Name: Winter Cherry

Plant Habit

An erect evergreen shrub

Portion of Medicinal Importance

Roots, leaves, fruits and seeds

Uses

Arshwagandha is considered the Indian ginseng and is said to increase a sense of wellbeing and improve sexual performance. Tuberous roots are effective in treating Leocoderma, constipation, insomnia, tissue-building, nervous breakdown, and they are also used as an aphrodisiac. The leaves are used for fever, painful swelling and ophthalmitis.

Estimated Market:

Ayurvedic 125 tons, Unani 70 tons, Herbal Doctor 50 tons, Total 250 tons (yearly).

Value Chain:

Farmer Tk80-90 /kg, Wholesaler 140 Tk/Kg

Users among the interviewed companies

14 companies:

Hamdard Laboratories; A. H Janakalyan Pharmaceuticals; Modern Herbal; Kamruz Unani Laboratories; Mukti Aushadalaya; Ayurvedic Pharmacy (AP); Shadana Aushadalaya; Masud and Co; Anirban Medical Industries Ltd; Whole Herbomeds; Mukti Ayurved Laboratories; Seema Dawakhana, Jayson Natural Pharma, Hamdard Laboratories (WAQF)

Local producers' profile

Agricultural farmers, homestead growers or household producers

Future Prospects:

Arshwagandha is a major product particularly in the Ayurvedic sector, accounting for about half the utilization. Prospects are for increased demand and, particularly, for import substitution.

Quality Specifications:

Dried, cream colour and more than half centimetre in width roots are desired.

BASAK

Local Name: Basak

Latin Name: Adhatoda vasica

English name: Malabarnut, Vasak

Plant Habit

Large shrub

Portion of Medicinal Importance

Leaves & stems

Uses

Basak is a reputed remedy for all sorts of cough and colds, bronchitis and other respiratory disorders due to its expectorant properties.

Estimated Market

Ayurvedic- meagre, Unani-205

Value Chain

Fresh leaf: Farmer 8 Tk/kg, Bepari 12 Tk/kg, Wholesaler 18 Tk/kg,

Dry leaf: Farmer 30 Tk/kg, Bepari 40 Tk/kg, Wholesaler 50 Tk/kg.

Users among the interviewed companies

12 companies:

Square Pharmaceuticals; A. H Janakalyan Pharmaceuticals; Modern Herbal; Kamruz Unani Laboratories; Mukti Aushudalaya; Shadana Aushadalaya; Masud and Co; Anirban Medical Industries Ltd; Whole Herbomed; Mukti Ayurved Laboratories; Jayson Natural Pharma

Future Prospects

The product is in short supply and the demand is increasing. Some processors felt there was an expanding market for Basak. The plant serves as a boundary fence. It coppices well and the branches and twigs are used as fuel.

Quality Specifications

Fresh and clean leaves are used. No mixing or adulteration with other leaves.

BAHERA

Local: Bahera

Latin Name: Terminalia bellerica

English name: Myrobalam, bastard.

Plant Habit

Large deciduous tree

Portion of Medicinal Importance

Fruits & bark

Uses

Fruit of Bahera is bitter, astringent, tonic and laxative.

Estimated Market

Ayurvedic 390 tons, Unani 168 tons

Value Chain

Farmer 8 Tk/kg, Bepari 14-15 Tk/kg, Wholesaler 18-22 Tk/kg.

Users among the interviewed companies

12 companies:

Processor: Hamdard Laboratories, Dhaka, Shakti Aushadhalaya, AP, Square Pharmaceuticals, Jayson Group, Jana Kalyan, Neptune Pharmaceuticals, A.H. Jana Kallayan Pharmaceuticals, Dhaka; New Life & Co., Dhaka; Adlab Pharmaceuticals, Bogra; Whole Herbomeds; Mukti Ayurved Laboratories; Jayson Natural Pharma

Future Prospects

There is an expanding market for the product. Since the product is being imported, through improved production, quality and variety development, imports can be substituted to some extent.

Quality Specifications

Well-dried, clean, good colour, fleshy fruits are desired

BEL SHOOT

Local name: Bel

Latin Name: Aegle marmelos

English name: Bael fruit tree

Plant Habit

Tree

Portion of Medicinal Importance

Fruits, leaves & roots

Uses

Digestive, tonic and chronic dysentery.

Estimated Market

Unani 331 tons

Value Chain

Farmer 20 Tk/kg, Bepari 30 Tk/kg, Wholesaler 40Tk/kg.

Users among the interviewed companies

Processor: A..H. Jana Kallayan Pharmaceuticals, Modern Herbal, Dhaka; Mukti Aushudalaya; Shadana Aushadalaya; Masud and Co; Anirban Medical Industries Ltd;

Future Prospects

Bel is used as a fruit and grown in the homestead all over the country. There is a growing demand for young bel shoots in local shop's processing units.

Quality Specifications

Immature fruits cut into pieces and well-dried, free from fungal infection

GRITHAKUMARI- (EP Livelihood supportive)

Local name: Grithakumari

Latin Name: Aloe vera

English name: Indian aloe, Barbodos aloe, Jafrabadaloe

Plant Habit

A rosettes herb with bulbs.

Portion of Medicinal Importance

Leaves (dried juice), pulp & roots

Uses

Aphrodisiac, purgative & tonic. It is used in haemophilia, skin & urine disorders, liver & spleen enlargement, chronic ulcers.

Main Supply Area

Natore, Manikganj

Estimated Market

Self consumption 1000 tons, Total 1000 tons (yearly)

Proportion Imported/Locally Produced

100% local

Value Chain

Farmer 4 Tk/kg, Bepari 6 Tk/kg, wholesaler 10 Tk/kg

Users among the interviewed companies

Nil

Future Prospects

Fresh leaves need to be transported within the shortest possible time. The demand for fresh Aloe vera leaves is increasing all the time and it would continue like this. The processing of Aloe vera to produce Musabber could have good potential. This may need further variety improvement.

Quality Specifications

Long, thick leaves, clean & free from disease and spots.

HARITAKI

Local name: Haritaki

Latin Name: Terminalia chebula.

English name: Chebulic Myrobalam

Plant Habit

Large deciduous tree

Portion of Medicinal Importance

Fruits

Uses

Fruit is astringent, digestive, antiseptic, alterative, laxative, diuretic and carminative.

Value Chain

Farmer 7 Tk/kg, Bepari 12 Tk/kg, Wholesaler 15 Tk/kg.

Users among the interviewed companies

12 companies:

Processor: Hamdard Laboratories, Dhaka, Shakti Aushadhalaya, AP, Square Pharmaceuticals, Jayson Group, Jana Kalyan, Neptune Pharmaceuticals, A.H. Jana Kallayan Pharmaceuticals, Dhaka; New Life & Co., Dhaka; Adlab Pharmaceuticals, Bogra; Whole Herbomeds; Mukti Ayurved Laboratories; Jayson Natural Pharma

Future Prospects

As a major herbal item, there is a need to increase production and to do proper processing.

The local Haritaki are not well dried and do not possess good colour compared to the imported ones.

Quality Specifications

Uniform, big size, well dried & good colour.

MUTHA

Local name: Cyperus rotundus

Latin name: Cyperus rotundus

English name: Nut-grass

Plant Habit

A perennial herb with dark green glabrous culms.

Portion of Medicinal Importance

Tuber or bulbous roots

Uses

Home remedy for indigestion, diarrhoea, and other intestinal problem of children. An infusion of a soup made of the tubers is useful in diarrhoea, dysentery, dyspepsia, vomiting, cholera, and fever.

Estimated Market

Ayurvedic 202 tons, Unani 205 tons

Value Chain

Buying price 6 Tk/kg and Selling price 9 Tk/kg

Users among the interviewed companies

11 companies:

Processor: Hamdard Laboratories, Dhaka, Shakti Aushadhalaya, AP, Jayson Group, Jana Kalyan, Neptune Pharmaceuticals, A.H. Jana Kallayan Pharmaceuticals, Dhaka; New Life & Co., Dhaka; Adlab Pharmaceuticals, Bogra; Whole Herbomed; Mukti Ayurved Laboratories; Jayson Natural Pharma

Future Prospects

Mutha is grown as a grass for making mat. The farmers generally sell the Mutha grass but not the rhizomes. Linkage with the processing industries would help them to secure additional income and the industries could collect the items at a reasonable price.

Quality Specifications

Tuber roots to be well-dried, clean and free from foreign matter

PEEPUL (*EP Livelihood supportive*)

Local name: Peepul

Latin name: Piper longum

English name: Indian long pepper.

Plant Habit

A slender aromatic climber with perennial woody roots

Portion of Medicinal Importance

Fruits & roots

Uses

Capable of improving intellect and memory power and also in regaining health by dispelling diseases. It is acrid, digestive, appetizer, aphrodisiac and tonic.

Estimated Market

Ayurvedic 64 tons, Unani 60 tons

Value Chain

Farmer: 35 Tk/kg, Bepari: 45 Tk/kg, Wholesaler: 60 Tk/kg

Users among the interviewed companies

12 companies:

Hamdard Laboratories, Dhaka, Shakti Aushadhalaya, AP, Square Pharmaceuticals, Jayson Group, Jana Kalyan, Neptune Pharmaceuticals, A.H. Jana Kallayan Pharmaceuticals, Dhaka; New Life & Co., Dhaka; Adlab Pharmaceuticals, Bogra; Whole Herbomed; Mukti Ayurved Laboratories; Jayson Natural Pharma

Future Prospects

Demand of Peepul is high but the local variety is not of good quality. Presently there is a short supply. Variety improvement leading to the production of long fruits would be of immense importance since it is being imported. Peepul is used in the manufacturing of herbal medicine.

Quality Specifications

Big and uniform sized, Free from fungal infection.

SHOTOMULI (EP Livelihood supportive species)

Local name: Shotomooli

Latin name: *Asparagus racemosus*

English name: Asparagus

Plant Habit

An extensively scandent, much branched, spinuous under- shrub with tuberous roots.

Portion of Medicinal Importance

Tuberous root

Uses

Shotomuli is capable of improving memory power, intelligence, and physical strength and maintaining youthfulness. It is tonic, aphrodisiac, galactagogue, roborant, diuretic, antidysenteric and demulcent. It increases breast milk, promotes sexual vigour, cures swelling, diseases due to impurities of blood, diarrhoea, piles, eye diseases. It is a good remedy of vaginal disorders like leucorrhoea, uterine disorders, excess bleeding and colicky pain. It is a reputed drug for peptic and duodenal ulcers.

Estimated Market

Ayurvedic 89 tons, Unani 10.

Value Chain

Farmer 20-25Tk/kg, Bepari 35-40Tk/kg, Wholesaler 40-50tk/kg.

Users among the interviewed companies

4 companies:

Shakti Aushadhalaya, AP, Adlab Pharmaceuticals, Bogra; Whole Herbomed;

Future Prospects

Presently Shotomul is grown in certain locations as reported in Natore. The local Shotomul is not fleshy when dried and not preferred by the trade. It is used mainly for Juices. Variety improvement could help to make import substitution.

Quality specifications

Fresh, clean, healthy, well dried and fleshy roots. Free from fungal infection.

Questions relating production, and processing

1. What are the sources of medicinal plants at your locality? How do they grow, and/or how are they grown?

2. How are these plants collected- with what instrument? In what stage of life cycle? What part of the plant?

3. Do you sell or handover or trade raw plants? If not, in what form? What are the processing mechanisms? What is the benefit of primary processing?

4. Please rank the top ten species names as per their demand by buyers. Please also mention price per species or per kg:

Species Name	Price
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

5. Is medicinal plant collection/production the primary means of your earning? If yes, to what extent does it help livelihood?

- a. adequately supports
- b. moderately supports
- c. not sufficient

If not, what other sources of income do you have?

6. Do you employ others to help you? Are they skilled? Semi-skilled? Unskilled? How many in each category? How much is paid to the employees by category? Are there any other benefits provided?

7. What is the farming method? What is the production lead time (species-wise)?

Species Name	Production time
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

8. Do you know of any other improved production and processing mechanism? Do you believe that improved input materials and production management may increase productivity?

9. Is there any community organization at your locality that deals with common pool resources, collection and harvesting of wild plants and the trading and marketing of these?

10. If you or your producer community are offered to buy back the facility by any industry besides the input materials supply and training, how will you respond to that arrangement?

Yes	No
-----	----

Questionnaire for *Kabiraj*

1. Please rank ten of your most used species?

- a.
- b.
- c.
- d.
- e.
- f.
- g.
- h.
- i.
- j.

2. Where do you get these species from?

3. Do the medicines you are preparing with these plants have the same availability at herbal shops manufactured by herbal processors?

- a. widely available
- b. mostly available
- c. a few are available
- d. unavailable

4. What is the price difference between processed medicine and yours for the same purpose?

5. If such commercialization and exploitation go on, these plant resources can be abolished; in such a consideration, how can these be conserved?

6. What type of support do you feel should be given to the Traditional Medicine practitioners for their professional capacity building and socio-economic status upgrade?

7. What are the causes of the extinction of species from your neighbourhoods? Do you have any suggestions to resist these?

8. If the economic importance of medicinal plants goes up and producers get more benefit out of production, will it impact your profession?

Questions for Wholesalers and Traders

1. Who supplies you with medicinal plants and from what sources?

2. Please rank your top ten (10) selling medicinal plants.

- a.
- b.
- c.
- d.
- e.
- f.
- g.
- h.
- i.
- j.

3. In what form do you buy the plant materials?

- a. raw unprocessed
- b. primary processed
- c. primary processed with protective packaging
- d. in all forms

4. Please rank your buyers as per volume (in terms of price) sold:

- a. herbal medicine manufacturers
- b. local medicine manufacturers
- c. allopathic medicine manufacturers
- d. *Kabiraj, hekim*, retailers or others

5. Can you give me an estimate of what percentage of your plant materials are coming from local sources?

- a. 0-20 %
- b. 21-40 %
- c. 41-60 %
- d. 61-80%
- e. 81-100%

6. How do you get the local and international price information on the plant materials you are dealing with?

7. Do you have any contractual supplier or producer?

8. What type of relation do you (wholesale or trading communities) have with the herbal medicine manufacturers?

Questions for Industrial users

1. What are the most used plants in your factory? Please name them:

- a.
- b.
- c.
- d.
- e.

2. What are the most highly priced plants? What is the volume of input required in a month (plant-wise, price-wise)?

Name of Plants	Price/Kg or Per Unit

3. How do local medicinal plant-based micro enterprises and supply points, e.g., wholesalers in Chalkbazar, help you in getting your raw materials?

4. What percentage of your raw materials are imported and how?

5. Do you think that, if the local producers and collectors are aided with seed, seedlings, technical know how and buy back assurance by the industries, the aforestration [PLEASE CHECK THE SPELLING OF THIS WORD] and plant population will increase?

6. What are your most produced items with these plants? What are their price levels?

Item	Price

7. Are the products sold locally or exported? Are there any new requirements arising from buyers with respect to product quality, production standard, production and manufacturing practices, etc.?

8. How do you distribute your products and to whom (locally)?

9. What are the existing market problems in retail, wholesale and consumer levels? What are the volumes of trade (monthly) in each level and in what form?

10. Do you have any international standardization certifications? Is the practice of eco-labelling on your product packages in place? If not, what would it take to make it work?

Questions for Medicinal Plant Specialists

❖ Collection, production, distribution, and consumption:

- What are the sources of medicinal plants? How do they grow, and/or how are they grown?
- How are these plants collected- with what instrument? In what stage of life cycle? What part of the plant?
- Do they sell or handover or trade raw plants? If not, in what form? What are the processing mechanisms? What is the benefit of primary processing?
- What are the highly prevalent plant species? What are the less abundant plants now? Which plants are already extinct? Why?
- What are most demanded by buyers or users? What are the most highly priced plants? What is the volume of output in a month (plant-wise, price-wise)?
- Is medicinal plants collection/production your primary means of earning? If yes, to what extent does it help livelihood? If not, what other sources of income do you have?
- In referring to collecting agents /middlemen, how many employees do they have? Are they skilled? Semi-skilled? Unskilled? How many in each category? How much is paid to the employees by category? Are there any other benefits provided?
- If production is through ex-situ cultivation, are there any community gardens, botanic garden living collections, seedbanks, tissue culture, etc.?

- What is the farming method? What is the production lead time (species-wise)? What is the ratio of comparative net cash benefit as opposed to the crop cultivated earlier? What are the farming and harvesting technologies? Do you know of improved technologies? What do you feel is needed for more productivity on the same amount of land?

❖ **Institution**

- Is there any community organization that deals with common pool resources, collection and harvesting of wild plants and the trading and marketing of these?
- What are the membership structure, sphere and influence of the community institutions?
- How is the MPs population in protected areas? Are these being extracted by local communities or enterprises commercially? Is there any intervention by Government or Development organizations to conserve MPs species?
- How can commercial/industrial models of cultivation and harvesting contribute in terms of their respective effects on long-term sustainable use in biodiversity conservation? What blends of these approaches can be applied and to what effect?
- To what extent is existing knowledge of the international experience on the sustainable use of medicinal plants available and utilized by NGOs, Development Agencies and communities?
- What are the lessons from the international experience across a range of categories: conservation methods, community participation & ownership, industry-community partnerships?

❖ **Sustainable management and marketing strategies:**

- What is the current provision for access to resources? Are there any government or community regulations? If so, what are they?

- What are the roles of community level institutions in current decision making processes?

- What jurisdiction do the local administrations (govt) have over medicinal plants resources? What are their responsibilities? How are these responsibilities exercised?

- How are development support agencies intervening to improve the current situation? How effective are these interventions? Are local people involved in these processes?

- How do industry users influence the resource use and exploitation? What role do local medicinal plant-based micro enterprises play?

- What are the factors hindering or limiting the role of local people in the management of wild plants and resources? What could facilitate more effective participation?

- What potentials exist in the locality/community that could lead to an industry-community partnership (bio-partnership)?

Company name and Address	Contact Person	Position	Phone	e-mail	Industry Size	System
Jayson Natural Products Ltd.28, Purana Paltan Dhaka-1000	Mr. Mahbubur Rahman	Factory Manager	9561643/ 9558128	jayson@citechco.net	Small	Unani
Hamdard Laboratories (WAQF), 291/1 Sonargaon Road, Dhaka	Unani Mr. Rafiqul Islam	Director Marketing	9665965/ 9555966/	hamdrdbd@bdmail.net,	Medium	Unani
A. H Janakalyan Pharmaceuticals (WAQF), 67/5, Pineer Road, Kakrail Dhaka-1000	Dr. Aminul Bari	Prod. Manager	9352865	jkalyan@bdmail.net	Small	Unani
Modern Herbal, 383 Maghbazar, Dhaka-1217	Dr. Alamgir Mati	Managing Director	9357052	modernherbalfood@gmail.com	Medium	Unani
Neptune Pharmaceuticals, 7-Darus Salam Road, Mirpur, Dhaka-1221	Saeed Ahmed Siddiquee	Managing Director	8019067		Small	Unani
Alaz Laboratories, Kanaikhali Natore	M Tajul Islam	Proprietor			Micro	Unani
B.P. Drugs Laboratories, 86, Nazimuddin Road Dhaka	M. Giasuddin	Proprietor	7126750		Micro	Unani
Happy Pharmaceuticals, 104, Tarek Lane, Azimpur Dhaka	M A Ajmot	Proprietor	7143428		Micro	Unani
Kamruz Unani Laboratories, Dhaka Road, Natore	Dharitri Puddar	Manager			Micro	Unani
Mukti Aushudalaya, Tongi Bazar, Dhaka	Dr. Abdul Latif	Proprietor	9114532		Micro	Ayurvedic
Ayurvedic Pharmacy (AP), House-15, Rd-4, Gulshan-1	Munshi Rakibul Islam	Director	9888169, 98885799	munshi@bdmail.net	Medium	Ayurvedic
Shadana Aushadalaya, 71 Dinnathsen Road, Gendaria	Beni Madhab Mukharjee	General Manager	7410442		Medium	Ayurvedic
Adiab Pharmaceuticals, Sultanganj para, Bogra Upashahar, Bogra	Rezaul Karim	Proprietor	5163977		Small	Ayurvedic
Masud and Co, Kachpur Road, Dhaka	Md Habibur Rahman	Proprietor	7150982		Micro	Ayurvedic
Anirban Medical Industries Ltd., Hazi Khorshed Road, Baganbari, East Jurain Dhaka	MA Jalil	Director	7143268	anirban@bdmail.net	Small	Ayurvedic
Whole Herbomeds, 1020, Dhakkingaon, Kushum Bag Dhaka	Abdullah Arif	Proprietor	8316138	aarif@bangla.net	Micro	Ayurvedic
Mukti Ayurved Laboratories., Pagar, Tongi Gazipur	Faizul Islam	Director	8914328	mukti@proshika.net	Small	Ayurvedic
Seema Dawakhana, 9, Saidabad, Dhaka	Naseema Akhter	Proprietor	7654872		Micro	Ayurvedic