

Supply chain analysis provides a powerful tool in designing actions that enhance sustainable economic development. In their commitment to 'cultivate healthy enterprise' KIT, IAMR and CSD developed an approach where stakeholders interact to construct a sustainable and equitable chain. A case study was conducted on medicinal plants in Uttarakhand, India. Medicinal plants are a fascinating global enterprise; they play a unique role in health care, culture, biodiversity and rural economies. Worldwide the demand for medicinal plants is growing. The mountains of Uttarakhand have the potential to become a major supplier. The central question is how this opportunity can be transformed into reality. This bulletin provides some answers and insights in the lessons learned. It summarises the findings of field research carried out in the Chamoli area. Recommendations are made regarding policy reforms, stakeholder dialogue, the promotion of cultivation and removal of market uncertainties. The authors believe that a sustainable medicinal plant chain can be developed, creating livelihood opportunities for people in remote and marginal areas. Similar initiatives, covering other regions and supply chains, can flourish with the lessons learned from this inspiring case.

BULLETIN

350

Cultivating a Healthy Enterprise

Developing a sustainable medicinal plant chain in Uttarakhand – India

ROYAL TROPICAL INSTITUTE
CULTIVATING A HEALTHY ENTERPRISE

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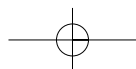
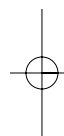
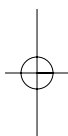
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DEVELOPMENT POLICY AND PRACTICE

CULTIVATING A HEALTHY ENTERPRISE

Developing a sustainable medicinal plant chain in Uttarakhand - India



Cultivating a Healthy Enterprise

Developing a sustainable medicinal plant chain
in Uttaranchal – India

Bulletin 350



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Abbreviations

CBD	Convention of Biological Diversity
CIMAP	Central Institute of Medicinal and Aromatic Plants
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CSD	Centre for Sustainable Development
DGIS	Directorate-General for International Cooperation
EU	European Union
FAO	Food and Agriculture Organisation of the United Nations
FRI	Forest Research Institute
FRLHT	Foundation for Revitalisation of Local Health Traditions
GoI	Government of India
GoU	Government of Uttaranchal
HAPPRC	High Altitude Plant Physiology Research Centre
HRDI	Herbal Research and Development Institute
IAMR	Institute of Applied Manpower Research
ICFRE	Indian Council of Forestry Research and Education
IDRC	International Development Research Centre
IFAD	International Fund for Agricultural Development
IR	Indian Rupee
ISMH	Indian Systems of Medicine and Homeopathy
KIT	Royal Tropical Institute (Koninklijk Instituut voor de Tropen)
MAPPA	Medicinal and Aromatic Plants Programme in Asia
NCDC	National Co-operative Development Corporation (NCDC)
NGO	Non-Governmental Organisation
SHER	The Society for Himalayan Environmental Research
UNDP	United Nations Development Programme
WHO	World Health Organisation
WII	Wildlife Institute of India

Weights and measures

1 lakh	=	100,000 IR
1 crone	=	10,000,000 IR
100 IR	=	2.08 Usd (November 2002)
1 Usd	=	48 IR (November 2002)

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Foreword

At the national level, India produces more than enough food to feed its people, but regional disparities leave a significant segment of the population without access to adequate nutrition and basic services. Official data shows a reduction in the number of rural people living below the poverty line, however there are pockets where poverty is concentrated, particularly in remote rural areas where the level of development is low. Labour migration from these pockets to economically productive areas is an increasing phenomenon.

‘Sustainable economic development’ means more than enhancing capital and labour flow. It is about people deciding themselves how to use their assets and resources, for which markets they wish to produce and which services they need to achieve their goals. ‘Enhancing people’s income is enhancing people’s autonomous development’. Information about markets, their long-term perspectives and risks determines to a large extent when and how producers respond to opportunities. A conducive environment in terms of legislation, taxation and communication is needed, to create a dynamic exchange of goods and capital between producers and traders. This warrants a new role for the government that stimulates rather than regulates, and provides services that meet the demands of the productive and commercial stakeholders.

This study was inspired by the results of earlier studies conducted by IAMR and KIT, on the effects of an ongoing privatisation of the agricultural sector on rural livelihoods. These studies indicated that diversification of agriculture is a prerequisite for any adjustment of the subsidy policy and avoidance of massive civil opposition. Moreover, it was concluded that private entrepreneurs invest in rural areas mainly to develop trade in ‘low volume-high value’ products. Massive public investment through subsidies and regulation of food grain prices favours the agriculturally developed states. These indirect income subsidies mainly benefit successful farmers and contribute to inequalities between households, because the more you produce, the more you are subsidised. Yet, sub-sectors such as horticulture and floriculture thrive – thanks to private initiatives, but again, such private initiatives are limited to accessible areas with well-developed infrastructure. A number of questions arise from these observations. What about the millions of people in remote and marginal areas? Will they only benefit from public and private investment in agriculture by moving to pockets of economic development and working as wage-labourers? Will their financial remittances contribute to significant development in their areas of origin?

In 2002, a team composed of experts from IAMR, KIT and CSD conducted a study of the potential of production and trade in medicinal and aromatic plants in a remote and difficult accessible hill region. People in India have long known the benefits of medicinal and aromatic plants. However, the demand for these products is developing quickly because of accelerated local, national and international interest, the latter notably from western pharmaceutical industries. Medicinal and aromatic plants are often collected from natural sources by the poor. Because demand exceeds supply, many species are threatened with extinction. Conservation of the species by banning their collection directly affects the income of people who heavily depend on it. Other problems develop form the parallel, illegal market such as low prices and high risks for the collectors. Can sustainable exploitation of these species be promoted, thus preserving biodiversity and enhancing rural income?

In this bulletin the authors introduce the issue of sustainable economic chain development by presenting a case study conducted in the state of Uttaranchal. Opportunities, perspectives and constraints are analysed in an integrated manner, taking into account the various stakeholders and their views, as well as the links that bind or discard them. A picture emerges of a chain that is based on a certain measure of information sharing, consensus, and linkages. A smoother chain that enhances benefits for those who invest time, knowledge, capital and other scarce resources in areas so far excluded from mainstream economic development could be promoted.

This bulletin serves a wide audience and has been written to inspire those who are actively interested in the sustainable economic development of marginal areas. The information is of significance for other states of India, as well as other developing countries with similar potential. The bulletin provides information about the choices and issues at stake, as well as the development process ahead. We hope that this bulletin will inspire further studies with the aim of enhancing employment and earning potential of people with limited choice.

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1 Introduction

1.1 Background

This study has its origin in a partnership that has existed between the Royal Tropical Institute (KIT), the Netherlands, and the Institute of Applied Manpower Research (IAMR), India, since 2000. When the Planning Commission of the Government of India felt a need to review the impact of ongoing privatisation of agricultural services, a key instrument of India's agricultural reform, IAMR (the Planning Commission's specialised agency) and KIT agreed to meet this challenge. Field studies were conducted in the states of Punjab, Maharashtra and Orissa. The research focussed on the effects of privatisation on service provision, productivity and rural livelihoods and was based on information collected from farmers and other stakeholders in both the private and public sectors. The results of the study, and their implications for policy adjustments were discussed during workshops in each of the three states (IAMR/KIT, 2001a, 2001b, 2001c). The study concluded with a national policy workshop held in New Delhi from the 7th to the 9th of July 2001 (IAMR/KIT, 2002a) and resulted in the publication of a national policy recommendation report (IAMR/KIT, 2002b).

The study suggests that the current agricultural policies which involve a system of input subsidies and minimum support prices, are not sustainable (IAMR/KIT, 2002b).¹ Although these policies have played a crucial role in India reaching national self-sufficiency in food, many serious negative effects are emerging. Apart from the direct cost of subsidies, the cost of transporting and storing the large and rapidly increasing stocks of food is prohibitive. The system aggravates regional disparities; generates substantial negative environmental effects; has not alleviated malnutrition among the rural and urban poor² and favours large over small producers. Unfortunately, when national food self-sufficiency was attained the policies were not altered accordingly, to prevent serious over-production and soaring public expenditures. It is widely believed that the current system of food subsidies should be discontinued, though there is some resistance to this.

¹ This is also confirmed by others, such as GoI, 2002; Parikh and Radhakrishna, 2002.

² The food supply is sufficient to feed India's population, but many of the 260 (GoI, 2002) to 290 million poor (World Bank, 2002) do not have sufficient buying power to access the food.

It is also noted that the productivity and profitability of a number of important crops such as maize, wheat, rice, and potato are declining. It is important, therefore, that the cultivation of alternative and more profitable crops should be encouraged. This implies a need for a diversification of the Indian agricultural system. It is anticipated that increased diversification would stimulate greater dynamism in the agricultural sector and growth in farm incomes and rural employment.³ These can only be achieved through major policy reforms.⁴

Based on the insights gained during the first phase, KIT and IAMR decided to continue its contribution to the ongoing debate on agricultural policy reforms by conducting a study focused on agricultural diversification in India. To analyse the whole spectrum of diversification in such a large and diverse country would have been over ambitious, so it was agreed that the study would focus on one sector⁵ in a particular state. It was felt that the insights and experiences gained would provide a valuable contribution to the national and state level policy debate on an appropriate and meaningful diversification strategy in India. The case of medicinal plants in the State of Uttaranchal was chosen. This choice was influenced by a number of factors.

Medicinal plants are a commodity with a high added value, and increasing international demand is enhancing their value. Both the Central and State Governments have shown interest in the sector, which they wish to strengthen in order to create additional income and employment opportunities. Uttaranchal already has a rich resource of medicinal plants, with terrain and agroclimatic conditions that are particularly suitable for their collection and cultivation. A number of tribal communities, such as the Bhotias, have a long tradition of growing and using medicinal plants. In view of all these advantages, the State government hopes to develop Uttaranchal into 'The Herbal State of India'.

Through previous projects, IAMR had already collected significant information on the sector and developed a network of contacts with the main stakeholders.

1.2 Objectives of the study

The following prime objectives were formulated for the study:

- conduct an in-depth study of the current status of medicinal plants in Uttaranchal;
- identify the main opportunities and constraints;
- suggest policy measures and a plan of action to support the development of the sector;

³ In addition to reduced pressure on the environment and increased crop diversity in farmers' fields.

⁴ In order to be successful, the main stakeholders should be actively involved in such a reform process.

⁵ Strictly 'sub-sector', but for the sake of simplicity, the term 'sector' is used throughout the text.

- enhance the capacity of the collaborating institutions through joint research (KIT-IAMR-CSD).

1.3 Methodology

The analytical approach used in this study is a combination of the supply or value chain concept and stakeholder analysis. It was decided to take the supply chain of medicinal plants as the point of reference. Such a chain describes the full range of activities that are required to bring a product or service from its origination, through intermediate phases, to the final consumer (after Kaplinsky and Morris, 2001; IDS, 2001; Kaplinsky, 2000).

The linkages between production, trade, processing and consumption, and all the operations that add value, by all the different actors involved, are scrutinised. Specific attention is paid to the inter-linkages between different players and their power relationships. The stakeholder analysis generates an overview of the main players involved in the chain. In addition, it provides a framework to develop practical ideas of where to link stakeholders to attain common objectives. Following the supply chain, the level of coordination and cooperation is reviewed, with analysis of whether the requirements and needs of the consumers, at the end of the chain, are being communicated effectively throughout the chain. However, this is 'action-research' and does not stop at analysis of the existing situation; it formulates practical ideas as to how specific constraints can be removed and opportunities realised, improving the overall development and performance of the chain.

Actions to enhance the development of the chain should be through interventions which are discussed, planned and implemented by the stakeholders themselves. For example this could involve investments which create leverage throughout the chain, capacity strengthening of specific chain institutions or players, or helping to support a business entering the international market. Where 'pro-poor' policies are concerned, interventions could mean measures enhancing equity, such as supporting smallholders to produce a commodity which faces a high demand, improve their forward linkages through contract farming arrangements with buyers, and strengthening the commercial capacities of existing and emerging farmer organisations. Such measures aim at the inclusion of poorer sections of society into specific commercial operations, and making them more visible through a supply chain perspective.

The value chain approach provides a useful framework in which to think what action could be taken towards developing the medicinal plant sector in Uttaranchal. How can the growing opportunities be tapped in a coordinated manner in order to be successful? How can smallholders be best supported? Who are the stakeholders involved in the chain, what is their contribution and is there sufficient communication and coordination between them? How can effective stakeholder interactions and actions be organised? What sort of interventions would have the most far-reaching and beneficial effect for most sections of the medicinal plant chain?

The study is based on secondary and primary data sources. Secondary sources were used to collect information on Uttaranchal and medicinal plants in general. Primary information, collected through interviews with a variety of stakeholders, was used to examine various issues related to medicinal plants in Uttaranchal.

Chamoli, in the Garhwal region of Uttaranchal, was selected for detailed study. Much of this region consists of high altitude areas, which are notable for the growth of high value medicinal plants. With the community's long tradition of using, collecting and trading in medicinal plant material, the district has the potential to be an important supplier.

The research team consisted of personnel from IAMR (the Indian Institute of Applied Manpower Research); KIT (the Royal Tropical Institute, the Netherlands); and CSD (the Centre for Sustainable Development). Two field trips were carried out. The first trip was used to collect preliminary information on policy and trade in medicinal plants in India and Uttaranchal through discussions with officials, researchers, and traders in New Delhi and Dehradun (March 2002). The second trip was made in October 2002. During this trip a number of places in Uttaranchal were visited, including Srinagar, Gopeshwar, Joshimath, Badrinath and Mana. Detailed interviews were carried out with government officials, researchers, NGOs, traders, farmers, collectors, traditional healers, co-operative officials and contractors. Lastly, discussions with industry representatives and donor agencies were held in New Delhi.

1.4 Structure of the report

The report consists of five chapters.

- Chapter 1: a background to the research, the methodology and framework used;
- Chapter 2: the importance of medicinal plants in relation to agricultural diversification, income generation, gender and biodiversity;
- Chapter 3: the current status of medicinal plants in Uttaranchal State, largely based on secondary data;
- Chapter 4: the findings of the field research in Chamoli district;
- Chapter 5: conclusions of the study and policy recommendations.

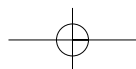
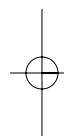
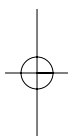
1.5 Projected audience, risks and follow-up

This report presents an overview of the major issues in developing the medicinal plant chain in Uttaranchal; it consciously avoids technical details pertaining to medicinal plants. The publication is aimed at policy makers, industry, donor agencies and NGOs working in this field in India. Members of the general public may also find much of interest in this report.

It is the first in a number of publications KIT-IAMR-CSD will publish on the topic. Additional publications are planned, reporting on the major trends in international markets, the perceived needs and prospects of the national

medicinal plant industry, and a detailed farming system analysis of some promising medicinal plants species.

With generous assistance from the key people interviewed the authors have been able to complete the study in a relatively short time, depending mainly on qualitative information. Applying this approach to complicated issues has, of course, its limitations. The authors wish to emphasise that they and not their informants are responsible for any mistakes made. We strongly encourage the reader to communicate with us any comment, need for clarification or questions they would like to ask. We would like to improve this publication wherever and whenever possible. Moreover, this report is just the first, small step in a longer process through which KIT, IAMR and CSD are committed to promoting 'The Healthy Enterprise'.



2 Medicinal plants: why are they important?

2.1 Introduction

Medicinal plants are important for a number of reasons. They provide material for both the pharmaceutical industry and traditional forms of medicine⁶, generate income and employment and have implications for the conservation of biodiversity and traditional knowledge.

World wide the number of species used for medicinal purposes is estimated to be more than 50,000, which covers about 13 per cent of all flowering plants (Schipmann *et al.*, 2002). In India over 8,000 plant species are used in traditional and modern medicine (Planning Commission, 2000).⁷ Box 1 gives examples of some commonly used medicinal plants in India.

Box 1: Three examples of medicinal plants

Aconitum heterophyllum (Atis) is a perennial herb that grows between 2500 and 4000 metres. Locally the tubers are given to alleviate fevers and stomach pains. The plant is used by the pharmaceutical industry in drugs combating debility and after fevers. The chief constituent is a non-ionic alkaloid, known as atisine.

Nardostachys grandiflora (Jatamansi) is a perennial herb that grows between 3200 and 5000 metres. Locally the leaves are used as a blood purifier. The roots are used in the manufacturing of drugs prescribed for epilepsy, diseases of the digestive and respiratory organs. As a home remedy the herb is used in flatulence, colicky pains and as a tonic for general debility. The active constituent, jatamansone, is known for reducing blood pressure and moderate hypertension without side effects.

Picrorhiza kurrooa (Kutki) is a perennial herb that grows between 3000 and 4600 metres. The dried plant parts are used to tackle fevers and cholera. It is a laxative in small doses and a cathartic in large doses. It is also considered to be a valuable bitter tonic (Nautiyal, 1996).

⁶ In addition, the cosmetics industry is increasingly using more natural ingredients, including extracts of medicinal plants, in their products.

⁷ Various medicinal plant species are described in CIMAP, 1992; Nautiyal, 1996; Joshi and Kumar, 2000.

2.2 Traditional medicine and the pharmaceutical industry

Medicinal plants are a precious natural resource, both from the perspective of their use in traditional medicine⁸ as well as providing natural ingredients for the manufacture of modern pharmaceuticals (Lambert *et al.*, 1997; Balick and Mendelsohn, 1992; FAO, 1997). They play a crucial role in providing new remedies for existing and new diseases. A large number of plant species are yet to be screened for active compounds.⁹ This suggests that the importance of medicinal plants is expected to grow further. It is therefore vital that existing stocks are protected and conserved.

Medicinal plants are very important for developing countries, as large segments of their populations depend on traditional herbal medicines (WHO, 1999).¹⁰ In addition to their contribution to human health care, medicinal plants play an important, yet often overlooked role in providing veterinary care (Lambert *et al.*, 1997).

Box 2: Hanuman's search for medicinal plants: a traditional Hindu story

The Hindu man-god-king *Ram* was fighting against the evil giant *Ravan* in Lanka. His brother *Lakshman* was seriously injured, and the faithful *Hanuman*, the monkey god, flew to a sacred mountain in the Himalaya to collect *Sanjeevani*, a lifesaving plant to cure him. When *Hanuman* arrived in the Himalaya he could not remember the name of the plant. He therefore decided to lift the entire mountain, and carried it to Lanka. The plants instantly cured *Lakshman*. During the journey, bits and pieces of earth dropped off the mountain, scattering plants all over India. This, so the story goes, is how the plants used in traditional Ayurvedic medicine can be found everywhere in India.

Seen from a global perspective, India has one of the richest traditions of using medicinal plants in health care (Lambert *et al.*, 1997; Planning Commission, 2000). Thousands of medicinal plants are used for a variety of cures. The knowledge and traditions of local communities include diagnosis, the location of plants and their uses and the ability to prepare remedies. Some practices are directly related to specific religious and spiritual beliefs and traditions (see Box 2). In general, women play a vital role in applying these

skills and transferring knowledge to the next generation (Lambert *et al.*, 1997).

Several important herbal-based healing traditions are practised in India. These include Ayurveda, Homeopathy, Unani, Siddha and Naturopathy (see ISMH, 2002). Of these, Ayurveda is the biggest and oldest system. Ayurvedic doctors

⁸ Traditional medicine can be defined as the knowledge, skills and practices based on theories, beliefs and experiences indigenous to various cultures in the maintenance of health (WHO, 1999).

⁹ So far only 1 percent of all plant species have been screened for active compounds (CTA, 2002).

¹⁰ According to some sources the proportion of population which totally depends on traditional medicine in developing countries is as high as 80 percent (Holley and Cherla, 1998; Planning Commission, 2000; World Bank, 2001).

and pharmacies are found all over India, and there are several Ayurvedic colleges in the country.

In many communities traditional healers continue to play an important role in local health care systems. In addition to traditional healers there is a strong family based tradition in which women play the central role. Traditional medicine is particularly relevant for the poor, many of whom cannot afford the cost of allopathic medicines. Also, in remote areas where modern medical facilities are not available, traditional medicine is often the only alternative.

2.3 Income and employment

As mentioned in chapter one, it is clear that the profit level of many current agricultural crops in India is declining. It is in this context that medicinal plants could provide a high-value, attractive alternative, generating additional income and employment. This could be markedly significant for the rural and landless poor. Medicinal plants have a number of forward and backward linkages in the chain and employment in other areas would follow, for example in supplying inputs, processing, drug formulation, trading, transport and the retail industry (see also Smith Olsen and Helles, 1997).¹¹ Since women are engaged in collection and cultivation, the promotion of medicinal plants could also help to empower women (Lambert *et al.*, 1997). In addition, medicinal plants can be an important source of revenue for both local and central governments.

Medicinal plants can provide substantial foreign exchange earnings. They provide natural ingredients for a growing number of 'conventional' allopathic medicines produced by the pharmaceutical industry. In addition, global interest in alternative medicines is strong and growing rapidly. For example, homeopathy and herbal medicines have now established themselves firmly in the western world as alternatives to allopathic medicines. Consequently the global demand for medicinal plants has increased. The international market for the medicinal plant trade is estimated at US \$ 60 billion, growing at an estimated 7 percent per year (Ramakrishnappa, 2002; Planning Commission, 2000; CTA, 2002). The actual demand will be even greater than the data suggests.¹² A substantial part of the trade is unrecorded, partly because much of it is illegal. Moreover, when analysing international trade statistics, it is difficult to separate medicinal from other uses such as flavouring, tenderisers, insecticides and perfumes (CBI, 2002).

The leading suppliers of the world market are China, Singapore, Brazil, India and Egypt. The international demand is largely from the United States and the European Union (EU), with Germany as the leading trade centre.

¹¹ For example, a recent report from the Planning Commission (2002) emphasises the important role that medicinal plants can play in creating additional employment in a number of sectors, including agriculture, pharmacy, health, tourism and manufacturing.

¹² As a large proportion of medicinal plant material is used domestically, the total demand is far greater than that suggested by trade figures.

2.4 The conservation of biodiversity

Biodiversity is the variability among living organisms, including diversity within species, between species and of ecosystems (CBD, 1992). Biodiversity provides ecosystems and species with the capacity to adapt to changing conditions (Zedan, 1995; IUCN 2000; SGRP, 2000). In addition to its contribution to sustainability, biodiversity also provides an important source of livelihood for rural communities. Poor people in these areas depend on non-timber forest products, such as medicinal plants, as additional sources in sustaining their livelihoods (Johari and Karki, 1999). Biological diversity also helps to sustain the cultural practices of local communities, since traditional medicine is closely linked to and dependent on the biodiversity available. For these reasons it is important that biodiversity, including the diversity of medicinal plants, is protected and conserved.¹³

Box 3: A shopkeeper in Dehradun

'I have a problem with getting enough supply of the ingredients I need to prepare the medicines,' says a shopkeeper and wholesaler in Dehradun. 'I place my order with the agents I know. If a species becomes rare in one area, we try to get it from somewhere else, sometimes even from Nepal or Bhutan. However, I foresee that in a few years time this will not be possible anymore'. He suggests that the government should do more to support the cultivation of medicinal plants, to make sure that he can access the plant material he needs in the future. 'For the rest, medicinal plants are good business. There is definitely a growing demand for most of the Ayurvedic products that I sell in my pharmacy. Some of the medicines I make myself in my small factory. Besides my customers here in Dehradun I also supply to Kolkata, Delhi, Bangalore and Chennai.'

There is however evidence that biodiversity is declining in most regions of India; medicinal plants are reported to have dwindled in a number of states, including Uttaranchal (Planning Commission 2000; Karki and Williams, 1999). One example, from a local drug manufacturer and trade, is given in Box 3. The main cause for this is an unscientific and excessive exploitation of forest resources. In many cases this has led to a near complete extinction of some important species of medicinal plants (Planning Commission, 2000). In spite of this trade continues openly in many

endangered species which are on the international CITES list.¹⁴

A number of steps have been taken internationally to protect biodiversity and plant genetic material. These include the Convention of Biological Diversity (CBD, 1992) and the FAO International Code of Conduct for Plant Germplasm Collecting and Transfer (FAO, 1994a). The CBD establishes the sovereignty of national governments over their genetic resources, their right to exploit them and their authority to control access. The FAO's Code of Conduct recognises farmers' rights and the need to compensate local communities and farmers for

¹³ Measures can involve collection as well as cultivation, or domestication, of medicinal plants.

¹⁴ CITES stands for Convention on International Trade in Endangered Species of Wild Fauna and Flora, see CITES, 2002.

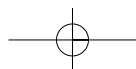
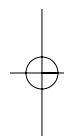
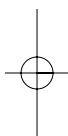
their contribution to the conservation and development of plant genetic resources.

In response, a number of national governments, including India's¹⁵, have passed laws that recognise the farmers' contribution to the conservation of biodiversity and traditional knowledge. The legislation also has provisions for compensation for the use of genetic resources by industry. This is pertinent to medicinal plants, as they are important raw material for the pharmaceutical industry.

It is hoped that these initiatives will contribute to the conservation of biodiversity. To date, however, biodiversity, including medicinal plant species, continues to decline. Cultivation¹⁶ has been suggested as one of the ways to reduce pressure on natural forest resources (see for instance Wood Sheldon, 1997; FAO, 1997).

¹⁵ The objective of the Biodiversity Bill 2000 is to promote the conservation of biological diversity, sustainable use of its components and equitable sharing of the benefits arising out of the use of biological resources (GoI, 2000).

¹⁶ Also referred to as 'domestication'.



3 Medicinal plants in Uttarakhand

3.1 Introduction

Uttarakhand lies in the north of India amidst the Himalayas, and is bordered by Nepal and China (see figure 1). It has 13 districts, with Dehradun as its capital (GoU, 2002a). Uttarakhand was declared an independent state in November 2000.

An important basis for its separation from Uttar Pradesh was that this region has a distinct socio-economy, geography, history, and culture. The state hosts important religious sites and pilgrim routes for Hindus and Sikhs, hence the reference to the area as the 'Abode of the Gods'. Uttarakhand is an area of great

Figure 1: Map of Uttarakhand



natural beauty, with forests, valleys and the snow covered Himalayan peaks that include the world famous Nanda Devi Biosphere Reserve. It is a favourite tourist destination, attracting national and international visitors. Apart from tourism, the economy of Uttaranchal is mainly based on agriculture. The industrial sector is very limited. Some measures are being taken to develop the region's hydroelectric potential, such as the building of the Theri Dam.

The state covers 51,000 square kilometres, which is less than 2 percent of the total territory of India.¹⁷ In 2001 the state's population was almost 8.5 million people, less than 1 percent of India's total population. Its annual population growth is 1.76 percent, compared to an average of 1.93 percent for the whole of India. The population density is 159 people per square kilometre; for India this figure is 324. Uttaranchal is among the poorest states of India; in 2001 its per capita income was 7,263 Indian Rupees, whereas the average for India was 10,771 IR. Only the States of Bihar, Jharkhand, Orissa, and Tripura reported lower per capita incomes in 2001. However, the level of education is relatively well developed since the 72 percent literacy rate in Uttaranchal is higher than the national average of 65 percent. The literacy rate for the male population is 84 percent (national average 76 percent), and for the female population 60 percent (national average 54 percent).¹⁸

Uttaranchal is a comparatively 'green' state. Approximately 70% of Uttaranchal comprises natural forest and rangelands. Most people reside in rural areas and live off small-scale agriculture (Pandey *et al.*, 2001). The road and communication infrastructure is not well developed because of the mountainous terrain and remoteness of communities. Its population has a strong tradition of protecting the environment and biodiversity. A well-known example of this includes the Chipko movement, which led to the banning of commercial logging in a large part of the state (see Box 4).

Medicinal plants are an integral part of the life of Uttaranchal people. Local communities, including traditional healers, have great knowledge of their healing capacities. With its variety in climate and altitude, the region is well situated for a range of medicinal plant species. The natural forests and ranges, when exploited by sustainable methods, provide ample opportunities for the harvesting of medicinal plant material from the wild. Farmers are experimenting with the cultivation of medicinal plants.

3.2 Government policies to promote medicinal plants

Both national and state governments have shown increasing interest in promoting medicinal plants in India. A task force from the Planning Commission reviewed the sector in 1999 (Planning Commission, 2000). The Commission acknowledges the importance of the sector and the need to pursue effective

¹⁷ Data for this paragraph were taken from GoI (2002).

¹⁸ No time series data for the main economic indicators is available as the state was created very recently.

Box 4: Chipko environmental movement

In the 1970s rural women from several Central Himalayan communities embarked on a grassroots environmental movement that became well known internationally. Their prime goal was to preserve the natural resources and ecological balance of the central Himalayas. They called themselves the Chipko movement, which literally means 'Tree Hugging Movement'. They confronted the commercial exploitation of the Himalayan forests. Following the doctrine of non-violence the women literally clung to the trees that were marked for logging, held demonstrations against the auctioning of trees, or tied sacred threads around trees destined for the axe. More and more villagers supported the Chipko movement and their influence rose to national and international levels. The responsible institutions, including the commercial logging companies, were forced to change their perspective on monetary versus environmental interests. Nowadays it is not permissible to fell trees above 1,000 metres and on those slopes exceeding 30 degrees. Chipko started an environmental revolution that has now spread inside and outside the country, giving the world a proud example of an alternative to political and environmental cynicism. It shows that well-organised grassroots activism can be an effective instrument in protecting the environmental rights of local communities (see also Weber, 1988).

policies to strengthen it. Similarly, the Uttarakhand Government recognises the importance of suitable policies and effective institutions (see Tiwari, 2002; GoU, 2002a; b; c). It has introduced a number of policies, which include:

- Supporting research and technology development;
- Providing financial support for planting material and land preparation through medicinal plant co-operatives;
- Providing financial support for projects promoting medicinal plants;
- Setting up nurseries to provide plant material;
- Strengthening linkages with the market;
- Setting up a Medicinal Plant Board to direct the growth of the industry.

Besides mentioning medicinal plants specifically in its industrial policy (see Box 5) the state government has developed an action plan to uplift the sector (see GoU, 2002b, 2002c). It has identified ten species of medicinal and aromatic plants for commercial exploitation in Uttarakhand.¹⁹

Box 5: Uttarakhand's industrial policy for medicinal plants

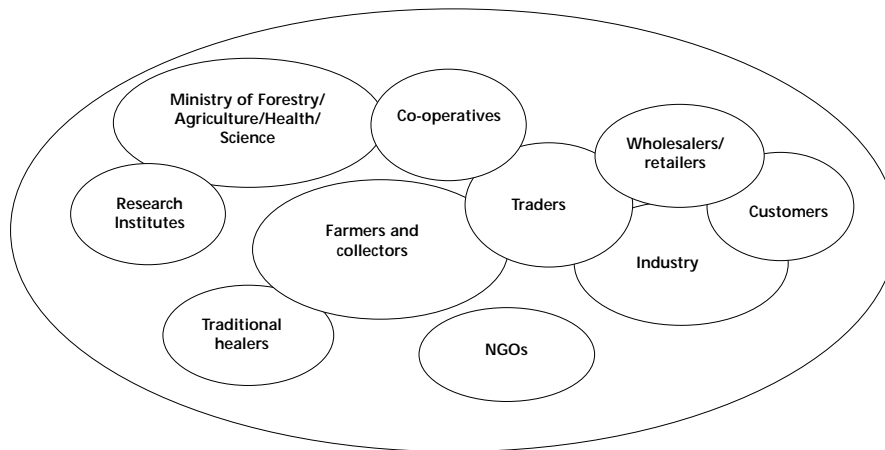
The 2001 industrial policy of Uttarakhand specifically mentions Herbal and Medicinal Plants: 'Uttarakhand is a storehouse of a rich variety of species of herbs, medicinal and aromatic plants. This massive potential has remained largely unexploited in the absence of a well-planned and coordinated strategy for commercial cultivation and integrated arrangements for processing and marketing. An integrated action plan will be drawn up for this purpose in coordination with the Government of India and specialised agencies all over the country. Strategic linkages and connectivity will also be forged between this industry and tourism. Special emphasis will be given to arrangements for marketing both within the country and abroad' (GoU, 2001).

¹⁹ Among others, these include *Atis (Aconitum heterophyllum)*; *Kutki (Picrorhiza kurrooa)*; *Feren (Allium strechyi)*; *Kuth (Saussurea costus)*; *Seabuck thorn (Hippophae salicifolia)*.

3.3 Institutions

A number of agencies are engaged in the promotion of medicinal plants in Uttaranchal. These include central and state government departments, universities, co-operatives, NGOs and donor agencies. In addition, the private sector is involved through numerous commercial agencies engaged in trade, processing and marketing. Figure 2 presents a simplified picture of the main institutions and stakeholders in the medicinal plant chain. Below, the main stakeholders among government, research, co-operatives, NGOs and donor agencies are introduced. The other stakeholders are covered in the next section, which discusses the flow of production, trade, processing and consumption within the medicinal plant chain.

Figure 2: Main stakeholders in the medicinal plant chain



The government ministries promoting the medicinal plant sector include the Ministry of Environment and Forests; the Ministry of Health and Family Welfare; the Ministry of Science and Technology and the Ministry of Agriculture.²⁰ The leading agency is the Ministry of Environment and Forests. Its mandate is to survey and conserve flora, fauna, forests and wildlife; prevent and control pollution; reforest and regenerate degraded areas and to manage India's forests, nature reserves and parks (Ministry of Environment and Forests, 2002). The policies and interventions of the Ministry of Environment and Forests have a direct influence over the medicinal plant sector.

The Ministry of Agriculture is indirectly involved in the medicinal plant business through its National Co-operative Development Corporation (NCDC). The NCDC plans, promotes and finances programmes for the production, processing, marketing, storage, export and import of agricultural produce, including medicinal plants (NCDC, 2002).

²⁰ For more information on government policies and programmes see GoI, 2001.

India has a strong and extensive research base in the field of medicinal plants. According to a database maintained by IDRC, over 900 Indian researchers are working on medicinal plants (Johari and Karki, 1999). Institutes belonging to the central and state governments carry out most of the research. The Ministry of Environment and Forest supports research through the Indian Council of Forestry Research and Education (ICFRE), based in Dehradun (see ICFRE, 2001). India's prime institution for forestry research, the Forest Research Institute (FRI) is also based in Dehradun. The institute conducts research on medicinal plants in its Non-Wood Forest Products Division. Other autonomous research institutes supported by the Ministry are the G.B. Pant Institute of Himalayan Environment and Development, and the Wildlife Institute of India (WII).

The Ministry of Science and Technology supports research through its Central Institute of Medicinal and Aromatic Plants (CIMAP) in Lucknow. This is the main research institute dealing with medicinal plants in India. Its objectives include the development of production and processing technologies, including genetic improvement, for economically important medicinal and aromatic plants, both indigenous and exotic (CIMAP, 2002).

The Ministry of Health and Family Welfare has three agencies dealing with traditional medicine. These include the Central Council for Research in Indian Medicine and Homeopathy and the Committee on Indian Systems of Medicine and Homeopathy, both based in New Delhi. Research is supported by three specialised agencies: the Central Council for Research in Ayurveda and Siddha; the Central Council for Research in Unani Medicine and the National Institute of Homeopathy (see ISMH, 2002).

The State Government of Uttaranchal also supports research through its Herbal Research and Development Institute (HRDI) in Gopeshwar.

In addition to these government institutes, universities, such as the Garhwal University, in Srinagar, carry out research. Its High Altitude Plant Physiology Research Centre (HAPPRC) is one of the prime research facilities in Uttaranchal.

The co-operatives, called Bhaishaj Sangh (literally medicinal plant organisation), were set-up in 1977 to develop medicinal plants in the hill areas of Uttar Pradesh (to which Uttaranchal belonged in the past). Each district in Uttaranchal has one co-operative. Each is involved in the collection of medicinal plants from the forests and rangelands. In addition to this, they promote the cultivation of medicinal plants.

A number of NGOs are also involved in the promotion of medicinal plants in Uttaranchal.²¹

²¹ At the national level NGOs involved in traditional medicine include the Foundation for Revitalisation of Local Health Traditions (FRLHT), Bangalore, and the Herbal Folklore Research Centre, Tirupati.

Prominent among these are the Centre of Minor Forest Products for Rural Development and Environmental Conservation and the Society for Himalayan Environmental Research (see Box 6).

Box 6: SHER: a NGO promoting medicinal plants in Uttaranchal

Kiran and Arun Kumar Badoni have set up the Society for Himalayan Environmental Research (SHER). This NGO aims to conserve and cultivate medicinal plants in the mountain areas of Garhwal district. Among SHER's main activities are the setting-up of demonstration plots of selected medicinal plant species; testing and promoting appropriate technologies and practices to grow medicinal plants (includes extension and training mainly aimed at women farmers) and exploring long-term buying contracts with industries using medicinal plants. Despite some policy limitations (lack of coordination among Ministries), shortage of planting material and lack of information on appropriate technologies and practices, SHER believes that the cultivation of medicinal plants has great potential for many small-scale farmers in Uttaranchal.

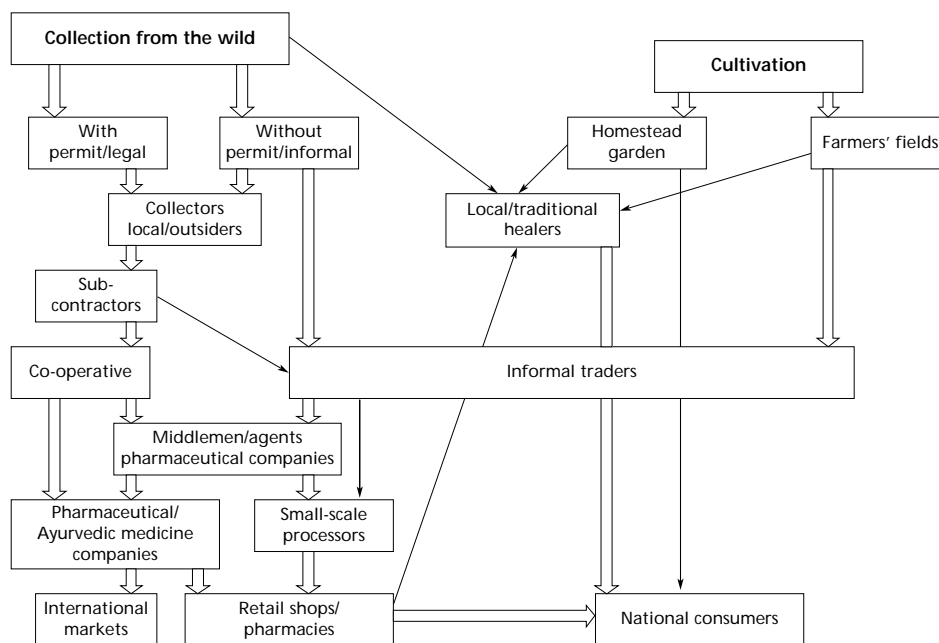
The international donor community is increasingly interested in supporting the Indian government's promotion of medicinal plants. The United Nations Development Programme (UNDP) has initiated a process to develop state level action plans for their conservation and sustainable utilisation (UNDP, 2002). It will utilise experiences from ongoing UNDP projects in the States of Andhra Pradesh and Maharashtra. The International Fund for Agricultural Development (IFAD) is planning, through a government loan scheme, to execute medicinal plants' projects in selected states. The Danish development organisation Danida is assisting medicinal plant initiatives in Andhra Pradesh, Karnataka and Tamil Nadu. The Canadian International Development Research Centre (IDRC) has a regional medicinal plant programme called the Medicinal and Aromatic Plants Programme in Asia (MAPP) (MAPP, 2002).

Besides supporting government efforts, most donors also assist the Non-Governmental sector to provide opportunities for the development of medicinal plants at the local level.

3.4 The medicinal plant chain: collection, trade and consumption

The structure of the medicinal plant chain is presented in figure 3. Below, the main steps in the medicinal plant business are discussed in detail.

Many of the medicinal plants originating in Uttaranchal are collected from forests and rangelands. The Forest Department determines the areas from which plants can be collected, designates the species and their quantity. The Forest Department gives permits to the co-operatives, which in turn use contractors. The contractors employ members of the local community and outside labourers to collect. The contractors are obliged to supply the collected plant material to the co-operatives, which then sell it to traders and the industry.

Figure 3: The medicinal plant chain

Few specialised wholesalers are engaged in this business. Small-scale traders and agents of the larger drug manufacturers transport the plants from the collection areas to the processors operating in the urban areas. These may be small or medium scale local operators, or large scale Ayurvedic and allopathic drug manufacturers. The latter are mainly based in Bombay and Delhi. It is estimated that there are 7,800 drug manufacturing units operating in India (Planning Commission, 2000).

The processors prepare the medicines through formulations, specific mixtures of medicinal plant material. It is reported that in India the processing industry uses around 400 plant species to manufacture their medicines, of which 35 species are used in large quantities (Planning Commission, 2000). Apart from supplying the national market, the larger companies export, mainly to the United States and the European Union. In India, numerous local Ayurvedic pharmacies and retail shops located throughout the country sell medications. Counselling by traditional healers and pharmacists, consumers use the medicines for a wide variety of preventive and curative applications. In both urban and rural areas Ayurvedic medicine is firmly established in the health care system.

In addition to legal collection it is reported that a large amount of medicinal plant material is collected illegally. In fact the amount collected without

permits is larger than the legal collection (Chakrabarti and Varshney, 2001; Ramakrishnappa, 2002). The trade is highly secretive and complex, which makes it hard to understand how the system works. There is very little detailed information available about the cultivation, trade, processing and consumption of medicinal plants (Holley and Cherla, 1998). The available information suggests that the sector is facing many market insecurities. The marketing of medicinal plants is not transparent, leaving collectors, farmers and processors in the dark about prices, quality, and consumer preferences.

4 Medicinal plants in Chamoli – main research findings

4.1 Cultivation

The fieldwork carried out in Chamoli consisted of a detailed examination of the cultivation of medicinal plants in the district. It focused on two issues:

- whether large scale cultivation of medicinal plants was taking place;
- if not, explore the reasons for its absence.

Some national and international literature refers to the cultivation, trade and use of medicinal plants in Uttaranchal.²² A survey of literature and discussion with officials suggested that large-scale cultivation was taking place in several areas such as Mana, Tapovan and Bhyundar Valley (Valley of Flowers) (among others Kala, 1998; Bhatt, 1999; Maikhuri *et al.*, 1998). It was also reported that Joshimath was a centre of trade. The team decided to visit these places to interview farmers and traders. Furthermore, as the Forest Department and the Co-operatives have a central role in the policy to promote cultivation, discussions with their officials were also held.

A small number of farmers grow medicinal plants in limited quantities on their homesteads for personal and community use, but there was little evidence of large-scale cultivation. Two examples were particularly interesting. One medical practitioner from Joshimath maintains a nursery of a variety of medicinal plants near Tapovan. The other example is from Badrinath where a volunteer from a religious NGO has set up a nursery. Both individuals are exceptional, as they are keenly concerned about the conservation of medicinal plants and traditional knowledge. They provide medicinal plant material and medications to the local community.

Some evidence of cultivation was also found in Mana and Tapovan villages. In both villages a limited amount of *Kuth*²³ was being cultivated by a small number of farmers for personal use. In the past a number of farmers had grown *Kuth*, but none of them continued. The reasons for stopping cultivation were examined in detail.

²² Among the most influential are: Biswas *et al.*, 2000; Kala *et al.*, 2002; Kala *et al.*, 1998; Bhatt, 2001; Samant, 2002; Maikhuri *et al.*, 1998; 1999; 2001a; 2001b; 2002; Mehta, 2002; Nautiyal *et al.*, 1998a; 1998b; 2001; Rao *et al.*, 2000; Silori and Badola, 2000; Uniyal *et al.*, 2002.

²³ Botanical name *Saussurea costus*.

Box 7: A Kuth farmer from Tapovan

A small-scale farmer tells his *Kuth* story: 'In Tapovan we have a long tradition of collecting medicinal plants from the wild for our health care. We noticed that the plants were disappearing in the wild and wanted to start growing medicinal plants on our farm. The state co-operative said we should cultivate *Kuth*. They arranged the permits and seeds and said that they would buy our crop. We provided land and labour. All went well and we produced a good harvest, but the co-operative didn't buy it. Also we could not access another market. That was a major loss for our family. We had put a lot of effort into cultivation, even more than we are used to, since extra weeding was required compared to our other crops. Growing medicinal plants is a risky business. If farmers received good profits, they would increase the production, but now the risks are too high for small-scale farmers like us. Have a look at my farm. You can see I don't have medicinal plants on my farm anymore. And without a guaranteed market outlet you will not see them back in my fields!'

The cultivation of *Kuth* in Uttaranchal started as a result of promotion by the co-operative, *Bhaishaj Sangh*. The co-operative provided farmers with seeds and credit. It also guaranteed that it would buy the crop. A number of farmers took advantage of the scheme and planted *Kuth* in their fields. It took three years for the crop to be ready for harvest. *Kuth* was found to be ideally suited for the high altitude areas of Chamoli and high yields were obtained.

Unfortunately, the co-operative could not buy all the harvest from the farmers since it did not have a buyer. Apparently, there had been no accurate analysis of the existing demand of *Kuth*.

Many farmers were unable to sell

their plants and suffered serious losses. In fact, many farmers still have stocks of *Kuth* for which they are unable to find a buyer, facing a saturated market. The experience created enormous frustration among co-operative officials and farmers. A lot of time, energy and money were wasted. Many farmers are now so frustrated they are unwilling to plant *Kuth*, or any medicinal plant species again.

Similar difficulties in marketing other medicinal plants, such as *Chirata*²⁴, were also reported by the farmers interviewed.

4.2 The failure of cultivation

A number of reasons were found responsible for the failure of efforts to promote the cultivation of medicinal plants.

A) THE PREDOMINANCE OF COLLECTION

It will never be economical to cultivate species that grow abundantly in the wild and can be collected easily. Also the problems that farmers experience in trying to get the necessary permits to cultivate (see point b) make collection the easier way to procure any medicinal plant species.

²⁴ *Swertia chirayita*.



Terrace farming in Chamoli

A Uttarakhand farmer growing medicinal plants in his garden





A traditional farmer and medicinal doctor, Badrinath



A farmer expressing his views on medicinal plants, Niti

Ayurvedic pharmacy, Srinagar





Women farm workers, Tapovan

Ms. Badoni, Director of SHER,
Dehradun (see box 6)





Mana, last village before the Tibetan border



A traditional healer, Tapovan



Villagers, Tapovan (see also box 7, 8)

Children in a medicinal plant garden, Mana





Ayurvedic medicines on sale in Dehradun

B) PERMITS

Permits from the Forest Department are required for the cultivation and marketing of medicinal plants. There seems to be considerable confusion about the procedure and eligibility to obtain a permit. In fact, at the time of the fieldwork, it was not clear whether the permits were issued by the co-operative or the Forest Department. Most farmers reported that in spite of promises they had not been given permits. This has created uncertainty, discouraging farmers from opting for cultivation.

Box 8: A farmer from Tapovan speaks his mind

'No, I do not want to discuss medicinal plants. Why not? They don't allow me to go to the forest. I am scared to go. Even our traditional healer is scared, afraid that they will catch him. Our healers have collected a little over generations for our own use, but now the authorities put us in prison. Why? This decline of medicinal plants is certainly not our fault. I asked for a permit to start cultivating two years ago, I had to pay 2000 rupees to the Forest department. Every time I go there they tell me: 'It is in process.' I want to cultivate, for the market, for my own use and to preserve our culture. My kids have never seen *Atis* and it is such a useful plant. I don't understand. Why can't I grow medicinal plants on my own farm? What is the harm?'

C) MARKET UNCERTAINTIES AND LOW PRICES

At present farmers are expected to sell their harvest through co-operatives, but these are unable to access and provide information on demand and prices. This creates uncertainty and increases the farmers' risk. If farmers were to cultivate medicinal plants independently they would be compelled to sell to illegal traders, who capitalise on their monopoly and only give low prices. These dealers also need to recover the high costs related to illegal trade.

It is clear that for cultivation to be successful farmers require strong support in accessing market outlets. Discussions with farmers suggest this is lacking.

D) TECHNICAL SUPPORT

Most farmers do not have experience in growing medicinal plants and need technical support. Although a number of institutes are engaged in the development of cultivation techniques, their contribution has been small. Most farmers complained that the degree of technical support delivered by governmental agencies is inadequate. The research efforts are primarily science driven and do not focus on solving farmers' immediate problems. It was also found that most research activities are carried out on-station. The experience of farmers is not fully capitalised on, partly as very limited research is undertaken on-farm. The linkages between researchers and extension workers seem very weak or non-existent. As a result the diffusion of developed technologies has been extremely limited.²⁵

²⁵ For more information on farmer participatory research see for instance Martin and Sherington, 1996; KIT, 1994; KIT, 1996.

E) PLANTING MATERIAL

A number of farmers mentioned a serious shortage of the planting material required for cultivation. This could prevent large-scale cultivation even when farmers are interested. For example, farmers from Ghes Village, Chamoli district, are interested in

Box 9: A farmer's viewpoint

A Ghes farmer and community leader explains the HAPPRC initiative:

'When I retired from the army I went back home, and started farming. Our area is very remote; sometimes the price we receive for our potatoes is lower than the transport costs. Our soil is not very fertile. Growing medicinal plants would be a good option for us. Through HAPPRC we have entered into a contract-farming scheme. The industry has agreed to buy all we harvest and at a guaranteed minimum price. They initially offered us an advance but we refused. We do not want to be too dependent. HAPPRC provides us with technical knowledge and seeds. They are also organising an organic farming certificate. HAPPRC acts as an intermediary between the industry and us. Because our project is still in an experimental phase HAPPRC agreed that we could use their permit for the cultivation of medicinal plants. We farmers applied for a permit ourselves some time ago but nothing has come of that yet. So far, we are very positive about cultivating medicinal plants. The plants are doing very well, no problem with pests and diseases. Profit prospects are good, certainly when compared to our traditional crop potato. The plants are scattered over the farm, mostly planted on wasteland, land that is not cultivated. Besides *Kutki* I have also planted *Kuth*, and a bit of *Atis*. I plan to extend with more species. We will harvest our first crop next year.'

cultivating *Kutki* and *Atis*, but large-scale cultivation of these plants has not been possible since only a small amount of planting material is available.

Farmers also mentioned that the planting material supplied by government agencies was of poor quality. For example, in a number of instances in Tapovan, *Kuth* seeds failed to germinate. The farmers attributed this to the poor quality of the seeds provided by the co-operative.

F) HIGH RISK AND LONG GESTATION PERIOD

Many farmers in Uttaranchal operate small landholdings and have little capacity to take on the risks involved in cultivating a new crop. Moreover, many medicinal plants require a long gestation period before they can be harvested; for example, *Kuth* requires a minimum of three years. Small farmers are unable to invest and wait such a long period for returns.

4.3 HAPPRC: A success story

The High Altitude Plant Physiology Research Centre (HAPPRC) is a research institute belonging to Garhwal University in Srinagar. The Centre has a long tradition of botanical research for mountain areas. In recent years the Centre has focused on a number of important medicinal plants in Uttaranchal. It has developed and diffused cultivation technology. One of its important activities is to promote *Kutki* cultivation in Chamoli district.

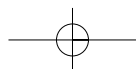
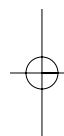
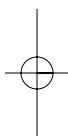
HAPPRC's efforts to promote the cultivation of *Kutki* differ from similar attempts by other agencies. Farmers are given comprehensive support, not only technical, but also in marketing. Taking a farming system's approach the Centre provides planting material and training to farmers. Most importantly, they have arranged a buying contract with a commercial company with a commitment to purchase the complete production of *Kutki* at a guaranteed minimum price. This has been done through a tri-partite agreement between the farmers, the company and the Centre.

The farmers are very satisfied with the arrangement as they have an ensured and profitable market outlet for their product. Industry is satisfied as a supply of high quality raw material is ensured. The Centre benefits since its technology is being tested on-farm, and more likely to be adopted by farmers. Based on this experience the Centre is considering expanding the scheme to other medicinal plants such as *Atis*, *Jatamansi*²⁶ and *Chirata*²⁷.

The HAPPRC case shows that cultivation can still be a viable strategy provided various constraints are removed. As the yields and profitability of major cash crops decline farmers are keen to shift to alternative crops. In fact many farmers showed interest in cultivating medicinal plants. However, in order for this to be a viable option, major changes in policies are required. These are discussed in the following chapter.

²⁶ *Nardostachys grandiflora*.

²⁷ *Swertia chirayita*.



5 Conclusions and policy recommendations

5.1 General conclusions

Medicinal plants have an important role to play in agricultural diversification, and can generate income and employment. The agro-climatic conditions in Uttaranchal particularly suit medicinal plants. This provides Uttaranchal with a unique window of opportunity to capitalise on the increasing domestic and global demand for herbal-based medicines.

The Uttaranchal government is keen to take advantage of this window of opportunity and has a policy to promote the cultivation of medicinal plants. At present most of the medicinal plants in Uttaranchal are collected from forests, and this has led to the near extinction of some important species. Cultivation is expected to relieve some of the pressure on forest resources and provide much needed alternative income opportunities for farmers. Furthermore, large-scale cultivation will be more conducive to investment by industry. If medicinal plant material becomes abundantly available in Uttaranchal, the industry will be disposed to take an interest in developing the sector in the state.²⁸

Cultivation will also provide impetus to exports. Consumers in developed countries are prepared to pay a premium for products procured without damaging the environment. Medicinal plants produced through cultivation will be more acceptable to these markets. Certification of supply becomes an option, which will enhance consumers' trust that they are obtaining a genuine product as well as enabling access to ecological and fair trade markets.

Policies which influence the growth of the medicinal plant sector are implemented by a number of institutions. The most important of these are the Forest Department and the medicinal plant Co-operatives. Research shows that there is considerable overlapping of responsibilities between various departments. There is also possible conflict between the agencies belonging to the central and the state governments. This has caused much confusion and uncertainty, which has hampered the development of the sector.

Coordination among the different stakeholders involved in the medicinal plant chain needs to be improved urgently. The fieldwork showed that relationships

²⁸ More information on this can be found in Karki and Johari, 1999.

between some of the major stakeholders are non-existent or very weak, and that a certain degree of trust is missing. In order to develop the chain, the players will have to work together to make medicinal plants a successful enterprise, to the benefit of many. Effective communication and joint action that create leverage by removing common constraints, is required.²⁹ Otherwise the wrong priorities will be pursued, efforts duplicated and opportunities will soon vanish.

The Uttaranchal government has recently facilitated the setting-up of an independent Medicinal Plant Board which is expected to coordinate the activities of the various actors involved in the sector. It is understood that the Board is not merely a formal institution or meeting place but a centre of facilitation where government, private sector, research, extension, farmers, NGOs meet to discuss and plan interventions to develop the medicinal plant chain. It has the potential to become an effective platform for dialogue and facilitate the formulation of policies and plans. However, in Uttaranchal the Board is yet to become fully active.

5.2 Cultivation

In spite of the policy to support cultivation, research shows that little is taking place. There are a number of reasons for this. The most important of these are: large scale collection; legal restrictions on cultivation, especially those related to permits; market uncertainties and low prices; a lack of technical support including the unavailability of suitable planting material. These reasons are discussed in detail below.

A) LARGE SCALE COLLECTION

If a species is available in abundance in the wild, and it can easily be collected, then cultivation will not be economical.

Recommendation

Only species not abundantly available in the wild should be promoted for large-scale cultivation.

B) LEGAL RESTRICTIONS

The main legal issues concern permits for cultivation and access to forest resources for collection. In the case of cultivation, there is great uncertainty about whether permits will be granted or not. There is also confusion regarding the government agency responsible for issuing the permits. This is compounded by a lack of transparency regarding the rules and regulations and an unclear process of decision making.

²⁹ See also Alsop *et al.*, 2000; and Singh, 2001.

The Forest Department has made some attempts to rationalise the process in the Nanda Devi Biosphere. The Department has begun to maintain a register of farmers interested in cultivating medicinal plants. It is proposed that this register should be used as a basis for granting permits. According to officials the Forest Department will be responsible for verification of the farmers' claims to cultivate. The Department will have to verify a claim within a specified time period. If the Department fails to visit the farm within that time, the farmer's claim will be automatically accepted and a permit will be issued. However it is unclear how long it will take to implement this process, which is still at an initial stage.

In the case of collection, local communities and farmers complain that while they are not allowed access to the forests, large-scale illegal collection and trading continues to take place. If local communities were allowed greater involvement in the collection process it would reduce illegal activity while creating income opportunities for the local population.

Recommendation

A clear policy to grant permits should be formulated and implemented without delay. It should be made clear, transparent and time-bound.³⁰ Local communities and farmers should be allowed access to forests to collect medicinal plants for their own use and have a greater influence over the process of collection. At the same time large-scale collection should be closely monitored. Most importantly a balance between collection and cultivation should be maintained. This is important in order to provide incentives to local communities to cultivate medicinal plants as well as promote the conservation of biodiversity.

c) MARKET UNCERTAINTIES

Farmers do not have direct links with trade and industry and depend largely on government agencies for information regarding demand and prices. These agencies have weak links with trade and industry and are not equipped to provide reliable market information. Consequently efforts to promote cultivation so far have proved inadequate to link farmers to the market. This increases the risks and discourages farmers from taking up cultivation.

Prices of some species are low, partly due to large-scale collection. This makes cultivation unattractive. In the current situation, where farmers are not granted permits to cultivate, they are forced to sell in the illegal market. This exposes farmers to action by government agencies and exploitation by middlemen.³¹

³⁰ Some lessons can be learnt from the aforementioned Forest Department initiative in Nanda Devi Biosphere.

³¹ This as a result of the limited competition following the high barriers to enter the business. Alternatively, it can be argued that due to the unavoidable illegality of the business middlemen are forced to operate under high risks and costs, and can therefore not offer higher prices to their suppliers.

Recommendation

Farmers need greater information on demand and prices. Farmers and their organisations need more support in the area of market information and commercialisation. Information on which crops are in demand in the end market needs to be communicated throughout the chain. Therefore, an effective communication mechanism needs to be in place linking players operating at different levels in the chain. Specific attention needs to be given to researching demand prospects in international markets, as well as instruments to access the major international outlets. Farmers also need support in building close and effective linkages with trade and industry. Both government departments and NGOs can act as facilitators to bring farmers and industry together. Such market linkages can be strengthened through contract farming arrangements and supporting commercial capabilities of producer organisations.³² The possibility of obtaining international certification for cultivated medicinal plants needs to be investigated.

D) LACK OF TECHNICAL SUPPORT

As most farmers do not have experience in the cultivation of medicinal plants, they require support. This should include cultivation practices, processing and storage techniques and quality control methods. A number of research institutions, from both the central and state governments, have the mandate to develop and diffuse technologies related to medicinal plants. However, evidence suggests that their contribution to meeting farmers' needs has been limited. The reasons for this include a duplication of efforts, misplaced priorities and a lack of resources. The researchers also have weak links with farmers, and this limits their ability to address farmers' problems.

One objective of research is to develop suitable planting material, which can be made available to farmers. Some research institutes and co-operatives have set up nurseries to propagate planting material, but the amount available in Uttaranchal is still very small.³³ If a larger number of farmers were to opt for cultivation, this is likely to emerge as a serious constraint.

Recommendation

Farmers need to be assisted with appropriate technical support on a continual basis. Apart from government agencies the involvement of NGOs and the private sector should be ensured.

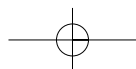
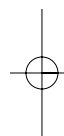
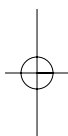
³² For more information on this see for instance FAO, 1994b; 1995; Coulter *et al.*, 2001; Rondot *et al.*, 2001; Belt, 2001.

³³ It is also questioned whether the right species (i.e. those that are in demand by the market) are propagated.

Greater coordination and collaboration between researchers is essential in order to increase the efficiency and impact of research efforts. This will ensure optimal use of scarce resources. Farmers need to participate in the research process, including the identification and selection of issues to be researched, the execution of research on-farm, and the testing and dissemination of results.

Linkages between researchers, extension services and farmers need to be strengthened. The Medicinal Plant Board could play an important role in this by providing a platform for discussion and action. The private sector can play an important role in communicating to the other chain actors which species are in high demand, diffusing appropriate technologies and supplying planting material. Its role should be encouraged.

To conclude, it should be emphasised that Uttaranchal has a unique window of opportunity to develop its medicinal plant sector. This will contribute to the process of agricultural diversification and open new income and employment opportunities. The central question is how this opportunity is to be converted into reality. This requires a number of policy measures. Some steps in this direction have already been taken. However, as the research suggests, a number of important constraints still remain. If the sector is to grow to its full potential, these will need to be addressed.



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