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Title:

Conservation and Cultivation of Medicinal and Aromatic Plants for Climate Resilient Livelihoods in Indian Himalayan Region

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Abstract:

Climate change is already seen to be shaping the impacts of the drivers of overall social and natural resources change. Amongst India's vulnerable sections of the population, mountain people and communities from the Himalayan river basin are particularly vulnerable to climate and other drivers of change that impact the hydrological cycle, agricultural systems and associated livelihoods. The impacts of climate change on tourism are manifesting in a number of different ways according to local conditions. These changes result in multiple impacts on the food, water and livelihood security of the rural community, especially women, increasing their burden and drudgery in resource collection (water, fuel, fodder, etc.).

The incidence of natural disasters particularly floods and droughts, is expected to increase due to climate change influence. Impact of disasters is directly proportionate to the vulnerability of populations, and people in this region have limited capacities and coping mechanisms.

It is therefore imperative to build the resilience of most communities to help them cope with climate change impact. This can be achieved to a great extent by capacity building and sustainable use of local biological resources, maintaining a rich diversity of crops in farming systems, management of pastures/fodder trees to support livestock based livelihoods, identifying and promoting sustainable alternate livelihood options for example - cultivation of medicinal plants, edible mushrooms, high value products like Bay Leaf,

ornamental plants and beekeeping, pine briquetting and many more depending upon local traditions and resources.

This paper deals in detail about one such potential area of 'sustainable livelihoods through medicinal and aromatic plants (MAPs) based on CEE's interventions in Uttarakhand. There exists a tremendous global demand for medicinal and aromatic plants. India being biodiversity rich and blessed with congenial bio-geo-climatic conditions is already 2nd largest exporter (2010). But the demands are on much higher side than the supply. Looking at the demand supply ratio in Uttarakhand alone, the state is not able to meet even 20% of the demand of which only 7.5% comes from cultivation.

The Himalayan State of Uttarakhand by virtue of having varied ecological conditions, plains to high altitude, is endowed with rich medicinal plants diversity; many are threatened and are at the brink of extinction. More than 40 'Globally Significant Medicinal Plants' grow in Uttarakhand. There are 7 Medicinal Plants Conservation Areas (MPCA) and around them Medicinal Plants Development Areas (MPDA). From MPDA community can sustainably harvest medicinal plants they require whereas MPCAs are protected for conservation. Seeking community participation and involving them in the development and management of MPDAs will ensure availability of medicinal plants required for the health care needs of local population. MPDAs can also serve as a source of planting material.

On the research agenda there is an urgent need to have the cultivation protocols established for high demand MAPs, equipment/technology for scientific and sustainable harvesting, post harvest management, processing technologies for value addition, strengthening marketing linkages at grass root level.

At policy level, cultivation of MAPs to be considered and promoted as alternate livelihood, documentation of traditional knowledge and practices on health care systems, revival of herbal health care systems, more schemes to promote MAPs cultivation as an organised sector, appropriate incentives to MAPs growers and assurance for financial security.

Introduction

Herbs have occupied a place of reverence and honour in Indian households since time immemorial. Be it in the form of spices, condiments, medicines, supplemental food items, cosmetics or religious ingredients herbs are synonymous with Indian tradition and culture. Their ubiquitous presence in almost every sphere of our lives makes them an indispensable source of health benefits and nutrition. Herbs are also integral to several branches of traditional medicine, namely *Ayurveda*, *Yoga & Naturopathy*, *Unani*, *Siddha* and *Homoeopathy*. India, especially the Himalayan region, is a haven of medicinal and aromatic plants (MAPs). Traditionally, MAPs were procured from the wild to address local/domestic needs. With the proliferation of the modern pharmaceutical industry, however, medicinal plant species from the wild are being over-exploited leading to alarming consequences.

The State of Uttarakhand boasts of nearly 700 species of medicinal plants used in the traditional system of medicine. Almost 150 medicinal plant species, in about 240 formulations, are used to treat almost 70 ailments of both humans and domestic animals. Herbal medicines are organic, reliable, have multiple benefits, and are believed to have zero side-effects. Almost 80% of India's rural population relies solely on natural medicines and traditional healthcare practices, more so in the far-flung rural mountains. However, with rapidly disappearing plants, people are facing an acute shortage of herbal medicines. Along with rare, endemic and native plant species, the formerly widespread and respected traditional healthcare system is also dying a slow but steady death.

MAPs are an integral part of India's tradition and its cultural heritage. They are found in all types of forests across the country and provide essential services to those who depend on them for healthcare, food, nutrition, religious values and ecological services. Not only are MAPs essential to the people of the mountains for their survival, MAPs are also the preferred lean season sustenance for high altitude faunal species. In rural mountain communities, MAPs are especially significant as they are the primary source of traditional herbal remedies where modern medicine is yet to make inroads.

The Himalayan region is estimated to contain 10,000 species of MAPs of which over 700 species are found in the state of Uttarakhand.

Today, the medicinal values of MAPs are being recognized by pharmaceutical giants who are increasingly diversifying into alternate medicine as the demand for the same is on the rise. However, the biggest threat to the Himalayan flora and fauna system rests in the unprecedented large scale removal of native, endemic and rare MAP species, with scant regard for the regeneration potential and opportunities for these species. In addition, widespread plantation of non-

native trees is further damaging the habitats of MAPs, thereby, pushing them to the brink of extinction.

Non timber forest produce (NTFPs), including MAPs, have traditionally been an important source of livelihood for mountain communities as their collection from wild mountainous habitats has provided self-employment opportunities to rural communities. Today, there are very few plants left in the wild for collection as huge tracts of forest land have been cleared of MAPs, leaving very little possibility of these plants ever growing back. In such a scenario, cultivating MAPs to meet commercial demand seems to be the last resort if we want to ensure the availability of MAPs for future use.

Cultivation of MAPs in Uttarakhand

Owing to ever-rising demand for MAPs in the international pharmaceutical and cosmetics market, there is great potential for employment and income generation in the MAPs sector. Raw materials as well as value added products are highly sought after and farmers stand to gain high profits from the cultivation of species in demand.

In addition to their income generation potential, medicinal and aromatic plants also purify the environment, reduce pollution and help cut down on food and medicinal costs. At the same time, cultivating these species will aid the numerous conservation efforts that are being made across the country, especially through the current project for which this manual has been prepared.

Medicinal Plant Conservation and Development Area (MPCA and MPDA)

MPCAs are a network of natural forest areas meant for conservation, breeding and natural regeneration of MAPs in their natural habitat. MPCAs offer protection to species that are in high demand and at risk of becoming extinct. They also help in preserving plants species, seeds, germplasm, water and soil to help sustainably utilize the biodiversity.

MAPs may be categorized according to their demand in the international market as well as their threat status. Higher the demand for a species, the more threatened becomes its existence. Some MAPs of Uttarakhand have been classified as GSMPs (Globally Significant Medicinal Plants). The term denotes high conservation concern and efforts are being made to offer, viable populations of these species, protection in the wild. Therefore, certain sections of undisturbed natural forests have been especially demarcated for *in-situ* conservation of GSMPs. These sites, ranging from 200 hectares to 350 hectares,

are known as MPCAs. There are seven MPCAs in Uttarakhand in different districts, at different altitudes, offering protection to around 38 GSMPs and numerous other MAPs.

Although a holistic term, an MPCA is actually divided into two sections – the core conservation area and the much wider development area, also known as MPDA (Medicinal Plant Development Area). MPDAs cover an area of approximately 1300 hectares. The conservation area, a “hands off area” where no human interventions are permitted, helps in scientific research and preservation of plants species, seeds, germplasm, water and soil. The development area helps local communities benefit through sustainable collection of seeds, further multiplication and enrichment of population of native medicinal plants.

The main purpose of creating a network of MPCAs is to ensure long term conservation of the wild medicinal plants. The MPCAs are located in the relatively undisturbed forest areas with rich plant diversity across different vegetation types and altitudinal ranges within a state so as to capture the viable population of the identified GSMPs.

The **objectives** of establishment of a network of MPCAs are:

- Conservation of viable population of identified GSMPs in their natural habitat
- Capture the medicinal plants diversity of the states and link with associated traditional knowledge to meet the health and livelihood requirements of local community
- Conduct studies on biological and ecological aspects of medicinal plants for developing appropriate conservation approaches
- Sensitise and enable the local communities and resource managers to manage the MPCAs for their effective conservation
- Design and develop strategies and mechanisms for long term conservation of medicinal plants

The MPCA model was pioneered by the Foundation for Revitalisation of Local Health Traditions (FRLHT), Bangalore. Two approaches were followed to establish the MPCAs. The first approach was to establish MPCAs in the areas that were traditionally valued as medicinal plants repositories, were easily accessible, were

relatively less disturbed, formed compact micro watershed and were likely to cause minimum interference with livelihoods of local people. This approach captured maximum diversity of medicinal plants across different forest types and altitudinal ranges. 30 MPCAs were established in Karnataka, Kerala and Tamil Nadu under DANIDA assisted project and 21 MPCAs in Andhra Pradesh and Maharashtra with support from UNDP under CCF-I program. The second approach was to capture viable populations of red listed medicinal plant species or GSMPs. The MPCA model is still evolving and it is very significant in that it has shown the country the most cost effective way to conserve wild germplasm in a network of MPCAs.

In this project the identification of the MPCA site was based on the availability of viable population of GSMPs of the states. The list of threatened species was obtained from CAMP workshops conducted in the state. The species that were assessed as critically endangered, endangered and vulnerable were given high priority for conservation action. Some of the threatened species were identified and the viable populations of such species were identified in the forest area.

Over exploitation

The demand of medicinal and aromatic plants (MAPs) is ever increasing whereas their availability has been steadily decreasing. This increasing gap in demand and supply has been putting tremendous pressure on these plants, thus, rendering them threatened. The MAPs that are slow- growing and have poor regeneration potential, but are in high demand, are rapidly being pushed to the brink of extinction.

We need to use MAPs wisely, meeting our needs of the present and ensuring adequate supply for the future as well. It is noted that for higher profits, MAPs are often extracted in excess of their regeneration capacity. This kind of harvesting is generally unscientific and unsustainable. When we harvest MAPs in an unscientific manner, we impede the regeneration potential of that plant. However, harvesting MAPs in a manner that will facilitate the regeneration of MAPs, will go a long way in solving this problem.

Current scenario

Currently, almost 95% of medicinal plants are collected from wild and over 85% of wild collection involves destructive harvesting and over-harvesting. Unsustainable harvest threatens not only the future of the plants but also the livelihood and health status of people throughout the world.

Sustainable collection

It is a practice of collection/harvesting of Medicinal and Aromatic Plants (MAPs) from the wild in such manner and quantities that will satisfy present day needs as well as continue to meet the demands of the future generations indefinitely.

This means that while we may harvest medicinal plants for our present consumption, we must also make sure that enough plants are left in the wild whose seeds will give birth to new plants, thereby maintaining a steady population of the species.

It also means that adequate time and opportunity must be provided to plants for natural regeneration. It is important to ensure that the process of self-renewal takes place in the plants' natural habitat – the wild.

Which species need special attention?

While it is important to conserve and protect all plant species in the forests, it is necessary to particularly pay attention to the following categories of plant species:

- Species that are an essential part of the local livelihood
- Species that are harvested for their roots, leaves, bark, flower, fruit, resin, rhizome, tuber etc. for their medicinal value
- Species with high market demand that is likely to increase in the near future
- Species that can be collected only from the wild and cannot be cultivated
- Local species that are an integral part of the environment and local ecosystem

Biodiversity Management Committee (BMC) and People's Biodiversity Register (PBR)

India is a big country that is highly diverse in terms of geographical terrain, climate, ecosystems, cultures, languages, food habits, agricultural practices, traditional healthcare methods, native plant and animal species etc. However, a huge proportion of these species and traditional practices are yet to be documented. With rapid changes in lifestyles and occupational patterns, our national wealth and heritage are experiencing a slow but steady death.

In an effort to revive old customs, sustainable practices and traditional knowledge, the Government of India, through the National Biodiversity Act of 2002, is urging local communities to contribute towards conservation of species and documentation of traditional knowledge, status of species, traditional uses, history, current uses, economic benefits to communities and causes of changes affecting local biological diversity and their use.

In order to facilitate this process in every part of the country, the government has introduced a Biodiversity Management Committee (BMC). The BMC will be a body of local community members who will work with the rest of the community to preserve and document information regarding habitats, seeds, plants, wild & domestic animals and micro organisms. This body will also be consulted by the National and State Biodiversity Boards during decision-making processes. In addition, the BMC, as managers of local biological resources, may also regulate usage of local biodiversity for commercial purposes.

A significant part of this initiative includes the People's Biodiversity Register (PBR). The PBR will be successful in earning recognition for age old practices of India. However, the PBR cannot be a successful endeavor without complete ownership by local communities.

In other words, the government is seeking the help and contribution of community members in protecting, preserving and documenting their lifestyle and practices. This will help build a nation that is aware, concerned and proactive in biodiversity conservation.

Village Botanists

Village Botanists are required to accurately identify the presence of local biodiversity, especially floral species. Identification of plants is an important step towards recognition and documentation of the existence of a species, its habitat, occurrence, density, characteristics, uses and other important facts. Identification of plant species, in this case medicinal plant species, is an important task of the Village Botanist. The presence or absence of certain species can define the health of the local eco-system and help us to take effective measures to preserve natural resources. Taxonomy, the field of identifying, defining and naming plant species is a highly skilled profession and one of the most important branches of natural sciences. Unfortunately, we do not have as many qualified taxonomists as we require. Efforts are therefore being made to train local village residents to take on the role of the local botanist and help the field of science with their invaluable contributions.

Village botanists are native people (male or female) rooted in different localities. They are generally in the age group of 20-40 years, literate and professionally employed (farmer, forest guard, school teacher, permanent employee of an organization, self-employed or in business). These are persons with knowledge and interest in the subject of medicinal plants, and who are keen to enhance their knowledge and skills related to local biological resources.

Village Botanists can serve society and the medicinal plant sector as local resource persons. They can be of use to the State Forest Departments, Biodiversity Boards, Medicinal Plant Boards, Research Institutes, local NGOs, educational institutions and traditional herbal healers. They have the potential to render field-level assistance in initiatives such as vegetation monitoring and seed & germplasm collection for the Forest Department and other institutes. They can also serve as field informants and village-level resource persons for nature camps, orientation programmes and awareness generation activities in rural areas. They can be treated as key individuals in biodiversity assessments, preparation of Community Biodiversity Registers, Community Knowledge Registers etc. They can also serve as local eco-guides under eco-tourism initiatives.

Conservation and cultivation of MAPs offers great potential for the health, food security, prosperity and progress and the nation. Indian Himalayan Region having added advantage of suitable ecological conditions has edge over other areas and must take advantage of it.