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Assessment of Herb and Mushroom Collection in Great Himalayan National Park Conservation Area, Kullu District, H.P.

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EXECUTIVE SUMMARY

The dependence of the hill people on the non timber resources , especially the medicinal plants has been reviewed historically since the advent of the British in the hill states. The Colonial State's direct role in the rhythms of daily life of the hill people was limited and this did not hamper the extraction of non timber forest products. In the pre-colonial time the use of ecological resources was regulated by the customary law of common property systems and collective patterns of use of non timber resources. During the British Forest Administration systematic documentation was regarded as a virtual compulsion but the trend involved to accumulate more knowledge especially on the economic aspect of botany . The British gave importance to research on medicinal plants but the Ayurvedic and folk medicinal system remained on periphery, due to lack of botanical taxonomy, more stress on forest visits, basic requirement of research and the greater respect of Sanskrit and vernacular traditions which the late Victorians would not tolerate. For the Kullu region , including GHNP area, Anderson's 1886 Forest Settlement Report puts no restriction on the collection of other forest products and the rules were designed by keeping in mind the individuals right in each village hamlet and this was finally adopted in the Punjab law in 1896.

The Great Himalayan National Park Area [GHNP] in Kullu District, is a representative of Western Himalayan flora and fauna. Local people depend on the resources of the park, they collect herbs and mushrooms from this area. Most of the rural people rely on herbal traditional medicines for primary health care and around 40-50 species of medicinal plants are collected for trade from this area, and are commercially important. It is more viable to promote traditional system of medicine and Ayurveda as primary health care in the rural areas of the state due to lack of proper medical facilities. For this purpose Scientific documentation, revitalization and strengthening of TSM is needed. Intellectual property rights should be extended to provide appropriate protection and compensation to traditional knowledge. The over exploitation, unsustainable, unwise and premature harvesting have accelerated destruction , so the exploitation of medicinal plant must be accompanied by conservation measures. Local communities themselves have undertaken some strategies for conservation action to manage the resources in GHNP and these have become the part of their traditions.

A case study of indigenous system of herb management in Sainj Valley of GHNP has indicated collection of herbs by several generations for traditional medicinal system and later for commercial purposes. The knowledge of herbs was descended from generation to generation and they have several local management practices like root depth, regenerative capacity, time and season of collection 1to ensure the sustainability of these herbs.

Many herbs once abundant in the National Park are dwindling rapidly, the solution is not to ban the extraction but to follow a scientific approach in this field. The present lack of pricing policies demands a change as the requirement of such herbs is never ending . The value addition of the raw products and

cultivation of medicinal and aromatic plants has bright prospects. The commercial cultivation of various such plants in the Park can be taken up. For this sufficient scientific knowledge in the field of marketing is needed and the trading in Kullu region was studied. The market prices are being controlled by the collectors and mainly by the traders outside the state. The market chain analysis of the herbs and mushroom collected from the National Park shows that the collectors sell the raw produce to the traders in Kullu district and further the produce reaches the terminal markets outside the State leading to loss of economic value.

Valuable mushrooms that fruit in large flushes are harvested by thousands of pickers from private and public lands. The uncertainly about the ecology of wild edible mushrooms hinders efforts to manage this valuable resource. Regulations for protecting the mushroom resource may take the form of implementing harvest rules and permit systems limiting permit numbers, allocating and rotating collection areas or providing contracts for exclusive harvest rights.

Various strategies are presented for development of enterprise in the herb collection ranging from cultivation, processing, trading, herbaria and value addition. The role of the State and Central agencies in this connection is also elucidated.

For sustainable management of the rich natural resources of the GHNP area it is imperative to understand firstly the pressure on the medicinal resources and secondly utilise the local knowledge and wisdom on how these resources can be sustainably managed. It has imperative to initiate a larger dialogue with all the concerned stake holders so that the excessive exploitation of medicinal plants and mushrooms can be monitored and suitable conservation measures are taken in the National Park.

1.0 HISTORICAL REVIEW OF MEDICINAL PLANTS

1.1. INTRODUCTION - METHODOLOGICAL PROBLEMS

The history of forest exploitation in the South Asian subcontinent emerged in the early 1980s as the leading aspect of its embryonic environmental history studies. For a decade analysis centered on the extraction of timber by the colonial and post colonial state and its commercial allies , and the social conflict which resulted from that systems challenge to the traditional rights of village communities. The imperial system has been seen largely in terms of timber cutting and commercially oriented silviculture; the village level resistance has been seen primarily as a defense of grazing and timber rights.

However, this discussion has tended to be shaped by the colonial system's own frame of reference , it has been silent concerning the wide variety of non timber , non grazing forest products which have been vital to both the floristic diversity of forested areas and the subsistence systems of the people of the forest. European foresters imported into India a classificatory system which defined as Minor Forest Products " MFPs" all products which did not produce large - scale market sales or revenue for Government. Their system of scientific research relegated the vast majority of forest products to an insignificant corner of their agenda. This market orientation was one major reason for their failure to comprehend the character and scope of twentieth century peasant and tribal resistance movements. It is therefore important to retrace the evolution of scope and limitations in the Forest Services non-timber forest products policy and evaluate the extent to which the Forest Department attempted to regulate the gathering and sale of MFPs. Documentary evidence indicates that in many places their rhetoric about managing the extraction of MFPs was not matched by any significant effort on the ground. If this was the case , then the conflict between Forest Departments and villagers did not extend to most non- timber forest products in most situations.

This reconstruction of rural social ecology is not a simple matter to achieve. Written documentation from colonial times is thin , because of the relative lack of interest among the literate who knew their own botanical resources well. To compound the problem there has as yet been little research on ethnobotany , in the context of government policy and market pressures, which can help to broaden our understanding of forest productivity beyond a near exclusive emphasis on timber products.

These factors varied greatly. Land holding elite's were a far less significant factor in the landscape of the Himachal Pradesh region of the western Himalayas than , say , the Katmandu region of the Nepal Himalayas. And the rulers of local hill kingdoms rarely if ever restricted their subjects' access to the common resources of the mountain forests. But demographic pressure of whatever structure had not yet presented society, government and ecosystem with the problems which are inherent in an increasing scarcity of socially valued natural resources. When British systems of regulation were imposed, they were a dramatic departure from previous history . But we still lack careful studies of changing consumption

of forest resources, and we lack studies of how British and Indians perceived the changing population and resources equation as the decades went by. In sum, the great escalation of human and therefore livestock populations since the nineteenth century is fundamental to the social and ecological change. But since the complexity of population environment dynamics is still only vaguely understood [for India or anywhere else], it remains merely a shadowy factor in the following discussion.

1.2. THE PRE-COLONIAL SETTING : THE WESTERN HIMALAYAS

Any analysis of the historical interactions between humans and Nature must recognize the variations among political administrative units, cultural regions and biogeographical regions. Moreover, none of these can be neatly defined , except for the bureaucratic boundaries defined by modern governments. The western segment of the Himalayan region can be taken as the mountain zone southeast of the Khyber Pass and west of the Sarda River , India's boundary with western Nepal. More specifically it is the present day hill districts of Uttar Pradesh and Himachal Pradesh, with some reach into adjacent areas of Jammu and Kashmir. Their southern boundary is the transition zone of the Terai, the formerly dense lowland forest zone at the foot of the Siwalik hills . The northern boundary of this zone is less easy to define usefully. For most purposes its farthest extent during colonial times was the snowy passes marking the transition into the Tibetan highlands. This is particularly appropriate for historical ethnobotany [For the Forest Department purposes the farthest reach was of a different sort, the upper limit of harvestable timber: foresters mandates and interests rarely if ever reached above tree line, wherever that happened to lie].

In any case any discussion of the human use of ecological resources in pre colonial times must be very tentative , since no systematic study has yet been carried out for this mountain region. Much therefore must be speculation , based in part on the survival of earlier adaptation and extraction systems, long into the colonial era . The social dimension largely concerns the customary law of common property systems and collective patterns of use of non-timber resources.

In the western Himalayas the key distinction must be between settled farming systems and tribal hunter gatherer systems. Over an era approaching two thousand years Hindu farmer castes gradually expanded their settlements and terraced agriculture up the alluvial soils of the regions many river valleys. Hill peasants practiced mixed cropping systems on their terraces, primarily for local use but in some situations and to a limited degree for monetized regional markets as well. In principle, ownership of all land including arable lay with the hill rajas. But in practice peasant households generally maintained use of their terraces down the generations , and land holding was distributed relatively equitably, with far less presence of a land holding elite than in many parts of lowland India.

The Upper Beas region, perhaps as much as any cultural region in the Indian subcontinent, maintained a geography of sacred places. Most villages in Kullu and Seraj had ancient temples to local gods and goddesses [Devtas and devis] . Temple groves of the sacred deodar tree were under the care of the

devtas , protected against cutting. Some temples were within the villages others were sited on prominent or dramatic locations in the forest. These gods' homes were constructed of stone and deodar timber, most of them in similar style to human homes. They held rent - free land and granaries , and were supported by one or more pujaris [some Brahmin but mostly kanet], a manager [kardar], an oracle or shaman, interpreters [chelas], and musicians for festival times. All these positions in village society's management of sacred sites were hereditary [Diack, 1897]. The devtas linked village life with the outside world too. One way a Raja could make his power legitimate was by making gifts to the gods and their devtas; by the late 1800s 1/7 of cultivated land in Kullu was temple endowments . Taxes which were extracted included portions of many items of village produce as well as forest products [Diack, 1898].

One further dimension must be added to a full analysis of resource extraction in order to define the context of non timber botanical resource use. This is the historical expansion of marketing systems, long distance trade routes, and consumer demand for the traded products. It encompasses both social and spatial dimensions. Socially its segments are suppliers, traders and consumers , which have been little analyzed for that region; only the rural suppliers the harvesters of the botanical riches of the hills , will be touched in this analysis . In the spatial dimension it includes trade routes and market towns.

1.3. BRITISH FOREST ADMINISTRATION

In the aftermath of the East India Company's 1815 defeat of the Gorkha armies of Nepal, British revenue officials moved into lower Himachal and began surveys of the forest wealth of the outer Himalayas. From then on, their primary interest lay with the commercial and revenue potential of a few species of timber trees , plus a few other species such as bamboo which could be marketed on a large scale . But forty years later , at the time of the founding of the colonial Forest Service, it was already conventional to relegate all other botanical resources to the category of "Minor Forest Products **" — Minor, that is , in monetary terms , though by no means minor in the range and diversity of biological species or their human uses for rural subsistence and some trade.**

It must be asked whether the British intervention in these products was minor or peripheral , and whether their efforts to regulate them or even to collect systematic data on them were incidental to their major interests. If the officials involvement was indeed peripheral or fragmentary, then the increasing aggregate use of these many resources of the forest probably evolved largely form an increasing rural populations needs on a shrinking commons. It would also be the case that the political conflicts of this century did not encompass a struggle over access to most non timber forest resources. In tribal zones elsewhere in the subcontinent , as Guha and Gadgil have incisively summarized, many pre-colonial communities were gradually and profoundly undermined. But in a mountain region populated largely by farmers and shepherds, these particular consequences of colonial rule seem to have been far less damaging .

In the Punjab hills , which came under British control after the successful military campaigns of the late 1840s early revenue settlements began a process of defining and cataloguing non-timber forest resources,

a process which was less systematic than pragmatic. Economic botany was bound to develop faster than ethnobotany as a field of inquiry. The Forest Law established a system of Reserved and Protected Forests. Reserved Forests were to be managed primarily to protect the natural forest or to produce commercial timber; Protected Forests were intended to meet nearby villagers needs as a higher priority. Thus , for non timber forest products the Reserved Forests in principle should preserve the under story in all its variety, while in the Protected Forests the District Forest Officers and their Rangers would ideally monitor the availability of minor products , encourage their optimal growth, regulate their harvest and sale and collect duties for the Govt. Shamlat land or village commons were controlled by the villagers only.

In the Punjab hills the arduous , time consuming effort of reviewing actual patterns of forest use, codifying them and thereby implicitly establishing a social philosophy, was finally settled in the last years of the 1800s , in a series of Forest Settlements , for each administrative jurisdiction . In order to establish administrative uniformity and expedite the otherwise endless work, officers came to adopt similar lists of villagers rights in the forest , but with significant variations from one jurisdiction to another . These lists reveal a social and economic ideology which attempted to allow villagers to maintain both material subsistence and religious ritual. At the same time the regulations were designed to restrict severely and systematically forest products harvesting for sale or monetary profit.

In Reserved Forests the lists were very limited. But in Protected or Second Class Forests , where local subsistence was a high priority the discussions were lengthy and detailed. These were the regulations from which we can infer the fine grain of the working lives of the District Forest Officers and their staffs of rangers and guards. These are the lists which suggest to us the day to day working relations between imperial authority and local subjects regulations which villagers would tolerate as far as they could , evade wherever the risk was not too high, and rebel against when survival seemed at stake.

Human uses of the alpine forests and meadows were more complex than merely pastoral. As Trevor reported in 1920 “Extensive tracts of alpine pasture stretch above the forest limits to the line of perpetual snow. It is impossible in the space available to describe in an adequate manner the vast flora which is here found. These grazing grounds are resorted to by the local sheep during the summer months and large herds of ponies are turned out to graze where the hills are not too steep. Nomads dig for medicinal roots and the poacher snares the musk deer secure form the attentions of the forest guard.” Second class protected Forests were mostly in this high country; they included the finest fir forests. Trevor concluded that concentrated management would not be attempted above 10,000 [Trevor 1920].

Products other than trees and shrubs fell under a general principle of control. The regulations for one District , in this regard virtually identical to all the others stated “ No forest produce acquired in the exercise of these rights of user, except bamboo, fruits , flowers, medicinal roots and leaves may be sold or bartered [Record of rights, 1904]. Long lists of tree leaves , bark and brushwood leaves and bark of creepers, grasses of several kinds, fruits , flowers , medicinal herbs, and finally honey were identified as open to unrestricted local use except when a maximum of one third of any forest was closed for several

years for reforestation. In other words, many non - timber products in these areas of small scale settled farming were normally excluded from governmental management and control. In Kullu this haphazard approach was replaced by governmental timber operations from 1864 onward, under the 1855 Forestry Law, the first of its kind in British India [Trevor 1920; Samler, 1935]. The forest management system which had begun to evolve had to balance two factors..... villagers rights in the forests versus commercial logging..

To make the analysis more complex, the western Himalayas were administratively complex; large areas outside the British districts were left as intact Princely Hill States . These States tended to maintain the older forms of discretionary management more nearly intact until they were administratively absorbed into independent India in 1947. But most of them , under diplomatic pressure from the British , gradually adopted approximations of the British forest management system. The effect of this for management of non timber products is even more uncertain than for the districts of British India, but some indication can be gained from the forest rules which Chamba and Bashahr States adopted by 1900. These rules stated that Reserved Forests would be under the direct control of a British Forest Conservator appointed by Raja , whereas Unreserved Forests were under the Raja's control. In the Reserved Forests the villagers had rights only to building timber, fodder grass and fuel wood . In the Raja's forests villagers had rights to the collection and sale of dry and fallen timber and inferior trees for fuel, grass, wild animals, birds, honey, wax, fruit and flowers taking care that such collection is effected in such a manner as not to injure the forest [Forest Rules, 1907]. The mutual value of such cooperation between local rajas and British administrators was exemplified in the tiny State of Guler in the Punjab foothills where duties from sale of both timber and bamboo to traders from the plains were divided , giving ¾ of the revenue to the Raja and ¼ to the British run Forest Department [Sheepshanks,1913].

Encroachments on forest land continued to increase over the years. The law stated that villagers could till new soil only in their home kothi. But many local people were beginning to encroach on forest / grazing land of adjacent villages. These cases were rarely recorded by the Revenue Dept. and the Forest Department avoided intervention, not wanting to act as a buffer between villages. The boundary of responsibility between the two departments remained blurred. One senior forester wrote, "Generally the cultivated lands are extended without proper sanction. The correct procedure is not followed and as soon as an application is filed , the applicant thinks the land is his. Immediately he breaks it up and keeps it in his illegal occupation. As is usually the case, the influential and clever persons indulge in such activities and the poor and needy law abiding inhabitants suffer." [Kapoor 1972, Jaiswal 1987].

In sum, both British India and the Princely States under Western hegemony experienced a trend toward managed forest ecosystems, with an accommodation between European and traditional systems of use. On the British side , where systematic documentation was a virtual compulsion , there was to be a gradual accumulation of knowledge especially the economic aspects of botany. But that presupposed some development of systematic taxonomy, based on collections painstaking made in the field.

1.4. MEDICINAL BOTANY

Medicinal plants also became an important category , for they were obviously of great interest to pharmacologists, and no culture carried a more profound or complex understanding of the many medicinal species and their uses than India. Throughout the following decades the British included research on medicinal botany , reflecting the origins of several botanists' careers as East India Company surgeons. Work was coordinated from the Calcutta Botanical Garden. Its first major publications were E. J. Waring's Bazaar Medicine of 1860 and his Pharmacopoeia of India of 1867 , which remained standard works for Westerners there for many years. Waring's work was praised for enabling the British in India to avoid importing drugs from Europe. But in addition to the practical uses of indigenous medicinal drugs , this research [however limited in staff and scope] held scientific standing internationally , establishing India as an important link in an international network of research on tropical medical botany. By the early 1900s the Calcutta Botanical Gardens were working in collaboration with Duthie, who had moved to Dehradun for his senior years, and internationally with Kew Gardens as well as two American institutions the Smithsonian Institution and the Missouri Botanical Garden.

However, the study of Ayurvedic and folk medicine remained peripheral in colonial British science, for three reasons: First, those traditions embodied much broader cultural knowledge than simply botanical taxonomy, and European taxonomists tradition had become rigorously narrow in their definition of their work. Second, research would have to be carried on in bazaars as much as in hill forests. Third, that research would require greater respect for Sanskrit and vernacular traditions than most late Victorians would tolerate .

Though the Government of India established an Indigenous Drugs Committee in 1896, to encourage systematic cultivation and use of indigenous medical plants , it was so weakly funded that it remained little more than curiosity at the cultural fringe of the Empire. Though the major concern of Hugh Cleghorn's surveys of timber resources of Punjab hills was environmental damage caused by unregulated logging of all the deodar forests , his eye was quick : his report included a long list of tree and shrub species and their uses. Yet even this versatile and energetic official's catalogue revealed the limits of British interests. He noted the uses of nuts and fruits of those trees , but little else. The few tree species which he discovered which had medicinal uses he merely listed by botanical and vernacular names, not stating their medicinal properties specifically , or their social uses.

Another decade of this work was sufficient to produce the first systematic Forest Floras for each region of the subcontinent. The Forest Flora of North West and Central India appeared in 1874, largely the work of J. Lindsay Stewart in the Punjab plains and hills. Stewart coordinated work on his Flora with Kew Gardens , where research on the economic botany of many parts of the Empire was being coordinated. Dietrich Brandis finished Stewart's work when Stewart died. Recognizing the emphases and pragmatic uses of a work like Stewart helps to reveal the priorities and limitations of colonial ecological science. Brandis was explicit : it "includes only the more important trees and shrubs ..... it has been written not for

botanists but for practical men especially for those who have the care of the public forests." Some observers had wanted an even simpler practical handbook for the field.

1.5. THE MINOR FOREST PRODUCTS BRANCH OF THE FOREST RESEARCH INSTITUTE

The First World War made heavy demands on India's timber resources for military uses , and highlighted the strategic importance of the Empire's timber reserves.. In the aftermath , the Government of India took the decisive step of expanding the modest research and training facilities at Dehradun into the monumental buildings of the Forest Research Institute and its long adjacent avenues of botanical gardens and research facilities. This investment in the early 1920s was the time when the forestry priorities of the Raj would show whether a biologically [and culturally] broad range of non timber species would finally gain serious emphasis.

There were tantalizing economic possibilities. Various annual reports of the Minor Forest Products Branch asserted that vast but little - tapped resources of non timber species were available for control and exploitation. This was only a semi educated guess, for the research remained to be done. As well as a routine argument for expanded budgets, it was the familiar stereotype of the virtually limitless resources of the Himalayas, and as yet in the 1920s it was not yet linked to any warning that commercially attractive species were becoming scarce or their sources remote.

Among the Institute's priorities, minor forest products remained from the beginning a minor branch indeed. MFP research and product development efforts had been initiated shortly after 1910 when R.S. Pearson was appointed Forest Economist at the FRI. An energetic man, he could not fill his time entirely with timber trials, so he added non - timber species to his agenda, searching for sources of commercially viable paper pulp and tanning materials. But that work was soon almost totally eclipsed by timber experiments as his successor H. Trotter put it in 1925 , the MFP laboratory became the perennial "Cinderella of the Economic Branch." The commercial timber economy took a long downward turn in the early 1920s and as a result the restricted research budget at the FRI was allocated almost solely to timber testing and marketing. After 1922 no one was appointed officer in charge of MFP for many years. Perennially under funded and understaffed, the MFP work of gathering and cataloguing was extremely constrained and often nearly haphazard. Very little was done to explore the rural people's knowledge and use of these products . Trotter 1925 report sheds light on this lack in explaining the weakness of the MFP Branch at the FRI.

Little changed during the penurious years of the Depression, and then the tumultuous years of World war II and the transition to Independence. Even as late as 1965 a select committee which evaluated the entire FRI operations reported that the full time staff numbered only four botanists , whose research had been allowed to expand to unsystematic coverage of more products than they could handle. The products under study were a ludicrously brief list in themselves : Principally camphor, two species of citronella grass and three medicinal herbs. The committee recommended that the MFP staff should be expanded

, that they should take over chir pine tapping from the Silviculture Branch , and intensify research on products which are of high value or which have been earning foreign exchange." They could expand their work on medicinal plants by establishing links with other institutes like the Central Medicinal Plants Organization and the Central Drugs Research Institute , as well as the pharmaceutical and chemical industries which had been increasingly aggressive in forest areas . In other words, the Institutes central administration had marginalized this work and its own staff had been sluggish in their work.

Research priorities were repeated in the Institute's training programme for Forest Service recruits . Their two year curriculum included only brief surveys of "Minor" forest species in Forest Botany and Forest Utilization courses, in which they used Troup's Utilization of Forest Products. This was hardly more than an afterthought in the curriculum. Then, presumably, individuals carried on further work on location in their work , but that was beyond the formal administrative structure of the service. In other words, the conceptual structure was not oriented toward subsistence issues , thus limiting the foresters capacity to comprehend villagers realities. Nonetheless, in spite of all these limitations in the central records of the Forest Service , its records do reveal some patterns of evolving use, monitoring and management of non - timber forest products in the western Himalayas during the decades before Independence.

1.6. MANAGEMENT OF ECONOMICALLY MAJOR NON- TIMBER PRODUCTS

The Floras provided systematic definitions of minor forest products as well as discussions of them by category, for British India as a whole . Ideally, any analysis should consider them in terms of specific species and their biotic communities and extents , and also their specific social uses. But this merging of perspectives has not yet happened, except in a few fragmentary cases, most of which are not from northwestern India.

Several non - timber botanical products like bamboo and katha became so important commercially that the Forest Service produced a steady flow of research and publications , as well as developing their management in great detail. In effect they became major forest products, since they were vitally important sources of revenue for the Forest Departments of the provinces. Several were highly significant in the western Himalayas and their adjacent lowlands .

1.7. MEDICINAL HERBS

Other products began to appear on Forest Department list as well , but coverage of them was more fragmentary, primarily because their commercial value was minor . This is not to say that their importance for village life and biological diversity was minor. It does suggest that the Forest Department declared right to manage the contracting and sale of them in Protected Forests seems to have been infrequently imposed. One broad category of these products was medicinal herbs. Herbs represent the widest variety of species for human use of any category in the mountain region. Forestry and Botanical Survey documents usually indicated the provenance of each species and its methods of harvesting, preparing

and storing. The full range of the herbs human meanings, encompassing such dimensions as their ritual uses and sacred significance , was excluded from the explicit concerns of the forest botanists.

One sharp indication of the rulers growing awareness of the fiscal value of these products appeared just at the time of Indian independence in 1947, when Nehru's Government was absorbing Princely States large and small into an integrated national administration. It also shows the increasingly legalistic character of rural administration, and perhaps most significantly it gives one of the forest indication's that market demand for medicinal herbs was leading to their disappearance at their source locations.

One other aspect of forest administration which was initiated by Anderson's [1884] system and ultimately became very important for village life and forest ecology was that he put no restriction on the collection of medicinal herbs, fruits , nuts, or bamboo, for villagers, own use or sale , or collection by outsiders. Many years later, in the 1960s it became evident that the government choice not to regulate this segment of forest resource use was a major limitation on its capacity to protect forest flora from the unforeseen consequences of an expanding commercial economy. For the Kullu region, including GHNP area Anderson's 1886 Forest settlement Report puts no restriction on the collection of medicinal herbs. Anderson foresaw great difficulties in completing the record of rights and concluded that the process must be ongoing, rather than finalized permanently. Anderson's system , including its detailed list of individual rights in each village and hamlet, was finally adopted as Punjab law in 1896.

The Raja of Chamba State, which controlled the middle reaches of the Ravi River [a branch of the Indus to the west of Kangra] decreed in March 1947 the " Chamba Minor Forest Produce Exploitation and Export Act" which specified that the Raja's foresters, local revenue officers and village officials had the authority to grant or refuse or revoke licenses to gather and sell medicinal herbs . The government's fiscal interest was specific villagers must pay Rs. 1 for each permit to collect medicinal herbs , urban Chamba must pay Rs. 25, and non residents must pay Rs. 50 for a three month season. License renewals would cost Rs. 25 yearly. The decree enumerated fifteen controlled species , and defined collection of herbs as picking up, digging, extracting out of earth, culling, separating or cutting from the bushes , plants or pods [H.P. code Chamba, 1947].

The language of the law reveals the emergence of a fear that over exploitation of the enumerated species was becoming a danger. It warned that no permit holder should so act as to retard further development of the said produce or render it extinct from further growth. Further, if any permit holder is exploiting any area in a manner highly detrimental to the source of supply or so as to render natural reproduction impossible , the permit could be restricted or revoked. Fines of up to Rs. 300 and prison of up to three months gave the law teeth which could potentially bite [H.P. code Mandi, 1941].

Like other management documents , sadly , this one indicates nothing about the castes or genders of the herb collectors, the social identity of the traders , or the ultimate markets for these species of herbs. Nor does it suggest anything about whether the right to harvest the herbs was allowed for landholders only, or also non-landed castes such as Doms, or annual migrants through these areas [Tucker, 1982].

1.8. CONCLUSIONS

In sum, fragmentary evidence suggests several conclusions. The first is that in areas of mixed settled farming and forest gathering , the colonial state penetrated the rhythms of daily life to a very limited extent in its attempts to regulate the extraction of non timber forest products. Some of the variations in local experience depended on individual forest officers interest in commercial botany . But the regime does not seem to have been at all active where there were no readily visible markets for those species.

Second, conflict between state and rural community over non- timber forest products was structured quite specifically to the ethnobotanical patterns of each location, and in general it seems to have been the exception rather than the rule. In part this was because foresters could hardly hope to restrict access to most MFPs; everyday forms of resistance and evasion would be easy for village people to practice, when the products were small in bulk and readily available.

Third, and closely related , there is little evidence of scarcity or biotic decline during the colonial period. But this too may be misleading , for data are unreliably thin, and biotic change can be systemic- almost undetectable to anyone until the reproductive rates of particular species or the health of an entire natural community is endangered

If the historical evidence is to be explored more fully for evidence of the timing and location of emerging scarcities of non timber species, additional evidence to consider might include sudden rises in market prices of particular products and declining revenue from those species. It must also include surveys of folklore and oral histories from village people familiar with the species in question and their uses.

What evidence of scarcity emerges from the colonial and post Independence documentation is difficult to measure. It is clear that in recent years botanists are increasingly recommending controlled plantations of medicinal herbs , fearing that traditional methods of gathering are endangering their natural sources in the mountains. They describe increased marketing demand, by both the traditional peasant/ marketer system and modern pharmaceutical manufacturers , placing dangerous pressure on sources. Botanists now frequently assert that it is necessary to ban unregulated harvesting . The Forest Research Institute has made some efforts at intensive cultivation of herbs. But this work is difficult and expensive only fragmentary efforts have been possible as yet. But the overall picture of accelerating scarcity remains unclear, and should be a high priority on the research agenda concerning biodiversity and its value to society [Tucker,1998].

2.0 MEDICINAL PLANTS COLLECTION IN GHNP PROJECT AREA

Great Himalayan National park , which is situated in Kullu district of Himachal Pradesh is a representative refuge of a number of endangered species including of medicinal herbs, which are necessary for survival of the human being. Highly rich with biodiversity the National Park supports rare populations of , western tragopan, musk deer, serow, leopard, marten, etc. Interface of the Park and the People is crucial as they are totally dependent on the Park. The local dwellers of Parks buffer zone directly influence the Park ecosystems in the form of their access to fulfill the needs of grazing , collection of medicinal herbs/ other NTFPs , religious yatras, etc. Mainstay of local economy is the harvesting of medicinal herbs and mushroom. About 40 species of medicinal plants are being collected from Park forest areas and sold to the local / distant traders.

Unsustainable and pre- mature harvesting and over exploitation have led to threatening pressure on the species of high commercial value. Due to excessive extraction of plant material, both quality as well as quantity are continuously degrading . Some species have become endangered while some locally extinct. If existing trend of unwise and unsustainable exploitation of the medicinal species by the local people continues , the day is not much far when we'll lose a number of species forever. Local economies will also collapse leading into more poverty and hence more environmental/ biodiversity destruction.

So conservation measures in this direction are a matter of urgent attention. The need is on local community approach, and aimed at to establish some societal laws for preservation and sustainable utilization of the species through the full involvement and participation of the local communities , facilitation and adoption of conservation measures for medicinal plants through social instruments, establishing the status of various species [e.g. distribution, degree of destruction, dynamics, economics , etc.]

Community based organizations, preexisting or newly created, need to be involved in parallel collaborate the planning , implementation and management of this project. Regular monitoring and assessment of the progress/ success of the project activities needs to be done by the partner groups .Ultimately, it is to be said that this project is directly conservation oriented and seeks priority and immediate attention for its start.

2.1 BACKGROUND

The Great Himalayan National Park, together with the adjacent Pin valley National Park, Rupi Bhabha Wildlife Sanctuary, Kanawar Wildlife Sanctuary, and the proposed Srikand National Park, forms the largest block of relatively intact wildlife habitat in the Western Himalayas. Covering 1171 square km area it is located in the Kullu district of Himachal Pradesh.

The Great Himalayan National Park is a representative of Western Himalayan flora and fauna under biodiversity category 2A. The present biodiversity of the Park is rich, compared to other areas at a similar

Map

altitude in the Western Himalayas. It supports several endangered mammals and pheasants such as musk deer, serow , brown bear, blue sheep, western tragopan, chir pheasant and monal. The Great Himalayan National Park [GHNP] is one of only two National parks in the world to support a population of endangered Western tragopan [Tragopan melanocephalus] . The Park flora include a number of unusual plant associations, with little- disturbed low and middle altitude oak forests [< 2500 m} and alpine meadows above 3800 m rich in medicinal plants such as Aconitum heterophyllum, Salvia moorcroftiana, Viola serpens, Jurinea macrocephala, Rheum emodi.

Local people depend upon the resources of the Park mainly for grazing of sheep, goats and some cattle, and collection of minor forest produce [herbs, fungi, bamboo, etc.] About 2500 people collect herbs and mushroom [Morchella esculenta] from this area each year. Since about half the world's medicinal compounds are still derived or obtained from plants, so plant - derived drugs contribute billions of dollars to the economy each year. Thus the level of demand for biotic drug products has remained more or less stable for the last two decades. Often the cultivation and harvesting of medicinal plants is less costly than artificial drug synthesis ; well known examples of products are atropine, dioxine and morphine.

It has been estimated that as many as 75 to 90% of the world's rural people rely on herbal traditional medicine as their primary health care. Around 20 years back the herbal plants were commercialized in this area. Resultantly, very large quantities of medicinal herbs are removed from alpine meadows within the National Park during the summer season. Around 40-50 species of medicinal plants are been collected by the local people in this area [Gaston and Garson, 1992].

Certain of above species have already been severely over exploited in some alpine areas where some of them collected earlier are no longer found and might even have become locally extinct. A considerable crop of herbs is being collected by people without any local rights. The herbs collection is carried out primarily to earn a cash income. Thus under the greed people generally harvest the plant material without leaving a little bit to regenerate. Most of the plants are dug and uprooted which trigger's the vanishing of the species and fastens the soil erosion . This unwise and unsustainable harvesting of medicinal herbs overlooks regeneration of the plants, thereby posing threat to the species itself as well as to other associated plant species . Certain animal species like butterflies, small herbivores which are dependent on particular plant species may be in trouble because of degeneration of that particular species in a given locality. Therefore , the unsustainable harvesting of herbs greatly influences the natural ecosystems biodiversity and wildlife habitats, and ultimately the human society.

With the accelerating destruction of natural resources in this area, it has become clear that the exploitation of medicinal plants must be accompanied by conservation measures. Otherwise these plants become depleted as resources or may even face extinction.

Table : Commercially Important Species of Medicinal Plants and Mushroom being Collected in Ghnp

No.	Local Name	Botanical Name
1.	Dhoop	*Jurinea dolomiaea*
2.	Dhoop	*Jurinea macrocephala*
3.	Patish [Mithi]	*Aconitum heterophyllum*
4.	Patish [Karvi]	*Aconitum cheamanthus*
5.	Salem Panja	*Dactylorriza hatagirea*
6.	Mushkbala	*Valeriana wellichii*
7.	Karoo	*Picorriza kurrooa*
8.	Chora	*Angelica glauca*
9.	Chuchchi	*Rheum australe*
10	Bittal	*Juniperous squamata*
11	Kunth	*Saussurea costus*
12	Thut	*Salvia moorcroftiana*
13	Bhutkesh	*Sorudalis govaniana*
14	Banajwain	*Thymus sephyllum*
15	Banajwain	*T. linearis*
16	Chhingli Mingli	*Dioscorea deltoidea*
17	Banakhsha	*Viola odorata*
18	Rewandchini	*Rheum emordi*
19	Mamiri	*Thaliotrum sp.*
20	Soski	*Artimisia bravifolia*
21	Jharka	*Atropha accuminata*
22	Dori	*Potentilla nepalensis*
23	Kakarsinghi	*Pistacia integrima*
24	Salem Mishri	*Polygonatum verticellatum*
25	Mitha Telia	*Aconitum violacium*
26	Kala Zira	*Banium persicum*
27	Rakhal	*Taxus baccata*
28	Kashmiri Patta	*Rhododendron compactum*
29	Nihani	*Valeriana hardwickii*
30	Buch	*Acorus calanus*
31	Kail Cones	*Pinus wallichiana*
32	Jatamanshi	*Nardosiachys jatamansi*
33	Talis patra	*Abies webbiana*
34	Butchur [Ephedrine]	*Ephedra sp.*
35	Kapper Kachri	*Hedyenium acuminatus*
36	Kharasani Ajwain	*Hyossyamus nige*
37	Patishan Roots	*Heracleum sp.*
38	Bichchhu Buti	*Coradiana heterophylla*
39	Duagtuli	*Adiantum lanalatum*
40	Bhiryata	*Swerita chirata*
41	Rasaunt	*Berberis sariotala , B. sassiatios*
42	Rasaunt	*B.lycium, B.velgasis*
43	Guchhi [Mushroom]	*Morchella esculentum*
44	Chalora [Menhdi]	*Lichens*

2.2. PARTNER COMMUNITY

2.2.1. Cultural Identity and Population Size:

The rural settlements in the National Park Area are semi - sprinkled or hamlet type, sprinkled or dispersed type, and isolated homesteads. Intensive use of land, collective management of water and a common agricultural routine have led to the growth of small hamlets or semi - sprinkled type of settlements. The sprinkled or dispersed habitations have developed where the agricultural land is divided in patches as a result of dissection of soil. Here fields are small and scattered and peasants generally live on farmsteads to take greater care of land and to protect their crops from wild animals.

Scores of races , communities and cultures have intermingled in this area. The survivors of the hill aborigines can be found in the Kolis , the Doms , and the Dagies . The progeny of Aryans and Indo-Aryans can be seen in the Brahmins, the Khatris, the Rajputs, the Thakurs, the Chauhans, the Parmars and Mahajans . All kinds of typical Himachal cultures continue to exist here side by side.The people are deeply religious and god fearing but their Hinduism is different from that of the plains. The people worship the gods or the village deities , the Deotas, the hill tops , the trees, the joginis or wood fairies , the kali , the shakti and a host of devils and deities of the aborigines. The water courses , the sprouting seeds, the ripening corn ear are all in charge of separate spirits who are duly propitiated. Animal sacrifice is a major religious rite and is performed at weddings , funerals , festivals , harvest time, on the beginning of the ploughing or thanks giving. Kulluvi dialect of Pahari is spoken in this region.

Here , the people are very simple, straightforward, hardworking and honest. The crime rate is negligible. Their closeness to nature makes them elemental. Their faiths are simple , beliefs primitive, and myths difficult to fathom. But they are an extremely festive people. A birth, a fair , a community gathering , a marriage ,a festival , all provide them the opportunity for song and dance. Their culture is marked by a unity in variety and is exclusive. Women , after the household chores are over , are usually away from their homes most of the day, collecting grass , leaves or firewood or tending the animals in the forests. Winter and rainy seasons are periods of relative inactivity for them so far as work in the field is concerned. But even during this time spinning , weaving or knitting is done and mats and baskets made.

2.2.2. Nature of Dependence on Living Natural Resources :

Relationships of local societies with the forests of National park are dating back to the history of human settlements in this area. The importance of the forests for the local people is for the following socioeconomic or subsistence activities / needs :

Lands for settlement
Agriculture
Water
Fuel wood

Construction material
Fodder
Grazing in the park
Collection of NWFP materials
Collection of medicinal plants and mushroom
Timber
Yatras to religious places
Aesthetics
Poaching

In general the major economic activities of the people living in the periphery of GHNP can be divided into two broad categories :

1. Subsistence activities
2. Activities for earning cash

The two main activities which fall in the first category are agriculture and pastoralism. Of these two, the people depend the resources of GHNP for pastoralism. Almost everyone in the area rears sheep and goats , Between April and October , large flocks of these goats and sheep from almost every village in the area go up to the alpine pastures in GHNP and graze.

The important economic activities which fall in the second category are extraction of medicinal herbs and the collection of Guchi [Morchella esculenta]. Both these activities are undertaken inside GHNP and for many of the villagers are the only source of cash income . Other NWFP collected include honey, bamboo , nuts [pahari badam], fruits [jammu , Thena, Shrorh , peaches] flowers juniper [Juniperous macropoda] the bark of birth , the pith of yew tree and talshi [Rhododendron lepidotum].

2.3 MAJOR TRENDS IN NTF PRODUCTS IN GHNP

Most observers agree that the second major pressure on GHNP's diversity of species is the collection of medicinal herbs and other non-timber forest products such as bamboo and morel mushrooms. This is a different issue from grazing rights, for administrators as well as local people , since the Forest Settlements from Anderson onward placed no restrictions on anyone's collecting the herbs. Subsistence use of medicinals has never posed a significant pressure on the wild herbs , and by now there are few traditional medicinal practitioners any longer in the villages of the Ecodevelopment Zone, though many households still use medicinal herbs .

Until the 1960s, there was no significant commercial market for the major herbs, and no one anticipated that this would become a critical issue for the park. But beginning in the 1960s, regional and international markets expanded enormously giving local people a major new source of income . Tandon's field

survey of villages in the Ecodevelopment Zone indicates that 70-85% of households are now gaining cash income from collecting and selling herbs [Tandon, 1997]. The original system of rights established in Anderson's Settlement were restricted to a collecting seasons of only two months, 15 August to 15 October. But under the irresistible pull of the booming market, collectors expanded their work to the entire season, from April to November.

Before long nearly sixty species of wild plants were being commercially harvested in GHNP and the adjacent areas. In consequence several species of herbs have become rapidly depleted, including Picrorhiza kurroa [kaur, karu], Valeriana jatamansi [muskabala], Dioscorea deltridea [shingli mingli], Taxus baccata [brahmi] and Jurinea macrocephala [dhoop].

The 1996 IIPA study indicates that collectors and Park officials are aware of administrative restrictions only on Dioscorea, which has been seriously depleted for some years, and Taxus baccata , which is recently being over harvested. Records indicate about 1,200 Herb collectors at work, but there are probably many more. Herb collectors themselves report over exploitation of some species, especially dhoop, and a decline in the quality of some others. [GHNP Report 1996; Choudhury 1997 : 15-18].

Guchhi, the morel mushroom, attracts hundreds of collectors in May and June to mid- elevation forests. They probably disturb pheasant nesting sites, and have cooking and warmth fires, which may go wild [Gaston and Garson 1992]. Morels, which are in high demand on foreign markets , now bring in large amounts of cash each year in the Eco- development Zone. This market raises the twin dangers of depleting the source and raising social tension. "The village communities , especially the collectors, are unorganised, without any stable village level organization or groups" to regulate access to this major cash crop from the forest [Tandon 1997].

Bamboo's are another socially important forest products. Low income Scheduled Caste laborers continue to harvest ringal bamboos , but as other forms of cash, such as for unskilled labor, become more available, there is probably a slow decline in this work. Yet as market for bamboo items increases, there is an incentive too, for migrants from Bihar and Andhra. In sum, pressure on bamboos does not seem to have changed much in recent years, and is not a serious ecological problem in and around GHNP [Choudhury 1997].

Who collects the herbs ? Until recently no outsiders were involved: none had the requisite knowledge of the forests and mountains. Local people could maintain a form of environmental control through their traditional knowledge. They have a system of rotational harvesting which gives them some capacity to avoid depletion of the sources, so long as they can keep outsiders out. Their consensual strategy includes fallow years, since it would not pay them to go up for small amounts of herbs. They have reported to NGO researchers that the quantity of herbs has not decreased, but since the number of collectors has increased each one finds fewer plants than formerly. Increasing education for local boys leads them to take easier jobs but market demand brings in more outsiders, especially Nepali collectors.

[Singh 1997]. Right-holders also complain about other local people impinging on collection of marketable herbs and mushrooms, people from nearby villages with rights in other areas of the park. They complain that Forest Department staff should enforce the Record of Rights and prevent these irregularities [Choudhury 1997, I. Singh 1997].

Among local villagers entire families harvest herbs growing near their settlements, but only men and boys collect the more lucrative species, which grow in high elevations and often dangerous locations. These men include summer grazers [fuwals], who are gradually declining in numbers but the major work is done by an increasing number of men who go up specifically for herbs in the thaches and crags [Singh 1997]. Here is where outsiders began to intervene in the 1960s ,when cash cropping, especially apple orchards , brought in outside workers some of whom gradually became de facto right holders.[Tandon, 1997].

The new stress, both social and ecological , has been caused by a powerful trade network, which begins with many local shopkeepers, who buy from the gatherers at trail head bazaars. By the mid - 1999s there were eight traders in the Parbati valley and thirty eight in Seraj Division, many of who were specializing in just one or two items. Larger traders were working from market towns; the largest group was eighteen in Kullu , all of them north Indian firms except the largest buyer, the multinational Wyeth Laboratories with its headquarters in Bombay . The herbs were shipped from these towns to Amritsar, Delhi, Bombay and beyond. [Singh 1997; Tandon 1997].

Major traders in Amritsar and other distant cities place orders with key dealers in towns like Kullu, who give advances to local traders at trail heads including Gushaini, Manikaran and Sainj. Markets and prices are very unstable and risky, so the major dealers must have large amounts of venture capital in order to survive. The local agent is at the mercy of the urban dealers; he earns a small commission, or withholds some of price to collector. In turn , many herb collectors “are very poor and in debt to the local agent in his role as shopkeeper” using herb collection to finance their purchase of household goods in the bazaars. [Bajaj, 1997].

The trade has been regulated to some degree by a series of regulations, but these have been localized or of uncertain application, or else rapidly outstripped by the market. The first two laws applied to only one district each: the Chamba Minor Forest Products Act of 1947 and the Mandi Minor Forest Rules of 1956.[Tucker 1998]. For lack of statewide legislation, these regulations were informally adopted by the entire state. In 1964 the Punjab government fixed royalty rates for 14 species, but these were haphazardly collected or recorded. The 1972 Central Wild Life Act includes a list of species whose extraction and trade is prohibited or restricted.

In 1978 a Himachal Pradesh law set up a list of permit fees; in 1993 the Himachal Government raised royalty rates so as to reflect market prices more reasonably. But this was not accompanied by stricter regulation or collection of dues. On the scene in the market towns , DFOs have the authority to issue

transit and export permits. Local panchayats are authorized to collect fees. But one observer concludes that they have been ineffectual. Panchayats merely grant permission to local contractors. [Bajaj 1997: 43].

In 1983 Garson continued working with the Wildlife wing for base line surveys of the proposed National Park [Garson,1983]. In March 1984 the Himachal Government declared its intention to create GHNP that area , and also defined a 111,000 hectare buffer zone. Three years later in 1987 the park's first working Plan was completed as a revision of the former Forest Working Plan for the area. But the presence of many villages in the buffer zone was a major legal problem. In 1990 the state legislature cancelled the buffer zone by removing the lower Sainj valley, with its many villages, from the National Park. In order to establish park boundaries which both protected critical wildlife habitat and managed the human presence effectively, more wildlife surveys of the region and social surveys were urgently needed. Gaston and Garson resurveyed their original study area in 1991. They found increases among pheasants and ungulates below 3,000 meters, and found no significant change in sub alpine and alpine habitats. They recommended restrictions on grazing and medicinal collection in order to maintain the park's viability. [Gaston and Garson 1992].

In March 1994 the State Government adjusted the boundaries again, adding 14,500 hectares to the Park, but removing 9,000 hectares to create the Sainj Sanctuary. In 1994-95 it established the Eco-development Zone on the western side of GHNP , encompassing well over 100 villages. This new status required the participation of local villagers and NGOs in planning and managing the area. But it proved difficult to bring officials into direct sustained work with villagers to expedite programmes. The long tradition of suspicion and avoidance between officials and villagers was difficult to overcome.

2.4. PROPOSED STRATEGIES

It is almost impossible to stop the extraction of medicinal plants and mushroom from the forest areas of National Park. The local people , who are right holders and collect the herbs and mushroom for their livelihood, do sell this material to the local traders. Traders generally purchase it at low prices which ultimately triggers more and more collection. As the traders [permit holders] are a part of this network of medicinal plant business which involves the local leaders, thus either stopping the collection or phasing out traders [by means of any cooperative or local committee] is a matter of great conflict. Alternatively, people have to be motivated and united to care for and conserve the medicinal herbs on the basis of sustainable utilization.

2.5. ISSUES INVOLVED

1. Baseline surveys
2. To find out the distribution, degree of destruction and regeneration of medicinal herbs in the areas concerned.

3. To prepare a status report on the dynamics of and economy from medicinal herbs and mushroom being collected.
4. ocumentation of Traditional Knowledge.
5. To facilitate the conservation of medicinal plants through following approaches based on general recommendations and preliminary survey :

   a] Awareness building
   b] To close certain areas for harvesting and grazing for at least 3 years
   c] To prohibit, by making social rules , premature harvesting of herbs.
   d] To ensure full protection to rare or endangered species .
   e] To enhance, by making people aware of , the sustainable exploitation of herbs from the wild areas.
   f] To assess the impact of conservation measures , organised and sustainable collection on the biodiversity and ecosystems, and on the socioeconomic life of the people.

2.5.1 Benchmark Survey and Micro planning for participatory Management and conservation action

All the target villages, which also come in buffer - zone of the Great Himalayan National park, need to approached for their socioeconomic surveys with special emphasis on the activities pertaining to medicinal herbs business. During these surveys the specific problems connected with socioeconomic life of the people and herbs based economy and appropriate options and recommendations to conserve the medicinal plants will be drawn from the public concerned.

Frequent village wise and panchayat level meetings are proposed to put and draw the conservation ideas so that the local communities may become aware of and resolve the problems and may take initiatives to implement this project . Prior to launching the proposed conservation measures , a micro planning by the communities themselves in necessary to design the strategies and action plans of implementing the project . In this manner obligate participation of the local communities is obvious.

Village wise eco- development committees need to be formed, or the existing such committees/ organizations need to be strengthened to prepare policies & strategies for proposed activities, and to undertake and manage the conservation action. Women, in this project , can play substantial role but cannot be given the entire responsibilities because it is the men who are the main collectors and sellers of the medicinal herbs . Women generally engage in livestock and household jobs but are less devoted in collection of the herbs from wild habitats.

2.5.2. Identifying the Distribution and Abundance, Degree of Degradation and Regeneration of the Medicinal Plants

In the GHNP area demarcated for implementing this conservation project, general vegetation types and species of interest [detailed information] with their distribution and abundance need to be studied. Specific maps can be prepared showing where key species are likely occurring. Data on phenology [e.g. time of flowering , fruiting and seed maturation] would also be kept. On the basis of the information on the ecological status of the species [either rare, vulnerable , threatened or abundant] certain rules & regulations need to be designed by the local communities.

The local people are , in fact , well acquainted and best identifiers of the collecting plants. They know all the areas where these medicinal herbs and mushroom have been extracted from . So on the basis of their ethnic knowledge they would be able to establish some trends in the degree of destruction as well as of the regeneration of medicinal herbs. Structured interviews and ethnobotanical surveys need to be conducted to obtain the information. An available literature with the Park authorities or with Wildlife Institute of India on the subject needs to be consulted to determine the ecological status of various species of medicinal herbs considered under severe biotic pressure. Several field visits are also required to the forest areas including alpine zones just to see the situation in the field. Monitoring methodologies in the Himalayas need to be simple and cost effective [Gujral and Sharma, 1996].

2.5.3. Determining Dynamics and Economics of Medicinal Herbs :

Medicinal plants play an important role in the livelihood of local people . Their 50 - 70% economy is based on this collection. In order to compare the results of conservation measures to be taken pre implementation and post implementation analysis of the dynamics and economics of the medicinal plants is necessary. Since harvesting of herbs is directly related to money earning, an economic evaluation of the entire target villages with the special focus on medicinal herbs and mushroom need to be done prior to the implementation of project. In the end, a further economic analysis is also proposed which will indicate success or failure of this project.

Dynamics of medicinal plants trade is equally significant, as an array of traders , local to national level politicians, exporters and marketers are involved in this business and it is very difficult to phase out these deep rooted vested interest people . But, however, on the basis of dynamics information several improvements can be made in marketing systems. Information on both the subjects needs to be gathered from public , traders and key resource persons. This will also help in checking illegal collection.

2.5.4. Scientific Documentation of Traditional Knowledge Systems of Medicinal Plants used in Health care:

The Himalayan eco- region has a rich variety of traditions and practices. These practices have been transmitted from generation to generation. The practice of following the rules and traditions had been

legitimized as part of the religious discourse. Local people have wealth of knowledge about heir crops, livestock and environment and this indigenous knowledge is locally adapted as a result of many years experience and changes continuously as people experiment to find better ways of doing things. Western science as is prevalent in India has derided traditional and indigenous knowledge as being based on superstitions and ignorance. Indigenous knowledge is undervalued because it is seen as primitive, irrational, low cost, unquantifiable and backward in outlook., which is in fact more environment friendly and labour intensive. Over the years the traditional technologies and practices as well as values have declined to a state of extinction. There is a felt urgent need to contemporise much of what has been lost in the name of development and reinterpret it in the modern idiom. At this juncture it has become quite necessary to document these traditions to demonstrate their richness and scientific value through working models, visual and publications etc.

2.5.4.1 Health care based on medicinal plants

One of the main issue which needs more attention for documentation in the field of traditional knowledge systems is the traditional Indian system of medicines. From the ancient times various saints visited Himachal and practiced herbal cure. This information was spread to the local people and descended down from generation to generation and still forms the practice of herbal cure . But owing to the illiteracy and lack of proper written records the practice of herbal cure, once a rich heritage, is facing extinction. But documentation of this kind of information is not easy as many traditional healers think that this knowledge should not be made freely available . Even within their own societies much of this specialist knowledge is kept private rather than public, through ritual and taboo. On the other hand other traditional healers recognize that their knowledge has a wider value and want part of the benefits arising from its use.

2.5.4.2 Whose Knowledge ?

It is important that a distinction be made between the ethics associated with indigenous knowledge that is already published and in the public domain, and the ethics involved in soliciting and recording previously unrecorded knowledge. The solicitation of previously unrecorded knowledge is best approached through participatory research at a local community level. The ethics of interaction between researchers and the people who are the source of traditional knowledge is not only a responsibility of the individual researcher and the organization or the professional society but also of National Govt. The ethics and rules for people undertaking ethnobiological survey should be same for foreigners as for Nationals from outside those communities.

2.5.4.3 Intellectual Property Rights

Intellectual property rights should be extended in some form to traditional knowledge and mechanisms to provide appropriate protection and compensation are urgently needed. Compensation for traditional

knowledge need not always be in the form of cash although financial compensation is important, other forms of compensation could include technology transfer, , training, resource maintenance and institutional development . An immediate priority is the completion of species and traditional knowledge inventories which should include information dissemination These inventories need to be developed using electronic databases with wide access.

For the scientific documentation of information on medicinal plants a plant wise standardization should be done which will involve following steps:

a. Collection, Scientific identification and preservation of the biological material
b. Preparation of appropriate extracts and preliminary chromatographic analysis
c. Biological and pharmacological screening of crude extracts
d. Consecutive steps of chromatographic separation, with bioassays for each fraction (activity-guided fractionation)
e. Verification of the purity of isolated compounds
f. Elucidation of structure by chemical and physiochemical methods
g. Partial or total synthesis
h. Preparation of derivatives/analogues and investigation of structure-activity relationships
i. Large-scale isolation for further pharmacological and toxicological tests.

2.5.5. Facilitating the Conservation of Medicinal Plants

This step is the main conservation step which needs to be launched by the communities themselves. This conservation phenomenon is totally dependent on the awareness among the people about it. Secondly the panchayat or the village committees / organizations should come out on to a common consensus to make some social rules & regulations about conservation, protection and sustainable utilization of the resources. To facilitate the conservation following approaches are proposed :

a] Awareness Building : Awareness needs to be generated through various means, which include:

* Public meetings
* Door to door socioeconomic surveys .
* Panchayat meetings
* Village committees or organizations formal or strengthening.
* Micro planning for project implementation and management of activities
* Demonstration of hired audio - visual material on medicinal plants in the schools/formal gatherings
* By continuously interacting with and living among the people .

The people need to be educated about how conserving diversity of medicinal plants helps safeguard

the sustainable benefits they derive from wild species. Medicinal plants are only one component of this economic valuation process and cannot be disassociated from other related wild species. And so the wild populations of medicinal plants must be conserved.

b] Closing Certain Areas for Harvesting & Grazing

It is revealed that people generally harvest the same areas every year which causes continuous decline in the population of a particular species. To avoid this repeated exploitation, people need to be organised and motivated to make such social rules and regulations that one area can be left undug for at least 3 years for proper regeneration of the plants. Accordingly , the village communities organizations will look after to enforce those rules & regulations and will regularly monitor. Thus several areas [patches] should be closed in the first instance. On the completion of prescribed period those areas will be opened for collection. At the same time , other areas [patches] would be closed. In this fashion, alternative closing and opening is supposed to provide a sufficient time to the species to regenerate considerably, if not vanished entirely.

Grazing is a big factor in decreasing of herb populations. As a matter of fact , especially in the alpine zones , medicinal herbs are grazed a lot because of occurring in meadows / grasslands/ thatches . Therefore grazing will also be closed and opened together with collection of the herbs in specific patches.

c] Discouraging Pre- Mature Harvesting

Most of the medicinal plants flower in spring season. Optimal collection time is August to October when the plants ripe and seeds start dispersing. Inspite of knowing the phenology some local people in mutual competition , uproot the plants in their flowering stage I.e. sometimes in May, June or July. This digging of the herbs does not allow seeds to ripe and disperse . Hence plants vanish from these pre - mature harvested areas.

Pre- mature harvesting needs to be discouraged, if possible, with the help of social instruments, it would be totally prohibited. Regular monitoring needs to be done by the village committees . The violators of the rules may be fined by the panchayat under pre - decided social punishments.

d] Preservation of Rare/ Endangered Species

Several areas have already been over - exploited, up to the extent that some species of medicinal herbs have become rare, endangered or even locally extinct. After identifying such areas and species, some consensus is to be developed in the rural communities to preserve the species, provided it is still existing in that area. In this reference , either those areas needs to be closed forever or the particular species needs to be banned from collection. This type of protection can be done by the villagers only.

e] Enhancing Sustainable Utilization

Sustainable utilization of resources I.e. medicinal herbs is central theme of linking conservation with economic development. Since the resources are very limited and the pressure is very high, so the community needs to be educated to exploit the herbal plants sustainably. The collectors needs to be taught in the field that at least 25% of the plant material should be left for further regeneration. The demands may also be cut- off viewing the situation of the degradation of resources.

f] Final Assessment of the Progress

Apart from the periodic monitoring and assessment of ongoing activities, a final assessment is proposed in relation to see the impact of undertaken conservation measures and the sustainable utilization on the species and ecosystems. Progress in the conditions of biodiversiity status as well as Socioeconomic profile of the villages needs to be assessed and documented.

INDICATORS OF SUCCESS

Local communities themselves have to draft the strategies of conservation actions, to initiate and manage the activities. So it is clear that once an appropriate system of conservation approaches is established , there are less chances of that system's failure. Slowly- slowly the conservation efforts made by the community will become part of traditions . Examples are there that especially in this area certain traditions are pro-conservation. Resultantly, the attempted actions can lead into self sustaining social process.

Conclusively, betterment in the state of exploitation of medicinal herbs and establishment of sustained conservation process in the society are the most important success indicators of the project. These conservation processes will continue in the communities which are supposed to benefit future generations also. Economic benefits from all types of conservation and sustainable utilization are apparent.

3.0 CASE STUDY ON INDIGENOUS SYSTEM OF HERB MANAGEMENT

3.1 THE RESEARCH AREA

Sainj valley lies in the Banjar development block of Kullu district in Himachal Pradesh. It is a narrow side valley of the main Beas valley, formed by the Sainj river . The area is mountainous , villages are small and scattered far apart on steep mountain slopes. Altitude ranges from 1300 to 6110 m and a variety of vegetation is found depending on altitude , and aspect. The area has a high floral and faunal diversity , which has led to the notification of the Great Himalayan National Park in this region.

Banjar Tehsil is entirely rural and has a population of 47,554 persons spread over 45 revenue villages [district census report , 1991]. Villagers are primarily subsistence agriculturists and also keep small numbers of livestock for their own use. Cash income is derived from sporadic labor availability and mainly sale of charas or non timber forest products. Forest dependence of local people is very high , both for use as well as for cash income. Local forests provide wood for house construction and agricultural implements fuel wood for cooking and heating , fodder for cattle , fruits , herbs and other plant and animal products for food , medicines and other religious purposes . In recent years these products , particularly herbs and mushrooms have also gained significance as the main source of cash income for many households . Local people have exercised rights to these forest products for several generations , and these rights have been recorded in the Rights and Settlements of Kullu District [Alex Anderson, 1886].

3.2 RATIONALE OF THIS STUDY AND OBJECTIVES

While several studies have focused on the floral and faunal biodiversity of this region [Gaston et al . 1981, Gaston 1986] the interaction of local people with this ecosystem has received attention only recently. In the hilly region of Himachal Pradesh, where cattle rearing and herb collection forms a part of the socioeconomic lifestyle of the local population , several reports have illuminated the extremely high cattle population , herb collections considered to be one of the most serious pressures on the Park , Hundreds , perhaps thousands of people enter the park from May to November to collect herbs . However , at present there is no estimate of the actual grazing and herb collection in the area or of any indigenous management systems that exist in the region.

For sustainable management of the rich natural resources of the are , it is imperative to understand firstly the pressure on the resource and secondly local knowledge and wisdom on how these resources can be sustainably managed. Our study on grazing and herb management was proposed as a preliminary research to meet these needs. The main objectives of the study are to :

i] Enumerate the herbs collected in the area , their status , seasonality of collection, and use
ii] Trace the local trade links for the herbs collected
iii] Documentation of indigenous systems of management of herbs .

3.3 METHODOLOGY

The study site was selected & included four panchayats of Sainj valley [Raila, Shangarh, Gadaparli and Shainsher] as well as the alpine pastures visited by people of these panchayats. The list of thaches visited by these villagers for herb collection is given in the table No. 2 Ten individuals were involved in the data collection process alone over a period of 12 months . Data collectors themselves . Data collectors were trained in the basics of survey and PRA methodology. These two methodologies were used for collecting all the data for this study.

Key resource persons from the villages were interviewed to collect data. Key resource persons included:

1. Older villagers who were able to provide information on past management practices.
2. Traditional medical practitioners who provided data on local uses of various herbs .
3. Village women for data on home processing of herbs and collection of herbs near the villages .
4. Fuhals [village Graziers] for information on grazing and herb collection in the thaches .
5 Herb collectors for information of herb collection processing and local trade links.
6. Local traders for understanding local trade links.
7. Devta committees and temple managers [kardar] for information on indigenous management practices [sacred grove] .

3.4 RESULTS AND DISCUSSION

a] Identification and Status of Herbs collected

The list of herbs collected was identified by interviewing the key resource persons . Estimates of the quantity collected per household in one season was also studied. Each household collects only 1 or 2 specific herbs in a given season . Data about the use of various herbs and methods of local processing were also collected. These are listed in the Table No. 1 This list includes both herbs that are sold as well as herbs that are used in making local medicines or for religious purposes.

Herbs are collected in two areas : One from forest and areas around the village and the other from alpine pastures [Thaches]. The herbs from around the village are usually collected by all family members while thaches are visited for fixed periods by only the young men. The thaches from where the herbs are collected and the months during which collection takes place are given in Table 2 and 3. The herbs collected from the thaches and those collected from nearby forest / villages are given in Tables 4 & 5 respectively. Herbs are available and can be collected only in specific seasons. The seasonality of availability and collection of herbs in the Sainj valley is given in Table 6.

3.5 HERB COLLECTION

Local people have been collecting herbs in this region for several generations. Earlier these herbs were used in the traditional medicinal system. Over the last decade a market for these herbs has steadily developed. Methods of recognition of these herbs as well as knowledge about collection procedures have been passed on from generation to generation among local people . In our study , we discovered several local management practices that are designed to ensure the sustainability of these herbs. Some of these are discussed below :

There are two classes of herb collectors. One is the group that collect herbs that are available only in higher altitudes, in the alpine meadows above the tree line. The second are people who collect herbs that are found at slightly lower altitudes, around the villages. The herbs found at these two different locations are listed separately in the Tables 4 and 5. At lower altitudes, around villages the entire family is involved in herb collection during the season. Women, children and men of all ages go out to collect these herbs. Herbs in the alpine meadows are difficult to reach, and involve a strenuous two day climb. Only men undertake this activity and they are generally between the ages of 15 and 45 .

Among these high altitude Herb collectors , there are tow groups . One are the Fuwals , who are seasonal graziers. Their primary aim of going to the alpine pastures is to graze livestock during the summer months. Fuwals generally take their own animals as well as those of other villagers and stay in the alpine pastures for a three months , from June to August. They take the livestock to the same patch of pasture land called a thach. Each panchayat has rights to take cattle to a particular thatch. Since the area is grazed for only three months of the year there is good regeneration of nutritious grasses every year. Fuwals also collect herbs while they stay in the thaches. The second group of herb collectors are local people who go up to the alpine pastures specifically to collect medicinal herbs. This second group is more significant for herb collection since their number has increased in recent years while the number of Fuwals have decreased. The presence of Fuwals is important however, as they usually travel first to these meadows, and make pathways to these areas as they travel.

Local herb collectors show a keen awareness of regeneration capacity of various herbs. They follow a system of rotational closure , wherein the same area is accessed only in alternate years. Herb collectors that we interviewed mentioned that if the same area is used every year there is neither sufficient regeneration nor is it efficient for them. The returns for the time invested would be very low. Earlier the fallow period for these areas between collection was longer , up to three or four years . Now each area is accessed in alternate years. Interviewees felt that this time was sufficient for regeneration of these herbs.

First time herb collectors are taught how to identify and collect herbs by more experienced collectors , since the collectors generally travel in groups . For most medicinal herbs , the root is the valuable part. But if the root is completely removed regeneration is affected. Collectors make sure that a small bit of the root is left behind to facilitate regeneration.

For instance the collectors were able to tell us the root depth of the various herbs:

1. Hath-Panja	5Inches
2. Koudi	2"
3. Patish	4"
4. Dhoop	7"
5. Lalchudi	5"
6. Chuchi	8"
7. Masangar	10"
8. Haini	6"
9. Sathu Jalyadi	4"
10 Naihnu	2"
11 Shiringli	12"
12 Chorga	5"

All the herb collectors interviewed mentioned that regeneration is good and the quantity of herbs has not decreased over time due to this collection . However the number of collectors has increased , and thus the available herbs is distributed among a larger number of collectors. No quarrels were reported between any of the collectors, and collectors felt that there was enough herbs for all the collectors. Resource scarcity is not yet an issue. Although the number of herb collectors has increased over the last decade, there is also a counter trend . Educated youth generally do not go for Herb collection. They also tend to have fewer cattle in their homes. This might reduce the number of collectors in the next generation as education spreads in the area.

The increase in market rates of these herbs prompted some herb traders to employ outsiders as wage labor to collect herbs. Local collectors opined that these labourers were not aware or bothered about sustainable collection methods, and tended to plough up the whole area instead of patiently collecting single plants . Local people resented their entry and stopped them from entering the area , as they were not right holders . Thus they make sure that only right holders collect herbs in the area through sustainable methods [Singh, 1997].

Map

Table

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Table

4.0 POTENTIAL OF MINOR FOREST PRODUCTS AND ITS TRADE

4.1. MEDICINAL PLANTS - ECOLOGICAL AND ECONOMIC TREASURE OR LOSS

4.1.1. Introduction

The Himalayan region, traditionally an abode of Gods, has been nestling in its lap the great centres of meditation, learning and research from the heydays of Indian golden age. Himachal, a younger state of India, is situated in the West Himalayas with an altitude of about 300-600m above the mean sea level. The diverse topography & the varied agro- climatic conditions of the state provide a natural habitat for a wide spectrum of flora, thus , the state is a rich basket of medicinal and aromatic plants which, if scientifically exploited , can play a vital role in strengthening the fragile economy of the hill people. The total geographical areas of the state is about 55,673 sq. km. out of which about 21, 142 sq. km. is covered with forests, thus making a warehouse of medicinal and aromatic plants which are found in these forests. The flora of the state is however becoming ecological & economic loss instead of a treasure.

One of the main reasons being the lack of proper scientific knowledge and guidance to the villagers , farmers and the right holders of the state. It is the outcome of unbridled exploitation by drug manufacturers and unscrupulous local elements . Many herbs once abundant in Himachal Pradesh are now dwindling rapidly. More and more species are reaching the extinction level, which is an alarming situation. The solution is not to ban the extraction but a follow up of a scientific approach in this field. Lack of pricing policy has made the matters worse. Villagers sell precious herbs to the local shopkeepers at throw away prices who act as middlemen for the traders within and outside the state. Truck loads of the plant raw material are being pilfered from the state, as a result of which the revenue earned by the state government is too less than practically what it can. With an aim of minimizing the percentage of raw materials going out of the state as such, the promotion of herbal industries needs encouragement.

The present policies and strategies of the Government demands a change. Although , the Govt. has set up a committee on medicinal plants and Environment protection Council to recommend policy changes but the desired results have not been materialized yet. India , once a leading exporter of medicinal herbs is today a net importer of pharmaceutical products. A turn around is still possible. The demand of such herbs is never ending , hence , the cultivation of medicinal and aromatic plants has got very bright prospects . The commercial cultivation of various such plants in our state is still a distinct dream and efforts are required to turn it into reality.

The term " Minor forest product " cover all forest products other than " Major forest products" which consists of timber , small wood and fuelwood. Minor forest products , specifically include grass, fruit, leaves , bark , exudates , animal products , soil & minerals. In consequence, they vary considerably in kind as well as in value. As far as Kullu district/circle and GHNP Area is concerned it is very rich in

minor forest products of middle hills, alpine and dry region. A nominal export and collection fee is realized from the traders for exporting various medicinal and aromatic herbs outside H.P. The right holders collect these herbs free of charge and sell them to petty contractors and dealers. No reliable data is available with the Forest department in Kullu regarding the market value of herbs and its quantity consumed locally by the right holders. However during the survey in the fields it has been found that although the consumption of the herbs locally [by the right holders] is not significant but the quantity of herbs extracted every year is in huge quantity, as compared to the records of the Forest department [Table and Graph : Minor forest Products Extracted from Different Areas of Kullu during the years 1991 -1995].

The present methods of collecting and marketing are except in a few cases , rather crude and any improvement in this direction would certainly lead to a considerable increase , in the quantity and quality collected and consequently , in the forest revenue. There are besides , many other Minor Forest Products which are not extracted fully and are left to go to waste either due to insufficient knowledge of their use or due to their occurrence in remote and in accessible localities . In some cases, the lack of sufficient information on the distribution, availability and proper methods and best season of collection, grading etc. has stood in their way of scientific exploitation.

It may also be mentioned here that the immense variety of soils, climatic and local edaphic factors are present in Kullu district, which permits the growing of various types of plants which yield different types of MFP. Our country still imports a number of minor forest products worth crores of rupees. The market value of Kuth [Sassurea lappa] in the Kullu area has decreased considerably in the last 2-3 years. Although this medicinal plant is being cultivated on a commercial scale in the adjacent district of Kullu but the fall in the market price is due to insufficient scientific knowledge in the field of its cultivation. Earlier available @ Rs. 80/ a kg it has gone down to Rs 40/- a kg at present. An exporter of medicinal herbs revealed that the much better quality of kuth is available in the southern states of India thus the demand of it from H.P. has decreased.

4.2 HOUSEHOLD SURVEY AND ANNUAL INCOME OF HERB COLLECTION IN SAINJ VALLEY [GHNP]

Survey was conducted in 24 villages in the Sainj valley of the GHNP area and information was collected through the household survey on the total population, herb collectors in the village, area of collection and income through agriculture as well as income through herb collection [Table : Record of Household Survey and Annual Income from Herb Collection in Sainj Valley of GHNP].

It was seen that in a total of 234 households, comprising of 1423 individuals the number of herb collectors was 211. the income of these households from agriculture was Rs.92,400 as compared to the income from herb collection, which was about Rs. 365,300. Thus the income from herb collection is substantially more than other sources and that is why collection is a major activity in the GHNP area.

Table & Figure

Table

4.3 PRESENT MARKET OF MEDICINAL AND AROMATIC PLANTS IN KULLU DIST.

Various dealers of medicinal / aromatic herbs in the Kullu district were contacted to find out the prices of various herbs at which these are available in the market. The data indicates a lot of fluctuations in the prices.

1. Dori Ghas : Its price ranges from Rs. 6/- to Rs. 12/- per Kg
2. Baj: The fresh material is available @ Rs. 7/- to Rs. 10 per Kg. Its dried form rate ranges from Rs. 18/- to Rs. 20 - per kg.
3. Banafsha : The present market price is @ Rs. 300/- per Kg.
4. Chora : Depending on the quality , the price ranges from RS. 10/- to Rs. 30/- per Kg.
5. Chuchi : It is available @ Rs. 15 /- per Kg.
6. Dandasa : This item is banned at present . Dealers refused to comment anything about this item. The forest department officials revealed that recently a truck load of dandasa was seized from some party & auctioned openly during the last month. The successful bidder could take it @ RS. 70/- per Kg. The prevailing price of this item outside our state ranges from Rs. 150/- to Rs. 200/- per Kg.
7. Dhoop: The quantity of dhoop available this year is comparatively less as to the previous years. Its market price ranges from Rs. 40/- to Rs. 70/- per kg.
8. Guchhis : 2000 /- to 3000/- per Kg.
9. Karu : This plant material was available for sale with one collector / right holder at Rs. 35/- per Kg whereas one of the dealer in the drug market Kullu quoted it for Rs. 100/- per Kg. This example /figure shows the high profit margin of the dealers.
10. Karwa Khastha : Rs. 30/- to Rs. 35/- per Kg.
11. Kauri Pattis : The dealers purchase from the right holders @ Rs. 500/- to 600/- per Kg and sell @ Rs. 800/- per kg.
12. Mehandi : During this month [September 1996] it was not available with the dealers, however they quoted it @ 50/- per Kg.
13. Mithi Pattis : Price ranges from Rs. 200/- to Rs. 250/- per Kg.
14. Muskwala : The right time to extract this plant for the high commercial value is the September end or October , however it was not available in the market even during the last week of August. I.e. the plant material is being extracted every year before time due to unhealthy competition amongst the collectors / right holders. Its price ranges from Rs. 15/- to Rs. 20/- per Kg.
15. Nihani : Market price is Rs. 60/- per Kg.
16. Thuth : It is available @ Rs 30/- per Kg.
17. Sath Jalari : Rs. 40/- per Kg.

The Forest department of Himachal Pradesh has listed about 42 medicinal / aromatic plants for the movement of which an export permit is mandatory [Table- Export Permit fees]. A person interested to carry the herbs/ Minor Forest Produce from one place to another has to deposit a royalty / export fee

Table

with the concerned D.F.O.'s office. For the export of other plants / plant materials , which have not been covered, a nominal royalty of Rs. 50/- to Rs. 100/- per quintal is charged by the concerned Forest Dept.. for providing the necessary export permit. Apart from their monetary value, Minor Forest products are of enormous economic value to the Pradesh and Kullu district as a whole . The cultivators and orchardists in these areas often depends for relief in case of petty sickness or injuries on medicinal plants available in the nearby forests . In short , so great is the economic importance that to call them "Minor" is not appropriate. In fact, the World Forestry Congress at Dehradun recommended their being called "Economic Forest Products other than wood". These days herbs are commonly referred to as "Non Timber Forest Products" [N.T.F.Ps]. In the Kullu district , the forests of Sainj , Bali chowki , Banjar , Manikaran , Gadsa and Manali are the sources of medicinal / aromatic flora. This has been depicted in the Flow - diagram.

4.4 MEDICINAL HERBS DEALERS OF THE KULLU DISTRICTS

Samples and market rates of medicinal herbs of Kullu region were procured from different dealers of this trade. The storage conditions of the forest produce at the dealers shops were found to be unsatisfactory . The photographs on the following pages show the view of place where dealers keep these herbs. Besides , the offices of the Forest department at Kullu, Banjar, Bhuntar, Shamshi, Manikaran and Manali were also visited to collect the concerned information.

4.5 SUGGESTIONS FOR SCIENTIFIC EXTRACTION OF M.F.Ps, ITS STORAGE, CULTIVATION AND REVISION OF ROYALTY RATES

4.5.1. Scientific Extraction of M.F.Ps.

Present methods of extraction of medicinal herbs/ M.F.Ps are quite crude and out dated. No attention is being paid towards timely extraction and moreover it is not properly stored. It was observed that the dealers possessed three varieties of Karu and two varieties of Bach depending on the different quality of these raw material . According to one of the dealers of this trade, the 'Maal' [different herbs/ jaributi] we get from different collectors differs in the quality , hence it is priced after grading the superior and inferior of each item . The reason for such differences in the quality of a particular herb, although collected from the same region is the lack of knowledge about the scientific methods of extraction amongst the right holders/ collectors of such herbs with respect to the scientific means. Moreover , it has been observed that a lot of it gets destroyed enroute. So, proper survey should be made for extraction of particular M.F.Ps at a proper time. Scientific mode of extraction be adopted & right holders be educated in this regard.

a] Fixation of time schedule for collection

It is very important to know as to which is the best month/ time to collect a particular medicinal / aromatic Herb without endangering the existence of the plants and also the labour used may not go waste. There

Figure

Figure

is a thumb rule that a herb / MFP should be tapped at a time when the contents of oil , drugs , alkaloids or other phytochemicals are in fullest quantity and reaches to its optimum level for tapping. Due to the unhealthy competition in the trade of medicinal herbs, the collectors hardly bothers about such thumb rule. e.g. the optimum time for collecting mushakbala is during September - October months . The concentration of non - volatile active compounds viz, "Valepotriates" in this plant are maximum. During this survey , it was seen that during this year it was extracted & sold during July- August only. It is therefore need of an hour to make people aware of the technical facts about each medicinal herb at the grassroots level.

b] Adoption of technically sound methods for extraction

It should always be ensured that during the extraction of roots / tubers of a particular MFP it does not get injury as otherwise it will promote early rot of the material and fetch a lower price. For better value , the extracted roots / tubers should be kept in a dry condition . A training - cum - demonstration programme can be started in each Panchayat to begin with, from area which is rich in M.F.Ps.

4.5.2. Handling, Drying, Storage and Marketing of M.F.Ps.

Proper handling is of utmost importance especially for the aromatic MFPs . These if not handled properly, tend to lose their value by losing their aromatic components into the surrounding atmosphere. Such materials should not get crushed during their transport. Drying of such herbs in the shade is preferred than in the direct sunlight. However, some percentage of loss of the volatile components do take place while drying but it can be minimized if proper methods are adopted. The storage area for medicinal herbs/ aromatic herbs should have proper / systematic ventilation and it should be completely free from any kind of dampness . No dealer in he surveyed area has got proper storage conditions for MFPs So, there is a need to adopt proper method in this regard and the concerned persons/ traders be motivated to use it . By this way, the rates of these products will go much higher than the present rates . The study of economics of markets should also be made for better price[s]. The Forest department/ Government agency should provide adequate help to the common right holder. A demonstration programme can be started for this also.

4.5.3. Extraction in Rotation

There should be a rotational extraction programme for each division with respect to each and every medicinal herb/ MFP. This will enable the medicinal plants to grow and replenish itself naturally and the indiscriminate extraction will be stopped to a large extent. An Act should be passed for this regulation to alter the ways of extraction by right holder without any restriction. This sort of rotation or extraction cycle is not needed in general, where flowers , leaves or fruits are extracted and used as MFPs as these come up annually in a natural way but the one becoming endangered and at present being extracted indiscriminately needs attention with respect to extraction cycles.

4.5.4 Field Survey of MFPs

It is very important to know the regeneration status of all MFPs and also its value and areas which are rich in the GHNP Conservation area can be identified . Special protection scheme can be formulated for this vast wealth of our state. Scientific and technical survey on standard guidelines as formulated by I.C.F.R.E Dehradun , [U.P] should be made.

In the end, it is again emphasized that this subject of MFPs its extraction, survey, regeneration, aspect etc. do require a great attention to revitalize , replenish and regulate the extraction of this precious natural forest wealth in whole of GHNP and similar is the case in Kullu district, which contribute a larger share in total MFP. yield of the state. The steps in this discretion will prove this wealth of our state is a treasure , both ecologically and economically instead of a loss.

5.0 PRODUCTIVITY AND SUSTAINABLE HARVEST OF WILD MUSHROOMS

5.1 Introduction

Today thousands of pickers harvest commercial fungi from private and public lands, yet uncertainty about the ecology of wild edible mushrooms hinders efforts to manage this valuable resource. At the center of the management issue is a lack of information on the ecology of these forest fungi, productivity and habitat requirements, interaction of forest health and the effects of repeated mushroom harvest on production . Clearly, if wild edible mushroom production is to be sustained , it must be done by understanding these organisms and the social and economic forces behind their harvest. The suitability of a particular mushroom species for commercial harvest depends on many criteria including abundance shelf life , appearance , texture , flavor and familiarity to sellers and buyers.

Morels [Morchella species] are not generally mycorrhizal . They seem to fruit most prolifically in open woodlands , mixed conifer forests hardwoods and disturbed areas , especially following fire or tree mortality. In the northwest , fruiting begins as early as February in warm areas and continues into June in cool areas. The harvest fluctuates greatly from year to year depending on abundance . Many areas are crowded with pickers after fires . For morels , pickers earned about Rs. 1000 per kg. in 1992 , but many traders get excess of Rs. 3000 for fresh morels [Pilz and Molina, 1996].

5.2 ECONOMIC AND SOCIAL FACTORS IN MUSHROOM COLLECTION

Valuable mushrooms that fruit in large flushes [morels] often are harvested by transient mushroom gatherers who travel to new locations as the season progresses. Morels can begin fruiting as early as February in the south . In the forests, morels progressively appear at higher elevations and on more northerly aspects [as late as June and July] as weather warms and snow packs melt. Morels are predominantly marketed within the States in India, but international markets include Europe , Japan and Canada . Barring major disruptions to international trade, markets for wild edible mushrooms are likely to continue growing as human populations increase and become more affluent and as more people become familiar with the pleasures of their consumption.

Morels are commercially collected elsewhere throughout the Himalayan region resulting in significant competition. National markets and prices can fluctuate widely from year to year, and even within a season as global weather patterns produce good or poor crops in various locations. Competition or collusion among mushroom buyers and processors can dramatically influence prices paid to local harvesters. Prices paid to pickers can inflate tremendously when mushroom crops are poor elsewhere, good locally and buyers compete intensely. This is particularly true of high value mushrooms. When prices are high it is not unusual for large numbers of harvesters to congregate in small areas , sometimes to the consternation of land managers and the local communities.

Regulations for protecting the mushroom resource may take the form of implementing harvest rules and permit systems, limiting permit numbers, allocating or rotating collection areas or providing contracts for exclusive harvest rights. Prevention of inappropriate harvest methods requires communication through meetings, videos, posters, handouts, press releases, presentations and other public education efforts. strict enforcement is needed to deter unauthorized or illegal activities in the forest . Large numbers of harvesters and avid competition for a valuable commodity can affect the ecology of the resource.

There is additional concern that mushroom harvesting at current rates could affect forest health or food webs for wildlife species. Unfortunately few benchmark measurements of commercial mushroom production exist to make comparisons of effects over time . As a result agencies have to restrict mushroom harvest in some areas due to uncertainty over mushroom production and harvest impacts. Increased regulation and legislative appeals are likely.

The impact of improperly harvesting wild mushrooms has received attention over the last few years and studies are needed to assess the impacts of various harvesting techniques . Certain practices such as raking the forest floor to expose the young buttons of valuable morels have been specifically identified as potentially damaging to the mycelium along with damage in heavily trampled areas or removing all sporocarps before spores are disseminated. No quantifiable information currently supports claims that these activities reduce production however. Many mycologists believe that harvesting mushrooms is as harmless as picking fruit off a tree or berries from a bush. Careful and long term monitoring is needed to determine if raking , trampling and reduced spore production are damaging to the fungi.

Forest age composition and structure likely influence wild edible mushroom production and there is great potential to manage forest stands to produce conditions that favor fruiting of a preferred mushroom species . Matsutake in Japan fruits most abundantly in 3- - 60 year old pine stands and Japanese foresters clear out under story vegetation to reduce litter depth and thin trees to increase matsutake production. Clearly, morel production is stimulated by fire. Forest management activities such as weed control, density management prescribed under burning and altering forest structure and composition to promote host species for certain wild edible fungi may be used as tools to enhance production in the future. The economic benefits during a rotation could be substantial, especially for highly valued commercial fungi such as morels.

A variety of wildlife consume yet we poorly understand the role of mushrooms in their diets and whether mushroom harvesting by humans consequently reduces their food supplies. If these mushrooms are a significant wildlife food resource then human competition for them may affect specific wildlife populations . For instance , in Japan one forester has asked whether matsutake harvesting should be restricted near northern spotted owl nest sites on the supposition that flying squirrels [a main item of the spotted owl diet] might feed on the mushroom , conversely mycophagy by indigenous wildlife species might be an important spore dispersal mechanism in certain locales. Commercial collectors claim that matsutake mushrooms often are found fruiting near dusky footed wood rat [Neotoma fuscipes] nests, and they

speculate that new colonies are formed through dispersal of spores in wood rat feces . Deer also actively seek matsutakes and can consume large quantities. The importance of this mushroom in their diet and whether they act as spore vectors are unknown.

Large numbers of mushroom hunters also may impact other resources and some areas may need protection from mushroom harvesting .Heavy harvesting can have adverse effects on areas prone to high levels of erosion. It may be necessary to set up no harvest areas as controls to examine the effects of harvest or rotate areas to minimize the impact of continued harvest. Many management concerns regarding mushroom harvesting are actually concerns about managing people when they visit the forest. Demographic information from collection permits, industry surveys, public meetings, site visits , and interagency communication are all effective means of improving the regulation of human activities and serving the public.

5.3 SITE SELECTION FOR RESEARCH AND MONITORING COLLECTION

Known fruiting sites should be selected when investigators plan to apply experimental treatments to study the biology and ecology of a given mushroom or measure productivity in areas of particular interest to managers or harvesters. The biased selection of these sites prevents valid extrapolation productivity estimates across broader landscapes. Careful site selection becomes particularly important when research addresses commercially valuable mushrooms . Sites must be secure from trespass and unauthorized collection of sporocarps but also readily accessible to field crews. Field personnel often are aware of obscure areas or areas located on roads.

Research site security may be enhanced in several other ways. Educating the public about research activities and goals is the most effective way to minimize intrusion and damage . Examples include providing handouts and verbal explanations when individuals obtains permits showing educational videos and publishing articles in the local press No Mushroom Harvest signs are essential to inform the public that collection is not allowed in the study area, because these signs often attract unscrupulous harvesters they should be posted within the site and not be visible from a road . Signs should be large brightly colored and posted low because mushroom pickers usually have their attention focused on the ground. Illustrations of the most commonly collected mushroom in the area, overlain with the circle and slash symbol effectively communicate the message to harvesters. When pickers obtain permits , they should be shown examples of the signs and instructed to avoid harvesting in posted areas.

Frequent visits to research sites by field crews is another effective means of security .Law enforcement officers can visit the site regularly and cite or ticket individuals who are picking illegally. Researchers and officers should greet harvesters politely explain the purpose of the study and the restrictions ask them to avoid the area and solicit their help in informing others. When mushrooms are harvested as part of the study , investigators may choose to cooperate with previous harvesters of the site, the harvester obtain exclusive access and can sell mushrooms found on the site in exchange for their efforts in harvesting

the site and providing the data to researchers . If the mushrooms are regularly picked or marked in a manner that destroys their commercial value unauthorized harvesters will find the site discouraging .

In the mountains, morels represent yet another life history group of edible mushrooms . Massive episodic fruiting of certain morel species often occur in response to events such as logging, fire, insect infestations and ground disturbance. These large fruiting subside dramatically over the next several years after the event although the magnitude and rate of decline are poorly documented. Persistent fruiting at low levels does occur without disturbance but large disturbance related crops are most cost effective for commercial harvesting in this region. The episodic nature of fruiting places constraints on the location and timing of studies.

5.4 INTERVENTIONS AND MONITORING

The term edible mushroom inventories refers to either surveys of occurrence or estimates of sporocarp production [counts or weights] per unit area . We use the term monitoring when those inventories are repeated to detect trends. Monitoring also can be used more broadly when it refers to tracking o r understanding the health or viability of a resource. Baseline surveys of occurrence and estimates of annual variation in productivity are needed to determine if commercial harvesting diminishes subsequent fruiting or interferes with the reproduction of these fungi over extended periods of time [that is decades or several timber rotations]. Habitats change as forest mature and experience replacement events such as logging or fire , hence baseline inventories must be tied to habitat types if we are to measure and predict long term trends in occurrence and production across landscapes . All renewable resources have inherent limits to sustainable harvesting and we are just beginning to theorize about the functional limitations for forest fungi. Creative experiments can test many of our hypotheses but final verification of sustainable harvesting will result only from careful long term monitoring.

Investigators must distinguish between total biological production and commercial production when planning inventories. Commercial harvesters use efficient search patterns to obtain the most valuable mushrooms with the least effort. Mushrooms too small damaged or old are usually not collected. Mushrooms not commercially harvested may be important as food for wildlife or for reproducing the species via spore dispersal . Clear objectives regarding the type of production information needed will determine monitoring methods . For measuring commercial production managers could give commercial harvesters exclusive access to a defined area and weigh all the mushrooms they collect by commercial grade. If an estimate of total production and animal use of the resource is desired, then through sampling designs and searching techniques must be used.

A reasonable number of circular or square plots covering where they had already searched unless the plot were elaborately subdivided. Investigators must balance the shape and arrangement of the plots with how much walking is practical, ease of sporocarp observation site, brushiness and potential for soil compaction or erosion from repeated visits Investigators also must decide whether to sample

mushroom production at a given site or within a given habitat type. . Randomly located plots provide greater assurance of unbiased estimates than systematically located plots but may require a little more effort to locate establish and sample because to relocate them they need to be better marked and documented than strip plots starting from the edge of a road . A distance or orientation criterion also must be used to ensure that randomly located strip plots do not overlap.

The simplest way to determine mushroom biomass is to pick and weigh then. Unfortunately no one has conclusively demonstrated whether picking influences the size number or biomass of subsequent sporocarps either that season or in following years . Study suggests no short term effects of harvest on subsequent chanterlle production but carefully replicated comparisons are needed for other mushroom species studies. Any inventory of total production should rely on dry weights for comparisons among sites and sampling periods because mushroom moisture content will change with differences or changes in the weather . If it is impractical to dry all sampled mushrooms, investigators can weigh sub- samples, calculate a dry to wet weight ratio and use this ratio to estimate total dry biomass from the total fresh weight . Some mushroom collectors report that mushroom harvesting influences the size of abundance of mushrooms that fruits later in the season or in following years. Confirming or refuting these anecdotes requires a statistical comparison of harvest and non harvest treatments. Sporocarps are collected and weighted on harvest plots and counted and measured for size and weight regressions on control plots . Three years of baseline productivity data were collected from plots [selected clusters] in study before harvest treatment were applied.

Forest thinning or clear cutting, soil disturbance, fire, fertilization, cattle grazing and allowing forest stands to age naturally; all potentially influence edible mushroom productivity. Studies of forest management effects will allow managers to predict trends in edible mushroom production as these activities change forest landscapes. Studies can be located where managment activities have already occurred [retrospective] or where they are planned [prospective]. In the forested regions of the Temperate Zone true morels [Morchella] are the premier spring wild mushroom collected for personal and commercial use. True morels are easily distinguished from other wild mushrooms but identifying a given collection to species is often frustrating .

The life cycle and life style [mode of nutrition] of true morels is saprobic or at most facultatively mycorrhizal . They regularly form sclerotia [dense masses of tissue] and conidal states as part of their life cycle. Each of the four groups of morels appears to have different ecological preferences The common and half free morels occasionally fruit abundantly in mechanically disturbed [but likely not burned] areas. They also may fruit regularly if less abundantly in relatively stable habitats in association with broad leaved trees in the Rosaceae.

Informed management of wild morels is possible only if we know which organisms are involved, agree on what to call them and understand their biology and ecology. Areas in need of attention include defining the species and arriving at a stable set of names for them and gathering baseline data on natural fruiting patterns for each and confirming the life cycle of species [Palm and Chapela,1997].

6.0 ENTERPRISE DEVELOPMENT AND ROLE OF ORGANISATIONS

The State of Himachal Pradesh is presently facing an economic as well as ecological loss in the extraction of the medicinal plants and mushroom. The economic loss is because of the lack of value addition, no local industries and unorganised collection and selling of medicinal plants. The ecological loss is due to the unscientific extraction of medicinal plants, lack of rotation and heavy extraction from some accessible areas.

Enterprise development in the medicinal plants and mushroom envisages the following interventions :-

- **Formation of Village level Cooperative Institutions**

  The village level cooperatives, Mahila Mandals, Panchyats and Ecodevelopment Committees would be assisted to form cooperatives which control the collection of medicinal plants from various areas and the selling of these plants to the local traders and industries. The cooperatives would ensure a control on collection enforced among the right holders and better remuneration for collection.

- **Small scale processing units**

  The processing units would be formed by the cooperatives with the help of the other industries to provide value addition to the medicinal plants.

- **Traditional Medicine documentation and kits**

  The medicinal plants have been used by the local population since ages. Due to the lack of documentation and scientific validation of the Ethnomedicine, derived from these medicinal plants, there is increased emphasis now on using Western medicine. With the shift towards Herbal medicines it becomes imperative to document the efficacy of traditional medicinal plants, so that when judiciously used, these medicinal plants could provide the cure for the future diseases.

6.1 Baseline Survey and Micro planning

All the target villages, which also come in buffer - zone of the Great Himalayan National park, need to approached for their socioeconomic surveys with special emphasis on the activities pertaining to medicinal herbs business. During these surveys the specific problems connected with socioeconomic life of the people and herbs based economy and appropriate options and recommendations to conserve the medicinal plants will be drawn from the public concerned.

Frequent village wise and on panchayat level meetings are proposed to put and draw the conservation ideas so that the local communities may become aware of and resolve the problems and may take initiatives to implement this project . Prior to launching the proposed conservation measures , a micro planning by the communities themselves in necessary to design the strategies and action plans of implementing the project . In this manner obligate participation of the local communities is obvious.

Village wise committees need to be formed, or the existing such committees/ organizations will be strengthened to prepare policies & strategies for proposed activities, and to undertake and manage the conservation actions. Women, in this project , can play substantial role but cannot be given the entire responsibilities because it is the men who are the main collectors and sellers of the medicinal herbs . Women generally engage in livestock and household jobs but less devoted in collection of the herbs from wild habitats.

6.2 M.F.Ps Cooperative Societies formation

The local people and Gram Panchayat should be encouraged to form cooperative societies for extraction, collection , marketing & distribution of profits with regard to sale of MFPs. This will avoid exploitation of common villager from the hands of traders. The total profit will reach to the villagers/ Village Panchayat. Some steps are required to be taken in this regard by the state Govt.

6.3 Cultivation of Medicinal & Aromatic Plants

The medicinal plants that are facing depletion due to excess collection need to be conserved by encouraging their cultivation. Agro- technologies need to be developed so that the farmers could take up the cultivation. In this case the use of Forest Floor for cultivation of medicinal plants on the lines of China will be explored. The prospects of cultivation of MFPs/ medicinal and aromatic plants in our state are extremely bright. During the survey to various places of Kullu district, the local people of these areas who own big orchards or land as such have shown a keen interest in the cultivation of such plants . But unfortunately, there is no practical knowledge with these people regarding the quality & optimum production of such plants . Recently, a training programme on the cultivation of medicinal & aromatic plants was organized in the State capital during April , 1996 but the utility of conducting such programmes by the state government is nil because not even a single grower/ farmer participated in this programme. The reasons mainly being the high registration fee kept and secondly their being no arrangement made that information regarding the conduct of such programmes reaches to the local people / orchardists / farmers of our state . T o encourage the farmers / right holders should be given incentives & encouraged to attend such programmes. The government should provide subsidies for the purchase of medicinal / aromatic plants cuttings etc. from the reputed Institutes of our country . The Forest department should also formulate a scheme to cultivate or plant these medicinal herbs / MFPs in potential areas . This will boost and supplement in the overall yield of the MFPs & generate additional income to the H.P. Govt./ panchayats.

The Production Technology for some indigenous plants has been given in Annexure V. The Dept. of ISM [Ayurveda] has made Rules for the grant of subsidies on various inputs to the Medicinal Plants Growers of the State [Annexure VII].

6.4 M.F.Ps. Based Small Scale Industries

The small MFP based industries should be given encouragement to augment the income of the local people & create job opportunities to the local people. Although, the state government has kept the herbal industries in its priority list but the entrepreneurs in this line complain of lot of shortcomings in the Government's present policy. An entrepreneur in the Kullu district revealed that his application for the license of cedar wood stumps is pending with the Government since one year, inspite of a favourable report from the Forest department of Kullu regarding the availability of the raw material in the district to meet the requirement of the applicant for next ten years. As a result the person is in a fix and unable to start the herbal project . The government will have to come forward to explore the possible potentials and wherever possible , should materialize the project at its earliest. This will not only reduce unemployment but at the same time can increase the state revenue manifold.

6.5 Need for changes in the Govt. Policies

The State Govt.. has imposed a royalty for all kinds of MFPs / medicinal herbs for providing an export permit for its movement from one place to another . Recently , this fee has been increased manifold, as a lot of raw material is being pilfered outside the state by the local agents and the agents from outside the state. This increase, however has resulted into smuggling in this trade and a major setback to the entrepreneurs / herbal units working within the state . In order to encourage the herbal units within the state which of course have been listed in the priority sector of the industries the royalty on MFPs medicinal & aromatic herbs should be minimum for its movement within the state & manifold for the raw material going outside the state. This will result into a value added products export from our state and a much better revenue to the state Govt. besides minimizing the problem of unemployment in our state.

7.2 Coordination among Govt. Agencies and R&D Institutions

At present the Department of Ayurveda, CSIR, University of Horticulture and Forestry , Nauni, State Council for Science Technology and Environment, HP and DRDA are engaged in the area of medicinal plants and mushroom development. It will be ensured that the Ecodevelopment Committees and the village cooperatives take into account, the expertise of the above agencies. Coordination of the work on medicinal plants done by these agencies, will also be ensured to bring benefits to the ecology of the GHNP and surrounds and the economy of the local people.

Regional Centres of Y S Parmar University of Horticulture and Forestry are engaged in developing

nurseries of medicinal plants . But since cultivation of these plants is not yet tested, so not proposed. Hence , these institutions seem very likely to assist much this conservation action oriented project , However , the possibilities of such involvement of the specialists from Y S Parmar University of Horticulture & Forestry , H.P. Agriculture University , G B Pant Institute of Himalayan Environment and Development , and other local institutions needs to be explored. Local NGOs, schools , village committees/ organizations , women organisations, etc. needs to be partner in this project.

6.6 M.F.Ps Herbarium Network and Research and Education in Medicinal Herbs

In the potential areas of Kullu and GHNP, M.F.Ps Herbarium can be set up. This network will be of great significance in imparting education to the local people to know its economic importance , method of regeneration , extraction etc. At present such herbariums are only a few e.g. at Jogindernagar in Mandi [H.P.]. A network of such herbariums will help the local people in realizing the importance of this natural valuable wealth and thus its optimum usage. There is a great need for education about M.F.Ps & its importance at college and University level. More & more researches are needed and all Universities should encourage research scholars to go ahead with the detailed researches in various aspects of regeneration , extraction etc. of different medicinal herbs/ MFPs . For the successful results , coordination between the researchers and the right holders / collectors of medicinal herbs / MFPs should be explored.

The tentative functions of such herbal gardens could be as follows :

1. Undertaking Field trial and demonstrations
2. Assessing adaptation of Agro- technology vis- a- vis the climatological zones.
3. Establishing Source of genuine plant material
4. Undertaking Farmers training programmes.
5. Raising Nursery/Seed/Planting material for supply to farmers.
6. Ensuring Technical supervision and support to farmers undertaking field demonstrations
7. Establishing Experimental processes and analytical facilities
8. Establishing Crop museum/ germplasm undertaking collection in association with R&D units.
9. Undertaking Study in association with R&D institutions on growth habits / plants breeding.
10. Undertake Study of habitat distribution of endangered species.
11. Undertake Tissue culture/ botanical research , if required.
12. Involving Unemployed Ayurvedic Doctors/ N.G.O.s in helping farmers for cultivation of herbs / plants which are used in Ayurveda.
13. Keeping liaison with drug firms.

6.7 Data Bank for Germplasm Collection

A nodal Agency has to be identified to immediately to initiate steps to create centralised information

system for medicinal plant wealth of the State. Nodal Agency will contact CIMAP [Lucknow] and Biotechnology Dept., Govt. of India for deciding the format of collecting, storing and retrieving the information and also ensuring compatibility with the information system already created at National level.

1. Drug farms could be developed in promotional sectors.
2. Areas should be demarcated where operation of NGOs would be most productive Himachal Pradesh. Commercial organisations can be involved for marketing arrangements.
3. Farmers Cooperative can also be established.
4. The processing of the produce in the area of its collection or nearby should be undertaken either through NGOs or the entrepreneurs.
5. Value addition units should be established with in the State.

Some plants are tissue cultured by M/s Agrigene International, in Shimla.

These are : *Aconitum heterophyllum, Acorus calamus, Abelmoschus esculentus, Dioscorea deltoidea , Gentiana Kurroo, Jurinea macrocephala , Orchis latifolia and Valeriana wallichii.*

7.0 RECOMMENDATIONS

7.1. PLANT SPECIFIC APPROACH

There is a lot of diversity in the Medicinal Plants and each plant has unique characteristics of growth, seasonality, collection , trade, products and ethnobotanical importance .Thus a plant specific approach has to be adopted for interventions in its ecology and related economic aspects.

7.2. TRAINING ROTATIONAL EXTRACTION AND DRYING

Presently Crude methods are being used in extraction of the plants leading to graded material being available with the dealers. Training is required to the plant collector in extraction methods to conserve the plants and also for value addition.

7.3. TIME SCHEDULE OF COLLECTION

In the plants the products like oil and alkaloids are in full quantity during particular time periods when the extraction and processing of the plant can yield maximum phytochemicals . Thus time schedule for collection and processing has to be adhered.

7.4. STORAGE & TRANSPORTATION

Damp free storage and transportation environment is required to prevent the loss of aromatic values from these plants.

7.5. MEDICINAL PLANTS COOP SOCIETIES

For Better value during storage and good prices, plant collectors need to be organised into societies.

7.6. EX SITU CULTIVATION

7.7. MFP BASED INDUSTRIES

7.8. LOCAL HERBARIUM FOR EDUCATION - FIELD GUIDES

Plant classification and collection methods need to be simplified through herbarium and field guides.

7.9. POLICY LEVEL INTERVENTIONS & INSTITUTIONAL ROLES

The Following institutions need to have defined roles :

Forest Dept. - Regulation of export fee, issue of rights

Ayurveda Dept.. - Cultivation & Drugs

R&D Institutes & Universities - Cultivation, Screening of plants

7.10. ACTION PLAN FOR RARE SPECIES

7.11. NEED FOR MONITORING OF PLANT COLLECTION AND TRADE

Workshops need to be conducted with the traders and other stake holders so that monitoring protocols are developed.

7.12. MEDICINAL PLANTS ARE TREASURES

Presently there is total loss - Ecological , Economic and loss of Indigenous knowledge, to the State because of the medicinal plants whereas these can be treasures for the state.

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