



CENTRE *of*
EXCELLENCE
on FOREST BASED
LIVELIHOOD IN
UTTARAKHAND



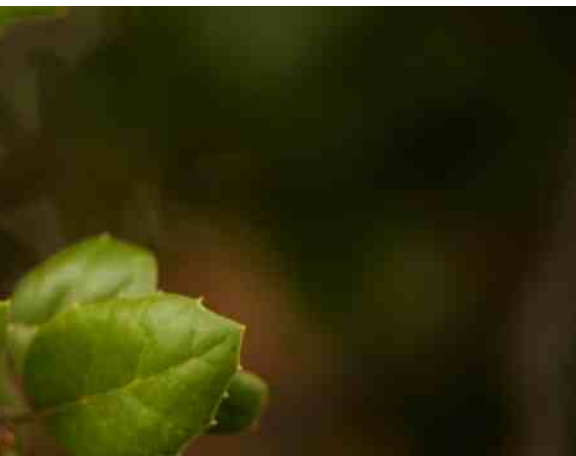
PROGRESS REPORT 2016-2017



Ministry of Environment,
Forest & Climate Change







CENTRE *of*
EXCELLENCE
on FOREST BASED
LIVELIHOOD IN
UTTARAKHAND

**CoE Team Members:**

Dr. Rajendra Dobhal, Director General, UCOST

Dr. B. P. Purohit, Joint Director, UCOST

Dr. Piyush Joshi, Senior Scientific Officer, UCOST

Dr. Ajeet Kaur, Senior Scientist, CoE, UCOST

Mr. Siddharth Napalchyal, Scientist, CoE, UCOST

Ms. Kanchan Dobhal, Junior Research Fellow, CoE, UCOST

Ms. Seema Maikhuri, Junior Research Fellow, CoE, UCOST

Contact Information:

Centre of Excellence on Forest Based Livelihood in Uttarakhand
Uttarakhand State Council for Science and Technology (UCOST)
Vigyan Dham, Jhajra, Dehradun-248007

Phone No. +91-8193099431-34
+91-9412051557

Email: coe-moef@ucost.in

Website: www.ucost.in

Uttarakhand State Council for Science and Technology (UCOST) is an autonomous body under Department of Science & Technology, Government of Uttarakhand. The Council plays a catalytic role for the promotion of science and technology in the State and supports programmes on sustainable development of the State through their application.

Uttarakhand with its 46.73% geographical area under forest and tree cover is an indispensable repository of important plant species. Forests protect watersheds, ensure water security, constitute important wildlife habitats, ameliorate environment, sequester and store carbon, and ensure food security. They also supply timber and mitigate climate change in addition to the fact that they continue to sustain livelihoods through diversified forest based products and services which are very important for the subsistence of people of Uttarakhand living on the fringes of forests.

Therefore a research and development project was prepared with a focus on forest based livelihood of inhabitants of forest fringe villages and submitted to the Ministry of Environment, Forest and Climate Change, Government of India. Since the project demands long term studies, a Centre of Excellence on Forest based Livelihood in Uttarakhand (CoE) was proposed to be established in the State under the ambit of Uttarakhand State Council for Science and Technology (UCOST) which was sanctioned by the National CAMPA Advisory Council and Ministry of Environment, Forest and Climate Change (MOEF & CC) on 10 December 2015. First of its kind in the State, the CoE delves on issues related to forest based products and dependence of forest fringe dwellers on these resources for sustaining their livelihoods. During the last year, the emphasis of CoE was to collect as much secondary information as is available with different government agencies such as the State Forest Department, Forest Development Corporation, research organisations and other published reports and research articles; the compilation of which is before you in the form of this document. The document suggests possible explanations for the data shown through graphs and tables and raises issues of concern like indiscriminate harvesting and pricing of the wild harvest. I hope the document will be of great use to forest managers and policy makers of Uttarakhand in particular and MOEF & CC in general.

(Rajendra Dobhal)

CONTENTS

Introduction	08
Literature Review	10
Forest Legislation governing harvest and trade of NTFPs in India	14
Mandate	16
Vision	17
Overall objectives	17
Objectives undertaken during the period (2016-2017)	17
Methodology	18
Findings	22
Publications based on the work done under project	41
Annexures	42
Annexures	44

LIST OF TABLES

Table 1.	Selection criteria of household classes (affluent/ less affluent and others).
Table 2.	List of Cultivable medicinal plants for subsidy by government of India.
Table 3.	Medicinal plant mandis and their forest collection areas.
Table 4.	Quantity (in quintals) of medicinal plants sold through UAFDC mandis in Uttarakhand.
Table 5.	Medicinal plant species in Uttarakhand permissible for decontrolled collection from forest.
Table 6.	Medicinal plant species of Uttarakhand completely banned for collection from forest.
Table 7.	Medicinal plant species of Uttarakhand permissible for sustainable collection (i.e. on rotational basis) from forest.

LIST OF FIGURES

Figure 1.	Resin production (quintal) in Uttarakhand.
Figure 2a.	Sale data of medicinal herbs collected by UAFDC.
Figure 2b.	Sale data of medicinal herbs collected by Bhesaj Sangh.
Figure 2c.	Sale data of medicinal herb collected by KMVN.
Figure 2d.	Sale data of medicinal herb collected by Van Panchayat.
Figure 2e.	Sale data of medicinal herb collected by GMVN.
Figure 3a.	Sale data of Jhula at UAFDC.
Figure 3b.	Sale data of Moss at UAFDC.
Figure 3c.	Sale data of Tejpatta at UAFDC.

LIST OF BOXES

Box 1.	Chirpine leaves - a problem turned into opportunity
Box 2.	Green ambassador of Uttarakhand: Shri Jagat Singh Junglee

LIST OF MAPS

Map 1.	Atlas of Uttarakhand State
Map 2.	Protected forest areas in Uttarakhand

LIST OF ANNEXURES

1.

Ringal clusters table in Uttarakhand
-
2.

Mandi wise data of NTFPs auctioned from 2010-11 to 2015-16
Table I. Sale data of NTFPs auctioned through three UAFDC mandis of Uttarakhand in year 2010-11.
Table II. Sale data of NTFPs auctioned through three UAFDC mandis of Uttarakhand in year 2011-12.
Table III. Sale data of NTFPs auctioned through three UAFDC mandis of Uttarakhand in year 2012-13.
Table IV. Sale data of NTFPs auctioned through three UAFDC mandis of Uttarakhand in year 2013-14.
Table V. Sale data of NTFPs auctioned through three UAFDC mandis of Uttarakhand in year 2014-15.
Table VI. Sale data of NTFPs auctioned through three UAFDC mandis of Uttarakhand in year 2015-16.
-
3.

Collection data of Keedajadi (*Ophiocordyceps sinensis*)
Table I. Collection of Keedajadi from Joshimath Block, District Chamoli in year 2008-09 and 2009-10.
Table II. Collection of Keedajadi from Dharchula Block, District Pithoragarh in year 2009
Table III. Collection of Keedajadi from Munsyari Block, District Pithoragarh in year 2009.
-
4.

Excerpts of interaction with the middlemen

ABBREVIATIONS

CAMPA	- Compensatory Afforestation Fund Management and Planning Authority
CAP	- Centre for Aromatic Plants
CDH	- Conservation Development and Harvesting
CoE	- Centre of Excellence
FGD	- Focused Group Discussion
FRI	- Forest Research Institute
GEF	- Global Environment Facility
GMVN	- Garhwal Mandal Vikas Nigam
GOI	- Government of India
HRDI	- Herbal Research and Development Institute
ICFRE	- Indian Council of Forestry Research and Education
IUCN	- International Union for Conservation of Nature
JFM	- Joint Forest Management
KMVN	- Kumaon Mandal Vikas Nigam
MAPs	- Medicinal and Aromatic Plants
MoEF & CC	- Ministry of Environment & Climate Change
MPCAs	- Medicinal Plant Conservation Areas
NFLIC	- National Forest Library and Information Centre
NMPB	- National Medicinal Plants Board
NTFP	- Non- Timber Forest Product
PAC	- Project Advisory Committee
PCCF	- Principal Chief Conservator of Forests
spp.	- Species
UAFDC	- Uttarakhand Forest Development Corporation
UCOST	- Uttarakhand State Council for Science & Technology
UNDP	- United Nations Development Programme



ANNUAL PROGRESS OF THE PROJECT

Title of the project :

**Centre of Excellence on Forest Based
Livelihood in Uttarakhand- A Pilot Study**

Name and address of
Principal Investigator:

Dr. Rajendra Dobhal

Director General,
Uttarakhand State Council For Science & Technology,
Vigyan Dham, Jhajra, Via- Premnagar,
Dehradun-248007
(Uttarakhand)

Number of Sanction letter:

No.13-31/2015-CAMPA

Duration of the Project:

Five Years

Date of start of Project

10th December, 2015

INTRODUCTION

Himalaya, the greatest physical feature of planet Earth, is rich in forest and other natural resources. It forms an integral part of history and heritage and has been serving as a melting pot of races, religions and cultures. Being the source of many great rivers, it is also known as the Water Tower of Asia. It acts as an ecological guardian to large part of India serving it with ecological assets and also ensuring the fertility of landscape for the socio-economic development of people living downstream of rivers arising here. Himalayan forests have varied forest types from gregarious and multi-layered forest of *Shorea robusta* (Sal) in the Shivaliks and low level conifers of *Pinus roxburghii* (Chir) in lesser Himalayas to luxuriant forests of *Cedrus deodara* (Deodar) which gradually go up with broad leaved *Quercus spp.* (Oaks), *Castanea spp.* (Chestnuts), *Picea smithiana* (Spruce) and *Abies pindrow* (Fir) and end up with greater Himalayan flora and fauna many of which are of great medicinal values. The nature has endowed Himalayan regions with a large variety of biodiversity which yields useful products. The needs of the people residing here are so inextricably linked with the forests that without them, it would be impossible for the people to survive. Forests of Himalaya represent the very soul of the people living there.

Uttarakhand, which lies in the central Himalaya, is very important due to its geographical location. The river Kali and the international boundary with Nepal form its eastern limit. Rivers Yamuna and Tons demarcate its western boundary with Himachal Pradesh. The State has international boundary with Tibet on north and towards south are the Indo-Gangetic plains of Uttar Pradesh. The terrain in Uttarakhand ranges in altitude from 74 m in Tarai region to 7785 m (above mean sea level) of Nanda Devi summit in greater Himalaya. Out of its total area of 53,483 Km², Uttarakhand has 24,992 Km² area under forest and tree cover (FSI, 2015). Its rich forest with diverse array of forest types from tropical to alpine types is not only intricately associated with hydrological balance but also form the life supporting system for the local inhabitants. This is a land where man and nature are almost inseparable from each other.

The people of Himalayan region make strenuous efforts in meeting their daily needs. The agriculture on mountainous region requires a lot of labour and inputs but still the production meets only partial requirements of the people. Therefore, they have to make use of other natural resources particularly forest biodiversity to supplement their house hold income. The locals have been dependent on different forest products such as construction timber, food, fodder, fuel wood, bamboo, resins, gums, grasses, herbs and a large number of medicinal and aromatic plants. Earlier during last century, only timber was considered an important contribution of the forests as it yielded sizable revenue to the states. Post 1970 the minor or non-timber forest products (NTFPs) were recognized to play great role in sustaining the forest dependent population. While the agriculture and allied activities continue to be the primary occupation of people but it suffices to meet their household requirements for about 100-150 days in a year. The forest based gathering for self-consumption and sale in the market provides substantial income and meets their house hold requirement for another 150-200 days in a year. Thus the forest based livelihood in Himalayan region is of great economic and ecological significance for the people of mountains due to large variety of forest based products and services. Many NTFPs provide large livelihood opportunities to all states in general and to Uttarakhand in particular which is rich in high value medicinal plants, resins, gums and wild edibles such as fungi, berries, nuts, flowers, honey etc. besides fodder and fuel wood. These NTFPs are used for self-consumption and largely for trade to supplement their annual income.

Uttarakhand is recognised as a hot spot for medicinal plants due to wide altitudinal variation, different habitat types and varying micro-climatic conditions. The state has nearly 700 species of medicinal plants which find usage in folk and documented systems of medicine like Ayurveda, Siddha, Unani and Homoeopathy. Medicinal plants are not only a major resource base for the traditional medicine and herbal industry but also provide livelihood and health security to a large segment of Indian population. In Uttarakhand, there are mainly eight bamboo species growing naturally- four thick species which grow between 300-1500 meter above msl, are used for making paper and diverse household items; the remaining four thin species, known as ringals, grow between 1500-3500 meter above msl and are commonly used for making baskets, mats, flowerpots and other products. Tejpatta (Bay leaf, *Cinnamomum tamala*) possessing several medicinal properties, has become the first botanical from Uttarakhand to receive the Geographical Indications (GI) tag. *Ophiocordyceps sinensis* (Keerajadi), a caterpillar fungus which grows at meadows of Uttarakhand, due to its high medicinal value, have greatly enhanced the economic status of the collectors in the Pithoragarh, Chamoli and Bageshwar districts. Jhula, a lichen, is a source of livelihood due to

its use in condiments, perfumery and dye making. Some multipurpose species like Bhimal and Khadik are a part of rural culture in hilly region and their products are indispensable utility items of their household chores. Besides these, numerous other minor products of Uttarakhand's forests have been providing livelihood opportunities to the natives for hundreds of years

Although NTFP sector is of great importance for the forest dependent communities, their marketing and trade mechanism has not developed as yet. Due to lack of market intelligence and organization the gatherers are unable to get remunerative price for their efforts. Due to large economic benefits of these NTFPs, the mountain people have started harvesting these NTFPs in an indiscriminate manner which resulted in the depletion of these products. Few of the NTFPs have already attained the status of endangered and threatened species in IUCN's Red Data book. There should be proper arrangements for sustainable harvest of these NTFPs by the forest dependent communities, to use the NTFPs for perpetuity. Considering the large contribution of NTFP sector in the rural economy of forest dependent communities, their effective managements is the need of the hour in order to support sustainable overall development.



LITERATURE REVIEW

Uttarakhand has half of its population in the rural areas and are partially dependent on surrounding forest resources for their livelihood. It was estimated that 55% of employment from forestry sector is based on non-timber forest products (NTFPs). NTFPs like firewood, fodder, bamboo, grasses, wild fruits, medicinal and aromatic plants, lichens, wild flowers and vegetables etc. are the articles of day to day needs of the people. They have been used for subsistence by communities living near to forests. Minor forest products as they are also referred to have tremendous potential and make significant contribution in terms of income and employment in rural areas, near forests. NTFP based activities are mostly household based, labour intensive, prevalent among low income and socially disadvantaged classes and most often managed by women (Camphell, 1992). These activities are usually seasonal and characterized by the usage of simple techniques and formation of diverse products. They provide direct benefits to the local economy by bringing supplementary income to the family. Many people living near and in forests are unaware of the potential of these resources for income generation because they lack access to information on processing possibilities.

A large number of wild plants used by rural and tribal population contribute significantly to livelihood. The wild edibles are gaining increased attention as potential food supplement or cheaper alternative of commercial fruits. The Himalayan region comprised of large variety of wildly growing plants that are used for food and other subsistence need by local communities. *Rhododendron arboretum*, a wild plant species, possesses high ecological importance with its flowers having unique medicinal and nutritive values. Among wild and semi-wild fruits, *Hippophae rhamnoides* has the highest protein content, followed by *Myrica nagi*, whereas cultivated species such as *Citrus sinensis* and *Citrus aurantium* are very low in protein content. If the people of Uttarakhand begin to derive economic benefits from the region's plants, the natural environment will





automatically be conserved in situ (Maikhuri et al., 2004). Jhula (*Parmelia* spp) is also one of the NTFP and is an important source of livelihood for the people living in the hilly area. Parmelioid lichens are commercially trading lichens from Garhwal Himalaya and about 750 metric tons of lichens are collected from Uttarakhand hills and are used indigenously for preparation of perfumes, dyes and condiments. Species like *Quercus*, *Rhododendron*, *Acer* act as favorable substrates for the luxuriant growth of lichens. A number of communities are involved in collection of Jhula from the forest for their livelihood. Collection of Jhula continues for 6

month in a year and one trader collects the produce from about 15-20 primary collectors. The extraction of Jhula takes place mainly from October to March. The primary collectors collect about 4-5 Kg of Jhula per day either directly from the trees or from the ground. *Ophiocordyceps sinensis* is a parasite fungus which infect Lepidoptera larva. The infected larva is commonly known as fungus caterpillar. In Uttarakhand it is locally known as keeda jadi and is usually found in meadows at a height of 3500-5000m asl. Due to its potential medicinal value, *Ophiocordyceps sinensis* has a huge market and is highly priced. Its collection therefore has become a good



source of income for the locals.

Ophiocordyceps sinensis is primarily found in Munshyari region of Pithoragarh district and Niti and Mana valley of Chamoli district. The harvesting season begins in April and continues up to May. The caterpillar fungus is more valuable before it sporulates or early during sporulation. Depending on the quality and size of the larval host, the cost varies. One kilogram of harvest is priced ₹ 4-5 lakhs in Indian market or ₹ 200-500 per piece. The state government through van panchayat and the forest development corporation, is also engaged in the collection and marketing of this important species. The government offers ₹ 50,000/Kg hence, the economic conditions of this region has seen significant improvement. (Bhandari et al., 2012).

Uttarakhand is well known for its rich diversity of medicinally important plants and associated traditional knowledge. The use of herbal medicines is enormously increasing due to fewer side effects, easy availability, low cost and longer shelf-life. This has put a heavy pressure on the biodiversity of the medicinal plants particularly on native plants of Himalayas. Nearly 90% medicinal plants in use are collected from the wild, in which 70% collection involve destructive harvesting (Ved et al., 1998). Habitat destruction due to prevailing biotic and non-biotic factors has caused loss of diversity of various levels and increasing risk of extinction of many high value species. *Aconitum heterophyllum*, *Angelica glauca*, *Dioscorea deltoidea*, *Hedychium spicatum*, *Heracleum candicans*, *Picrorhiza kurroo*, *Podophyllum hexandrum*, *Saussurea costus* and *Valeriana jatamansi* are

high value threatened medicinal plants of Himalayan region. *Aconitum heterophyllum*, *Arnebia benthamii*, *Dactylorhiza hatagirea*, *Nardostachys jatamansi* and *Picrorhiza kurroa* are in critically rare category. Whereas *Angelica glauca*, *Fritillaria roylei*, *Rheum emodi*, *Swertia chirayita* and *Taxus baccata* are enlisted under the endangered category and *Gloriosa superba*, *Polygonatum verticillatum* and *Valeriana jatamansi* under the vulnerable category (Bisht et al., 2013). Sustainable exploitation of these resources could improve their livelihood through supplemental income and employment. Cultivation of medicinal plants is viewed as an alternative method ensuring sustainable supply of raw material without threatening their existence in wild habitats (IUCN, 1993). The national forest policy (1988) also has made an emphasis on marketing and trade of NTFPs to ensure adequate wages to the tribal collectors, including women. Along the altitudinal range the maximum diversity of medicinal plants exists in <1800 m elevation. Optimum survival of *D. deltoidea*, *H. sapicatum*, *H. candicans*, *P. hexandrum* and *V. jatamansi* across 1170 to 2500 m indicated their adaptability at a wider range of



altitudinal zones. However low survival of *A. Heterophyllum*, *A. glauca*, *P. kurroa* and *S. costus* below 1600 m restrict their cultivation possibilities upto high altitudinal zones only (Butola and Malik, 2012). Most of the species used for their underground parts were usually uprooted. Moreover, large scale collection of plants from wild can have a negative influence on their growth, reproduction and survival (Bhattaria et al., 2010) hence Government of Uttarakhand had banned the collection of 34 species of medicinal plants from wild.

Few species apart from providing fodder also used in medicines, fuel etc. and are known as multi-purpose species. For example, the flowers of *Bauhinia variegata* are edible, petals have medicinal property and dry wood is used as fuel; *Diploknema butyracea* provides edible fruits, vegetable fat and fuel; *Castanopsis tribuloides* provides edible seeds, timber, and fuel. Similarly, species of *Quercus* provide excellent fuel and timber. Seeds of *Corylus jacquenmotii*, fruits of *Zanthoxylum armatum*, *Terminalia chebula*, *Embica officinalis*, *Myrica esulenta*; roots of *Aparagus racemosus* and flowers of *Bauhinia variegata* are traded and are source of income generation in the area (Samant and Dhar, 1997). Wood of *Boehmeria rugulosa* and *Ougeinia oojeinensis* is used for making various types of utensils and culms of *Thamnocalamus spatheflorus* for making mats (Locally known as Mosta) and other items and add to the income generation. Livestock population is an important part of rural economy of Uttarakhand which cannot be maintained on the fodder produced on arable land alone. To maintain healthy livestock farmers have to largely depend on the forest resources (Purohit and Samant, 1995).

Fuelwood is the only source of energy for many people living in the mountains (Sundriyal and Sharma, 1996) because it is freely and easily accessible and simple to use (Blaikie, 1985). The most preferred species for fuelwood are: *Alnus nepalensis*, *Quercus floribunda*, *Pinus roxburghii*, *Rhododendron arboretum*, *Rhus purviflora* and *Toona ciliata*. In Garhwal Himalayas 77.4% of the total human population is rural (Anonymous, 1991) Fuelwood collected from nearby forests is the only source of energy in this region (Bhatt & Badoni, 1990). *Quercus floribunda*, *Anus nepalensis*, *Rhododendron arboreum*, *Lyonia*



avolofolia, *Pinus roxburghii* etc. were exclusively used fuel wood species in higher altitude (1500-2000m asl) while *Quercus floribunda*, *Rhododendron arboretum*, *Alnus nepalensis*, *Shorea robusta*, *Pinus roxburghii* and *Indigofera heterantha* were preferred fuel wood species in middle altitude (1000-1500 m asl) and *Pinus roxburghii*, *Rhus purviflora*, *Mallotus philippensis*, *Toona ciliata*, *Woodfordia fruticosa* in lower altitude (500-1000 m asl). *Pinus roxburghii* was commonly used in all three altitudes. The fuel wood consumption is higher in high altitude as compared to middle and lower altitudes which may be due to remoteness, poverty, poor transportation and lower temperature. Low fuel wood consumption in lower altitudinal range may be due to low availability of fuel wood due to population pressure and farthest distance from the forest (Dhanias et al., 2015).

FOREST LEGISLATION GOVERNING HARVEST AND TRADE OF NTFPS IN INDIA

The National Forest Policy 1988 was a paradigm shift in the forestry sector. It differed from the previous policies of independent India. In the past, forests were being looked upon merely as a source of revenue. The objective of the 1988 policy was to ensure that the rights of the forest dependent people are protected. The ecological security was the primary goal of this policy. The policy also emphasized upon the close relationship between the tribal population and the forest (MoEF, 2006 and Saxena, 1996). In tune with the nation's forest policy, the programmes aim at enhancing and improving the forest and tree cover of the country thereby enhancing the quantum of forest ecosystem services that flow to the local communities. The services include fuelwood, timber, fodder, NTFP and also carbon sequestration. In 1990 India initiated a very successful programme involving local communities for forest protection and management. The concept of Joint Forest Management (JFM) recognizes the share of the protecting communities over forest produce. The local communities and the forest department jointly plan and implement forest regeneration and development programmes, and the communities are rewarded with substantial share in forest produce in return for their efforts in protection and management of forests. So far, more than 1,12,816 JFM committees have been formed covering about 25 million ha of forest area (ICFRE, 2010). The total area under JFM is now comparable to the areas managed under national parks and sanctuaries. Over the years, the involvement of the local communities in the management of forest has increased manifold due to setting up of JFMCs in many parts of India. The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) ACT, 2006 is a

result of the protracted struggle by the marginal and tribal communities of India to assert their rights over the forestland over which they were traditionally dependent. The notification of Rules for the implementation of the Forest Rights Act, 2006 on 1st January, 2008 has finally paved the way to secure community rights or rights over common property resources of the communities in addition to their individual rights. The Act enjoins upon the local communities, to recognize their role in forest and biodiversity protection through sustainable management practices, which will yield long term benefits to them (Dash, 2010). The Act is significant as it provides scope and historic opportunity of integrating conservation and livelihood rights of the people. The rules under the Act encourage transition from regulatory mode of forest governance to decentralized forest governance in India.

The forest legislation provides for Working Plans to be prepared by the State Forest Department, for guiding the village level institutions and the local communities and prescribes ways for sustainable harvest of forest produce. Working Plan is a written document for the management of the forest of the entire division and is prepared by the working plan officer of that division. This working plan is divided into working circles according to the type and situation of the forest as per the past practices carried out in the particular forest. The main aim of any working plan is to convert the forests of a division towards normal forest (a forest having trees of all age group is called Normal Forest). The working plan for any forest division is prepared for a particular period of time. The Working Plan of the division has to be approved by the PCCF of the State. Every Working Plan is finally approved by the

Ministry of Environment and Forest for the State. In working plan the forest of a division is divided into small areas describing different management practices to be carried out in the area. Each area is opened for management for a particular time on a rotational basis to maintain the forests in a sustainable manner. Each part of the opened forest area remains open for different species which is mentioned in the Working Plan for that area. If the area is open according to the Working Plan, the permit for the harvest of any NTFP mentioned in the working plan is given by the Divisional Forest Officer of that area. Forest department determines the amount of the NTFP harvest from the area and issues a permit for the exit of the harvested forest product in a written manner. Different information regarding the period of collection, exit of the collected NTFP, quantity of the NTFP to be collected and the route are mentioned in the permit issued by the concerned Forest Department Office. Different forest rules that govern the harvest of the NTFPs are mentioned below:



- The National Green Tribunal Act, 2010
- National Environment Policy, 2006
- Recognition of Forest Rights Act, 2006
- Biological Diversity Rules, 2004
- Forest (Conservation) Rules, 2003
- Biological Diversity Act, 2002
- National Environment Appellate Authority Act, 1997
- The Wildlife (Protection) Rules, 1995
- The National Environment Tribunal Act, 1995
- The National Forest Policy, 1988
- The Environment (Protection) Act, 1986 amended in 1991
- The Environment (Protection) Rules, 1986
- Forest (Conservation) Rules, 1981, amended in 1992
- The Forest Conservation Act, 1980 amended in 1988
- The Indian Wildlife (Protection) Act, 1972, amended in 1993
- The Indian Forest Act, 1927

MANDATE, VISION, OBJECTIVES

MANDATE

Uttarakhand's forests have been an essential part of the state development and nearly 80% people are directly or indirectly dependent on forests either for their sustenance or subsistence. Forests create microclimate for cultivation of several crops of the hill and also provide various forest based products like fodder, fuel wood and fruits etc. CoE thrives to generate datasets on forest based livelihood and income generating opportunities.



VISION

To become a resource and knowledge centre on forest based livelihood and contribute towards sustainable livelihood opportunities in the state.

OVERALL OBJECTIVES

- a) To collect all the available data on forest based produce with focus on non-timber products like medicinal plants and bamboo and to create a clearing house for the same.
- b) To interact with people through Focused Group Discussion (FGD) and to estimate their dependence on forests for their livelihood.
- c) To do value and supply chain analysis for different forest products.
- d) To create a resource directory of various government and non-government organisations, private institutes and experts working in the area of forest livelihood.
- e) To conduct socio-economic analysis and estimate cultural dependence of the forest fringe villages on forestry.

OBJECTIVES UNDERTAKEN DURING THE YEAR

- Infrastructure development for Centre of Excellence on Forest Based Livelihood in Uttarakhand and recruitment of Project staff.
- Formulation of objectives of the Project after consulting experts.
- Formation of Project Advisory Committee (PAC) and to organise PAC meeting.
- To develop webpage of Centre of Excellence under ucost.in website.
- To bring out brochure for Centre of Excellence.
- To prepare atlas of Uttarakhand showing different contour and important places.
- To bring out News- bulletin of Centre of Excellence.
- To make Resource Directory for forest based livelihood in Uttarakhand and update it from time to time.
- To prepare different schedules of enquiry for household survey and Focussed Group Discussion (FGD) to assess forest based livelihood and test them in forest fringe villages.

METHODOLOGY

A

POSITIONING OF PROJECT STAFF AND ORGANIZING WORKING FACILITIES AT THE CENTRE

The sanctioned project staff was duly recruited through well-established practices of inviting applications, short listing of suitable candidates and formal recruitment by a selection committee constituted by Director General, UCOST. The selected staff formally joined on 18 March 2016. The team includes:

1. **Dr. Ajeet Kaur**
(Senior Scientist)
2. **Mr Siddharth Napalchyal**
(Scientist)
3. **Ms Kanchan Dobhal**
(Junior Research Fellow)
4. **Ms Seema Maikhuri**
(Junior Research Fellow)

Web Page on CoE was prepared and uploaded on the website of UCOST (www.ucost.in). A detailed brochure outlining the objectives, mandate, vision and likely outcome from the studies of CoE were prepared, printed and distributed among large number of identified stake holders representing community institutions, forestry research institutions, other academic institutions and state forest department of Uttarakhand State.

B

CONSTITUTION OF PROJECT ADVISORY COMMITTEE (PAC)

Project Advisory Committee was constituted by Director General, UCOST under the mentorship of Dr. Ram Prasad (Former Director General M.P. Council of Science and Technology, Director, IIFM, Bhopal and PCCF Madhya Pradesh). Shri S.T.S. Lepcha, PCCF & MD Uttarakhand Forest Development Corporation, Dr. B. P. Tamta, Scientist- E, Non Wood Forest Product Division, Forest Research Institute (FRI), Dehradun and Shri Mahendra Singh Kunwar, Secretary, Himalayan Action Research Centre (HARC) were nominated as expert members of PAC. First meeting of PAC was held on 1st August 2016 and brochure for Centre of Excellence was released on this occasion. Concerned officials of UCOST and project staff were present during the meeting.

C

**COLLECTION OF SECONDARY DATA
THROUGH LITERATURE REVIEW**

Both published and grey literature were reviewed and relevant information were collected from Forest Working Plans, published papers, reports and forest records from Uttarakhand Forest Department and Forest Development Corporation and National Forest Library cum Information Centre (NFLIC), FRI campus, Dehradun. The team collected the information about the quantity of medicinal plants collected from the forest and sold in the UAFDC mandis through auction during last few years. Ambiguity of data was corrected through cross checking of data from different sources. The data were presented through graphs and tables and interpreted accordingly. Dr R K. Maikhuri (Scientist- F and Incharge (GU) G. B. Pant National Institute of Himalayan Environment and Sustainable Development (GBPNIHESD), Srinagar) and Dr. R.C. Sundriyal (Group Head, SED & KCB, GBPNIHESD, Kosi-Katarmal, Almora) kindly shared their research articles related to forest based livelihood. Information on Keedajadi (*Ophiocordyceps sinensis*) collection and market price from three districts of Uttarakhand viz. Chamoli, Pithoragarh and Bageshwar was kindly shared by Dr. V. P. Bhatt, Herbal Research and Development Institute (HRDI), Gopeshwar. The data were assessed for its contribution to the income of collectors in different villages. The team visited Uttarakhand Bamboo and Fibre Development Board at Dehradun and gather information about bamboo & fibre yielding plants species, various articles made out of them and ringal focused clusters in Chamoli, Bageshwar and Uttarkashi districts. (Please refer to Annexure- I). Other sources of information were also examined and a copious note on relevant themes were collected.

Village boundary data and forest layer of Uttarakhand in shp. format were acquired from Survey of India and Uttarakhand Forest Department respectively, which were prerequisites for selecting forest fringe villages for household survey and focussed group discussion in order to assess forest based livelihood. Vector layer of Protected Areas in shp. format was collected from Dr. Gopal singh Rawat, Dean, Wildlife Institute of India and demographic data of Uttarakhand was collected from the Directorate of Census.

D

FIELD STUDIES

Pilot survey was conducted to test the schedules of enquiry and FGD format in three villages viz. Sainthi and Saitoli of Ghat Block and Sunil Gaon of Joshimmath Block in Chamoli District in December 2016. Household survey was carried out by selecting 12 families in the ratio 2:5:5 (affluent: less affluent: others) from each village. This was according to the criterion set by National Sample Survey Organization as quoted by Forest Survey of India (2008) which is given in Table 1.

S. No.	Assets possessed by household	Affluent	Less-affluent	Others	Table 1. Selection criteria of household classes (affluent/ less- affluent/ others)
1	Motorcar/jeep/tractor/truck/van/bus/ large business/spacious pucca house in good condition	Yes	None	None	
2	Refrigerator/telephone/Colored TV/ Washing machine/ Micro oven/Two wheeler (automobile)	Yes	None	None	
3	Cultivable land Or Irrigated land	≥ 7 ha ≥ 3.5 ha	< 7ha and > 0.4 ha <3.5 ha and > 0.4 ha	None None	
4	Number of cattle and buffaloes Or sheep /goat	≥ 10 ≥ 30	≥ 2 and < 10 ≥ 5 and < 30	None None	



The team collected necessary feedback from villagers through Focus Group Discussion (FGDs). Preliminary information related to the extent of dependence of locals for employment and income on forest and other occupations was gathered. Team also visited a local ringal artisan shop at village Tangdi (Chamoli district) and collected information related to ringal based products and their marketing in Uttarakhand. CoE team visited fruit processing unit of Himalayan Action Research Centre at Kaleshwar, Karanprayag in Chamoli district. CoE team interacted with

women of Self Help Group (SHG) working at the unit. It was a primary study based on random sample of villages to have a detailed planning for undertaking an intensive and systematic survey on various aspects of forest based livelihood. CoE team visited medicinal plant nursery of Herbal Research and Development Institute (HRDI) at Dhanaulti in August 2016 and also interacted with some of the villagers who were selling wild fruits like berries, apple and walnuts on the way.



E

VISIT TO MEDICINAL PLANT MANDIS

CoE team visited the mandi of Uttarakhand Forest Development Corporation (UAFDC) at Bibiwala (Rishikesh) on 22 of July and December 2016 as auction is held on 22 day of every month in this mandi. The officers and staff of the mandi facilitated the team's interaction with the traders and representatives of collectors locally called middlemen who had come to participate in the auction of the collected forest produce.



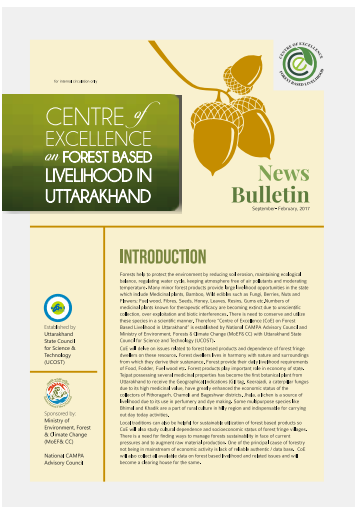
Preparation of Resource Directory

Information from various government and non-government organisations, private institutes and experts working in the area of forest livelihood in the state of Uttarakhand were compiled to form resource directory and uploaded on the webpage of CoE. This is proposed to be updated from time to time. Please find the resource directory link at <http://ucost.in/document/COE/COE-Resource-Directry.pdf>.

F

PREPARATION OF NEWS- BULLETINS

Information on various activities of CoE during March- August, 2016 was compiled to prepare news - bulletin (Sep 2016-Feb 2017). Some other relevant information was also incorporated in to the bulletin. News-bulletins were distributed among various stake holders.



FINDINGS

EXTRACTION OF PINE RESIN

Uttarakhand's forests has substantial area under Chir pine which exudes resin locally known as lisa. Resin tapping provides employment to a large number of people in the hills and also is the highest revenue generating activity of the State Forest Department. Lisa extraction was started on experimental basis in 1890 and by the year 1920 it was made a regular practice. A forest area is declared open for the extraction on rotational basis as per forest Working Plan of that area. Every year open tenders are invited by the Forest Department for harvesting chir resin during March-October. The quality of forest, number of pine trees and distance of forest from the road are the determining factors for the bid. About 3.5 kg resin can be tapped from a single tree in one season. Minimum extractable quantity of resin of a forest is decided during bidding which the bidder has to deposit into the depot after September of that year. The contractor has to pay ₹ 500/quintal of deficit as penalty. The excess resin if harvested has to be deposited in the depot. The tapping of resin costs ₹ 2000/quintal to the contractor which includes labour and transportation charges from forest to depot. The labour charges are around ₹ 1500/quintal of resin collected. On the other hand the auction price may reach up to ₹ 9000/quintal during sale. The Forest Department formulated and issued resin policy on 30 April 2003 to ensure transparency in allotment of resin to different agencies. Main features of the policy are:

25%

of the resin will be sold by open auction on all India basis.

50%

will be sold by open auction to units registered in Uttarakhand according to their processing capacity.

25%

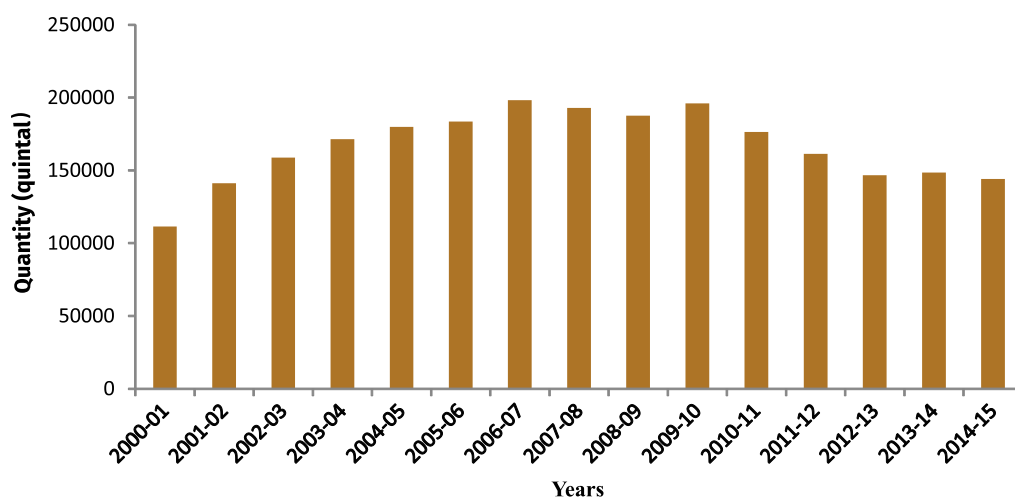
Balance will be sold by open auction amongst the units of Khadi-Gramodyog, Co-operatives, Kumaon Mandal Vikas Nigam and Garhwal Mandal Vikas Nigam according to their processing capacity.

OPEN AUCTION

If some quantity of resin is left unsold as per the above arrangements it will also be sold by all India open auction.

The pine resin is an important non-timber forest produce from pine forests of Uttarakhand. Viroja and turpentine oil is made from it which is used in production of soaps, paper and paint etc. Pine resin in Uttarakhand is a key means of self-employment and the rural economy and currently employs 173 pine based industries (According to year 2010 - 2011 census) out of which 90 pine resin units are working and remaining 83 are non-working. Resin production from year 2000-01 to 2014-15 in Uttarakhand is given in Figure 1. The production increased from 1,11,520 quintal in the year 2000-01 to 1,98,190 quintal in the year 2006-2007. There was a slight downfall in total resin production from year 2009-10 to 2014-15 which may be explained on the terms of Working Plan prescription.

Figure 1.
Resin
production
(quintals) in
Uttarakhand



CHIRPINE LEAVES — A PROBLEM TURNED INTO OPPORTUNITY

Chirpine (*Pinus roxburghii*) trees shed a huge lot of leaf biomass, locally called as pirul that is underutilized and is often a cause of forest fires each year. The estimated volume of this litter is approximately 2 million tons per annum. Uttarakhand Forest Department invited proposals from the commercial firms in 2009 to purchase pine needles from the local people at a minimum rate of ₹ 1 per kg with a token amount as royalty and few firms came forward for making fire briquettes out of the collected needles, and utilizing the dry needles for generating power. This exercise was helpful in generating local employment opportunities and controlling incidents of forest fires (Planning Commission, 2011) initially but did not bear much prospects as not many firms are approaching to buy pirul presently. In 2010, Uttarakhand forest authorities came up with a long-time pirul plan to find a permanent solution to forest fires. The plan envisages utilisation of pine needles, a major cause of the spread of forest fires. It also calls upon generating power from pirul. Forest authorities have been soliciting support of major industries to ensure utilization of collected pine needles. Since then efforts have been made to make briquettes from pine needle due to its high calorific value i.e. 4000 KCal/Kg to be used as fuel by the rural communities. Moreover, use of pirul in generating electricity is also being explored. 13 Kg of dried pirul may generate 9 KWatt Hour or 9 units of electricity. Villagers already use a large sum of pirul along with other leaves, which they collect before monsoon and winter to be used as bedding for their livestock. This bedding gets messed up with the excreta of the livestock and gets replaced regularly. The leaves and excreta together make a good manure and are used up in the fields. Further, use of pine needles in constructing check dams to control the flow of water and soil erosion in hills is also being practiced. For making check dams, pine needles are packed inside a net made of jute ropes. The net is subsequently shaped into a cylindrical form like that of a bedroll. This roll is put up at strategic points and serves as an effective means to break the flow of small water bodies in forest areas. By 2013, 36 pirul check dams had been constructed in the Van Panchayat's of Chausali, Barshmi and Shail in Almora district (Civil and Soyam Forest Division, Almora, 2013). G. B. Pant National Institute of Himalayan Environment and Sustainable Development, Almora, as part of its training initiative has been encouraging villagers to prepare briquettes from pirul. A recent decision by state authorities to ensure that briquettes be used in government offices during winters has come as a big encouragement. There is still a long way to go for ensuring hundred percent utilization of pirul.

COLLECTION OF MEDICINAL PLANTS

Uttarakhand has rich vegetation wealth, which constitutes vast range of important medicinal plants in the natural conditions. The state has 700 species of medicinal plants which comprise 97% species of flowering plants with 135 tree species, 138 shrubs and 421 species as herbs. There are 87 globally significant medicinal plants in India out of which 36 have been identified in Uttarakhand. To promote cultivation of medicinal and aromatic plants, Government of Uttarakhand has prioritized 26 species (Table 2) for mass cultivation by providing subsidy on them. Herbal Research and Development Institute (HRDI) and Bhesaj Vikas Ikai are jointly co-ordinating cultivation, promotion and processing of medicinal plants. In the year 2013-14, about 1300 farmers were registered with the state government from Almora, Bageshwar, Chamoli, Champawat, Pithoragarh, Rudraprayag, Tehri and Uttarkashi districts for cultivation of tejpatta, kutki, kuth, atis, big cardamom, lemon grass, amla, reetha, sarpgandha and chamomile with the support from HRDI, Bhesaj Sangh and Centre for Aromatic Plants (CAP), Selaqui. The cultivators have choice to sell the cultivated medicinal plant material in the UAFDC mandis or open market, the latter one usually fetch them higher returns. Some programmes initiated to promote cultivation of medicinal plants in the state are- Chief Minister Jari Buti Vikas Yojna, National Mission on Medicinal Plants, Amla awareness and Value Link Development Programme etc. 4th August is declared as Jari Buti Day to mark significance of medicinal plant sector to the state. Seven selected areas viz. Kandra, Khalia, Jhuni, Gangi, Mandal, Purnagiri and Mohan are being established as medicinal plant conservation areas (MPCAs) with the help of UNDP-GEF-GOI supported project.



Table 2. List of cultivable medicinal and aromatic plants identified for subsidy by Government of Uttarakhand

S. No.	Name of the medicinal/ aromatic plant	Botanical name	Subsidy (₹ per Nali) (50% of the total cost)
1.	Atees /अतीस	<i>Aconitum heterophyllum</i>	1000.00
2.	Kutki /कुटकी	<i>Picrorhiza kurroa</i>	500.00
3.	Kut /कूट	<i>Saussurea costus</i>	250.00
4.	Jatamansi /जटामांसी	<i>Nardostachys jatamansi</i>	1250.00
5.	Chirayta /चिरायता	<i>Swertia chirayita</i>	1000.00
6.	Vankakdi /वनककड़ी	<i>Podophyllum hexandrum</i>	1250.00
7.	Faran /फरण	<i>Allium stracheyi</i>	250.00
8.	Kala Jeera /काला जीरा	<i>Carum carvi/ Bunium persicum</i>	400.00
9.	Pyrethrum / पाइरेथ्रम	<i>Chrysanthemum cinerariaefolium</i>	400.00
10.	Tagar / तगर	<i>Valeriana jatamansi/ V. officinalis</i>	400.00
11.	Manjeetha / मंजीठ	<i>Rubia cordifolia</i>	500.00
12.	Bari ilaychi / बड़ी इलायची	<i>Amomum subulatum</i>	400.00
13.	Coleus / कोलियस	<i>Coleus forskohlii</i>	250.00
14.	Rosemarry / रोजमैरी	<i>Rosmarinus officinalis</i>	400.00
15.	Gerenium / जिरेनियम	<i>Pelargonium graveolens</i>	500.00
16.	Sarp Gandha / सर्पगन्धा	<i>Rauwolfia serpentina</i>	1000.00
17.	Kalihari / कलिहारी	<i>Gloriosa superba</i>	1250.00
18.	Satawar / सतावर	<i>Asparagus racemosus</i>	400.00
19.	Lemon grass & aromatic crops / लेमनग्रास	<i>Cymbopogon flexuosus & aromatic plants</i>	400.00
20.	chamomile / कैमोमाइल	<i>Matricaria chamomilla</i>	250.00
21.	Sylibum /सिलिबम	<i>Silybum marianum</i>	250.00
22.	Stevia / स्टीविया	<i>Stevia rebaudiana</i>	1000.00
23.	Pipli /पिपली	<i>Piper longum</i>	800.00
24.	Mandookparni/Brahmi मण्डूकपर्णी / ब्रह्मी	<i>Centella asiatica/ Bacopa monnieri</i>	400.00
25.	Ami Majus / अमी मेजस	<i>Ammi majus</i>	250.00
26.	Til Pushpi /तिलपुष्पी	<i>Digitalis lanata/ D. purpurea</i>	400.00

Forest Development Corporation of Uttarakhand (UAFDC), Kumaon Mandal Vikas Nigam (KMVN) and Garhwal Mandal Vikas Nigam (GMVN), Bhesaj Sangh and Van Panchayat are entitled for collection of medicinal plants from wild habitats as per Working Plan prescriptions. For marketing of the collected medicinal herbs, the state has established three mandis at Rishikesh, Ramnagar and Tanakpur in 2004 which are being run by Forest Development Corporation. These mandis are placed at the timber depots already working at the said places and cater to the different collection areas from forest as shown in Table 3.

S. No.	Mandi's name	Forest area
1.	Rishikesh	Yamuna circle, all forest divisions of Bhagirathi and Shivalik circles, (Bibiwala Depot)Karnaprayag forest division and Pauri and Paithani ranges of Pauri forest division of Garhwal circle, Kedarnath forest division of Nanda Devi biosphere reserve
2.	Ramnagar	The remaining areas of Garhwal circle, South Kumaun circle, Almora forest (Aamdanda Depot) division of North Kumaun circle, Bageshwar forest division, civil soyam forest division Almora and Ranikhet forest division, Tarai West, Tarai central and Ramnagar forest division of West circle
3.	Tanakpur	Haldwani and Tarai East forest divisions of West circle, Pithoragarh and (Tanakpur Depot) Champawat forest divisions of North Kumaun circle

Table 3.
Medicinal
plant
mandis and
their forest
collection
areas

The sale data of medicinal herbs collected by the five agencies during the years 2006-07 to 2015-16 are shown in Figure 2(a-e). It is clear from the figure that Bhesaj Sangh followed by Van Panchayat is the major collecting agency of medicinal herbs in Uttarakhand. The collection through GMVN is the least in terms of quantity and amount among the five agencies. Table 4 shows the number and quantity of medicinal plant species sold through UAFDC mandis in Uttarakhand during the year 2011-12 to 2015-16. From this table, it is clear that there are three medicinal herbs viz. Jhula (lichen), moss and tejpatta which are regularly brought to the mandis and occupy major share of medicinal plant material (in terms of quantity) brought for auction. The collection of two species viz. atis and satua mentioned in the table, is completely banned from the forest (Please refer to Table7). If such species are harvested illegally and are seized by the forest department, they are auctioned in the mandis through normal auction procedure. Figure 3(a-c) shows the quantity and rate at which Jhula, moss and tejpatta were auctioned through the UAFDC mandis during the year 2011-12 to 2015-16. This figure corresponds to the collection data of these species from the forests as the cultivated material hardly reaches mandis due to higher rates in the open market as compared to UAFDC mandis. Also the cultivator save on

transportation expenses as the firms usually pick the material from fields itself. The figure shows that the quantity of Jhula was maximum (23539 quintal) in the year 2012-13, hence the rate fell to minimum (₹ 92.05/kg) due to inverse relationship between supply and rate. Quality is also a major rate determining factor for Jhula. Highest quantity (5440.48 quintal) and high rates (₹ 28.47/kg) of moss were observed in the year 2012-13. Rate of moss is highly dependent on the season and its demand by the nursery growers. The demand is maximum before monsoon for preparation of horticultural and ornamental nurseries. Collection of tejpatta was maximum (53 quintal) in the year 2011-12 and minimum (5.63 quintal) in 2015-16. Collection of tejpatta is allowed after a rotation period of 4-5 years. This is because the quality as well as quantity of tejpatta leaves is enhanced after this period. The mature leaves contain high biochemical contents and are highly priced. This is important to mention that the collection of forest produce is done as per Working Plan prescription and vary year to year. Tables 5(a-f) show the mandi wise data of NTFPs auctioned from year 2010-11 to 2015-16 (Annexure- II).

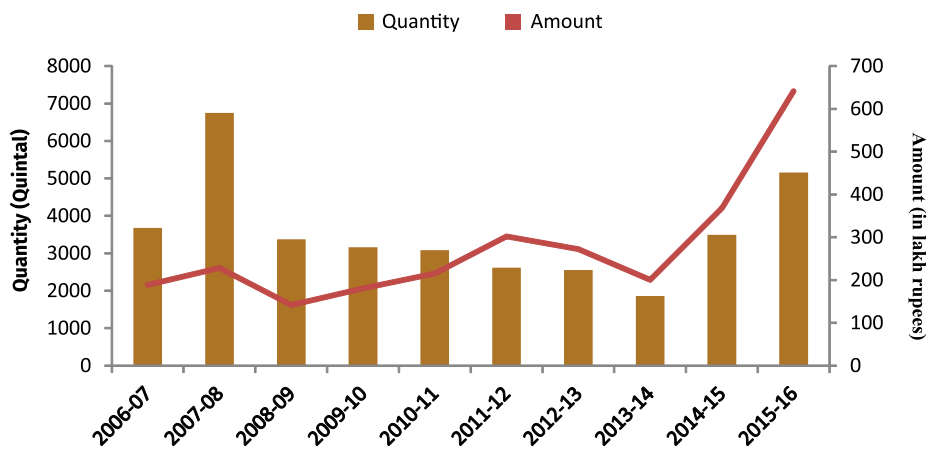


Figure 2a. Sales data of medicinal herbs collected by UAFDC

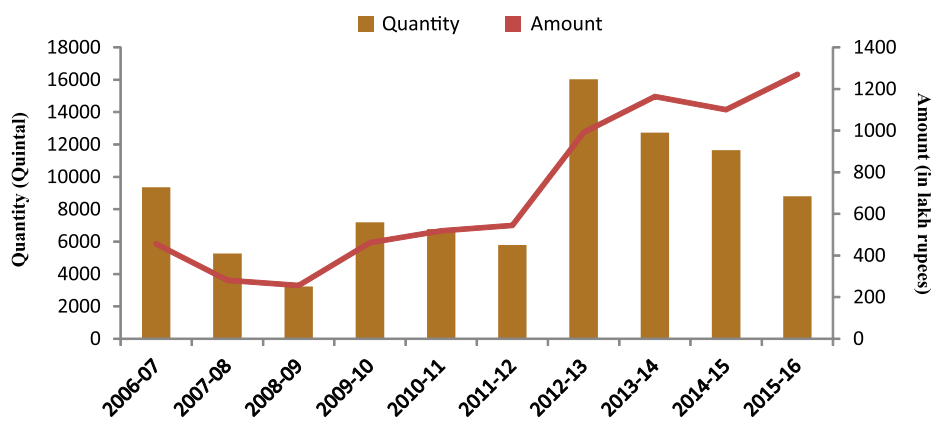


Figure 2b. Sales data of medicinal herbs collected by Bhesaj Sangh

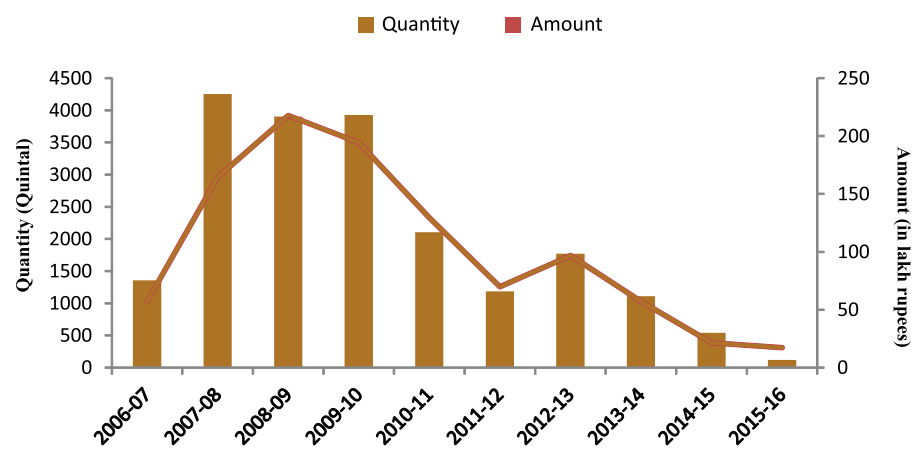


Figure 2c. Sales data of medicinal herbs collected by KMVN

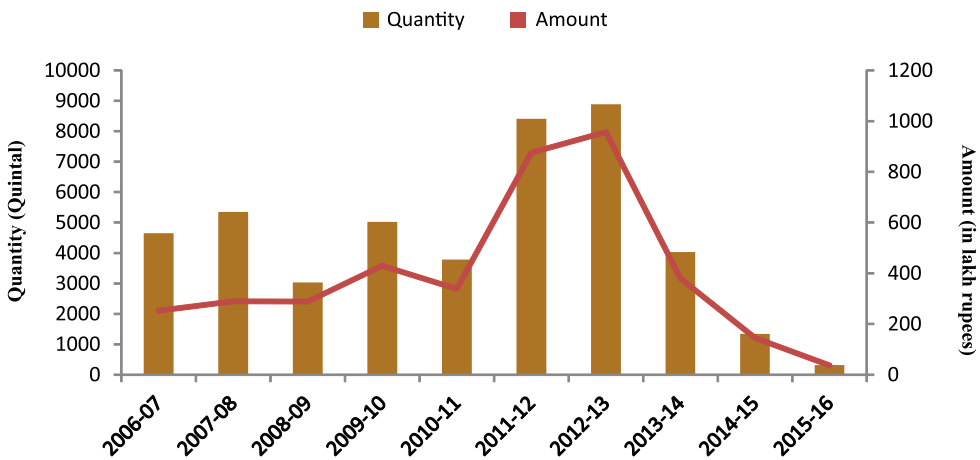


Figure 2d. Sales data of medicinal herbs collected by Van Panchayat

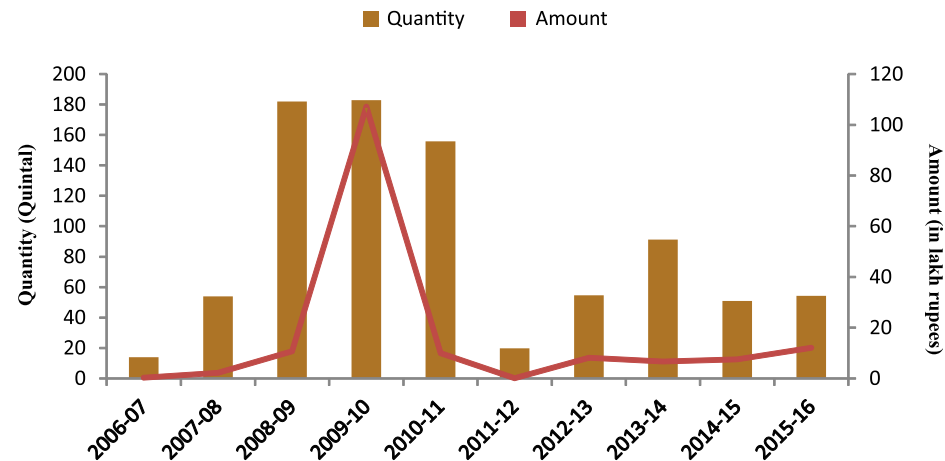


Figure 2e. Sales data of medicinal herbs collected by GMVN

Table 4.
Quantity (in
quintal) of
medicinal
herbs sold
through
UAFDC
mandis in
Uttarakhand

S. No	Species	Years					
		2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
1	Jhula	12688	13855	23539.97	16373	12257.01	13142.55
2	Moss	2394	1935	5440.48	3419	4739.30	1146.48
3	Bansa-Panchang	3.04	31.55	-	-	-	-
4	Kadu Panchang	12.18	7.89	-	-	-	-
5	Padam Kashth	297.70	32.2	117.45	-	-	-
6	Dandasha	20	52.92	-	-	-	30.00
7	Basa Patta		6.5	-	-	-	-
8	Tejpatta	294	53.00	50.63	14.30	33.77	5.63
9	Kadu	-	13.22	-	-	-	-
10	Atis	-	0.73	0.05	-	0.04	-
11	Salam Panja	-	0.23	0.03	-	0.08	-
12	Pangar Phal	-	0.79		-	-	-
13	Ritha	-	5.02	9.46	-	-	-
14	Kantkari	-	581.0	-	-	-	-
15	Bel Dana	-	1.05	-	-	-	-
16	Harad	-	0.20	-	-	0.05	-
17	Semal Phool	-	1.10	-	-	-	-
18	Karipatta	0.36	0.42	0.60	-	-	-
19	Chitrak	-	24.57	109.50	6.23	-	-
20	Van haldi	-	-	18.35	-	-	-
21	Pashanbhed	-	-	0.59	0.99	-	-
22	Chandan	-	-	-	-	0.04	-
23	Satua	-	-	-	-	1.55	0.02
24	Gurbach	0.09	-	-	-	6.48	-
25	Baheda	0.1	-	-	-	0.88	-
26	Yarsa Gambu	0.027	0.002	-	-	0.028	-
27	Bel giri	0.91	-	-	-	-	-
28	Rohini seed	5.82	-	-	-	-	-
29	Rohini Powder	0.22	-	-	-	-	-
30	Rohini Chilka	4.62	-	-	-	-	-
31	Bel Chilka	2.71	-	-	-	-	-
32	Bel Saboot	2.82	-	-	-	-	-
33	Kingore jad	153.19	-	-	-	-	-
34	Van Tulsi	3.05	-	-	-	-	-
35	Arjun Chaal	0.39	-	-	-	-	-
36	Kaphal Chaal	4.05	-	-	-	-	-
37	Meetha Neem	10.42	-	-	-	-	-
38	Kantkari	0.01	-	-	-	-	-
39	Dhakphool	0.04	-	-	-	-	-
40	Amaltash	0.45	-	-	-	-	-
41	Chaya Phool	1.2	-	-	-	-	-

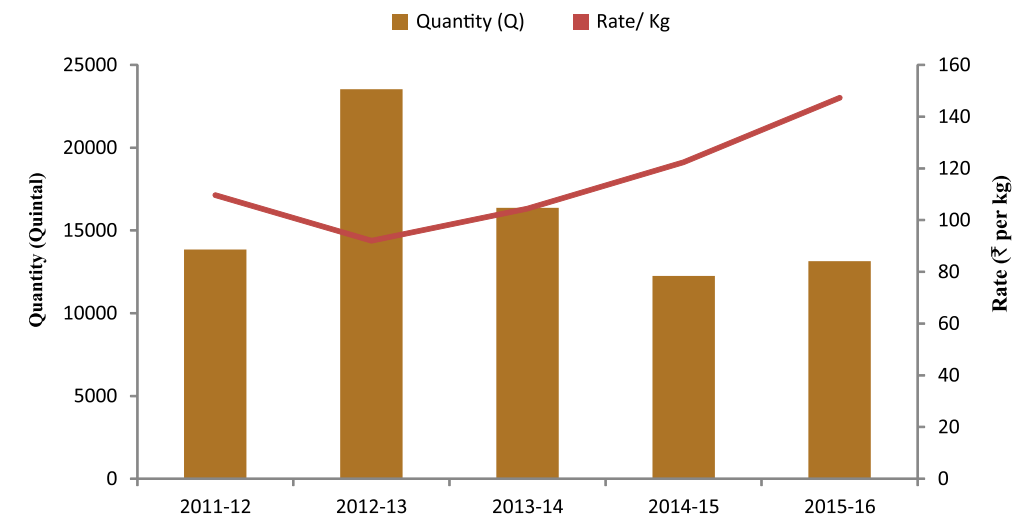


Figure 3a.
Sale data of
Jhula at
UAFDC

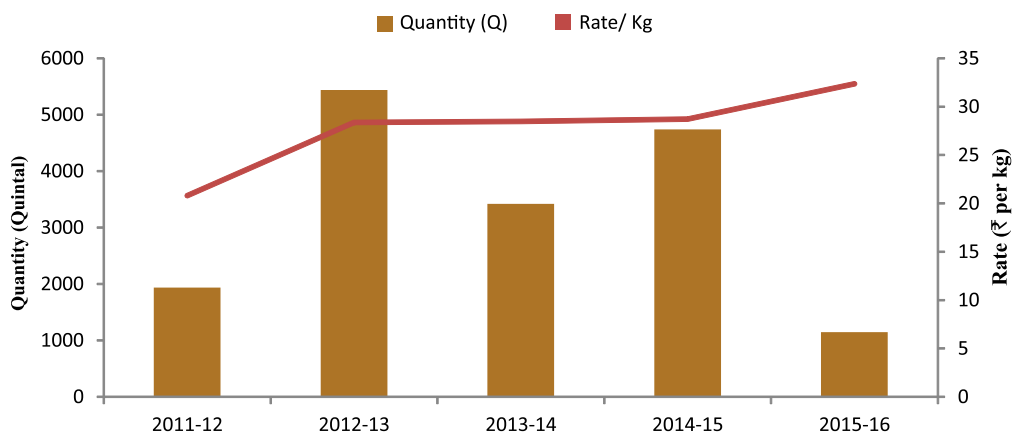


Figure 3b.
Sale data of
Moss at
UAFDC

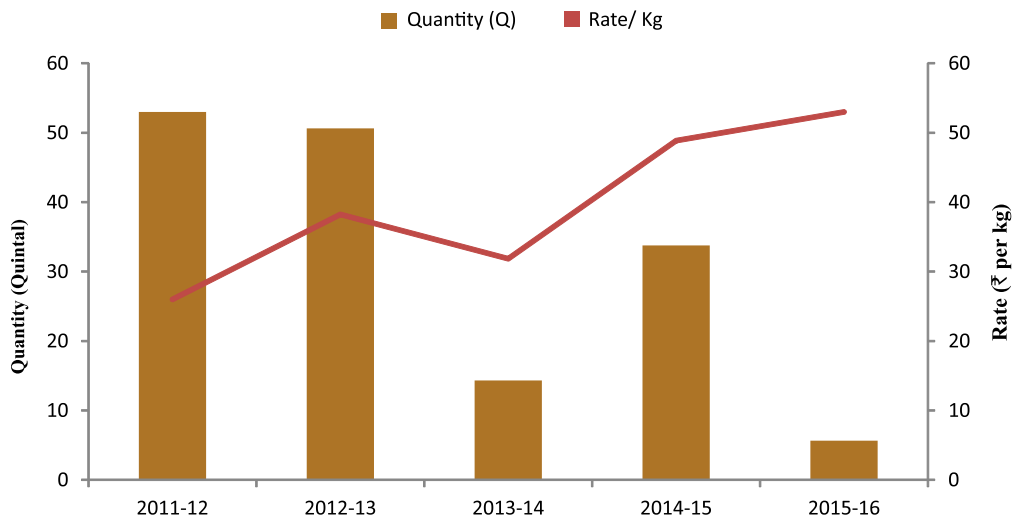


Figure 3c. Sale
data of
Tejpatta at
UAFDC



SUSTAINABLE HARVESTING OF NTFPs

It is known that the demand for medicinal plant-based products continues to grow inexorably. Given the limited ability of cultivation as compared to demand and given that 95% of all medicinal plants are found in natural forests, conservation and sustainable use of commercially important medicinal plants become indispensable. Those species that are likely to bear most risk from destructive harvesting are also most difficult to cultivate on large scale. Equally, while consumers have access to very low-priced wild products there is little incentive to purchase more costly cultivated stocks of raw materials and thus little incentive for investment in cultivation by potential MAPs farmers. Thus, it becomes imperative to focus first on ensuring the viable populations of medicinal plants be conserved in-situ and harvesting them on sustainable manner, especially of commercially important medicinal plants and species that are more vulnerable to extinction. Sustainable collection can be promoted by focusing on medicinal plants within Van Panchayat/ Joint Forest Management (JFM) areas and other forests. This would supply medicinal plants sustainably and provide incremental benefits to the villagers and dwellers in and around the forests. This habit may also ensure better field collection practices. Thus there is a need to invest in forests for production and sustainable supply of medicinal plants. This investment has to be in terms of education and awareness creation about the kinds of MAPs available, methods for their sustainable harvest, proper post-harvest handling to ensure safety and efficacy and maybe even primary processing as a means of value addition. Additionally the State government may consider providing some form of financial incentives/rebate for products manufactured using cultivated plants and sustainably harvested plants. The principle of harvest from the wild being followed at present seems to be making wild collections “somehow”, “anyhow” and “before others”. The indiscriminate harvesting practice in the state has led many a high value medicinal plant species to the risk of

extinction. Whereas the need for harvest from the wild, being linked to livelihood security of rural populations is recognized, the wild populations can still be conserved (i) by developing and disseminating sustainable harvest methods through field agencies and research institutes, (ii) by effectively regulating the wild harvests of high risk species through formulating comprehensive participatory resource management plans, harvesting guidelines and enabling legislation. Uttarakhand have CDH (Conservation, Development and Harvesting) plan which should be followed properly while harvesting from forest areas. Similarly good collection practices published by NMPB at national level, FAO and IUCN at international level and by Bhesaj Development Units at state level can provide vital information on sustainable harvest from forest areas (SMPB, 2015). Agencies involved in collection i.e. Van Panchayat, KMVN, GMVN, UAFDC and Bhesaj Sanghs should be made aware about sustainable harvest methods and post-harvest management of produce. To check the over-exploitation and to conserve some of the threatened species, the State completely banned 35 species for collection and put 30 species under sustainable collection category in year 2006 (Table 5, 6 and 7).

PRICING OF WILD HARVEST

Another issue linked to harvest from the wild is that of pricing of the produce for commercial purposes. At present, medicinal plants sourced from the wild command a market price largely based on the labour involved in such collections plus a royalty charged by the Uttarakhand Forest Development Corporation. The conservation costs, the environmental costs and the community benefits are not reflected while arriving at royalty or price of this raw material. The low prices at which the raw material from the wild is available, is one sure deterrent to picking up of cultivation of medicinal plants in the State. The State has therefore, a case to rationalize the royalty rates of the raw material sourced from the wild in a way so as to reflect the conservation (protection, augmentation and management),

environmental (quotient of damage to ecology during harvesting) and the community benefit (opportunity cost of retaining the particular and use) values in the royalty calculations. This may increase the price of wild harvested medicinal plants but State can get additional funds for conservation and on the same time cultivation may also pick up for those species. Increased price may be neutralised if State can sell the produce directly to user industries by avoiding middlemen.

At present no scientific method is being followed in fixing the royalties. There is a need to take experts' advice on this. Services of institutes like IIFM Bhopal and ICFRE Dehradun can be taken to rationalise the royalty. The price of wild harvest can also be determined by an expert committee comprising professionals from forestry sector, environment sector, social scientist, community organisations, traders and industry (SMPB, 2015).

S/No	Trade/ Local Name	स्थानीय नाम	Botanical Name
1.	Bhumi amla	भूमि आंवला	<i>Phyllanthus urinaria</i>
2.	Neem	नीम	<i>Azadirachta indica</i>
3.	Bala	बला	<i>Sida cordifolia</i>
4.	Atibala	अतिबला	<i>Abutilon indicum</i>
5.	Mungparni	मूंगपर्णी	<i>Phaseolus trilobus</i>
6.	Shahatara	शहतारा	<i>Fumaria indica</i>
7.	Punarnawa	पुनर्नवा	<i>Boerhavia diffusa</i>
8.	Arandi	अरण्डी	<i>Ricinus communis</i>
9.	Gokharu	गोखरू	<i>Tribulus terrestris</i>
10.	Bhringraj	भृंगराज	<i>Eclipta alba</i>
11.	Apamarg/ Latjira	अपामार्ग / लटजीरा	<i>Achyranthes aspera</i>
12.	Aank	आंक	<i>Calatropis procera</i>
13.	Dhatura	धतूरा	<i>Datura metel</i>
14.	Makoi	मकोई	<i>Solanum nigrum</i>
15.	Mansparni	मांसपर्णी	<i>Teramnus labialis</i>
16.	Agyaghas	आज्ञाघास	<i>Cymbopogon spp.</i>
17.	Pudina	पुदीना	<i>Mentha arvensis</i>
18.	Kamal phul	कमल फूल	<i>Nelumbium speciosum</i>
19.	Gulab phul	गुलाब फूल	<i>Rosa damascena</i>
20.	Gurhal phul	गुड़हल फूल	<i>Hibiscus rosa sinensis</i>
21.	Tulsi	तुलसी	<i>Ocimum sanctum</i>

Table 5: Medicinal plant species of Uttarakhand permissible for decontrolled collection from forest

S/No	Trade/ Local Name	स्थानीय नाम	Botanical Name
1.	Hattajari/Salam panja	हत्थाजड़ी / सालमपंजा	<i>Dactylorhiza hatagirea</i>
2.	Riddhi	रिद्धि	<i>Habenaria intermedia</i>
3.	Vriddhi	वृद्धि	<i>Habenaria edgeworthii</i>
4.	Kakoli	काकोली	<i>Fritillaria roylei</i>
5.	Chhir kakoli	छिर काकोली	<i>Lilium polyphyllum</i>
6.	Jivak	जीवक	<i>Malaxis muscifera</i>
7.	Rishibhak	ऋषभक	<i>Melaxis cylindrostachya</i>
8.	Salam Mishri	सालम मिश्री	<i>Eulophia dabai</i>
9.	Jatamansi	जटामांसी	<i>Nardostachys jatamansi</i>

Table 6: Medicinal plant species of Uttarakhand completely banned for collection from Forest

S/No	Trade/ Local Name	स्थानीय नाम	Botanical Name
10.	Karvi	कड़वी	<i>Gentiana kurroo</i>
11.	Satuva	सतुवा	<i>Paris polyphylla</i>
12.	Chirayita	चिरायता	<i>Swertia chirayita</i>
13.	Kingora	किनगोड़	<i>Berberis spp.</i>
14.	Atis	अतीस	<i>Aconitum heterophyllum</i>
15.	Mitha bish	मिठाविष	<i>Aconitum balfourii</i>
16.	Kutki	कुटकी	<i>Picrorhiza kurroa</i>
17.	Genthi	गेंठी	<i>Dioscorea deltoidea</i>
18.	Salparni	सालपर्णी	<i>Desmodium gangeticum</i>
19.	Prishnaparni	पृष्ठपर्णी	<i>Uraria picta</i>
20.	Bach	बच	<i>Acorus calamus</i>
21.	Giloy	गिलोय	<i>Tinospora cordifolia</i>
22.	Maida / Maha Maida	मैदा / महामैदा	<i>Polygonatum spp.</i>
23.	Dolu Archa	डोलू आर्चा	<i>Rheum spp.</i>
24.	Sarpgandha	सर्पगन्धा	<i>Rauwolfia serpentina</i>
25.	Kalihari	कलिहारी	<i>Gloriosa superba</i>
26.	Timru	टिमरू	<i>Zanthoxylum armatum</i>
27.	Van pyaj	वन प्याज	<i>Urginea indica</i>
28.	Sankhapushpi	शंखपुष्पी	<i>Canscora decussate</i>
29.	Manjith	मंजीष्ठ	<i>Rubia cordifolia</i>
30.	Balchari	बालछड़ी	<i>Arnebia benthami</i>
31.	Thuner/ Talispatra	थुनेर / तालिशपत्र	<i>Taxus baccata</i>
32.	Dhup	धूप	<i>Jurinea dolomiaea</i>
33.	Tagar	तगर	<i>Valleriana wallichii</i>
34.	Choru	चोरू	<i>Angelica glauca</i>
35.	Van Kakdi	वन ककड़ी	<i>Podophyllum hexandrum</i>

Table 7:
Medicinal plant species of Uttarakhand permissible for sustainable collection (i.e. on rotational basis) from Forest

S/No	Trade/ Local Name	स्थानीय नाम	Botanical Name
1.	Pashanbhed	पाषाणभेद	<i>Bergenia ciliata</i>
2.	Malkanjani	मालकंगनी	<i>Celastrus paniculatus</i>
3.	Karipatta	कड़ीपत्ता	<i>Murraya koenigii</i>
4.	Priyangu	प्रियंगु	<i>Callicarpa macrophylla</i>
5.	Nirgundi	निर्गुण्डी	<i>Vitex negundo</i>
6.	Gandhprasarni	गंधप्रसारणी	<i>Paederia foetida</i>
7.	Harad	हरड़	<i>Terminalia chebula</i>
8.	Baheda	बहेड़ा	<i>Terminalia bellerica</i>
9.	Amla	आँवला	<i>Embllica officinalis</i>
10.	Satavar	सतावर	<i>Asparagus racemosus</i>
11.	Marorphali	मरोड़फली	<i>Helicteres isora</i>
12.	Bael	बेल	<i>Aegle marmelos</i>
13.	Vasa	वसा	<i>Adhatoda zeylanica (A. vasica)</i>
14.	Bidarikand	बिदारीकन्द	<i>Pueraria tuberosa</i>
15.	Patha	पाठा	<i>Cissampelos pareira</i>
16.	Ratti	रत्ती	<i>Abrus precatorius</i>
17.	Amaltas	अमलतास	<i>Cassia fistula</i>

S/No	Trade/ Local Name	स्थानीय नाम	Botanical Name
18.	Tejpat	तेजपात	<i>Cinnamomum tamala</i>
19.	Bhutkeshi I	भूतकेशी	<i>Selinum tenuifolium</i>
20.	Gugule	गुगुल	<i>Tanacetum dolichophyllum</i>
21.	Ginjaru	गिंजाडू	<i>Stephania glabra</i>
22.	Sarpunkha	सर्पूखा	<i>Tephrosia purpurea</i>
23.	Lajwanti	लाजवन्ती	<i>Mimosa pudica</i>
24.	Nairpati / Kedarpati	नैरपाती / केदारपाती	<i>Skimmia laureola</i>
25.	Chitrak mool	चित्रकमूल	<i>Plumbago zeylanica</i>
26.	Indrayan	इन्द्रायण	<i>Trichosanthes spp.</i>
27.	Kapur kachri	कपूर कचरी	<i>Hedychium spicatum</i>
28.	Pathar Laung	पत्थर लौंग	<i>Didymocarpus aromaticus</i>
29.	Moss	मॉस	<i>Chondrus crispus</i>
30.	Jhula	झूला	<i>Parmelia perlata</i>

HARVESTING OF KEEDAJADI

Keedajadi (*Ophiocordyceps sinensis*) is a rare and unique herb that grows in alpine meadows of 3 districts of Uttarakhand viz. Pithoragarh, Chamoli and Bageshwar above 3500 msl. It is a mummified larva filled and coated with mycelia of *Ophiocordyceps sinensis*, a parasitic fungus(family Clavicipitaceae) growing on and deriving nutrients from caterpillar of several species mainly those belonging to the genus Thitarodes (previously Hepialus), order Lepidoptera and family Hepialidae. A slender, brown, club-shaped fruiting body (mushroom) of *Ophiocordyceps sinensis* emerges out just above the eyes of larva in mid-May when overlain snow starts melting and so is the harvesting season, which lasts about 6 weeks.It is also known by other names such as dragon herb, keera ghas, caterpillar mushroom and Yar Tsa Gumba. The fruiting body of the herb ranges from dark brown to black, whereas, the root is either yellowish or brown in color and weighs about 300-500 mg. Pharmacological activities ascribed to fungus are antitumour, antimetastic, immunomodulatory, antioxidant, anti-inflammatory, insecticidal, antimicrobial, hypoglycemic, neuroprotective and renoprotective among others. Due to its high commercial value and medicinal properties it is also named as Himalayan gold/ Himalayan

Viagra. In traditional Chinese medicine, it is used historically for over 2000 years for the treatment for a variety of diseases. Its major chemical constituents include nucleotides such as adenosine, adenine, hypoxanthicine, nucleotide, uracil, thymine, uridine, guanine, 3'-deoxyadenosine (also called cordycepin), steroides such as ergosterol peroxide, cholesteryl palmitate, ergosterol, polysaccharides, such as galactomannan; alkaloids such as, D-mannitol (also called cordycepic acid), large quantity of crude proteins, essential amino acids, multiple trace elements and some vitamins.

Keedajadi is mostly traded to China through Tibet or Nepal in raw form, where its value is multiplied many times by preparing highly valued herbal products/medicines. Studies in Niti valley highlight that a family of 3-4 members may collect about 1.5-2.0 kg of Keedajadi in a season. The quantity of collection depends upon the skill of collectors. A price of about ₹ 2,50,000 to 3,00,000 per kg was quoted by collectors during 2009-2010. Though the quantum of collection is unknown, it is reported that 300-350 kg per year is collected from the valley which was monetary equivalent to over ₹ 90 million and was illegally trafficked into Nepal from Dharchula (India) (Maikhuri et al., 2013). Presently it is priced at ₹ 12-15 lakhs/ kg

(Bhatt, 2016). Collection data of Keedajadi from Joshimath Block of Chamoli district; and Dharchula and Munsyari Blocks of Pithoragarh district are kindly shared by Dr V. P. Bhatt, Scientist, Herbal Research and Development Institute, Gopeshwar and are given in Table I, Table II and III respectively (Annexure-III). Highest collection of Keedajadi was recorded from Patao village (Ralam) in Munsyari block of Pithoragarh district. The collection varied from 15-23 Kg per season. The maximum collection was 22-23 Kg in the year 2005-06.

The collection is mainly regulated by the respective Van Panchayat and rules of collection differ from village to village and area to area. In most cases, per person royalty is paid to respective Van Panchayat. However, there is no limitation on number of collectors derived from a family. Only limited amount of collected material is traded through Government agency i.e. Forest Development Corporation as the Government rates are still not compatible with open market and thus most of the collected material, which is now treated as illegal, is traded through middle men or traders to China. No doubt, many of the Himalayan poor families in these areas now earn good amount of money.

ISSUES OF CONCERN

Srestha and Baba (2013) indicated the overharvesting of keedajadi and associated degradation in the Himalaya which caused a significant challenge to ecology and socio-cultural system in the region. Its yield is inversely related to gradient of slope i.e. greater availability at 150 slope and decline with greater inclination of slope. Size ratio of fruiting body to insect larva determines the price of specimen; smaller ratio fetch better price. 70- 80 % of harvested lot contain immature specimen. There is no sustainable and scientific way of collection, it depends on how much one can collect in given time and space. Educating harvesters about precise life cycle and importance of availability of mature specimen for completion of infection cycle would go a long way in ensuring the availability of keedajadi in future. Sometimes important species of rare and endangered medicinal plants i.e. van-lahsun (*Fritillaria*

spp.), satuwa (*Trillidium govanianum*), meetha atis (*Chaerophyllum vilosum*) and Guchhi (*Morchella esculenta*) are also collected and traded to neighbouring country like Nepal and China. Many families who were hardly surviving on the payment of ₹ 100-150 per day as daily labour, now earn in lakhs that too within a very short span of two and a half months. Hence they have stopped doing hard work in their fields and have developed other permanent sources of income by purchasing goats, sheep and mules and constructing buildings to be given on rent. On the other side many people lose their lives while collecting this fungus from very tuff terrain on the top of the Himalaya. On an average, 5-10 deaths are recorded during the collection season. There is a need to educate villagers about sustainable harvesting methods and there should be a limit on the number of harvesters and duration of their stay in alpine meadows.

FIELD STUDY

Pilot survey conducted in the villages of Chamoli district showed a large dependence of villagers on forest for livelihood. Collection of forest produces is usually done by the women who visit the nearby forest twice or thrice a week. Sainthi and Saitoli villages are situated only 2-3 kilometres away from the forest and totally depends on forest for fuelwood and fodder. Major fuelwood species collected are banj, buransh, moru, akhrot, chir, kafal, angaar, utis, sor, kuriyal, chanchri and bhimal. Fodder species collected by the villagers include banj, akhrot, brinja, kachnar, bhimal, khadik, kuriyal, sayaar, beduli grass, mahua, timla, chanchri and thin grass. Many wild fruits and vegetables are also consumed by the villagers which include seabuckthorn, burans, kafal, lingra, hisalu, mehal, bedu, timla. Burans flowers are also collected by villagers for juice extraction and is self-consumed.

Sunil Gaon is about 10 kilometres away from forest and are less dependent on forest. Few artisans from this village are involved in collection of ringal from the forest to prepare kandi and tokri for self use and sale. A person

in one go may collect 50 pieces of ringal. This village recently is incorporated under Joshimath Municipal area, hence is not allowed to collect forest produce.

Agricultural productivity is reduced greatly due to regular attacks on crops by wild animals mainly wild boars, monkeys, pigs, ghural, kaakad and langoors. Monkeys and langoors were not present earlier and has been deported from other districts of low altitude as told by the villagers. Scarcity of water due to drying of natural springs is worsening the situation. Both these problems have let to abandoning of agricultural activities by many villagers and thus posing a threat to agriculture, a livelihood supporting activity in the hill.

Team also visited mixed forest developed by Shri Jagat Singh Janglee at Village Kot Malla, Rudraprayag district.

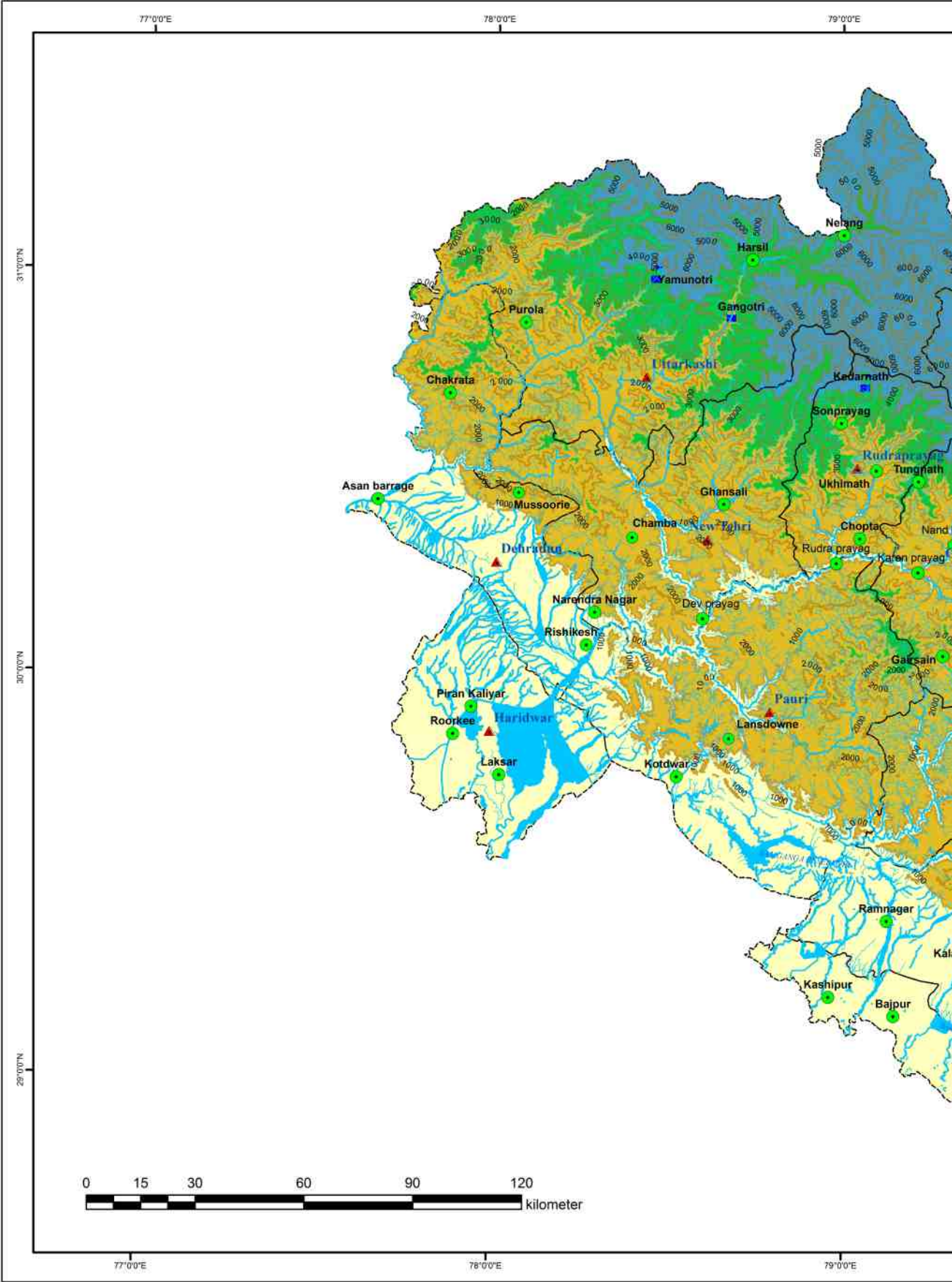
Team was apprised of the procedure followed in bringing the collected material from forest to the mandi which included the payment of royalty to the forest department in order to obtain the exit permit. Though the traders were reluctant in answering questions related to supply chain, the middleman willingly shared the information. (Excerpts of interaction with the middlemen are given in Annexure IV)

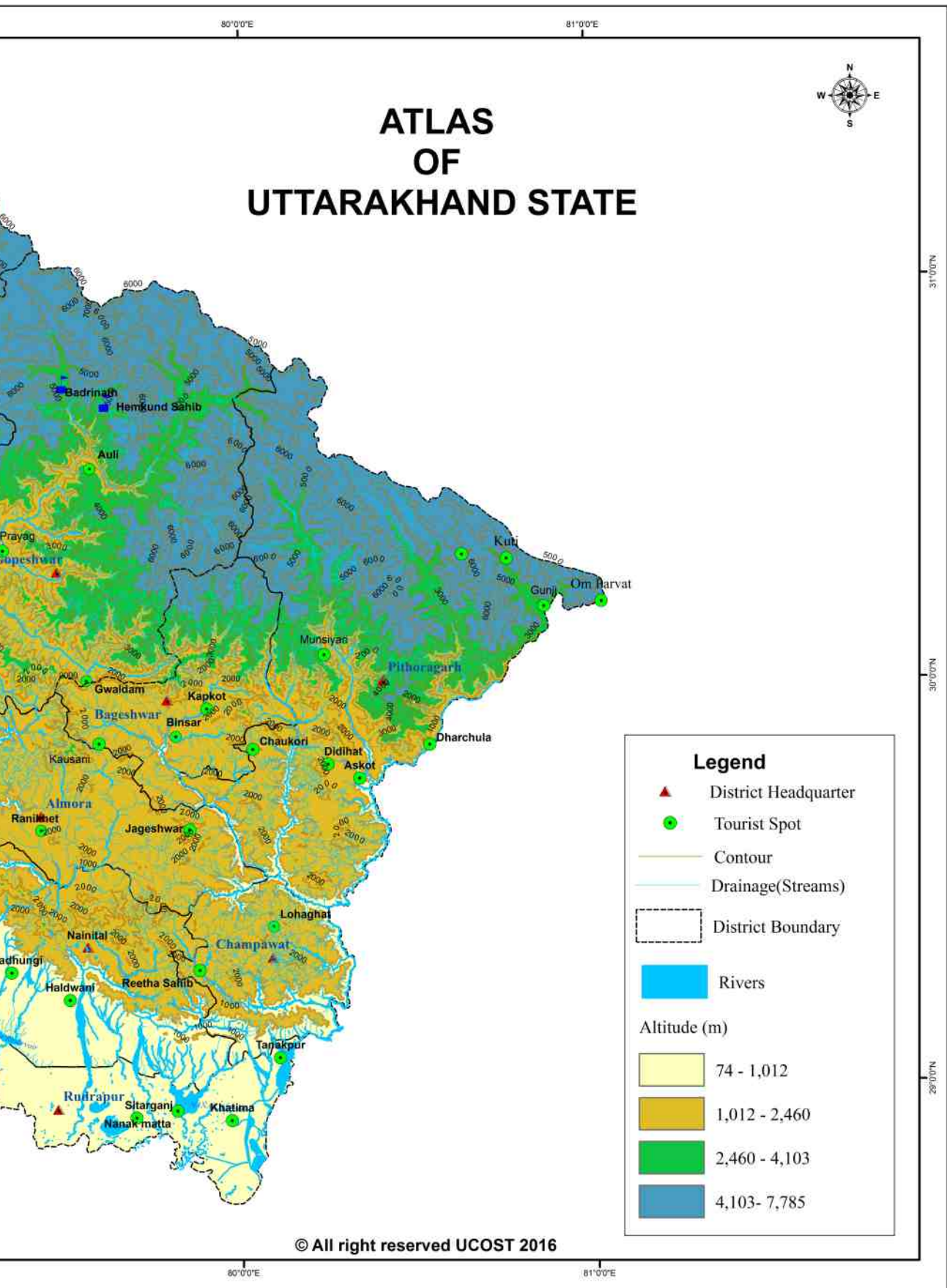


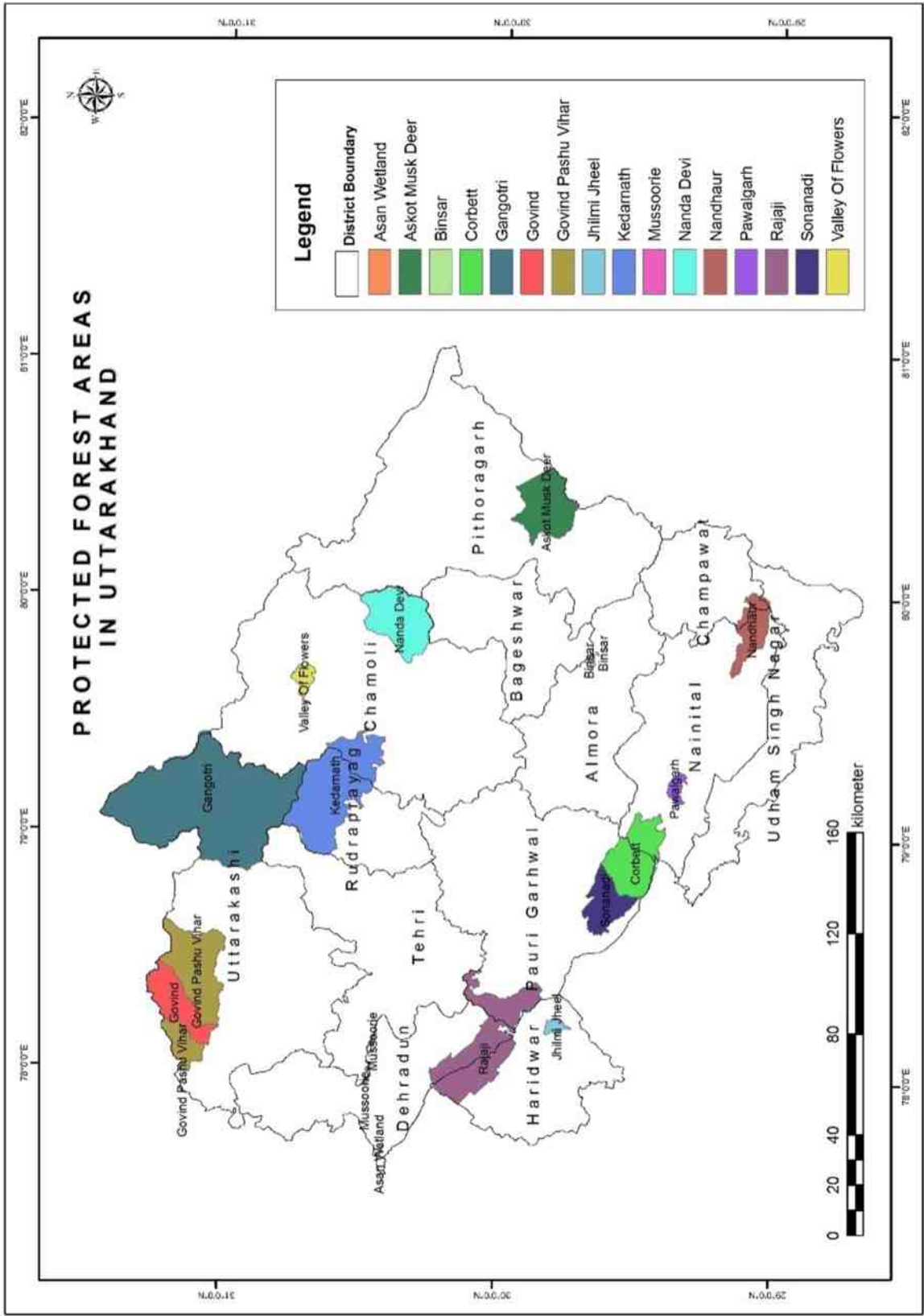


GREEN AMBASSADOR OF UTTARAKHAND: SHRI JAGAT SINGH JUNGLEE

Shri Jagat Singh Junglee, the Green Ambassador of Uttarakhand is developer of Mix Forest Model and creator of sustainable development of Micro Climate. His journey with the movement started in 1974 when he was serving BSF and once when he returned to his village during holidays he realized the plight of the women of his village who used to go early in the morning to far away forests for collecting fodder and fuel wood, only to return late in the evening. Many of them used to get injured while climbing the forest. He thought to himself of providing a source of these necessities to them near to their village. With this idea he started working on a barren patch of land of 1.5 hectare inherited from his forefathers. From 1974 to 1980 he dedicatedly started building up the forest. He used to come on Casual and Annual Leaves to his village during the rainy and winter season for plantation and harvesting. In 1980 he took voluntary retirement from his job and developing the forest became his motto of life. Family supported him in his cause especially his wife and gradually he mobilized the support of his villagers who helped him in shaping his dream. In 1993 his name got published for the first time in a local newspaper after he was awarded the certificate with title "Junglee" in a function at a High School near his village where he was invited as a speaker to deliver a speech on environment and the forest which he was developing. Late Dr. R. S. Tolia, Ex Chief Secretary, who was then posted as Principal Secretary in the erstwhile Uttar Pradesh Government suggested his officials to replicate the model of his forest in the state. After much persuasion by Dr Tolia who asked him to make people aware of his work, he moved out and started interacting with people and learnt a lot and adopted many of the best practices and gradually the forest which he developed became a mixed forest model. In 2000 he was awarded the Indira Priyadarshini Vriksha Mitra Award. In 2002 Shri Surjit Singh Barnala, the Governor of Uttarakhand honoured him at H. N. B. Garhwal University, Srinagar. In 2005 he was awarded the prestigious Uttarakhand Gaurav award. He gave his first presentation on Mixed Forest at a Seminar of Vigyan Bharti in Delhi at Indian Physical Laboratory with the help of a JNU Student and was awarded the Aryabhatt Award in 2006. He was given Silver Award by Godfrey Philips India in 2007 and was honoured as Green Ambassador of Uttarakhand in 2012. His mixed forest model is a classic example on building up of micro-climate wherein both plant species of winter and summer climate can co-exist and survive by adopting simple technologies like Stone Technology. Here medium pieces of stone are hung in air and moss is grown on them. This helps in maintaining moisture and building up of cool climate. His forest serves not only a source of fodder and fuel wood for the villagers but also presents a classic example of forest farming by generating livelihood opportunities through plantation of various herbs, medicinal plants, ringal, rambaans, evergreen grasses, ginger, turmeric, tea etc. Some of the high altitude medicinal plants like thuner, salam panja, salam mishri and kutki can also be found in this forest due to engineered microclimatic conditions His forest thus serves as herbal species collection centre for students of different Universities from various parts of the country. He practices Pit Technology wherein a pit is dug and the collected bio mass from forest floor is filled in to it and covered with the mud which gets converted in to bio-manure after a period of time. This bio-manure not only makes the land fertile but also helps in retaining soil moisture and is in high demand in states like Punjab and Haryana. During the rampant forest fire incidents in Uttarakhand last year, this forest could survive due to mixed plantation and presence of species like *Pinus patula* (American Pine) which helps in maintaining moisture and whose leaves do not catch fire. His idea of mixed forest need to be replicated in other parts of the State and Country. Our vast forest resources should be managed with the help of local youths which may be trained appropriately which will further check the ever-growing unemployment rate.









PUBLICATION, IF ANY, BASED ON THE WORK DONE UNDER THE PROJECT

- a) Brochure of Centre of Excellence on Forest based Livelihood in Uttarakhand.
- b) Two News Bulletins (March- August 2016 and Sep. 2016 to Feb 2017) of Centre of Excellence on Forest based Livelihood in Uttarakhand.
- c) Following two abstracts were presented in 19th Commonwealth Forestry Conference 2017 held at Forest Research Institute Dehradun from 3rd to 7th April 2017 with support from MoEF& CC Government of India and Commonwealth Forestry association-
 - Ajeet Kaur, Siddharth Napalchyal, Kanchan Dobhal, Seema Maikhuri, Piyush Joshi, Rajendra Dobhal. Bamboo and ringal have great potential for rural livelihood in Uttarakhand
 - Ajeet Kaur, Siddharth Napalchyal, Kanchan Dobhal, Seema Maikhuri, Piyush Joshi, Rajendra Dobhal. Livelihood enhancement through Medicinal and Aromatic Plants in Uttarakhand
- d) Following three abstracts were presented in 11th Uttarakhand State Science & Technology Congress (USSTC) 2017 held at Uttarakhand State Council for Science & Technology Dehradun-
 - Ajeet Kaur, Siddharth Napalchyal, Kanchan Dobhal, Seema Maikhuri, Piyush Joshi, Rajendra Dobhal. Socio-economic importance of non-timber forest products of Uttarakhand (Oral).
 - Kanchan Dobhal, Ajeet Kaur, Siddharth Napalchyal, Seema Maikhuri, Piyush Joshi, Rajendra Dobhal. High nutraceutical and livelihood potential of lesser known wild fruits of Uttarakhand (Poster).
 - Seema Maikhuri Ajeet Kaur, Siddharth Napalchyal, Kanchan Dobhal, Piyush Joshi, Rajendra Dobhal. Jhula: A livelihood opportunity in Uttarakhand (Poster).

REFERENCES

- Anonymous (1991). Census data of Garhwal region of Uttar Pradesh.
- Bhandari, A.K., Negi, J.S., Bisht, V.K., Singh, N. and Sundriyal, R.C. (2012). *Cordyceps sinensis*: fungus inhabiting the Himalayas and a source of income. *Current Science*. 123 (8).
- Bhatt, A.K. and Badoni, A.K. (1990). Fuel characteristics of some mountain firewood shrubs and trees. *Energy* 15: 1069-70.
- Bhatt V. P. (2016) Herbal Research Development Institute, Gopeshwar. Personal communication.
- Bhattaria et al. (2010). Bhattarai S, Chaudhary RP, Quave CL, Taylor RSL (2010). The use of medicinal plants in the trans-himalayan arid zone of Mustang district, Nepal. *J.Ethnobiol. Ethnomed.* 6(14):1-11.
- Bisht, V.K., kandari, L.S., Negi, J.S., Bhandari, A.K. and Sundriyal, R.C. (2013). Traditional use of medicinal plants in district Chamoli, Uttarakhand, india. *Journal of medicinal plant research*. 7(15):918-929.
- Blaikie, P. (1985). *The political economy of soil erosion in developing countries*. New York: Longman.
- Butola, J.S. and Malik, A.R. (2012). Phenology and Survival of some Himalayan medicinal plants domesticated at different altitudes. *International journal of medicinal and aromatic plants*, ISSN 2249-4340. 2(4): 683-687.
- Campbell, J.Y. (1992). Putting people products first non-timber forest products the challenge of managing forest to local income. *MFP News* 2 (2-4 July-Dec):6
- Civil and Soyam forest division, Almora, 2013. Van Vani, Oct- Dec. 2013, page-15
- Dash, T. (2010). The Forest Rights Act: Redefining Biodiversity Conservation in India Exploring the Right to Diversity in Conservation Law, Policy, and Practice. *Policy Matters* 17.
- Dhanra, R., Negi, R.S., Singh, S. and Parmar, M.K. (2015). Fuelwood consumption by villagers in different altitudinal gradient: a case of Takoligad watershed of Garhwal Himalaya, India. *International Journal of Current Engineering and Technology* p-ISSN 2347-5161. 5(1)
- ICFRE (2010). Field manual on consumption and utilization of wood and non-wood forest produce in household sector, Forest Survey of India, Forest Sector Report India. Indian Council of Forestry Research and Education, Dehradun.
- FSI (2015) India State of Forest Report. Forest Survey of India. Ministry of Environment, Forest and Climate Change, Dehradun.
- Maikhuri, R. K., I. D. Bhatt, Subodh, Airi (2013). Biodiversity of Indian west Himalaya. In: Rawal R. S. et al. (editors), *The Himalayan biodiversity*. G. B. Pant Institute of Himalayan Environment and Development, Almora. pp 24-28
- Maikhuri, R.K., Rao, K.S., Saxena, K.G. (2004). Bioprospecting of wild edibles for rural development in the central Himalayan mountain of India. *Mountain Research and Development*, 24, 110-113.
- Ministry of Environment & Forests (2006). Joint Parliament Committee Report on Forest Right Act, 2006, Lok Sabha Secretariat, 2006 a, Report of the joint committee on The Scheduled Tribes (Recognition of Forest rights) Bill.

- Purohit, K. and Samant, S.S. 1995. *Fodder trees and shrubs of Central Himalaya*. Gyanodaya Prakashan, Naintal.
- Report of the sub-group II on NTFP and their sustainable management in the 12th, 5th year plan, September 2011, New scheme- Submitted under: Planning Commission's Working Group on Forests & Natural Resource Management- Planning Commission, 2011
- Samant, S.S. and Dhar, U. 1997. Diversity, Endemism and Economic Potential of Wild Edible Plants of Indian Himalaya. *International Journal on Sustainable Development. & World Ecology*, 4: 179-191.
- Saxena, N. C. (1996) Forest policy and rural poor in Orissa. *Wasteland News* XI (2) November-January 1996, New Delhi.
- State Medicinal Plant Board, 2015. Strategy for Conservation and Management of Medicinal Plants Resources of Uttarakhand
- Sundriyal, R.C. and Sharma, E. 1996. Anthropogenic pressure on tree structure and biomass in the temperate forest of mamlay watershed in Sikkim. *Forest Ecology Management*. 81:113-34.
- Ved, D.k., Mudappa, A. And Shankar, D. 1998. Regulating export of endangered medicinal species- need for scientific rigour. *Current Science* 75(4): 341-344.

ANNEXURE

ANNEXURE I

Ghat (Chamoli)

S.No.	Name of selected village	Total artisans
1	Ustoli	5
2	Lankhi	23
3	Sainti	15
4	Syari bangali	9
5	Bhenti	19
6	Banjbagar	21
7	Fali	17
8	Sutol	8
9	Kanol	24
10	Vaduk	15
Total identified artisans		156

Bhatwari cluster (Uttarkashi)

S.No.	Name of selected village	Total artisans
1	Gorsali	14
2	Hurri	80
3	Seku	12
4	Syaba	55
5	Dwari	10
6	Jakhol	25
7	Nateen	7
8	Pilang & Jadau	46
9	Salang	50
10	Bhukki	15
11	Tihar	98
12	Kujjan	50
13	Siror	30
14	Ganeshpur	16
15	Gajoli	45
16	Dasda	12
17	Dandalka	14
18	Naugaon	35
19	Bhankoli	5
20	Agoda	10
Total artisans/ weaver identified		629

Dewal cluster (Chamoli)

S.No.	Name of selected village	Total artisans
1	Wan	14
2	Kuling	10
3	Vank	15
4	Mundoli	8
5	Lwani	6
6	Tajpue	9
7	Rain	10
8	Palwara	16
9	Devsari	4
10	Airatha (Odor)	12
11	Lingadi	7
12	Chaur, Kotera	20
13	Kheta	25
14	Melkhet	8
Total identified artisans		164

Kapkot Cluster (Bageshwar)

S.No.	Name of selected village	Total artisans
1	Jhuni	65
2	Khaljhuni	15
3	Lahur	5
4	Harkot	8
5	Waccham	28
6	Karmi	97
7	Supi	108
8	Badiyakot	90
9	Sorag	40
10	Gogina	78
11	Khati	32
12	Kilparara	5
13	Dola	8
14	Teekh	24
15	Chaura	10
16	Bagar	15
Total identified artisans		628

Dunda cluster (Uttarkashi)

S.No.	Name of selected village	Total artisans
1	Kamad	28
2	Thandi	25
3	Kumarkot	15
4	Bagi	
5	Dhaneti	6
6	Matti	7
7	Veerpur	250
8	Dunda	15
9	Uprikot	22
10	Bharan	18
Total artisans/ weaver identified		312

Purola Cluster (Uttarkashi)

S.No.	Name of selected village	Total artisans
1	Sar	4
2	Lewtadi	12
3	Kaslon	10
4	Kimdar	5
5	Dingadi	3
6	Chanika	8
7	Kaul	9
8	Paunti	2
9	Kandiyal Gaon	11
10	Besti palli	21
Total artisans/ weaver identified		85

Mori Cluster (Uttarkashi)

S.No.	Name of selected village	Total artisans
1	Bari	18
2	Hadwani	14
3	Sewa	7
4	Panwtalla	31
5	Sunkundi	30
6	Paw Malla	25
7	Kotgaon	9
8	Haltadi	4
9	Suchan gaon	3
10	Dangan Gaon	7

Chamoli cluster (Dasoli Block)

S.No.	Name of villages	Distance from main road	No. of artisans involved in Ringal handicraft
1	Kiruli	5	72
2	Gandhi Gramm Bachher	2	34
3	Tangni	2	43
4	Pakhi-jal Gwar	2	12
5	Bemru (Bedumathal, Ludaon)	5	8
6	Sera	4	19
7	Gadi	4	18
Total			206

ANNEXURE II

Table-I. Sale data of NTFPs auctioned through three UAFDC mandis of Uttarakhand in the year 2010-11

Species Name	Bibiwala			Ramnagar		
	Qty	Amt	Rate	Qty	Amt	Rate
Jhula	7925.22	748.84	9449	2790	244.90	8779
Moss	62.5	1.50	2411	1454.82	26.86	1847
Tej Patta	24.02	0.85	3579	126.87	3.09	2442
Belgiri	0.912	0.00	1300	-	-	-
Basa Panchang	3.042	0.01	450	-	-	-
Kadu Panchang	12.183	0.05	450	-	-	-
Padam Kashth	297.7	2.00	674	-	-	-
Rohini Seed	5.82	0.11	1900	-	-	-
Rohini Powder	0.222	0.01	5203	-	-	-
Rohini Chilka	4.62	0.02	551	-	-	-
Belchilka	2.71	0.00	331	-	-	-
Bel Saboot	2.82	0.01	701	-	-	-
Dandasa	20	2	10000	-	-	-
Kingore Jad	109.84	1.43	1303.732702	43.35	0.21	500
Yarsa Gamboo	-	-	-	-	-	-
Van Tulsi	-	-	-	3.05	0.10	3500
Kari Patta	10.429	0.03	300	0.36	0.00	1411
Arjun Chaal	-	-	-	0.39	0.00	500
Bahera	-	-	-	0.1	0.00	610
Gud Bach	-	-	-	0.09	0.00	3000
Kaphal Chaal	-	-	-	4.05	0.02	600
Meetha Neem	-	-	-	10.42	0.03	300
Kantkari	-	-	-	0.01	0.00	6000
Dhakphool	-	-	-	0.04	0.00	4400
Amaltash	-	-	-	0.45	0.00	500
Total	8482	756.93		4434	275.26	

Table-II. Sale data of NTFPs auctioned through three UAFDC mandis of Uttarakhand in the year 2011-12

Species Name	Bibiwala			Ramnagar		
	Qty	Amt	Rate	Qty	Amt	Rate
Jhula	6338.96	827.16	13049	6808.69	629.37	9243.76
Moss	61.176	1.76	2891	1399.85	28.62	2045.04
Bansa-Panchang	31.559	0.14	462	-	-	-
KaduPanchang	7.89	0.03	400	-	-	-
PadamKashta	32.2	0.27	850	-	-	-
Dandasa	52.95	8.99	16983	-	-	-
BasaPatta	6.533	0.03	550	-	-	-



Quantity in Quintals, Amount in Lakh Rs and Rate in /Q

Tanakpur			Total		
Qty	Amt	Rate	Qty	Amt	Rate
1972.87	148.43	7524	12688	1142.18	9002
876.41	21.47	2450	2394	49.84	2082
143.08	4.22	2953	294	8.18	2784
-	-	-	0.912	0.01	1300
-	-	-	3.042	0.01	450
-	-	-	12.183	0.05	450
-	-	-	297.7	2.00	674
-	-	-	5.82	0.11	1900
-	-	-	0.222	0.01	5203
-	-	-	4.62	0.02	551
-	-	-	2.71	0.00	331
-	-	-	2.82	0.01	701
-	-	-	20	2	10000
-	-	-	153	1.64	1076
0.027	4.78	17704000	0.027	4.78	17704000
-	-	-	3.05	0.10	3500
-	-	-	11	0.00	337
-	-	-	0.39	0.00	500
-	-	-	0.1	0.00	610
-	-	-	0.09	0.00	3000
-	-	-	4.05	0.02	600
-	-	-	10.42	0.03	300
-	-	-	0.01	0.00	6000
-	-	-	0.04	0.00	4400
-	-	-	0.45	0.00	500
2992	178.91		15908	1211.10	

Tanakpur			Total		
Qty	Amt	Rate	Qty	Amt	Rate
707.362	63.869	9029.21	13855.012	1520.41	31321.97
474.786	9.88	2081.29	1935.812	40.27	7017.33
-	-	-	31.559	0.14	462
-	-	-	7.89	0.03	400
-	-	-	32.2	0.27	850
-	-	-	52.95	8.99	16983
-	-	-	6.533	0.03	550

Species Name	Bibiwala			Ramnagar		
	Qty	Amt	Rate	Qty	Amt	Rate
Tejpatta	22.358	0.64	2880	30.98	0.78	2539.38
Kadu	13.22	0.06	525	-	-	-
Atis	0.73	1.09	150000	-	-	-
Salam Panja	0.232	0.34	150000	-	-	-
Pangar Phal	0.793	0.01	2201	-	-	-
Ritha	5.029	0.10	2000	-	-	-
Kandkari	-	-	-	581.4	11.95	2055.55
Beldana	-	-	-	1.05	0.00	500
Hardh	-	-	-	0.2	0.00	700
Samal Phool	-	-	-	1.01	0.01	1600
Chaya phool	-	-	-	1.2	0.01	1200
Kari patta	-	-	-	0.42	0.00	1000
Chitrak	-	-	-	24.57	0.37	1510.87
Yarsa Gamboo	-	-	-	-	-	-
Total	6573.63	840.68		8849.37	671.15	

Table-III. Sale data of NTFPs auctioned through three UAFDC mandis of Uttarakhand in the year 2012-13

Species Name	Bibiwala			Ramnagar		
	Qty	Amt	Rate	Qty	Amt	Rate
Jhula	10731.47	896.73	8356.15	11303.26	1159.92	10262
Moss	611.44	23.83	3897.95	4365.75	115.91	2655
Padamkashth	117.45	0.60	516.48	-	-	-
Vanhaldi	-	-	-	18.35	0.19	1052
Pashanbhed	-	-	-	0.59	0.00	1500
Tejpatta	31.38	1.01	3640.54	18.63	0.77	4154
Karipatta	-		-	0.6	0.00	1500
Atis	0.05	0.12	249900.00	-	-	-
Salam Panja	0.025	0.07	280000.00	-	-	-
Chitrak (Bhirmora)	-	-	-	109.5	1.73	1580
Ritha	-	-	-	9.46	0.17	1800
Total	11491.82	922.51		15826.14	1278.72	



Tanakpur			Total		
Qty	Amt	Rate	Qty	Amt	Rate
-	-	-	53.338	1.43	5419.38
-	-	-	13.22	0.06	525
-	-	-	0.73	1.09	150000
-	-	-	0.232	0.34	150000
-	-	-	0.793	0.01	2201
-	-	-	5.029	0.10	2000
-	-	-	581.4	11.95	2055.55
-	-	-	1.05	0.00	500
-	-	-	0.2	0.00	700
-	-	-	1.01	0.01	1600
-	-	-	1.2	0.01	1200
-	-	-	0.42	0.00	1000
-	-	-	24.57	0.37	1510.87
0.002	0.16	8050000	0.002	0.16	8050000
1182.15	73.91		1316605.15	1585.75	

Tanakpur			Total		
Qty	Amt	Rate	Qty	Amt	Rate
1505.24	1103.30	7328.20	23539.97	2166.97	9205.50
463.29	14.60	3153.07	5440.48	154.35	2837.10
-	-	-	117.45	0.60	516.48
-	-	-	18.35	0.19	1052.32
-	-	-	0.59	0.00	1500.00
0.62	0.02	3279.03	50.63	1.93	3824.99
-	-	-	0.60	0.00	1500.00
-	-	-	0.05	0.12	249900.00
-	-	-	0.03	0.07	280000.00
-	-	-	109.50	1.73	1580.37
-	-	-	9.46	0.17	1800.00
1969.15	124.93		29287.11	2326.17	

Table-IV. Sale data of NTFPs auctioned through three UAFDC mandis of Uttarakhand in the year 2013-14

Species Name	Bibiwala			Ramnagar		
	Qty	Amt	Rate	Qty	Amt	Rate
Jhula	7268	903.54	12433	8485	754.95	8897
Moss	640	25.00	3909	2603	66.58	2557
Tejpatta	3.6	0.16	4343	10.7	0.29	2701.0
Chitrak				6.23	0.09	1539.0
Pasanbhed	1.0	0.03	3200	-	-	-
Total	7911.8	928.74		11105.7	821.92	

Table-V. Sale data of NTFPs auctioned through three UAFDC mandis of Uttarakhand in the year 2014-15

Species Name	Bibiwala			Ramnagar		
	Qty	Amt	Rate	Qty	Amt	Rate
Jhula	4962.4	751.0	15133	6454.4	647.0	10025.0
Moss	665.0	24.3	3647	3876.2	104.9	2707.0
Tejpatta	3.8	0.2	5000	2.8	0.1	2720.0
Atis	0.04	0.08	2200000	-	-	-
Salam Panja	0.1	0.3	392791	-	-	-
Chandan	0.04	0.05	102041	-	-	-
Satua	1.6	4.2	179756	-	-	-
Gurbach	6.43	0.45	7000.00	0.05	0.001	3000.00
Bahera				0.88	0.006	750.00
Harad				0.05	0.0004	860.00
Yarsa Gumbu				0.028	1.450	5178600
Total	5639.4	780.5		10334.4	753.4	

Table: VI Sale data of NTFPs auctioned through three UAFDC mandis of Uttarakhand in the year 2015-16

Species Name	Bibiwala			Ramnagar		
	Qty	Amt	Rate	Qty	Amt	Rate
Jhula	5667.2	1013.3	17845	7022.0	844.9	14018.0
Moss	224.3	8.4	3738	922.2	28.7	3114.0
Tejpatta	5.6	0.3	5300	-	-	-
Dandasa	30.00	3.00	10000	-	-	-
Miscellaneous	117.5	0.7	620	-	-	-
Satua	0.02	0.002	15000	-	-	-
Total	6044.6	1025.7		7944.2	873.6	



Tanakpur			Total		
Qty	Amt	Rate	Qty	Amt	Rate
620	52.10	8399	16373	1710.61	10448
176	5.75	3265	3419	97.34	2847
-	-	-	14.30	0.45	3185
-	-	-	6.23	0.09	1539
-	-	-	0.99	0.03	3226
796.7	57.86		19814.20	1805.53	

Tanakpur			Total		
Qty	Amt	Rate	Qty	Amt	Rate
840.2	101.4	12092.0	12257.01	1499.350	12233
198.1	6.9	3456.0	4739.30	136.050	2871
27.2	1.4	5100.0	33.77	1.650	4886
-	-	-	0.04	0.080	200000
-	-	-	0.08	0.340	425000
-	-	-	0.04	0.050	125000
-	-	-	1.55	4.230	272903
-	-	-	6.48	0.451	6960
-	-	-	0.88	0.006	682
-	-	-	0.05	0.000	800
-	-	-	0.028	1.450	5178600
1065.5	109.7		17039.23	1643.657	

Tanakpur			Total		
Qty	Amt	Rate	Qty	Amt	Rate
453.4	80.1	17656.0	13142.55	1936.240	14733
-	-	-	1146.48	37.100	3226
-	-	-	5.6	0.3	5300
-	-	-	30.00	3.00	10000
-	-	-	117.5	0.7	620
-	-	-	0.02	0.002	15000
453.4	80.1		14442.15	1977.342	

ANNEXURE III

Table-I. Collection of Keedajadi from Joshimath Block, District Chamoli in year 2009

S. No.	Village	Families	Places of collection	Area of collection (Km ²)	Quantity collected (Kg.)
1	Long	35	Raj-kharak, Duladee, Doblaa and Tadaak	10-15	18.600
2	Phagti	21	Raj-kharak, Duladee, Doblaa and Tadaak	10-15	8.500
3	Tolma	20	Tadaak	4-5	11.500
4	Bhalagaon	30	Taamaa-dyo, Rishikund, Songhangri	20-22	13.400
5	Juwa-gwar	33	Taamaa-dyo, Rishikund, Songhangri	20-22	11.200
6	Suki	22	Taamaa-dyo, Rishikund, Songhangri	20-22	7.800
7	Raini	63	Guppa, Khaldhar, Bangal-kwonda, Gangtoli, Baisani, Rajgair, Ronthee	15-20	21.600
8	Jugjoo	15	Guppa, Khaldhar, Bangal-kwonda, Gangtoli, Baisani, Rajgair, Ronthee	15-20	6.200
9	Subai	80	Guppa, Khaldhar, Bangal-kwonda, Gangtoli, Baisani, Rajgair, Ronthee	15-20	31.500
10	Peng-Morinda	44	Guppa, Khaldhar, Bangal-kwonda, Baisani, Rajgair, Ronthee	15-20	18.00
11	Lata	100	Guppa, Khaldhar, Bangal-kwonda, Gangtoli, Baisani, Rajgair these places collectively known as Ronthee	15-20	33.500
12	Theng		Chinap		
13	Chai(n)		Chinap		
14	Tapovan		Lata-Kharak, Chattar, Kunwari-Pass		
15	Bhangyur	36	Lata-Kharak, Chattar, Kunwari-Pass	20-22	14.450
16	Painka	18	Kagbhushandi	7-8	5.800
17	Ringee	36	Chattar, Kunwari Pass, Gailgarh, Saptkund	25-30	12.500
18	Dhak	150	Chattar, Kunwari Pass, Gailgarh, Saptkund	25-30	31.200
19	Karchon	65	Chattar, Kunwari Pass, Gailgarh, Saptkund	25-30	23.300
20	Tugaasi	66	Chattar, Kunwari Pass, Gailgarh, Saptkund	25-30	18.400
21	Belagarh	35	Chattar, Kunwari Pass, Gailgarh, Saptkund	25-30	4.100
22	Joonj	18	Chattar, Kunwari Pass, Gailgarh, Saptkund	25-30	5.900
23	Dronagiri	70	Nandi-Kund and Lampaa		
24	Kaga	25	Nandi-Kund and Lampaa		
25	Garpag	30	Nandi-Kund and Lampaa		
26	Bhyundar	40	Kagbhushandi		
27	Mana	250	Kalphang,Kujya Garbya, Menak Parvat, Gastoli, Satopant	10-25	1-2

Rate of Keda jadi was ? 50/ piece and ? 2.00-2.50 Lakh / Kg

Table-II. Collection of Keedajadi from Dharchula Block, District Pithoragarh in year 2009

S. No.	Village	Families	Places of collection	Area of collection (Km ²)	Quantity collected (Kg.)
1	Budhi	100	Budhi Galjya	7-10	30-35
2	Dar	130	Chinguwala	8-10	30-35
3	Tijim	60	Satpera	8-11	40-50
4	Sobla	75	Karchilla	20-22	15-20
5	Suwa	35	Karchilla	5-8	14-15
6	Ranthee	500	Chiplakedar	30-35	15-20
7	Jumma	300	Chiplakedar	30-35	12-15
8	Syankuri	200	Chiplakedar	30-35	8-10
9	Khela	100	Chiplakedar	30-35	10-15
10	Gargwan	100	Chiplakedar	30-35	10-15
11	Syan(g)khola	55	Karchilla	8-10	15-20
12	Gala-Jipti	90	Nyajang-khola	7-9	10-15
13	Takula-Pangla	35	Nyajang-khola	7-9	6-7
14	Khet	30	Chiplakedar	30-35	5-6
15	Napalchyu	20	Khangla	5-7	1-1.5
16	Garbyang	105	Api, Gagla	5-8	7-10
17	Nagling	45	Byakshee	5-7	12-13
18	Baling	50	Byakshee	5-7	3-5
19	Dugtu	40	Panchachuli	4-5	5-6
20	Bon	70	Changthang	3-5	4-6
21	Chal	35	Kamtee	4-7	10-15
22	Sella	40	Kamtee, Byakshee	4-7	15-20

Rate of Keda jadi was ? 1.5- 2.0 Lakh / Kg

Table-III. Year Collection of Keedajadi from Munsyari Block, District Pithoragarh in year 2009

S. No.	Village	Families	Number of Persons collecting	Places of collection	Area of collection (Km ²)	Quantity collected (Kg.)
1	Paato (Ralam)	27+61	120	Rajrambha, Ralam, Brijee-gang, Bhadeli-Gwar	15-20	18-20
2	Uchaitee	35	25	Panchachuli, Bhadeli-Gwar	15-18	2-3
3	Bothee	34	20	Panchachuli, Bhadeli-Gwar	13-15	2-3
4	Basantkot	41	25	Panchachuli, Bhadeli-Gwar	15-20	3-4
5	Bhatkuda	32	40	Panchachuli, Bhadeli-Gwar	15-20	5-6
6	Ringu-Chulkot	127+52	50	Panchachuli, Bhadeli-Gwar	15-20	6-7
7	Dhuratoli	43	20	Panchachuli, Bhadeli-Gwar	15-20	4-5

S. No.	Village	Families	Number of Persons collecting	Places of collection	Area of collection (Km ²)	Quantity collected (Kg.)
8	Golfa	83	90	Cherti	5-10	18-20
9	Kulthum	34	40	Nagini-Dhura, Panchachuli	18-20	6-7
10	Bona-Tomik	93+85	120	Nagini-Dhura, Panchachuli	18-20	20-22
11	Dheelam	30	40	Nagini-Dhura, Panchachuli	18-20	6-7
12	Jara-Jiblee (Dharchula)		20	Cherti	8-12	3-4
13	Sai(n)-Polo	37	105	Mohar Paan Poting, Bhadeli-Gwar	10-15	12-15
14	Bu(n)i	56	45	Rajrambha, Nagini-Dhura, Bu(n)i-Dhura, Dhoodhpaani	5-10	7-8
15	Namik	101	20	Heeramani Glacier	5-10	1-2
16	Laspa	9	160	Van-Katiya, Goomarti, Bhadeli-Gwar, Taam-Dhon	8-9	16-17
17	Rilkot	4	10	Bhadeli-Gwar, Taam-Dhon	4-6	1-2
18	Martoli	11	12	Saalang, Nanda-Van-Katiya	5-10	1-2
19	Lwa(n)	7	8	Nandakot, Bhadeli-Gwar	3-5	1-2
20	Paachu	17	25	Nandadevi, Bhadeli-Gwar, Kalchu-Gwar	5-8	2-3
21	Ganghar	6	15	Nandadevi, Bhadeli-Gwar	5-8	2-3
22	Milam	22	40	Kwalgang, Doodhpaani, Surajkund, Syuntpaani, Bhadeli-Gwar	10-15	4-5
23	Bilju	5	20	Bhadeli-Gwar, Bhadeli-Gwar	6-7	2-3
24	Burfu	24	22	Bhadeli-Gwar, Burfu-Gwar	5-10	2-3
25	Tola	9	25	Saatveni-Bassa, Brajeegang	4-6	2-3
26	Khilanch	5	20	Dhailphoo-Gwar, Bhadeli-Gwar, Brajeegang	5-6	4-5

Rate of Keda jadi was ? 1.10-2.40 Lakh / Kg

ANNEXURE IV

Excerpts of interaction with the middle men at medicinal plant mandi Bibiwala

Name -Atol Singh Rana, **Village:** Badkot (Uttarkashi)

Mr. Atol is a seller/ collector of Jhula (Lichen) from Badkot, Uttarkashi. He has brought 2 truck of Jhula for sale auction at Uttarakhand Forest Corporation mandi at Bibiwala, Rishikesh. A single truck having 40-50 quintal of lichen costs him ₹ 14000-15000 as freight. He has been coming to this mandi from 2004-2005 the year Rishikesh mandi got operational. Earlier he was going to Ramnagar mandi for selling the collected forest material. He mentions that the whole forest produce of Tehri and Uttarkashi district is brought for auction at Bibiwala mandi Rishikesh whereas the forest produce of Chamoli district goes to both Ramnagar and Rishikesh mandis. Mr. Rana comes to sell forest produce in the mandi throughout the year except during monsoon season when there is no collection from the forest. He says that he has signed a bond with District Bhesaj Sangh which authorizes him to collect lichen and bring it for sale in mandi. He has paid 532/quintal as fees to the Bhesaj Sangh.

Some of the villages engaged in the collection of Jhula from his area are Kansheru, Bhatia, Kapnor, Nandgaon, Ghantarri, Ratghadi, Hanuman chatti, Janki Chatti and most of the villages of Yamnotri Range. The wages paid to labour for collection ranges from ₹ 110-200 per Kg depending on the quality of material. The residents of villages earn their livelihood through collection of Jhula from forest and on an average a family can collect 3-4Kg of Jhula in a day. Apart from collecting Jhula he runs a government ration shop in his village and also is involved in the trade of collecting pine resin from the forest which is collected during April – October from the forest. 4-5 Kg of resin is extracted from a single tree in a season. Extracted resin is brought to forest department for sale. For collection of resin he has signed a bond with the forest department and a section of trees of around 3000-4000 trees is allotted to him from which he has to extract resin. If he extracts less than the required quantity a penalty of ₹ 500 per quintal has to be paid. Open tender is done by the forest department for the collection of resin from the forest and the state earns the highest revenue from the sale of resin as an NTFP. He got the contract for collection of resin at the rate of ₹ 2400/quintal for collection of resin which includes labour charges, collection, and transportation of resin from the forest. He employs labour at the rate of ₹ 1500/ quintal. A forest area is open for collection on a rotational basis generally as per of Working Plan of the forest.

Name: Gajendra Negi,

Village: Gopeshwar (Chamoli)

Mr. Gajendra Negi is the biggest collector of Jhula from District Chamoli. He informs that the reserved forest area is opened for collection by Forest Department as per the Working Plan from 1st of October to 31st of March in a year on a rotational basis of 4 years. Van Panchayat also have their micro Working Plans made by the DFO for a period of five years on the basis of which collection from the forest is done.

Lichen or Jhula as it is known locally, according to him, is important for trees growing on higher altitude and has a short life span therefore, it gets degraded if not collected from the forest time to time. Lichen reproduces well after it is collected as the part remaining on the tree regrows. Jhula, moss grass and tejpatta are some of the NTFPs which are collected and brought for sale by him at Bibiwala mandi which fetches him good profit. Moss grass is brought to forest mandi from April to June as this is the season when there is demand from nursery growers. Jhula is brought twice every month except during monsoon.

He collects Jhula from Chamoli district which falls under three forest divisions viz. Badrinath, Kedarnath and Nanda Devi National Park where one or the other range is open for collection as per the Working Plan. As Chamoli is the hub for Jhula collection so the villagers earn good money and are dependent on it for their livelihood. A person who takes his livestock for grazing in forest may collect around 3 Kg Jhula, sell it to the middleman and earn ₹ 450 in a day. Some of the villages where the locals earn handsomely by collecting Jhula are Kimoli, Dungi, Sarankot and Bainthi (Narayan Bagad block) Pagna, Matai, Kundi (Ghat block) Nijmola

(Chamoli block) and Salan (Joshimath block). Around 85% of the villagers collect Jhula for their livelihood in Chamoli. The collection from the forest by a family vary between 5-15 Kg per day. Sometimes, especially during April when harvesting season starts and the villagers get engaged in agricultural activities, labour from outside is also employed for collecting Jhula from wild. In winter season during snowfall Jhula growing on the branches of the trees falls due to weight of the snow and is thus easily available for collection. The Jhula collected during this period is without debris and is highly priced.

He also collects Chirgulia and tejpatta from the forest but mentions that tejpatta is open for lopping once in a five year period as it takes 3-4 years for the leaves to mature. The process for getting collection rights for tejpatta is tough. He has brought 2 trucks of Jhula and 1 truck of Chir Farrata. On transportation he has spent around 16,000-17,000. He is helpless to buy Chir Farrata from the villagers who come to him to sell Jhula, otherwise they would go elsewhere to sell it along with Jhula, a priced commodity. There is not much profit in selling Chir Farrata as it costs him ₹ 20/per kg in bringing it to mandi and sells at ₹ 17-18/per kg. He is not involved in collection of other medicinal plants, as he feels, the process of obtaining the forest permit is very tough and the margins are very less. Collection from the forests should start from 1st October every year but due to delay in obtaining permits the collection in his area usually starts from December legally. Though people start collecting stealthily so as not to miss the optimum collection period.

He further mentions that since 2007 the state level meeting of the Collection Committee of the Forest Department hasn't taken place. He mentions that the Forest Working Plan of Badrinath Forest Division was expired in 2013. The new Working Plan should have been implemented from 2014 but still the Working Plan of the division hasn't received the approval from authorities at the Central Government. In such cases working schemes may be prepared by the concerned DFO and approved by CCF which prescribe collection from the forest for one year.



**Uttarakhand State Council for Science & Technology
(UCOST)**

Department of Science & Technology
(Govt. of Uttarakhand)
VIGYAN DHAM Jhajra Via Premnagar,
Dehradun – 248007, Uttarakhand (INDIA)

M. 9412051556/57
Tel : +91-135-2762526(f)