



# Conserving bioresources for better livelihoods

## Identifying tradeable and potential bioresources for ABS in Kumaun, Uttarakhand

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## Foreword

**DR. RAKESH SHAH,**  
**CHAIRMAN UBB**

Conservation of biodiversity, sustainable use of its components and the fair and equitable sharing of benefits arising out of the utilisation of genetic resources are the three main objectives of the Convention of Biodiversity to which India is a party. In view of the International obligation and for achieving the objectives of the convention, Biological Diversity Act, 2002 was promulgated by the Government of India which became effective from 05th February 2003.

In view of the power conferred under Section 63 of the Act to State Governments, 'Uttarakhand Biodiversity Rule 2015' was notified by the Government of Uttarakhand on 4th of January 2017. Uttarakhand Biodiversity Board (UBB) is facilitating the implementation of the provisions of the Biological Biodiversity Act, 2002 and also helping in generating funds and other resources from the process of sharing of the benefits arising out of the utilisation of genetic resources (ABS) which is strengthening the local people's ability to protect, conserve, develop and make sustainable use of natural resources.

This document is a compilation from the study conducted as part of Indo-German ABS partnership project in three districts of Kumaun region, to assess the bioresources, different supply chains and identify ABS potential species. The findings of the study, will help in developing ABS mechanism through market linkages and strengthening the capacities of the Biodiversity Management Committee's (BMC).



**MR. S.S. RASAILY,**  
**MEMBER SECRETARY UBB**

India is one of the 17 mega-diverse countries in the world. It faces unique circumstances as well as challenges in the conservation of its rich biological heritage. Biodiversity supports millions of Indians in their livelihoods and ways of life, therefore, maintaining its rich biodiversity and natural resources is essential for achieving inclusive and sustainable development.

ABS refers to the way in which genetic resources and associated traditional knowledge may be accessed and how the benefits that result from their use are shared between people or countries using the resources (users) and the people or countries that provide them (providers).

The ABS Partnership Project aims at strengthening the capacities of various stakeholders, as well as raising awareness and build the capacities of the commercial user groups of biological resources and associated knowledge for the effective implementation of ABS mechanisms under the Biological Diversity Act 2002, in keeping with India's commitments under the Nagoya Protocol, 2010.

UBB is working with different stakeholders to implement the Biodiversity Act 2002. Formation of BMC's is being done at block and village level. People's Biodiversity Registers's (PBR) are being developed to document the biodiversity at the local level.

This study conducted as part of the ABS partnership project is to identify the traded bioresources in selected districts of Kumaun region of Uttarakhand, identify the supply and value chain of bioresources and identify the potential bioresources for ABS. The learnings from the study will help to strengthen the mechanism of ABS in the state. UBB and GIZ will be working with the BMC's in the next step to develop their capacities and benefit them from ABS by developing their market linkages.



**DR. KONRAD UEBELHÖR,**  
**DIRECTOR IGBP GIZ**

The ABS partnership project is a technical cooperation between India and Germany and is commissioned by the Federal Ministry for Economic Cooperation and Development (BMZ) under the Indo-German Biodiversity Programme.

The project is being implemented in partnership with the Ministry of Environment, Forest and Climate Change (MoEF&CC), National Biodiversity Authority and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH with three pilot State Biodiversity Boards namely, Uttarakhand, Maharashtra and Tamil Nadu.

This document is part of the study conducted under the ABS partnership project in selected districts of Kumaun region. The study gives a way forward to work towards ABS mechanism for some of the identified bioresources by raising awareness, strengthening capacity of the BMC's and strengthening the value chain. GIZ along with UBB will be working on the findings of this study for better implementation of ABS in the state of Uttarakhand.

# Background

The Access and Benefit Sharing (ABS) Partnership Project under the Indo-German Biodiversity Programme is implemented by the National Biodiversity Authority (NBA), Ministry of Environment, Forest and Climate Change, Government of India (MoEF&CC) and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, commissioned by the German Federal Ministry for Economic Cooperation and Development (BMZ). The aims of the project are:

- (a) To create awareness and communication strategies for better understanding among different actors and stakeholder groups of the Biological Diversity Act 2002 (BDA), the ABS Guidelines and the Nagoya Protocol on ABS;
- (b) Development, documentation and dissemination of ABS good practices; and
- (c) Development of an IT-based ABS monitoring tool for NBA.

## Introduction

Forest based resources have always played a pivotal role in the sustenance of human civilisation and they continue to serve the human development worldwide. As of today, forest products constitute an important source of livelihood for millions of people across the world (Ali and Rahut, 2018<sup>1</sup>).

However, the economic value of most of these forest resources is often not captured appropriately by the market. Accordingly, the potential value of biodiversity is often underestimated. The resulting low value must be considered as one of the factors that cause rapid loss of habitats and species, and the overall depletion of biodiversity in the state. Secondly, most of the existing bio-resources are on common land and their property rights are not defined clearly. Hence, the goods and services derived from these bio-resources often experience market failure or market distortions. The report of The Economics of Ecosystems and Biodiversity (TEEB) launched at the Convention on Biological Diversity in 2010 (CBD-COP 10) emphasized the need of a comprehensive economic valuation of biodiversity in a broader sense.

The Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (hereafter, “the Nagoya Protocol”) to the Convention on Biological Diversity (CBD) was adopted in 2010. Its objective is the fair and equitable sharing of the benefits arising from the utilisation of genetic resources and traditional knowledge, with the aim of contributing to the conservation of biological diversity and the sustainable use of its components (Nelliyat and Pisupati, 2003<sup>2</sup>).

1 Ali, A. and Rahut, BD, 2018. Forest-based livelihoods, income, and poverty: Empirical evidence from the Himalayan region of rural Pakistan *Journal of Rural Studies* 57 • January 2018.

2 Nelliyat. P. and Pisupati. B., 2014. Economic valuation of bio resources for access and benefit sharing. Report, National Biodiversity Authority, Chennai.

The Indian Parliament provided the basis for the national implementation of the CBD by enacting the Biological Diversity Act (BDA) in 2002. In compliance with the CBD, the BDA 2002 directs towards better conservation, the sustainable use of biological diversity, and the fair and equitable benefit sharing from the use of biological resources and related traditional knowledge. For the implementation of the BDA, the government devised a three-tier system consisting of (1) the National Biodiversity Authority (NBA), established in 2003 under the Ministry of Environment, Forests & Climate Change, (2) individual State Biodiversity Boards (SBBs), and (3) Biodiversity Management Committees (BMCs) at the local level.

The ABS Partnership Project aims at strengthening the existing three tier regulatory system and contributes to facilitate partnerships among providers and users of biological resources by bridging a broad range of stakeholders such as policy makers, traders and manufacturers, relevant line departments, and legal professionals.

On this basis, the present study was designed to explore the current usage of bio-resources and their trade in selected districts of the State of Uttarakhand. In Uttarakhand, the relationship between forests and communities is very close because the forests play a pivotal role for the economy and mountain ecology of the state.

## Objectives

The study was carried out to (a) identify bio-resources with ABS potential in selected areas of Kumaun, (b) to understand the existing supply chains of these traded bio-resources and to locate possible gaps. To achieve the above, the following individual objectives were formulated:

- Provide an assessment of traded key bio-resources in the selected districts (i.e. Almora, Pithoragarh and Udham Singh Nagar);
- Generate a comprehensive list of those bio-resources and their uses which emerge as having promising ABS potential;
- Identify all the key stakeholders who are or are to be involved in the trade of these bio-resources.

## Study Area

Uttarakhand's 13 districts are divided into a western and eastern division. The study was conducted in three districts of the eastern Division of Kumaun.

The study districts within the Kumaun Division are distinctly different pertaining to their position within the southern downslope of the Himalayas. The district of Udham Singh Nagar is located in the foothills of the Himalayas (Tarai region) at main elevations ranging between 220–320 m above sea level. The district of Almora is located at the mid of the downslope with

elevations mainly between 640–2500 m a.s.l. The district of Pithoragarh at its northernmost extension finally meets the central range of the Himalayas, and thus, its elevation range expands from valley floors at about 1300 m to high altitudes of about 6100 m a.s.l. With respect to the different elevation ranges, the study included bio-resources from lowland to high alpine ecosystems as well as the related traditional knowledge of their use.



The survey in the district of Almora included the nearby villages of Danya, Lamgara, Dwarahat, Hawalbag. In the district of Pithoragarh the nearby villages of Dharchula, Didihat, and Munsyari were included. In the district of U. S. Nagar, the survey included the nearby villages/areas of Khatima, Sitarganj, and Rudarpur.

## Methods

The following methodology was adopted for conducting the bio-resource assessment:

- a) Secondary Data Collection and Review of Literature related to trade of bio-resources: Secondary information was collected by means of a literature review of available sources such as government and related organisation/institutes, industries, universities, and NGOs which have worked specifically on bio-resources.
- b) Primary Data Collection: For primary data collection, research on the following items was conducted:
  - i) Identification of Stakeholders in the supply chains.
  - ii) Site and village parameter.
  - iii) Survey of industries along the supply chains.
  - iv) Participatory Rural Appraisal (PRA) (Freudenberger, 1999<sup>3</sup>).
  - v) Individual Interviews

A thorough survey was organised in all three districts for the development of the list of bio-resources with ABS potential. Data was collected from UFDC depots, Bhesaj Sangh, and Kumaun Mandal Vikas Nigam (KMVN). Information was also derived from meetings with representatives of line departments, collectors, academicians and farmers. In addition, surveys were conducted at the two major markets (Mandi) of Tanakpur and Ramnagar. Participatory Rural Appraisal (PRA) was conducted in the selected villages of each district. The PRA provided

<sup>3</sup> Freudenberger. D., 1999. Guidelines for Enhancing Grassy Woodlands for the Vegetation Investment Project. Consultancy report to Greening Australia ACT & SE NSW, Inc. CSIRO Wildlife and Ecology, Canberra.

information specifically about (a) bio-resources with ABS potential for livelihood generation, and (b) the existing supply chains of those bio-resources. Bio-resources which fell under the category of “Normally Traded as Commodity” were excluded from the list.

## Findings

A list of bio-resources with promising ABS potential within the three target districts of Uttarakhand's Kumaun region was prepared based on primary and secondary information (Table 1) collected from various sources which have professional expertise in either bio-resource management or business: The Forest Department of Uttarakhand, the Uttarakhand Forest Development Cooperation (UFDC), Bhesaj Sang, Bhasaj Vikas Samiti, the Herbal Research and Development Institute (HRDI), the GB Pant National Institute of Himalayan Environment and Sustainable Development (GBPNIHESD), the Kumaun University, Kumaun Mandal Vikas Nigam (KMVN) and other related organisations and institutions, as well as industries, traders, manufacturers, NGOs, SHGs, traditional healers and other individuals involved in the cultivation and collection of bio-resources.

**Table 1: List of bio-resources within the three study districts of Kumaun screened for ABS potential**

Sl.	Common name	Botanical Name	Use	Herb/Shrub/Tree
Pithoragarh District				
1.	Yarshagumba	<i>Ophiocordyceps sinensis</i>	Medicine	Herb
2.	Castor	<i>Ricinus communis</i>	Medicine (Oil)	Shrub
3.	Giloy	<i>Tinospora cordifolia</i>	Medicine	Climber
4.	Mehandi	<i>Lawsonia inermis</i>	Medicine	Shrub
5.	Reetha (Soap nut)	<i>Sapindus mukorossi</i>	Medicine	Tree
6.	Jambu	<i>Allium stracheyi</i>	Medicine, Spice	Herb
7.	Gandrayan/Chipi	<i>Angelica glauca</i>	Medicine, Spice	Herb (Root)
8.	Heeng	<i>Ferula asafoetida</i>	Medicine, Spice	-----
9.	Buransh	<i>Rhododendron arboreum</i>	Medicine, Spice	Tree
10.	Amla	<i>Emblca officinalis</i>	Medicine	Tree
11.	Aloe-vera	<i>Aloe sinkatana</i>	Medicine,	herb
12.	Sheep Wool		Craft	Hair
13.	Ateesh	<i>Aconitum heterophyllum</i>	Medicine, Spice	Shrub
14.	Nettle	<i>Urtica dioica</i>	Medicine	Shrub
15.	Chukh	<i>Hippophae salicifolia</i>	Medicine, Spice	Shrub/Fruits
16.	Hatthajari/ Salampanja	<i>Dactylorhiza hatagirea</i>	Medicine, Spice	shrub
17.	Lichen	<i>Parmelia perlata</i>	Medicine	Lichen

Sl.	Common name	Botanical Name	Use	Herb/Shrub/Tree
18.	Kala jeera	<i>Carum carvi</i>	Medicine	Seeds
19.	Kali jeeri	<i>Centratherum anthelminticum</i>	Medicine	Seeds
20.	Kutki	<i>Picrorhiza kurroa</i>	Medicine	Shrub
21.	Moss Grass	<i>Bryophytes</i>	Medicine	Lichen
22.	Pine	<i>Pinus roxburghii</i>	Resin/terpentine/biroza	Tree
23.	Pine Guliya	<i>Pinus roxburghii</i>	Fuel/Dhoop/Hawan Samagri	Wood
24.	Chyura	<i>Diploknema butyracea</i>	Edible oil/Ghee	Seeds

### Almora District

1.	Pine	<i>Pinus roxburghii</i>	Resin	Tree
2.	Wild Apricot	<i>Prunus armeniaca</i>	Medicine/Fruit/Oil/other products	Tree
3.	Pati	<i>Artemisia nilagirica</i>	Medicine	Herb
4.	Bichhu Ghas	<i>Urtica dioica</i>	Medicine	Shrub
5.	Walnut	<i>Juglans regia</i>	Fruits/Oil	Tree
6.	Lichen	<i>Parmelia perlata</i>	Medicine	Lichen
7.	Pashan Bhed	<i>Bergenia ciliata</i>	Medicine	Herb
8.	Aloe-vera	<i>Aloe sinkatana</i>	Medicine	Herb
9.	Shatavari	<i>Asparagus racemosus</i>	Medicine	Climber
10.	Buransh	<i>Rhododendron arboreum</i>	Medicine, Spice	Tree
11.	Berberis	<i>Berberis aristata</i>	Medicine	Shrub
12.	Pepal	<i>Ficus religiosa</i>	Medicine	Tree
13.	Bamboo	<i>Bamboo Spp.</i>	Handicraft	(Stem
14.	Nettle	<i>Urtica dioica</i>	Medicine	Shrub
15.	Chamomile	<i>Matricaria chamomilla</i>	Tea	Leaves
16.	Hedgehog coneflower	<i>Echinacea purpurea</i>	Medicine	Flowers
17.	Moss Grass	<i>Bryophytes</i>	Medicine	Lichen
18.	Timur	<i>Zanthoxylum armatum</i>	Medicine	Shrub

### Udham Singh Nagar District

1.	Eucalyptus	<i>Eucalyptus Spp.</i>	Paper/Plywood/Matchwood	Tree
2.	Salix	<i>Salix munja</i>	Paper/Plywood/Matchwood	Tree
3.	Poplar	<i>Populus ciliata</i>	Paper/Plywood/Matchwood	Tree
4.	Kattha	<i>Acacia catechu</i>	Kattha	Tree

Sl.	Common name	Botanical Name	Use	Herb/Shrub/Tree
5.	Castor	<i>Ricinus communis</i>	Medicine (Oil)	Shrub
6.	Jamun	<i>Syzygium cumini</i>	Medicine/Fruits/Seed	Tree
7.	Amla	<i>Embllica officinalis</i>	Medicine	Tree
8.	Harar	<i>Terminalia chebula</i>	Medicine	Tree
9.	Bahera	<i>Terminalia bellirica</i>	Medicine	Tree
10.	Rohani	<i>Mallotus Philippinensis</i>	Dye	Tree
11.	Lemon Grass	<i>Cymbopogon flexuosus</i>	Medicine	Herb
12.	Indian Bay Leaf	<i>Cinnamomun tamala</i>	Spice	Tree
13.	Karipatta	<i>Murraya koenigii</i>	Spice	Shrub
14.	Bael	<i>Murraya koenigii</i>	Fruit/squash	Tree

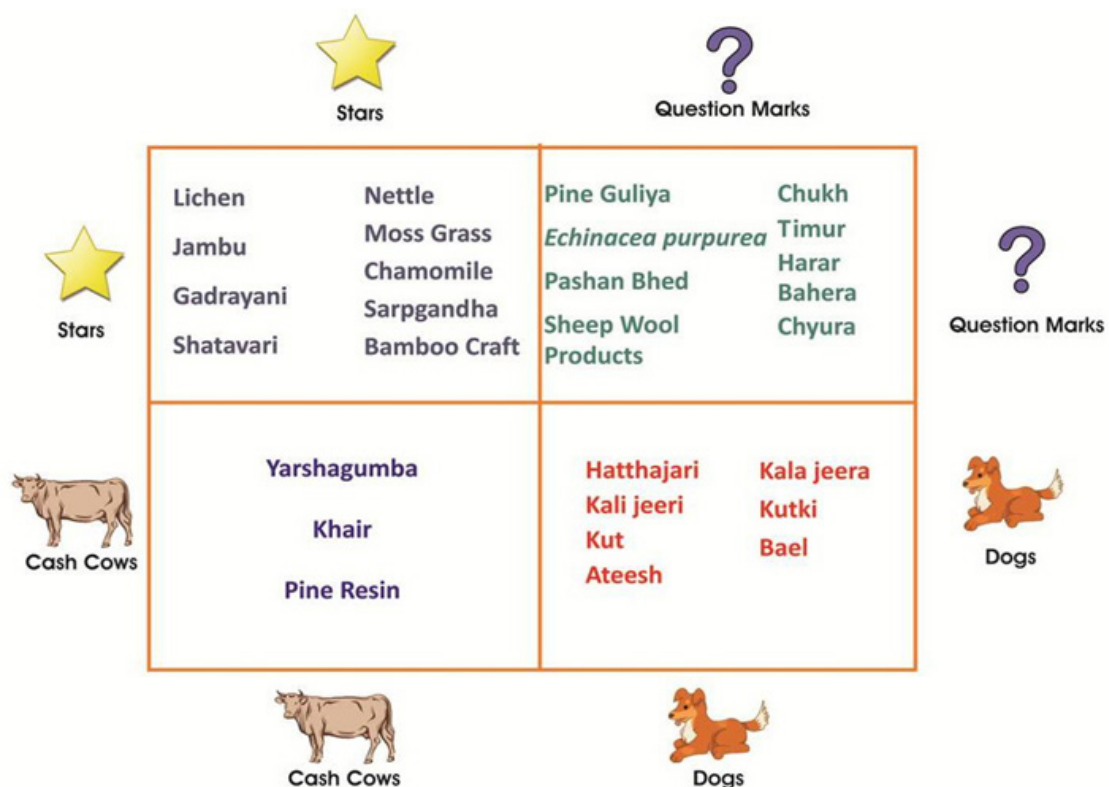
## Identification of potential bio-resources

The Boston Consulting Group developed a tool called BCG matrix for categorising the products of a company in relation to the overall life cycle of the individual products. The life cycle of the products is based on observations and weighing pertaining to their market development. To analyse and weigh all the products offered by one company, the BCG matrix places each of the products according to the growth rate of the business and the relative market share that one individual product controls. The original BCG matrix included four categories of product performance named “Stars”, “Cash Cows”, “Question Marks”, and “Dogs”. By identifying into which quadrant of the BCG matrix a product falls can provide valuable guidance to management for evaluating the possible future and value of the specific product within the company’s business portfolio.

In the present study, a BCG matrix was used to identify bio-resources with promising ABS potential, and hence, the performance categories are briefly explained.

- 1. Stars:** In this matrix section those products are placed, which show a relative high position in terms of market share in a growing market. Although these products may require large investments to maintain the market share, they usually produce more than sufficient revenue to cover those extra expenses. Based on the empirically confirmed basis of the BCG matrix analysis, it is recommended that companies make it a top priority to maintain the market share of products in the star quadrant of the BCG matrix to increase sales. When the product enters maturity and growth rates decline below 10%, the maintenance of the market share will require less investment but produce similar revenue, and thus the “Stars” turn into “Cash Cows”.

- 2. Cash Cows:** Cash cows produce substantial profits for the company as they require little investment to maintain their high market share. To adapt and develop the company business, managers can divert profits from cash cows to (a) facilitate the defending of the market shares of star products, (b) develop new products for emerging markets, or (c) turn struggling products around. While cash cows often provide the largest profit margin within a given portfolio, the company interested in maintaining long-term profitability must invest in defending and creating star products that will turn into cash cows.
- 3. Dogs:** These are low market-share products that show poor growth. Managers would minimise the number of dogs in the product portfolio. While many managers seek the challenge of trying to turn a dog product around, special scrutiny is recommended for any investment in dog products. Companies should decide whether to find a niche in the product's market to control or divest from the product entirely to free up resources for more profitable ventures.
- 4. Question Marks:** The most worrisome quadrant in the BCG matrix includes products which show only relatively weak positions in high-growth market areas. These “Question Mark” products require large investments to develop. Even with substantial funding, such products may suffer from the fierce competition in the high-growth market area. Managers ought to consider the likelihood and means of increasing market share, such as specialising



**FIG. 1** BCG MATRIX OF POTENTIAL BIO-RESOURCES FOR ABS IN THE KUMAUN REGION, UTTARAKHAND, INCLUDING THE ORIGINAL MATRIX NOMENCLATURE

in a niche market, before allocating additional resources to products of “Question Mark” performance. If such a product is less likely to capture a niche market or stand out against the better established competition, a company should divest to increase its overall profitability.

In the present study, the performance categories Star, Cash Cow, Dog and Question Mark are simplified and later on referred to as A, C (cash-in), D (difficult) and Q (questionable) products, respectively.

### BCG Matrix of Bio-Resources of the Kumaun Region with ABS potential

A BCG matrix was developed to identify bio-resources with ABS potential in the study districts of Almora, Pithoragarh and U S Nagar of the Kumaun Division in Uttarakhand. The criteria that determine the position of bio-resources in the BCG matrix are their current market value, the current demand in terms of weight volume and their present supply.

The output of the BCG matrix analysis indicating the different potential of bio-resources for ABS is compiled district-wise in Table 2.

**Table 2: Economic traits of Bio-Resources in terms of ABS potential as identified through BCG matrix analysis**

SN	Common name	Botanical Name	Use	Herb/Shrub/Tree	BCG Matrix Score
Pithoragarh District					
1.	Ateesh	<i>Aconitum heterophyllum</i>	Medicine, Spice	Shrub	D
2.	Nettle	<i>Urtica dioica</i>	Medicine	Shrub	A
3.	Chukh	<i>Hippophae salicifolia</i>	Medicine, Spice	Shrub (Fruit)	Q
4.	Chyura	<i>Diploknema butyracea</i>	Edible oil/Ghee	Seeds	Q
5.	Gandrayan/ Chipi	<i>Angelica glauca</i>	Medicine, Spice	Herb (Root)	A
6.	Hatthajari/ Salampanja	<i>Dactylorhiza hatagirea</i>	Medicine, Spice	Shrub	D
7.	Jambu	<i>Allium stracheyi</i>	Medicine, Spice	Herb	A
8.	Lichen	<i>Parmelia perlata</i>	Medicine	Lichen	A
9.	Kala jeera	<i>Carum carvi</i>	Medicine	Herb (Seeds)	D
10.	Kali jeeri	<i>Centratherum anthelminticum</i>	Medicine	Herb (Seeds)	D
11.	Kutki	<i>Picrorhiza kurroa</i>	Medicine	Shrub	D
12.	Moss Grass	<i>Bryophytes</i>	Medicine	Lichen	A
13.	Pine	<i>Pinus roxburghii</i>	Resin/terpentine/ biroza	Tree	C
14.	Pine Guliya	<i>Pinus roxburghii</i>	Fuel/Dhoop/Hawan Samagri	Wood	Q
15.	Sheep Wool	-	Handicraft	Hair	Q
16.	Yarshagumba	<i>Ophiocordyceps sinensis</i>	Medicine	Herb	C

SN	Common name	Botanical Name	Use	Herb/Shrub/Tree	BCG Matrix Score
Almora District					
1.	Bamboo	Bamboo spp.	Handicraft	Stem	A
2.	Nettle	<i>Urtica dioica</i>	Medicine	Shrub	A
3.	Chamomile	<i>Matricaria chamomilla</i>	Tea	Herb (Leaves)	A
4.	Hedgehog coneflower	<i>Echinacea purpurea</i>	Medicine	Herb (Flower)	Q
5.	Lichen	<i>Parmelia perlata</i>	Medicine	Lichen	A
6.	Moss Grass	Bryophytes	Medicine	Moss	A
7.	Pashan Bhed	<i>Bergenia ciliata</i>	Medicine	Herb	Q
8.	Pine Resin	<i>Pinus roxburghii</i>	Resin	Tree	C
9.	Shatavari	<i>Asparagus racemosus</i>	Medicine	Climber	A
10.	Timur	<i>Zanthoxylum armatum</i>	Medicine	Shrub	Q
Udham Singh Nagar District					
1.	Bael	<i>Aegle marmelos</i>	Fruit/squash	Tree	D
2.	Bahera	<i>Terminalia Baherlica</i>	Medicine	Tree	Q
3.	Chamomile	<i>Matricaria chamomilla</i>	Tea	Herb (Leaves)	A
4.	Harar	<i>Terminalia chebula</i>	Medicine	Tree	Q
5.	Khair	<i>Acacia catechu</i>	Kattha	Tree	C
6.	Sarpgandha	<i>Rauvolfia serpentina</i>	Medicine	Climber (Roots/Leaves)	Q
7.	Shatavari	<i>Asparagus racemosus</i>	Medicine	Climber	A

Overall, the output of the BCG matrix analysis points to a larger number of bio-resources with high ABS potential (category A) in the higher elevation districts of Almora (six out of ten) and Pithoragarh (five out of sixteen) than in the lowland district of Udham Singh Nagar (two out of seven).

# Key stakeholders and prevalent supply chains

In order to understand the marketing mechanism of bio-resources, the supply chain of each bio-resource with ABS potential was analysed and the key stakeholders were identified. A total of 39 major traders were identified in the three districts during the study. Different stakeholders and supply chains prevalent in the study area are illustrated in the flow chart below:

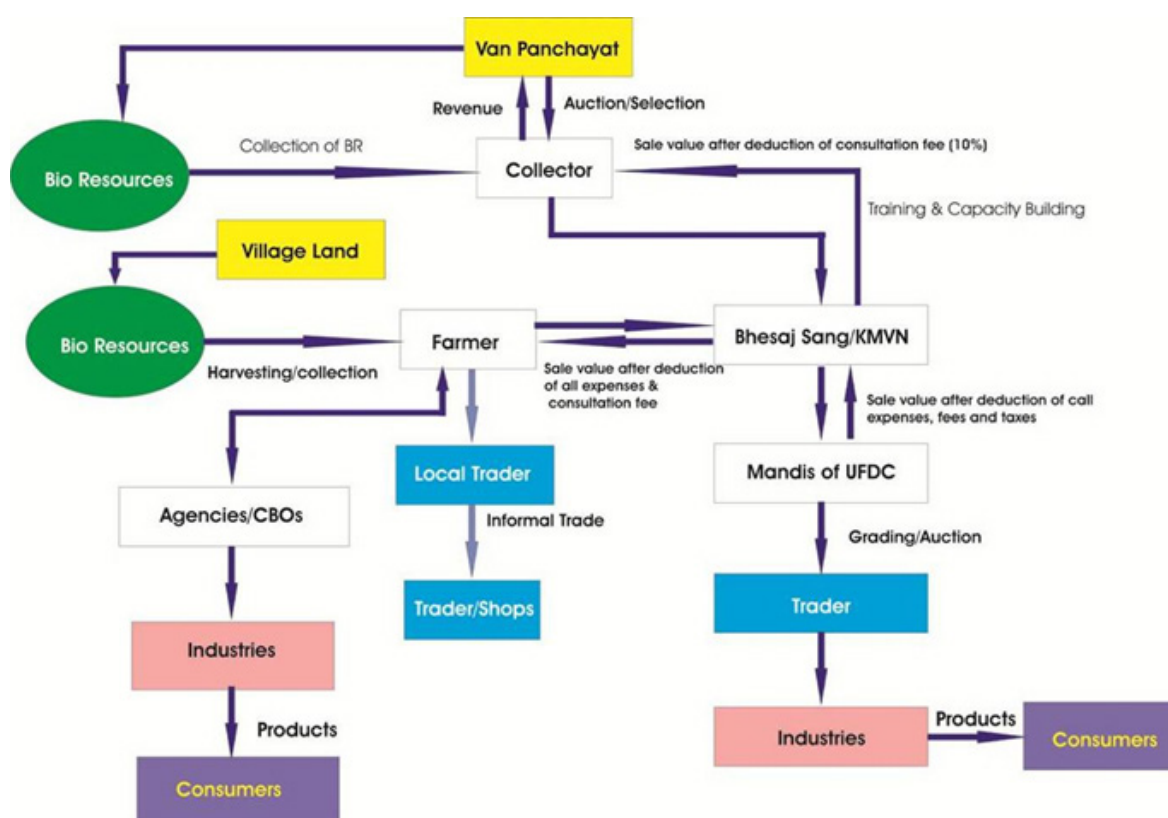
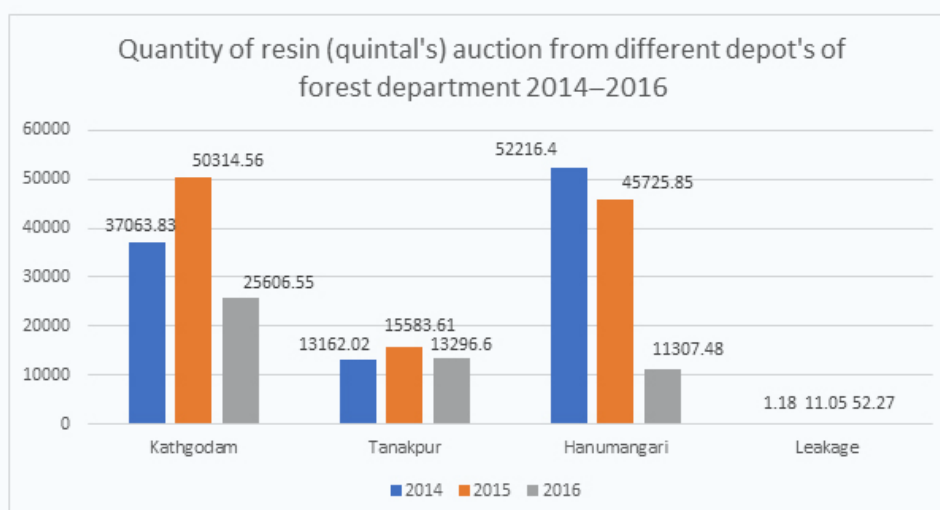
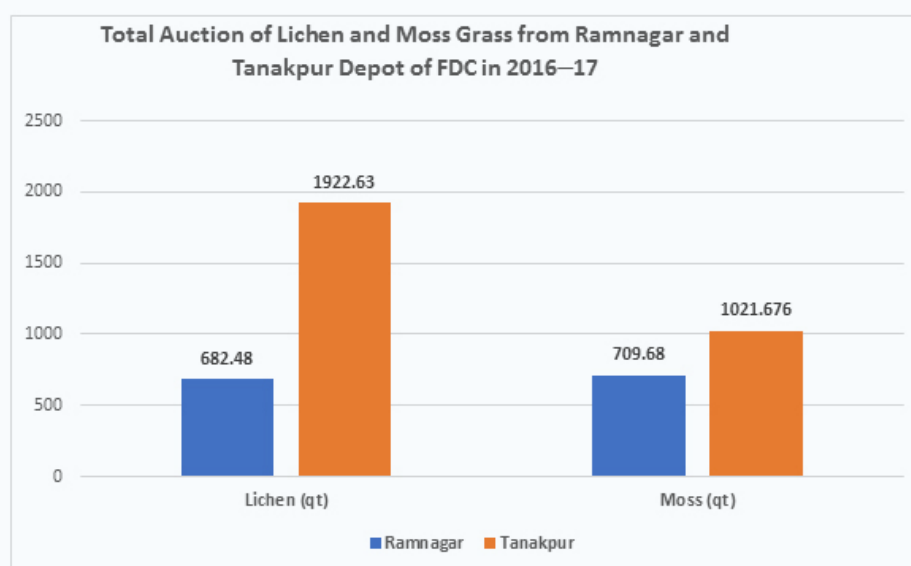


FIG. 2 KEY STAKEHOLDERS AND PREVALENT SUPPLY CHAINS

# Case example of Bio-resources auctioned by the Forest Development Corporation (FDC)

The nodal agency in Uttarakhand for the trade of bio- resources is FDC. FDC deals mainly with the trade of wood, resin, resin wood (pine guliya), lichens and moss. With respect to these FDC auctioned bio-resources, authentic data on quantities was available for the bio-resources lichen, moss grass and resin. Quantities of other bio-resources may be attached with a larger uncertainty due to the diversity of stakeholders and supply chains involved.

The trade quantities of the three bio-resources lichen and moss grass as well as resin is illustrated in Figures 2 and 3, respectively.



# Key Recommendations

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The key recommendations to strengthen ABS in the region are:

- Detailed study of 4-5 potential bio-resources which were identified by the present study for developing a holistic business model in the next phase of the existing project implementation;
- Engaging Village Level Institutions, Federations, Cooperatives and Non-Governmental Organisations (NGOs) for the formation of BMCs and micro-planning of marketing of bio-resources at the village level;
- Pilot project showcasing the development of successful implementation of the ABS mechanism for two bio-resources;
- Establishing small scale processing units to reduce the transportation costs and post-harvest losses. This could be taken up by Uttarakhand State Biodiversity Board;
- Strengthening marketing mechanism of bio- resources in the region through Uttarakhand Forest Development Corporation.

# Conclusion

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The study shows that especially the high elevation districts of Pithoragarh and Almora provide a good number of bio-resources with ABS potential. Projecting portfolio development in professional companies is substantially different from the planning of ABS implementation. This means that economic risks attached to possible products have even more weight and therefore only category A and C bio-resources are to be considered for community-based ABS development.

Climate at the higher elevations of the Himalaya are conducive to bio-resources with relatively high density or concentration of active components e.g. in Chamomilla and Nettle. This can provide options for the development of ABS compliant local product brands based on traditional knowledge or extraction methods. Of particular interest are also those bio-resources, again the example Chamomilla and Nettle, which can be beneficial for subsistence agriculture, small landholdings and other people who can get involved in bio-resource cultivation.

Interaction with 39 traders indicate that their knowledge of BDA and compliant activities is poor, but simultaneously there is immense scope for ABS development in the region. As a follow up within the project, there is scope to form BMCs in the districts where the potential bio-resources exist, and to enable these BMCs through capacity development trainings to implement the ABS mechanism, improve their livelihood and at the same time biodiversity conservation at large.



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