Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu
Division of Agricultural Extension Education

Dr. Rakesh Nanda
Professor and Head
E-mail: rakeshnanda2@rediffmail.com

No.: AUJ/DAEE/2022-23/F-24/896-97 **Date:** 24-08-2022

Er. Kireet Kumar
Director I/C & Nodal Officer, NMHS-PMU
Kosi- Katramal, Almora- 263643 Uttrakhand
India

Subject: Submission of Final Technical Report of the NMHS project "Availability, Utilization and Digital Documentation of Non-Timber Bioresources for Sustainable Rural Livelihood and Decision Support System of the Rural Households in the Northwest Himalayas" along with necessary enclosures.

Sir,

As desired, five hardbound copies of the NMHS project entitled "Availability, Utilization and Digital Documentation of Non-Timber Bioresources for Sustainable Rural Livelihood and Decision Support System of the Rural Households in the Northwest Himalayas", along with Consolidated Utilization Certificate, Consolidated Expenditure Statement and all necessary enclosures, of the above said project is enclosed for your kind consideration.

The project was sanctioned by NMHS vide Ref. No: NMHS_RN_SG_43, Sanction date: 28-03-2018. The project was inter-institutional and was being implemented by SKUAST Jammu. AMITY University, Noida and SMVDU Katra were the implementing partners of the project. The project tenure was from 01-04-2018 to 31-03-2021.

Further, it is stated that during the fund release for 3rd Year, some amount was kept on hold by NMHS. Now there is a shortfall of Rs. 24,843.00 in the manpower head of AMITY, Noida and Rs. 32,748.00 in the manpower head, Rs. 5,000.00 in the consumable head and Rs. 28,868.00 in the institutional charges head of SMVDU Katra. Therefore you are requested to release the balance amount to facilitate the payment to JPFs who have worked in this project and to the institute.

Yours faithfully

(Rakesh Nanda)
Principle Investigator
National Mission on Himalayan Studies (NMHS)
SKUAST-Jammu

Principal Investigator
National Mission on Himalayan Studies (NMHS)
SKUAST-Jammu

Copy to:
- Director Research, SKUAST Jammu for information and necessary action

NMHS-FINAL TECHNICAL REPORT (FTR)

Demand-Driven Action Research Project Grant

NMHS Reference No.:	NMHS_RN_SG_43

Date of Submission:	2	2	0	8	2	0	2	2
	d	d	m	m	y	y	y	y

PROJECT TITLE

AVAILABILITY, UTILIZATION AND DIGITAL DOCUMENTATION OF NON-TIMBER BIORESOURCES FOR SUSTAINABLE RURAL LIVELIHOOD AND DECISION SUPPORT SYSTEM OF THE RURAL HOUSEHOLDS IN THE NORTHWEST HIMALAYAS

Project Duration: *from* **01.04.2018** *to* **31.03.2021**.

***Submitted to*:**
Er. Kireet Kumar
Scientist 'G' and Nodal Officer, NMHS-PMU
National Mission on Himalayan Studies, GBPNIHESD HQs
Ministry of Environment, Forest & Climate Change (MoEF&CC), New Delhi
E-mail: nmhspmu2016@gmail.com; kireet@gbpihed.nic.in; subratabose@nic.in

***Submitted by*:**
Dr. Rakesh Nanda
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Sher-e-Kashmir University of Agricultural Sciences & Technology of Jammu
(SKUAST-J), FoA, Main Campus, Chatha, Jammu, J&K - 180009
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DSL: Date of Sanction Letter

2	8	0	3	2	0	1	8
d	d	m	m	y	y	y	y

DPC: Date of Project Completion

3	1	0	3	2	0	2	1
d	d	m	m	y	y	y	y

Part A: Project Summary Report

1. Project Description

i.	Project Reference No.	**NMHS_RN_SG_43**
ii.	Type of Project	**Small Grant** ✓ | Medium Grant | | Large Grant |
iii.	Project Title	**AVAILABILITY, UTILIZATION AND DIGITAL DOCUMENTATION OF NON-TIMBER BIORESOURCES FOR SUSTAINABLE RURAL LIVELIHOOD AND DECISION SUPPORT SYSTEM OF THE RURAL HOUSEHOLDS IN THE NORTHWEST HIMALAYAS**
iv.	State under which Project is Sanctioned	**Jammu & Kashmir**
v.	Project Sites (IHR States covered) (Maps to be attached)	**1. Jammu & Kashmir** **2. Himachal Pradesh**
vi.	Scale of Project Operation	Local | | **Regional** ✓ | Pan-Himalayan |
vii.	Total Budget/ Outlay of the Project	Rs. 49,08,920.00 (Rs. 51,09,904.00 including arrears sanctioned for revised salary of JRF/JPF) (**0.51 Cr**)
viii.	Lead Agency	**Sher-e-Kashmir University of Agricultural Sciences & Technology of Jammu (SKUAST-J)** www.skuast.org
	Principal Investigator (PI)	**Dr. Rakesh Nanda** (SKUAST-J)
	Co-Principal Investigators (Co-PI)	**1. Dr. Rajinder Peshin** (SKUAST-J) **2. Dr. N. S. Raina** (SKUAST-J) **3. Dr. L. K. Sharma** (SKUAST-J) **4. Dr. B. S. Hansra** (AMITY University, Noida) **5. Dr. R. S. Antil** (AMITY University, Noida) **6. Er. S. B. Kotwal** (SMVDU, Katra) **7. Er. Swastik Gupta** (SMVDU, Katra) **8. Er. Ashish Suri** (SMVDU, Katra)

ix.	Project Implementing Partners	**1. AMITY University, Uttar Pradesh (AAUP), Noida. www.amity.edu** **2. Shri Mata Vaishno Devi University (SMVDU), Katra Jammu. www.smvdu.ac.in**	
	Key Persons / Point of Contacts with Contact Details, Ph. No, E-mail	**Dr. Rakesh Nanda**	Professor and Head, Agricultural Extension Education, Division of Agricultural Extension Education, Block No. 2, Faculty of Agriculture, Chatha, SKUAST- Jammu- 180009 Ph: 9419703645, E-mail: rakeshnanda2@rediffmail.com
		Dr. B. S. Hansra	Professor Emeritus, AMITY University, Sector-125, Noida, Uttar Pradesh - 201313 Ph: 9971254407 E-mail: bshansra@amity.edu
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		Dr. L. K. Sharma	Professor, Agricultural Extension Education Division of Agricultural Extension Education, Block No.2, Faculty of Agriculture, Chatha, SKUAST- Jammu- 180009 Ph: 9419200534 E-mail: drlaxy@gmail.com
		Er. S. B. Kotwal	Assistant Professor, Dept. of Electronics and Communication Engineering, SMVDU University, Katra, Jammu Ph: 7006232937, 01991-285524 Extn: 2331 E-mail: kotwal.sb@smvdu.ac.in
		Er. Swastik Gupta	Assistant Professor, Dept. of Electronics and Communication Engineering, SMVDU University, Katra, Jammu Ph: 9419100914, 01991-285524 Extn: 2340 E-mail: swastik.gupta@smvdu.ac.in
		Er. Ashish Suri	Assistant Professor, Dept. of Electronics and Communication Engineering, SMVDU University, Katra, Jammu Ph: 9419190204, 01991-285524 Extn: 2337 E-mail: ashish.suri@smvdu.ac.in

2. Project Outcome

2.1. Abstract (not more than 500 words) [it should include background of the study, aim, objectives, methodology, approach, results, conclusion and recommendations).

Non-timber bioresources (NTBRs), also known as non-timber forest products (NTFPs), are useful substances, materials or commodities obtained from the forests which do not require harvesting (logging) trees. They include seeds, berries, mushrooms, oils, foliage, medicinal plants, peat, fuel wood, spices and forage. The study was done to explore the status of NTBR collectors in the Himalayan regions of Jammu & Kashmir and Himachal Pradesh. The objectives of the study were to find out the availability and use pattern of NTBR, to identify the production to consumption chain and price spread of different NTBR, to find out the contribution of NTBR income to household income, to delineate the factors driving the dependence of households on NTBR for livelihood security, to find out the constraints and the potential of NTBR for all stakeholders and future interventions required for sustainable livelihood of adjacent communities and to generate digital database and mapping of NTBR. Social research methodology with multistage random sampling was used for the study. This study involved the application of scientific methods through data collection, for understanding, studying and analyzing the social life in the North-Western Himalayan regions of Jammu and Kashmir, and Himachal Pradesh, in order to verify the existing sustenance practices and to help contribute concrete recommendations in order to uplift the same. Non-equivalent control group exploratory research design was employed for the study. Data was collected from 6 forest circles of H.P. and 3 forest circles of J&K after consultation with the officials of respective forest departments regarding NTBR collection, trade and usage.

The major non-timber bioresources (NTBR) available in the region were Kuth (*Saussurea costus*), Dhoop (*Commiphora wightii*), Ratanjot (*Anemone obtusiloba*), Zakhme hayat (*Bergenia ciliata*), Patis (*Aconitum heterophyllum*), Van rohun/ jungle thong (*Allium ursinum*), Guchi/ morels (*Morchella esculenta*), Banafsha (*Viola odorata*), Kod (*Picrorhiza kurroa*), Nagchatri (*Trillium govanianum*), Jungli lahsun/ thomb, Beladona (*Atropa acuminata*) and Mushkbala (*Valeriana wallichii*). Kuth (*Saussurea costus*), was locally being used for cough and as anti cloth mite. Dhoop (*Commiphora wightii*) roots were processed by drying and grinding and used to make incense/ fragrance and also used as air purifier. Zakhme hayat (*Bergenia ciliata*) whole plant was being collected and generally grinded roots and leaves were used for wound healing by local application. The roots and tuber of Patis (*Aconitum heterophyllum*) was being collected and used for fever, cough and anthelminthics. The overall income contribution of NTBRs to the rural households in the Northwest Himalayan households of Jammu and Kashmir was found to be around Rs. 38,905/- per annum. The NTBR income contributed to about 18.98 per cent to the household incomes with the minimum contribution being 0.67 per cent and maximum contribution of about 78.13 per cent. Overall, the variables positively affecting the dependence on NTBR collection were; number of males in family, number of females in family and practicing animal husbandry. The chi-square value was 101.529, with a p-value of 0.000 and Nagelkerke's R^2 value was 0.269. However, NTBR collection practice was declining with the possession of mobile phones by the respondents, having a nuclear family and practicing farming/ agriculture. The most serious constraints as expressed by the NTBR collectors of North West Himalayas were untimely issuance of transport permission by forest department (90%), wild weeds (88%), bad weather (80%) and improper weighing system (81%).

The study has brought into focus many problems relating to the cultivation and marketing of NTBRs in the study areas. In order to meet the growing requirements of NTBRs (mainly medicinal and aromatic plants) emphasis is needed on their marketing potential. Relying only on natural production sites will pose serious problems in sustainable management of NTBRs. The area under investigation is having lot of NTBR resources but the collectors collect only those NTBRs which give them benefit regarding economic, personal use and medicinal purposes.

2.2. Objective-wise Major Achievements

S. No.	Objectives	Major achievements (in bullets points)
1.	To find out the availability and use pattern of NTBR	• The major non-timber bioresources (NTBR) available in the region were Kuth (*Saussurea costus*), Dhoop (*Commiphora wightii*), Ratanjot (*Anemone obtusiloba*), Zakhme hayat (*Bergenia ciliata*), Patis (*Aconitum heterophyllum*), Van rohun/ jungle thong (*Allium ursinum*), Guchi/ morels (*Morchella esculenta*), Banafsha (*Viola odorata*), Kod (*Picrorhiza kurroa*), Nagchatri (*Trillium govanianum*), Jungli lahsun/ thomb, Beladona (*Atropa acuminata*) and Mushkbala (*Valeriana wallichii*). • There were a lot of local and indigenous uses for various NTBR explored during the study. The major reason of collection of these NTBR was economic benefits the collectors got by selling them to contractors, legally or even illegally, to sustain their livelihood. • The household and medicinal uses of these NTBR were among other reasons of collection by the NTBR collectors. • Some of the local uses of NTBR were also documented, e.g. Kuth (*Saussurea costus*), was locally being used for cough and as anti cloth mite. • Dhoop (*Commiphora wightii*) roots were processed by drying and grinding and used to make incense/ fragrance and also used as air purifier. • Zakhme hayat (*Bergenia ciliata*) whole plant was being collected and generally grinded roots and leaves were used for wound healing by local application. • The roots and tuber of Patis (*Aconitum heterophyllum*) was being collected and used for fever, cough and anthelminthics.

2.	To identify the production to consumption chain and price spread of different NTBR	Broadly, five marketing channels were identified and used for classification: • **Channel- A:** NTBR collector – Consumer, e.g. *Morchella esculenta, Matteuccia struthiopteris* and *Pinus gerardiana* • **Channel- B:** NTBR collector – Local retailer – Consumer, e.g. *Matteuccia struthiopteris, Pinus gerardiana, Bauhinia variegate* and *Myrica esculenta.* • **Channel- C:** NTBR collector – Local trader/ middleman – Contractor – Consumer, e.g. *Morchella esculenta, Viola odorata, Terminalia chebula, Picrorhiza kurroa, Angelica glauca, Saussurea costus* and *Pinus roxburghii* • **Channel- D:** NTBR collector – Local trader/ middleman – Mandi (Amritsar/ Delhi) – Retailer – Consumer, e.g. *Allium sativum, Trillium govanianum* and *Morchella esculenta.* • **Channel- E:** NTBR collector – Local trader/ middleman – Contractor – Mandi (Amritsar/ Delhi) – Retailer – Consumer/ Export, e.g. *Morchella esculenta, Trillium govanianum* and *Allium sativum.* • There was a huge price spread for different NTBR e.g. *Saussurea costus* fetched Rs. 100-150/Kg to NTBR collector, whereas the contractors sold it for Rs. 300-400/Kg and in mandi it was sold for Rs. 350-500/Kg. Similarly, the NTBR collectors got Rs. 5000-6000/Kg for *Morchella esculenta,* whereas the contractor sold it around Rs. 10,000/Kg and in mandi it was sold at about Rs. 12,000-15,000/Kg in the year 2019-20.

3.	To find out the contribution of NTBR income to household income	• The overall contribution of NTBRs to the rural households in the Northwest Himalayan households of Jammu and Kashmir was found to be around Rs. 38,905.00 and from Himachal Pradesh was around Rs. 28,478.61. • The mean annual income of the NTBR collectors from all sources was about Rupees Two Lakh. Out of the total income, about Rupees Thirty Two Thousand was contributed by NTBR income in J&K and Himachal Pradesh. • The NTBR income contributed to about 18.98 per cent to the household incomes with the minimum contribution being 0.67 per cent and maximum contribution of about 78.13 per cent.
4.	To delineate the factors driving the dependence of households on NTBR for livelihood security	• Overall, the variables positively affecting the dependence on NTBR collection were; number of males in family, number of females in family and practicing animal husbandry. • The chi-square value was 101.529, with a p-value of 0.000 and Nagelkerke's R^2 value was 0.269. Thus, 26.9 per cent variation in the decision to collect NTBR was due to the above factors. • However, NTBR collection practice was declining with the possession of mobile phones by the respondents, having a nuclear family and practicing farming/ agriculture.

5.	To find out the constraints and the potential of NTBR for all stakeholders and future interventions required for sustainable livelihood of adjacent communities	• The overall most serious constraints as expressed by the NTBR collectors of North West Himalayas were; untimely issuance of Form 16, wild weeds, bad weather, improper weighing system, difficulty in identification of useful herbs/ sherbs, danger from wild animals, sloppy and slippery terrains, lack of market facility, conflict with police and forest department officials and forest fires etc. • The contractors expressed the timing of the tender and allotment of work to be around September- October, followed by snowfall in the months of October to March, therefore no collection could be done. • Other constraint of contractors was testing for authenticity of items (medicinal herbs/ plants/ plant parts) which was expensive (average @ Rs. 3000/- per test). • So both the cost of test and location of testing labs was a serious constraint, as the cost of test was sometimes more than the cost of product, if quantity to be sent was small and the cost was to be borne by the supplier. • They suggested a uniform rule for banned forest items throughout the country.

6.	To generate digital database and mapping of NTBR	• Digital databases were generated for the mapping of NTBR in North West Himalayas and the dashboard is available at the address: https://nmhs.skuast.org/ (Hosted on the local servers at SKUAST Jammu) and https://ihyme.com/ntbr/index.php (Mirror copy hosted at the cloud storage). • The dashboard has been developed which could be accessed by any user around the world as it is a web based application and all needed to view this dashboard is an internet connection and a browser. • This dashboard also used the same API endpoints but doesn't allow any used to alter or update the data. It is also created in HTMl5 and JavaScript, is hosted on SERVER-1 and is served using Apache Web Server. • Following databases are available on the dashboard: 1. Descriptive statistics of the NTBR collectors. 2. Descriptive statistics of the non-collectors of the respective areas. 3. NTBR availiablity. 4. NTBR marketing channels. 5. NTBR marketing channels. 6. NTBR pricing. 7. NTBR mapping. 8. NTBR income. 9. NTBR collection constraints. 10. Site photos of the project. 11. Sample photos of various NTBR.

2.3. Outputs in terms of Quantifiable Deliverables*

S. No.	Quantifiable Deliverables*	Monitoring Indicators*	Quantified Output/ Outcome achieved	Deviations made, if any, and Reason thereof:
1.	Digital data base with documentation of the facts regarding availability of forest products and their subsequent utilization/ sale	No. of New Database/ Datasets/ Maps generated on NTBR/Use pattern of NTBR **(Nos)**	Out of total 9 forest circles of H.P. data has been collected from 6 selected forest circles and out of total 7 circles of J&K data has been collected from 3 selected forest circles. A total of 9 digital databases have been created as per the objectives of this study, which is available at https://nmhs.skuast.org/ (Hosted	-

	by the forest inhabitants		on the local servers at SKUAST Jammu) https://ihyme.com/ntbr/index.php (Mirror copy hosted at the cloud storage)	
2.	Mobile-based and web-based Apps to provide a DASHBOARD for decision-support system	No. of Capacity Building, Awareness Generation and Livelihood Generation Trainings or workshops conducted **(Nos)**	A workshop/ meeting was conducted with the NTBR collectors of Chamba region in Himachal Pradesh on 20-12-2019. Training cum workshop for veterinarians of Animal Husbandry Department (J&K) at SKUAST Jammu was conducted on 19-20 Feb, 2020. A two days workshop on **"Important Non-Timber Bio resources: Source of Livelihood for Rural Folks"** was held at Narag, District Sirmaur (Nahan Forest Circle, Himachal Pradesh) w.e.f. February, 4-5, 2021 Video links: 1. https://youtu.be/0mYEiF-svJs 2. https://youtu.be/5VDt0maujgA	-
3.	Effective market linkage to the NTFP collectors with the niche market area for selected villages	No. of Stakeholders benefitted **(No. of Rural Youth, No. of Women, and Total No. of Beneficiaries)** with establishing linkages with niche market and recognition with a sound framework	17 NTBR collectors of Chamba region in Himachal Pradesh were sensitized with niche markets for the trade of NTBRs on 20-12-2019. About 30 participants, farmers and farm women participated in two days workshop at Narag, District Sirmaur (Nahan Forest Circle, Himachal Pradesh) w.e.f. February, 4-5, 2021 (Appendix - 3). Video links: 1. https://youtu.be/tdUK-SNv0jM 2. https://youtu.be/Zwniixc5Bl0	-
4.		**No of data base** added to Mobile-based and web-	A total of 9 digital databases have been created as per the objectives of this study.	-

		based Apps to provide a DASHBOARD for decision-support system		
5.		Other Publications and Knowledge Products (Nos.)	Research articles are in process of publication with reputed journals having NAAS rating more than 4. A training manual with ISBN has been published.	-
6.		Data being uploaded.	Digital databases developed under the project are available at https://nmhs.skuast.org/ (Hosted on the local servers at SKUAST Jammu) https://ihyme.com/ntbr/index.php (Mirror copy hosted at the cloud storage) with a web and mobile based interface.	-

(*) As stated in the Sanction Letter issued by the NMHS-PMU.

2.4. Strategic Steps with respect to Outcomes (in bullets)

S. No.	Particulars	Number/ Brief Details	Remarks/ Enclosures
1.	New Methodology developed	Nil	-
2.	New Models/ Process/ Strategy developed	Nil	-
3.	New Species identified	Nil	-
4.	New Database established	Yes	Dashboard developed
5.	New Patent, if any	Nil	-
	I. Filed (Indian/ International)	N/A	-
	II. Granted (Indian/ International)	N/A	-
	III. Technology Transfer(if any)	N/A	-
6.	Others (if any)	N/A	-

3. Technological Intervention

S. No.	Type of Intervention	Brief Narration on the interventions	Unit Details (No. of villagers benefited / Area Developed)
1.	Development and deployment of indigenous technology	Nil	-
2.	Diffusion of High-end Technology in the region	Field veterinarians trained to make feed blocks from NTBR/ tree foliage.	21

3.	Induction of New Technology in the region	Nil	-
4.	Publication of Technological / Process Manuals	A training manual has been published with ISBN	-
	Others (if any)	N/A	-

4. New Data Generated over the Baseline Data

S. No.	New Data Details	Status of Existing Baseline	Additionality and Utilisation New data
1.	Descriptive statistics of the NTBR collectors.	Baseline data was not available	Can be used by stakeholders and researchers as baseline data and to track changes over time
2.	Descriptive statistics of the non-collectors of the respective areas.	-do-	-do-
3.	NTBR availability.	-do-	-do-
4.	NTBR marketing channels.	-do-	-do-
5.	NTBR marketing channels.	-do-	-do-
6.	NTBR pricing.	-do-	-do-
7.	NTBR mapping.	-do-	-do-
8.	NTBR income.	-do-	-do-
9.	NTBR collection constraints.	-do-	-do-
10.	Site photos of the project.	-do-	-do-
11.	Sample photos of various NTBR.	-do-	-do-

5. Demonstrative Skill Development and Capacity Building/ Manpower Trained

S. No.	Type of Activities	Details with number	Activity Intended for	Participants/Trained			
				SC	**ST**	**Woman**	**Total**
1.	Workshops	2	NTBR collectors to create awareness about importance and judicial extraction of NTBR	**-**	**-**	**5**	**17+30 (47)**
2.	On Field Trainings	Nil					
3.	Skill Development	1	Field veterinarians of Jammu region in Jammu and Kashmir	**-**	**-**	**9**	**21**
4.	Academic Supports	Staff of SKUAST-J	The staff of SKUAST-J was associated	**-**	**-**	**-**	**-**
	Others (if any)	N/A	N/A	**-**	**-**	**-**	**-**

6. Linkages with Regional & National Priorities (SDGs, INDC, etc)/ Collaborations

S. No.	Linkages /collaborations	Details	No. of Publications/ Events Held	Beneficiaries
1.	Sustainable Development Goal (SDG)	Nil	-	-
2.	Climate Change/INDC targets	Nil	-	-
3.	International Commitments	Nil	-	-
4.	Bilateral engagements	Nil	-	-
5.	National Policies	Nil	-	-
6.	Others collaborations	Departments of Forests, Agriculture and Rural Development of J&K and Himachal Pradesh	-	-

7. Project Stakeholders/ Beneficiaries and Impacts

S. No.	Stakeholders	Support Activities	Impacts
1.	Gram Panchayats	Nil	-
2.	Govt Departments (Agriculture/ Forest)	Collaboration in providing support and inputs for data collection for development of databases for study.	-
3.	Villagers	yes	-
4.	SC Community	Nil	-
5.	ST Community	Nil	-
6.	Women Group	Nil	-
	Others (if any)	N/A	-

8. Financial Summary (Cumulative)

S. No.	Financial Position/Budget Head	Funds Received	Expenditure/ Utilized	% of Total cost
I.	Salaries/Manpower cost	16,09,835.00	16,67,426.00	103.58
II.	Travel	11,28,319.00	5,72,509.00	50.74
III.	Expendables & Consumables	1,39,385.00	1,22,436.00	87.84
IV.	Contingencies	91,786.00	82,518.00	89.90
V.	Activities & Other Project cost	1,19,833.00	61,722.00	51.51
VI.	Institutional Charges	4,64,494.00	4,93,362.00	106.21
VII.	Equipments	13,41,000.00	12,81,494.00	95.56
	Total	**48,32,346.00**	**42,81,467.00**	**88.60**
	Interest earned	83,634.00		
	Grand Total	**49,15,980.00**		

* Please attach the consolidated and audited Utilization Certificate (UC) and Year wise Statement of Expenditure (SE) separately, *ref*. **Annexure I.**

9. Major Equipment/ Peripherals Procured under the Project** (if any)

S. No.	Name of Equipments	Cost (INR)	Utilisation of the Equipment after project
1.	Digital Camera (DSLR): Nikon D7200	Rs. 89,450.00	Being used by the department for research and teaching purposes along with maintenance of the dynamic digital dashboard.
2.	Printer: Canon PIXMA G4010	Rs. 17,346.00	-do-
3.	Online UPS (2KVA): Microtek with UPS batteries (6 No.)	Rs. 64,310.00	-do-
4.	Hand held GPS Monitor: Samsung Galaxy Tab A 2017 (SM-T385) (2 No. at SKUAST Jammu and 1 No. at Amity Noida)	Rs. 55,986.00	-do-
5.	Digital Voice Recorder: Tascam Linear PCM Recorder DR-05 (1 No. at SKUAST Jammu and 1 No. at Amity Noida)	Rs. 29,432.00	-do-
6.	SSD Drive 512 GB - WD	Rs. 14,750.00	-do-
7.	Hard disk external 2 TB: Toshiba	Rs. 7,080.00	-do-
8.	High Performance Computer Cluster: Dell Power Edge T640 Server	Rs. 3,90,000.00	-do-
9.	High Performance Storage Server: Dell Power Edge T640 Server, Dell EMC	Rs. 4,38,240.00	-do-
10.	High Performance Workstation: DELL Mobile Workstation at SMVDU Katra	Rs. 1,46,160.00	-do-
11.	I/O Box, CAT 6, PVC Pipe, Patch Cable: D-Link and ors.	Rs. 7,833.00	-do-
12.	8 Port Switch: D-Link and optic fibre	Rs. 12,081.00	-do-
13.	Wireless router: D-Link and wifi dongle	Rs. 8,826.00	-do-

Details should be provided in details **(*ref* **Annexure III &IV).**

10. Quantification of Overall Project Progress

S. No.	Parameters	Total (Numeric)	Remarks/ Attachments/ Soft copies of documents
1.	IHR States Covered	2	J&K and H.P
2.	Project Site/ Field Stations Developed	Nil	-
3.	New Methods/ Modeling Developed	Digitization and database creation	
4.	No. of Trainings arranged	1	Appendix 3
5.	No of beneficiaries attended trainings	21	-do-
6.	Scientific Manpower Developed (Phd/M.Sc./JRF/SRF/ RA):	JRF: 1, JPF: 2	-
7.	SC stakeholders benefited	Nil	-
8.	ST stakeholders benefited	Nil	-
9.	Women Empowered	Nil	-
10.	No of Workshops Arranged along with level of participation	2/ 47	Appendix 3
11.	On field Demonstration Models initiated	Nil	-
12.	Livelihood Options promoted	Sustainable NTBR collection, marketing, preservation and use	-
13.	Technical/ Training Manuals prepared	1	Appendix 1
14.	Processing Units established	Nil	-
15.	No of Species Collected	Nil	-
16.	New Species identified	Nil	-
17.	New Database generated (Types):	Digital databases with dynamic dashboard	https://ihyme.com/ntbr
	Others (if any)	N/A	-

11. Knowledge Products and Publications:

S. No.	Publication/ Knowledge Products	*Number*		*Total Impact Factor*	*Remarks/* Enclosures
		National	International		
1.	Journal Research Articles/ Special Issue:	In process	In process	N/A	In communication with the publishers
2.	Book Chapter(s)/ Books:	2	Nil	N/A	Training manual sent
3.	Technical Reports	1	Nil	N/A	Final Technical Report enclosed

S. No.	Publication/ Knowledge Products	*Number*		*Total Impact Factor*	*Remarks/* Enclosures
		National	International		
4.	Training Manual (Skill Development/ Capacity Building)	1	Nil	N/A	Training manual sent
5.	Papers presented in Conferences/Seminars	Nil	Nil	N/A	-
6.	Policy Drafts/Papers	In process	Nil	N/A	In communication with the publishers
7.	Others:	Nil	Nil	N/A	-

* Please append the list of KPs/ publications (with impact factor and further details) with due Acknowledgement to NMHS.

12. Recommendation on Utility of Project Findings, Replicability and Exit Strategy

Particulars	Recommendations
Utility of the Project Findings	• The major recommendation of this study is to frame a pattern of organized collection, storage, processing and marketing of NTBR resources of IHR which will greatly contribute to the enhanced income and sustainability of the NTBR collectors and forest dwellers of the region. • The present system of awarding a contract/ tender to one contractor without proper estimation of the availability of NTBR in that particular range or circle should be reassessed. • Educating the collectors about the issue and giving them a demarcated area for collection is the need of hour. • Forest dwellers can be given some rights, which they are already using in the name of "*patta*" is some areas like Himachal Pradesh, which will ensure the development of more infrastructure through innovation and wants.
Replicability of Project	• The project can be replicated in other areas of IHR along with improvements with regard to exploring the NTBRs available. • Similar studies should be done in the regions of UT of Ladakh and Kashmir division as they are rich in NTBR resources, which could not be covered during the tenure of this project due to travel restrictions on account of Covid-19 and socio-political factors which arose after the reorganization of the state of Jammu and Kashmir to the union territories of Ladakh and Jammu and Kashmir, during the last years.

Exit Strategy	• The study has brought into focus many problems relating to the cultivation and marketing of NTBRs in the study areas. In order to meet the growing requirements of NTBRs (mainly medicinal and aromatic plants) emphasis is needed on their marketing potential. Relying only on natural production sites will pose serious problems in sustainable management of NTBRs. • Present system of extraction from the wild is also adding to the problems of extinction of some of the species. • There is a need to train local people in cultivation of the medicinal and aromatic plants. • Information on market potential, their prices and market intelligence is required to be collected through regular market surveys, so that proper marketing strategies could be formulated. • The producer- industry linkages needs to develop model of contract farming should be developed to ensure better marketing for their harvest.

(PROJECT PROPONENT/ COORDINATOR)

(Signed and Stamped)

Principal Investigator
National Mission on Himalayan Studies (NMHS)
SKUAST-Jammu

(HEAD OF THE INSTITUTION)

(Signed and Stamped)

Director Research
SKUAST-Jammu, Chatha

Place: Jammu

Date: 22/08/2022

Annexure-I

Consolidated and Audited Utilization Certificate (UC) and Statement of Expenditure (SE)

For the Period: 01st April, 2018 **to** 31st March, 2021

1.	Title of the project/Scheme/Programme:	**AVAILABILITY, UTILIZATION AND DIGITAL DOCUMENTATION OF NON-TIMBER BIORESOURCES FOR SUSTAINABLE RURAL LIVELIHOOD AND DECISION SUPPORT SYSTEM OF THE RURAL HOUSEHOLDS IN THE NORTHWEST HIMALAYAS**
2.	Name of the Principle Investigator & Organization:	**Dr. Rakesh Nanda, Sher-e-Kashmir University of Agricultural Sciences & Technology of Jammu (SKUAST-J)**
3.	NMHS-PMU, G.B. Pant National Institute of Himalayan Environment & Sustainable Development, Kosi-Katarmal, Almora, Uttarakhand Letter No. and Sanction Date of the Project:	**No: GBPNI/NMHS-2017-18/SG12, Dated: 28-03-2018**
4.	Amount received from NMHS-PMU, G.B. Pant National Institute of Himalayan Environment& Sustainable Development, Kosi-Katarmal, Almora, Uttarakhand during the project period (Please give number and dates of Sanction Letter showing the amount paid):	**Rs. 49,15,980.00** *(Rs. 48,32,346.00 + 83,634.00 bank interest)* 1. Rs. **20,73,800**.00, No: GBPNI/NMHS-2017-18/SG12, Dated: 28-03-2018. 2. Rs. **13,53,490**.00, No: GBPNI/NMHS-2018-18/SG-12/616/216/251, Dated: 22-08-2019 (2nd Year Grant). 3. Rs. **21,944**.00, No: GBPNI/NMHS-2018-18/SG-12/616/216/251/463, Dated: 26-02-2020 (JRF arrears). 4. Rs. **69,418**.00, No: GBPNI/NMHS-2018-18/SG-12/616/216/251/463/ 471/132, Dated: 14-09-2020 (JPF arrears). 5. Rs. **12,30,174**.00, No: GBPNI/NMHS-2018-18/SG-12/616/216/251/463/ 471/132/231, Dated: 10-12-2020 (3rd Year Grant). 6. Rs. **83,520**.00, No: GBPNI/NMHS-2018-18/SG-12/616/216/251/463/ 471/132/231/297, Dated: 20-01-2021 (JRF arrears).
5.	Total amount that was available for expenditure (Including commitments) incurred during the project period:	**Rs. 49,15,980.00** *(Including bank interest accrued Rs. 83,634.00 upto 31-03-2021)*
6.	Actual expenditure (including commitments) incurred during the project period:	**Rs. 42,81,467.00** *(including Rs. 62,306 bank interest adjusted)*
7.	Unspent Balance amount refunded, if any (Please give details of Cheque no. etc.):	NIL
8.	Balance amount available at the end of the project:	**Rs. 6,34,513.00** *(6,13,185 + 21,328 bank interest till 31-03-21)*
9.	Balance Amount:	**Rs. 6,56,955.00** *(6,34,513 + 22,442 bank interest till date)*
10.	Accrued bank Interest:	**Rs. 1,06, 076.00 (Bal: 43,770.00)** *Rs. 83,634.00 (till 31-03-2021)* *Rs. 22,442.00 (from 01-04-2021 to till date)*

(Signature of Principal Investigator)

Principal Investigator
National Mission on Himalayan Studies (NMHS)
SKUAST-Jammu

(Signature of Registrar/ Finance Officer)

Deputy Controller of Finance (Projects)
S.K. University of Agri. Sci. & Tech.
Jammu

(Signature of Head of the Organization)

Director Research
SKUAST-Jammu

Certified that the expenditure of **Rs. 42,81,467.00 (Rupees: Forty Two Lakh Eighty One Thousand Four Hundred Sixty Seven Only)** mentioned against **Sr. No. 6** was actually incurred on the project/scheme for the purpose it was sanctioned.

Date: 26-07-2022

(Signature of Principal Investigator)

National Mission on Himalayan Studies (NMHS) SKUAST-Jammu

(Signature of Registrar/ Finance Officer)

Deputy Controller (Accounts) S.K.University of Agri. Sci. & Tech. Jammu

(Signature of Head of the Organization)

Director Research SKUAST-Jammu

OUR REF. No.

ACCEPTED AND COUNTERSIGNED

Date:

COMPETENT AUTHORITY
NATIONAL MISSION ON HIMALAYAN STUDIES (GBPNIHESD)

Statement of Consolidated Expenditure

Sher-e-Kashmir University of Agricultural Sciences & Technology of Jammu (SKUAST-J)

Statement showing the expenditure of the period from FY 2018-19 to FY 2020-21

UTR No.: **CBINR52018052810009776**, Dated: **28-05-2018**

Sanction No. and Date : No: GBPNI/NMHS-2017-18/SG12, Dated: 28-03-2018

1. Total outlay of the project : Rs. 49,08,920.00 (Rs. 51,09,904.00 including arrears sanctioned for revised salary of JRF/JPF)

2. Date of Start of the Project : 01-04-2018

3. Duration : 3 Years (01-04-2018 to 31-03-2021)

4. Date of Completion : 31-03-2021

a) Amount received during the project period : 48,32,346.00

b) Total amount available for Expenditure : 49,15,980.00 (83,634.00 bank interest)

S. No.	Budget head	Amount received	Expenditure	Amount Balance/ excess expenditure
1	Salaries	1609835.00 (1589759 +20076)	1667426.00	**-57591.00**
2	Permanent Equipment Purchased (Item-wise)	1341000.00	1281494.00	59506.00
3	Travel	1128319.00	572509.00	555810.00
4	Meetings and Workshop	119833.00	61722.00	58111.00
5	Consumable	139385.00	122436.00	16949.00
6	Contingency	91786.00	82518.00	9268.00
7	Institutional charges	464494 (422264 +42230)	493362.00	**-28868.00**
8	Accrued bank Interest	21328.00 (83634 -20076 -42230)	NIL	21328.00
9	**Total**	**4915980.00**	**4281467.00**	**634513.00**

*Bank interest amount Rs. 42230.00 of FY 2018-19 transferred to the institutional charges head of FY 2019-20, Bank interest amount Rs. 20076.00 of FY 2019-20 transferred to the manpower head of FY 2020-21.

(Signature of Principal Investigator)

Principal Investigator
National Mission on Himalayan Studies (NMHS)
SKUAST-Jammu

(Signature of Registrar/ Finance Officer)

Deputy Comptroller (Projects)
S.K.University of Agril. Sci. & Tech.
Jammu

(Signature of Head of the Organization)

Director Research
SKUAST-Jammu

Certified that the expenditure of **Rs. 42,81,467.00 (Rupees: Forty Two Lakh Eighty One Thousand Four Hundred Sixty Seven Only)** mentioned against **Sr. No.: 09** was actually incurred on the project/ scheme for the purpose it was sanctioned.

Date: 26-07-2022

(Signature of Principal Investigator)

Principal Investigator
National Mission on Himalayan Studies (NMHS)
SKUAST-Jammu

(Signature of Registrar/ Finance Officer)

(Signature of Head of the Organization)

Director Research
SKUAST-Jammu

OUR REF. No.

ACCEPTED AND COUNTERSIGNED

Date:

COMPETENT AUTHORITY
NATIONAL MISSION ON HIMALYAN STUDIES (GBPNIHESD)

Sher-e-Kashmir
University of Agricultural Sciences & Technology of Jammu
Main Campus, Chatha, Jammu - 180009

Annexure-II

Consolidated Interest Earned Certificate

It is certified that the bank interest earned from the **NMHS Project** entitled, **"AVAILABILITY, UTILIZATION AND DIGITAL DOCUMENTATION OF NON-TIMBER BIORESOURCES FOR SUSTAINABLE RURAL LIVELIHOOD AND DECISION SUPPORT SYSTEM OF THE RURAL HOUSEHOLDS IN THE NORTHWEST HIMALAYAS"**, sanctioned vide Letter No: **GBPNI/NMHS-2018-18/SG-12/616**, Dated: **28-03-2018**, and first installment release vide UTR No.: **CBINR52018052810009776**, Dated: **28-05-2018**, for the period from **28-05-2018** to **31-03-2021** is given as under:

S.No	Financial Year	From date	To date	Amount in INR	Remarks
1.	2018-19	28-05-2018	31-03-2019	**42,230.00**	Rs. 33,667.00 + Rs. 1,964.00 (interest amount of SMVDU Katra) = Rs. 35,631.00 adjusted against the institutional charges of SKUAST Jammu, Rs. 6,599.00 adjusted against the institutional charges of Amity University for the year 2019-20.
2.	2019-20	01-04-2019	31-03-2020	**20,076.00**	Rs. 1,253.00 + Rs. 9,971.00 (interest amount of SKUAST Jammu) = Rs. 11,224.00 adjusted against the manpower head of SMVDU Katra. Rs. 8,852.00 adjusted against the manpower head of Amity University, Noida.
3.	2020-21	01-04-2020	31-03-2021	**21,328.00** 11682 (SKUAST) + 3640 (AMITY) + 6006 (SMVDU)	Balance available with SKUAST-J, Amity University and SMVDU Katra
4.	2021-22*, 2022-23*	01-04-2021	24-06-2022	**22,442.00*** 18850 (SKUAST) + 3592 (SMVDU)	Balance available with SKUAST-J, Amity University and SMVDU Katra

*Bank interest amount for the duration exceeding 31-03-2021 to till date.

Total interest earned from 28-05-2018 to 31-03-2021: Rs. 83,634.00
Total interest earned from 01-04-2021 to 24-06-2022: Rs. 22,442.00
Total interest earned: **Rs. 1,06,076.00**

interest utilized from 28-05-2018 to 31-03-2021: Rs. 62,306.00 (Less)
Balance available: **Rs. 43,770.00**

(Signature of Principal Investigator)

Principal Investigator
National Mission on Himalayan Studies (NMHS)
SKUAST-Jammu

(Signature of Registrar/ Finance Officer)

Deputy Controller (Projects)
S.K. University of Agri. Sci. & Tech.
Jammu

(Signature of Head of the Organization)

SHER - E - KASHMIR
Director Research
SKUAST-Jammu
UNIVERSITY OF AGRICULTURAL SCIENCES & TECHNOLOGY, JAMMU

Annexure-I

Consolidated and Audited Utilization Certificate (UC) and Statement of Expenditure (SE)

(SKUAST-J allocation)

For the Period: 01st April, 2018 **to** 31st March, 2021

1.	Title of the project/Scheme/Programme:	**AVAILABILITY, UTILIZATION AND DIGITAL DOCUMENTATION OF NON-TIMBER BIORESOURCES FOR SUSTAINABLE RURAL LIVELIHOOD AND DECISION SUPPORT SYSTEM OF THE RURAL HOUSEHOLDS IN THE NORTHWEST HIMALAYAS**
2.	Name of the Principle Investigator & Organization:	**Dr. Rakesh Nanda, Sher-e-Kashmir University of Agricultural Sciences & Technology of Jammu (SKUAST-J)**
3.	NMHS-PMU, G.B. Pant National Institute of Himalayan Environment & Sustainable Development, Kosi-Katarmal, Almora, Uttarakhand Letter No. and Sanction Date of the Project:	**No: GBPNI/NMHS-2017-18/SG12, Dated: 28-03-2018**
4.	Amount received from NMHS-PMU, G.B. Pant National Institute of Himalayan Environment& Sustainable Development, Kosi-Katarmal, Almora, Uttarakhand during the project period (Please give number and dates of Sanction Letter showing the amount paid):	**Rs. 33,89,740.00** *(Rs. 33,44,391.00 + 45,349.00 bank interest)* 1. Rs. **16,86,000**.00 from Rs. **20,73,800**.00, No: GBPNI/NMHS-2017-18/SG12, Dated: 28-03-2018. 2. Rs. **7,01,277**.00 from Rs. **13,53,490**.00, No: GBPNI/NMHS-2018-18/SG-12/616/216/251, Dated: 22-08-2019 (2nd Year Grant) and No: GBPNI/NMHS-2018-18/SG-12/616/216/251/463, Dated: 26-02-2020 (JRF arrears). 3. Rs. **9,57,114**.00, No: GBPNI/NMHS-2018-18/SG-12/616/216 /251/463/ 471/132/231, Dated: 10-12-2020 (3rd Year Grant) and No: GBPNI/NMHS-2018-18/SG-12/616/216/251/463/471/132/231/297, Dated: 20-01-2021 (JRF arrears).
5.	Total amount that was available for expenditure (Including commitments) incurred during the project period:	**Rs. 33,89,740.00** (Including bank interest accrued Rs. 11,682.00 upto 31-03-2021)
6.	Actual expenditure (excluding commitments) incurred during the project period:	**Rs. 28,32,802.00**
7.	Unspent Balance amount refunded, if any (Please give details of Cheque no. etc.):	NIL
8.	Balance amount available at the end of the project:	**Rs. 5,56,938.00** (including bank interest Rs. 11,682.00 upto 31-03-2021)
9.	Balance Amount (upto 24-06-2022):	**Rs. 5,75,788.00** (including bank interest Rs. 30,532.00 upto 24-06-2022)
10.	Accrued bank Interest:	Rs. 11,682.00 (till 31-03-2021) Rs. 18,850.00 (from 01-04-2021 to till date) **(Total bal: Rs. 30,532)**

(Signature of Principal Investigator)

Principal Investigator
National Mission on Himalayan Studies (NMHS)
SKUAST-Jammu

(Signature of Registrar/ Finance Officer)

(Signature of Head of the Organization)

Director Research
SKUAST-Jammu

Certified that the expenditure of **Rs. 28,32,802.00 (Rupees: Twenty Eight Lakh Thirty Two Thousand Eight Hundred Two Only)** mentioned against **Sr. No. 6** was actually incurred on the project/scheme for the purpose it was sanctioned.

Date: 26-07-2022

(Signature of Principal Investigator)

Principal Investigator
National Mission on Himalayan Studies (NMHS)
SKUAST-Jammu

(Signature of Registrar/ Finance Officer)

(Signature of Head of the Organization)

Director Research
SKUAST-Jammu

OUR REF. No.

ACCEPTED AND COUNTERSIGNED

Date:

COMPETENT AUTHORITY
NATIONAL MISSION ON HIMALAYAN STUDIES (GBPNIHESD)

Statement of Consolidated Expenditure

Sher-e-Kashmir University of Agricultural Sciences & Technology of Jammu (SKUAST-J)

(SKUAST-J allocation)

Statement showing the expenditure of the period from FY 2018-19 to FY 2020-21

UTR No.: **CBINR52018052810009776**, Dated: **28-05-2018**

Sanction No. and Date : No: GBPNI/NMHS-2017-18/SG12, Dated: 28-03-2018

1. Total outlay of the project : Rs. 49,08,920.00 (Rs. 51,09,904.00 including arrears sanctioned for revised salary of JRF/JPF)

2. Date of Start of the Project : 01-04-2018

3. Duration : 3 Years (01-04-2018 to 31-03-2021)

4. Date of Completion : 31-03-2021

a) Amount received during the project period : 33,44,391.00

b) Total amount available for Expenditure : 33,89,740.00 (bank interest 45,349.00)

S. No.	Budget head	Amount received	Expenditure	Amount Balance/ excess expenditure
1	Salaries	946464.00	946464.00	**NIL**
2	Permanent Equipment Purchased (Item-wise)	1156000.00	1101482.00	54518.00
3	Travel	700000.00	268002.00	431998.00
4	Meetings and Workshop	70000.00	27385.00	42615.00
5	Consumable	50000.00	43143.00	6857.00
6	Contingency	91786.00	82518.00	9268.00
7	Institutional charges	363808.00 (330141 +33667)	363808.00	**NIL**
8	Accrued bank Interest (till 31-03-2021)	11682.00 (55320-33667 -9971)	NIL	11682.00
9	**Total**	**3389740.00**	**2832802.00**	**556938.00**

* Bank interest amount Rs. 33,667.00 of FY 2018-19 adjusted against the institutional charges head of FY 2019-20, Bank interest amount Rs. 9,971.00 of FY 2019-20 transferred to the manpower head of SMVDU Katra for FY 2020-21

(Signature of Principal Investigator)

Principal Investigator
National Mission on Himalayan Studies (NMHS)
SKUAST-Jammu

(Signature of Registrar/ Finance Officer)

Deputy Comptroller (Projects)
S.K.University of Agricultural Sciences & Tech.
Jammu

(Signature of Head of the Organization)

Director Research
SKUAST-Jammu

Certified that the expenditure of **Rs. 28,32,802.00 (Rupees: Twenty Eight Lakh Thirty Two Thousand Eight Hundred Two Only)** mentioned against **Sr. No.: 09** was actually incurred on the project/ scheme for the purpose it was sanctioned.

Date: 26-07-2022

(Signature of Principal Investigator)

Principal Investigator
National Mission on Himalayan Studies (NMHS)
SKUAST-Jammu

(Signature of Registrar/ Finance Officer)

(Signature of Head of the Organization)

Director Research
SKUAST-Jammu

OUR REF. No.

ACCEPTED AND COUNTERSIGNED

Date:

COMPETENT AUTHORITY
NATIONAL MISSION ON HIMALYAN STUDIES (GBPNIHESD)

Sher-e-Kashmir
University of Agricultural Sciences & Technology of Jammu
Main Campus, Chatha, Jammu - 180009

Annexure-II

Consolidated Interest Earned Certificate

(SKUAST-J allotment)

It is certified that the bank interest earned from the **NMHS Project** entitled, **"AVAILABILITY, UTILIZATION AND DIGITAL DOCUMENTATION OF NON-TIMBER BIORESOURCES FOR SUSTAINABLE RURAL LIVELIHOOD AND DECISION SUPPORT SYSTEM OF THE RURAL HOUSEHOLDS IN THE NORTHWEST HIMALAYAS"**, sanctioned vide Letter No: **GBPNI/NMHS-2018-18/SG-12/616**, Dated: **28-03-2018**, and first installment release vide UTR No.: **CBINR52018052810009776**, Dated: **28-05-2018**, for the period from **28-05-2018** to **31-03-2021** is given as under:

S.No	Financial Year	From date	To date	Amount in INR	Remarks
1.	2018-19	28-05-2018	31-03-2019	33,667.00	Adjusted against the institutional charges of SKUAST Jammu for the year 2019-20.
2.	2019-20	01-04-2019	31-03-2020	-9,971.00	Adjusted against the manpower of SMVDU Katra
3.	2020-21	01-04-2020	31-03-2021	11,682.00	Balance available with SKUAST-J
4.	2021-22*, 2022-23*	01-04-2021	24-06-2022	18,850.00*	Balance available with SKUAST-J

*Bank interest amount for the duration exceeding 31-03-2021 to till date.

Total interest earned from 28-05-2018 to 31-03-2021: **Rs. 55,320.00**

Interest transferred from SKUAST-J to SMVDU: **Rs. 9971.00**

Total interest earned for SKUAST-J: **Rs. 45,349.00**

Total interest earned from 01-04-2021 to 24-06-2022: **Rs. 18,850.00**

Total interest upto 24-06-2022: **Rs. 64,199.00**

Total interest utilized from 28-05-2018 to 31-03-2021: **Rs. 33,667.00** (Less)

Balance available with SKUAST-J: **Rs. 30,532.00**

(Signature of Principal Investigator)

Principal Investigator
National Mission on Himalayan Studies (NMHS)
SKUAST-Jammu

(Signature of Registrar/ Finance Officer)

(Signature of Head of the Organization)

Annexure-I

Consolidated and Audited
Utilization Certificate (UC) and Statement of Expenditure (SE)

For the Period: 1st November, 2018 to 31st March, 2021

1.	Title of the project/Scheme/Programme:	Availability, Utilization and Digital Document of Non-Timber Bioresources for Sustainable Rural Livelihood and Decision Support System of the Rural Households in the Northwest Himalayas
2.	Name of the Principle Investigator & Organization:	Prof. B. S. Hansra
3.	NMHS-PMU, G.B. Pant National Institute of Himalayan Environment& Sustainable Development, Kosi-Katarmal, Almora, Uttarakhand Letter No. and Sanction Date of the Project:	GBPNI/NMHS-2017-18/SG12 dated 28-03-2018
4.	Amount received from NMHS-PMU, G.B. Pant National Institute of Himalayan Environment& Sustainable Development, Kosi-Katarmal, Almora, Uttarakhand during the project period (Please give number and dates of Sanction Letter showing the amount paid):	–
5.	Total amount that was available for expenditure (Including commitments) incurred during the project period: 3 Years	Rs. 11,81,875/-
6.	Actual expenditure (excluding commitments) incurred during the project period: 3 Years	Rs. 10,79,489/-
7.	Unspent Balance amount refunded, if any (Please give details of Cheque no. etc.):	Rs. 1,06,026/-
8.	Balance amount available at the end of the project:	Rs. 1,06,026/-
9.	Balance Amount:	Rs. 1,06,026/-
10.	Accrued bank Interest:	Rs. 3,640/-*

* Bank interest amount Rs.3,640/- of FY 2020-21 is included in balance amount.

Certified that the expenditure of of **Rs. 10,79,489/- (Rupees ten lakh seventy nine thousand four hundred eighty nine)** mentioned against Sr. No. 6 was actually incurred on the project/scheme for the purpose it was sanctioned.

Addl. Dy. Finance Officer
AMITY UNIVERSITY
UTTAR PRADESH
06/07/2022

Date: 05.07.2022

(Signature of Principal Investigator)

Co-Project Investigator
NHMS Funded Project
Availability, Utilization and Digital Document.....Northwest Himalayas (HP)

(Signature of Registrar/ Finance Officer)

Addl. Dy. Finance Officer
AMITY UNIVERSITY
UTTAR PRADESH
06/07/2022

(Signature of Head of the organization)

Registrar
Amity University
UTTAR PRADESH

OUR REF. No.

ACCEPTED AND COUNTERSIGNED

Date:

COMPETENT AUTHORITY
NATIONAL MISSION ON HIMALAYAN STUDIES (GBPNIHESD)

Statement of Consolidated Expenditure

[Amity University Uttar Pradesh]

Statement showing the expenditure of the period from 1st November, 2018 to 31st March, 2021
Sanction No. and Date : GBPNI/NMHS-2017-18/SG12 and 28th March, 2018

1. Total outlay of the project : INR 12,20,564/-

2. Date of Start of the Project : 1st November, 2018

3. Duration : 36 Months

4. Date of Completion : 31st March, 2021

a) Amount received during the project period : INR 11,81,875/-
b) Total amount available for Expenditure : INR 11,81,875/-

S. No.	Budget head	Amount received	Expenditure	Amount Balance/ Excess Expenditure
1	Salaries	5,76,971/-	6,01,814/-	(24843)
2	Permanent Equipment Purchased (Item-wise)	35,000/-	33,852/-	1,148/-
3	Travel (T.A, D.A and Vehicle hiring for data collection)	3,50,000/-	2,54,507/-	95,493/-
4	Meetings and Workshop	49,833/-	34,337/-	15,496/-
5	Consumable	69,385/-	54,293/-	15,092/-
6	Contingency	00/-	00/-	00/-
7	Institutional charges	1,00,686/-	1,00,686/-	00/-
8	Accrued bank Interest	8,852/-*	–	3,640/-**
9	**Total**	**11,81,875/-**	**10,79,489/-**	**1,06,026/-**

*Bank interest amount Rs.8852/- of FY 2019-20 adjusted against Manpower Head for JPF arrears.
**Bank interest amount Rs.3640/- of FY 2020-21 is included in balance amount.

Certified that the expenditure of **Rs. 10,79,489/- (Rupees ten lakh seventy nine thousand four hundred eighty nine)** mentioned against Sr. No.09 was actually incurred on the project/ scheme for the purpose it was sanctioned.

Date: 05.07.2022

Addl. Dy. Finance Officer
AMITY UNIVERSITY
UTTAR PRADESH
05/07/2022

(Signature of Principal Investigator)

Co-Project Investigator
NHMS Funded Project
Availability, Utilization and Digital
Document.....Northwest Himalayas (HP)

Addl. Dy. Finance Officer
AMITY UNIVERSITY
UTTAR PRADESH

(Signature of Registrar/ Finance Officer) 06/6/2022

(Signature of Head of the Organization)

Registrar
Amity University
UTTAR PRADESH

OUR REF. No.

ACCEPTED AND COUNTERSIGNED

Date:

COMPETENT AUTHORITY
NATIONAL MISSION ON HIMALYAN STUDIES (GBPNIHESD)

Interest Earned Certificate

This is to certify that the interest earned from the project entitled "Availability, Utilization and Digital Document of Non-Timber Bioresources for Sustainable Rural Livelihood and Decision Support System of the Rural Households in the Northwest Himalayas" from the National Mission on Himalyan Studies (NHMS).

Year wise Interest earned are as under:

S. No.	Financial Year	Interest Earned (Rs.)
1.	2018 – 2019	Rs. 6,599/-
2.	2019 – 2020	Rs. 8,852/-
3.	2020 – 2021	Rs. 3,640/-

The interest of 1st year 2018 – 2019 was carried forward and adjust in Institutional charges. The interest of 2nd year of 2019 – 2020 was carried forward and adjust in Manpower arrear.

4/8/2021

(Dr B L Arya)
Registrar

Registrar
AMITY UNIVERSITY
UTTAR PRADESH

Annexure-I

Consolidated and Audited Utilization Certificate (UC) and Statement of Expenditure (SE)

For the Period: 2018-2021

1.	Title of the project/Scheme/Programme:	Availability, Utilization and Digital Documentation of Non-Timber Bio resources for Sustainable Rural Livelihood and Decision Support System of the Rural Households in the Northwest Himalayas.
2.	Name of the Principle Investigator & Organization:	Dr. Rakesh Nanda, Sher-e-Kashmir University of Agricultural Sciences & Technology of Jammu
3.	NMHS-PMU, G.B. Pant National Institute of Himalayan Environment& Sustainable Development, Kosi-Katarmal, Almora, Uttarakhand Letter No. and Sanction Date of the Project:	GBPNI/NMHS-2017-18/SG12 Dated 28.02.2018
4.	Amount received from NMHS-PMU, G.B. Pant National Institute of Himalayan Environment& Sustainable Development, Kosi-Katarmal, Almora, Uttarakhand during the project period (Please give number and dates of Sanction Letter showing the amount paid):	1. Rs. 95,000/-GBPNI/NMHS-2017-18/SG12 Dated 28.02.2018 2 .Rs. 35,000/-SKUASTJ/DAEE/NMHS/2019/107 Dated 16.09.2019 3. Rs.90,000/-(SKUASTJ/DAEE/NMHS/2019-19/198 Dated 16.03.20 4. Rs.25,920/-(SKUAST/DAEE/NMHS/2020-21/19-20-21 Dated 15.09.20 5. Rs.88,799/-(SKUASTJ/DAEE/NMHS/2020-21/39-41 Dated 15.12.20 Rs.3,34,719/- (Total Amt. Received)
5.	Total amount that was available for expenditure (Including commitments) incurred during the project period:	Rs.3,47,534/- (including Interest earned up to 31.12.21 Rs.12,815)
6.	Actual expenditure (excluding commitments) incurred during the project period:	Rs.3,72,393/- (Actual-Rs.2,94,325) (committed-Rs.78,068,Funds not available)
7.	Unspent Balance amount refunded, if any (Please give details of Cheque no. etc.):	Nil
8.	Balance amount available at the end of the project:	(-)24,859/-
9.	Balance Amount:	(-)24,859/-
10.	Accrued bank Interest:	Rs.9,598/- (up to 31.12.21)

(Signature of Principal Investigator)

(Signature of Registrar/ Finance Officer)

Finance Officer
Registrar
Authorised Signatories
SMVD University

(Signature of Head of the Organization)

Certified that the expenditure of **Rs.3,72,393/- (Rupees Three Lakh Seventy Two Thousand Three Hundred and Ninety Three Only)** mentioned against Sr. No. 6 was actually incurred on the project/scheme for the purpose it was sanctioned.

Date:

(Signature of Principal Investigator)

(Signature of Registrar/ Finance Officer)

Finance Officer
Registrar
Authorised Signatories
SMVD University

(Signature of Head of the Organization)

OUR REF. No.

ACCEPTED AND COUNTERSIGNED

Date:

COMPETENT AUTHORITY
NATIONAL MISSION ON HIMALAYAN STUDIES (GBPNIHESD)

Statement of Consolidated Expenditure

[Shri Mata Vaishno Devi University, Kakryal, Katra]

Statement showing the expenditure of the period from FY-2018-19 to FY-2020-21
Sanction No. and Date : GBPNI/NMHS-2017-18/SG12 Dated 28.03.2018

1. Total outlay of the project : Rs.4,28,548/-

2. Date of Start of the Project : 30th May 2018.

3. Duration : 3 years

4. Date of Completion : 31-03-2021

a) Amount received during the project period : Rs.3,34,719/-
b) Total amount available for Expenditure : Rs.3,47,534/- (including Interest earned Rs.12815/-

S. No.	Budget head	Amount received	Expenditure	Amount Balance/ excess expenditure
1	Salaries	86,400/-	1,19,148	(-)32,748/-
2	Permanent Equipment Purchased (Item-wise)	1,50,000/-	1,46,160/-	3,840/-
3	Travel	78,319/-	50,000/-	28,319/-
4	Meetings and Workshop	0	0	0
5	Consumable	20,000/-	25,000/-	(-)5,000/-
6	Contingency	0	0	0
7	Institutional charges	0	28,868/-	(-)28,868/-
8	Accrued bank Interest (up to 31.12.21)	12,815/-	3,217/-	9,598/-
12	**Total**	**3,47,534/-**	**3,72,393/-**	**(-)24,859/-**

(Signature of Principal Investigator)

Finance Officer
Authorised Signatories
SMVD University

(Signature of Registrar/ Finance Officer)

Registrar

(Signature of Head of the Organization)

Certified that the expenditure of **Rs.3,72,393/- (Rupees:Three Lakh Seventy Two Thousand Three Hundred and Ninety Three Only)** mentioned against Sr. No.12 was actually incurred on the project/ scheme for the purpose it was sanctioned.

Date:

(Signature of Principal Investigator)	(Signature of Registrar/ Finance Officer)	(Signature of Head of the Organization)

Finance Officer
Registrar
Authorised Signatories
SMVD University

OUR REF. No.

ACCEPTED AND COUNTERSIGNED

Date:

COMPETENT AUTHORITY
NATIONAL MISSION ON HIMALYAN STUDIES (GBPNIHESD)

Shri Mata Vaishno Devi University

Kakryal, Katra – 182 320 (J&K)

Annexure-II

Consolidated Interest Earned Certificate

Interest Earned for the FY-2018-19	Rs.1,964/-
Interest Earned for the FY-2019-20	Rs.1,253/-
Interest Earned for the FY-2020-21	Rs.6,006/-
Interest Earned for the FY-2021-22 (up to 31.12.2021	Rs.3,592/-
Total Interest Earned Up to 31.12.2021	**Rs.12,815/-**
Less: Interest Utilized	Rs.3,217/-
Balance Available	**Rs.9,598/-**

Finance Officer
Authorised Signatories
SMVD University

Signature of the P.I **Signature of the Finance Officer** **Signature of the Registrar**

Annexure-III

Consolidated Assets Certificate

Assets Acquired Wholly/ Substantially out of Government Grants

1.1 (Register to be maintained by Grantee Institution)

Name of the Sanctioning Authority: **NMHS, GBPNIHESD, Ministry of Environment Forest & Climate Change**

1. Sl. No. **1. Digital Camera: Nikon D7200, 2. Printer: Canon PIXMA G4010, 3. Online UPS (2KVA): Microtek with UPS batteries (6 No.), 4. Hand held GPS Monitor: Samsung Galaxy Tab A 2017 (3 No), 5. Digital Voice Recorder: Tascam Linear PCM Recorder DR-05 (2 No.), 6. SSD Drive 512 GB: WD, 7. Hard disk external 2 TB: Toshiba, 8. Heat pillar, Double Rod, 9. High Performance Computer Cluster: Dell Power Edge T640 Server, 10. Table top wooden: Pearl, 11. High Performance Storage Server: Dell Power Edge T640 Server, Dell EMC, 12. Exhaust fan for server room: Trans Air Crompton, 13. I/O Box, CAT 6, PVC Pipe, Patch Cable: D-Link and ors, 14. 8 Port Switch: D-Link, 15. Wireless router: D-Link, 16. Wifi dongle: Digisol, and 17. High Performance Workstation: DELL Mobile Workstation**
2. Name of Grantee Institution: **SKUAST-Jammu, Chatha, Jammu, J&K-180009**
3. No. & Date of sanction order: **GBPNI/NMHS-2017-18/SG-12, Dated: 28-03-2018**
4. Amount of the Sanctioned Grant: **Rs. 13,41,000.00**
5. Brief Purpose of the Grant: **For procurement of permanent equipment/ peripherals for the project**
6. Whether any condition regarding the right of ownership of Govt. in the property or other assets acquired out of the grant was incorporated in the grant-in-aid Sanction Order: **No**
7. Particulars of assets actually credited: **Rs. 12,81,494.00** or acquired: **N/A**
8. Value of the assets as on 22-08-2022: **Rs. 12,81,494.00**
9. Purpose for which utilised at present: **The assets are now used by the institutions for research purpose**
10. Encumbered or not: **No**
11. Reasons, if encumbered: **N/A**
12. Disposed of or not: **No**
13. Reasons and authority, if any, for disposal: **N/A**
14. Amount realised on disposal: **N/A**

Any Other Remarks: **NIL**

(PROJECT INVESTIGATOR)
Principal Investigator
National Mission on Himalayan Studies (NMHS)
SKUAST-Jammu

(FINANCE OFFICER)
Deputy Comptroller (Project)
S.K.University of Agri.Sci. & Tech.
Jammu

(HEAD OF THE INSTITUTE)
Director Research
SKUAST-Jammu, Chatha

Annexure-III

Consolidated Assets Certificate

Assets Acquired Wholly/ Substantially out of Government Grants

1.1 (Register to be maintained by Grantee Institution)

Name of the Sanctioning Authority: National Mission on Himalyan Studies (GBPNIHESD)

1. Sl. No. 1. Samsung Tablet T385 Tab-A 2017 Black 35852086477886; 2. Tascam DR-05 (Version 2) Portable Handheld Digital Audio Recorder (Black)
2. Name of Grantee Institution: Amity International Centre for Post Harvest Technology and Cold Chain Management (AICPHT&CCM)
3. No. & Date of sanction order: GBPNI/NMHS-2017-18/SG12 dated 28-03-2018
4. Amount of the Sanctioned Grant: Rs. 35,000/-
5. Brief Purpose of the Grant: For procurement of equipment
6. Whether any condition regarding the right of ownership of Govt. in the property or other assets acquired out of the grant was incorporated in the grant-in-aid Sanction Order: No
7. Particulars of assets actually credited No or acquired Yes
8. Value of the assets as on: _____
9. Purpose for which utilised at present : It will be utilized by Institution for research
10. Encumbered or not: No
11. Reasons, if encumbered
    _____
12. Disposed of or not: No
13. Reasons and authority, if any, for disposal _____
14. Amount realised on disposal : Nil

Any Other Remarks: Nil

_____

(PROJECT INVESTIGATOR)
(Signed and Stamped)

Co-Project Investigator
NHMS Funded Project
Availability, Utilization and Digital
Document.....Northwest Himalayas (HP)

(HEAD OF THE INSTITUTE)
(Signed and Stamped)

Registrar
AMITY UNIVERSITY UTTAR PRADESH

(FINANCE OFFICER)
(Signed and Stamped)

Addl. Dy. Finance Officer
AMITY UNIVERSITY UTTAR PRADESH
22/02/2022

Annexure-IV

List or Inventory of Assets/ Equipment/ Peripherals

S. No.	Name of Equipment	Quantity	Sanctioned Cost	Actual Purchased Cost	Purchase Details
1.	Samsung Tablet T385 Tab-A 2017 Black 35852086477886	01	Rs. 20,000/-	Rs 17,990/-	Aeonian Hub India, Pandav Nagar, Patpar Ganj, New Delhi-110092
2	Tascam DR-05 (Version 2) Portable Handheld Digital Audio Recorder (Black)	01	Rs. 15,000/-	Rs. 15,862/-	EduDap, RZC-180, Roshan Vihar, Najafgarh, New Delhi-110043

(PROJECT INVESTIGATOR)

Co-Project Investigator
NHMS Funded Project
Availability, Utilization and Digital
Document.....Northwest Himalayas (HP)

(Signed and Stamped)

(FINANCE OFFICER)

Addl. Dy. Finance Officer
AMITY UNIVERSITY
UTTAR PRADESH
22/02/2022

(Signed and Stamped)

Registrar
AMITY UNIVERSITY
UTTAR PRADESH

(HEAD OF THE INSTITUTE)

(Signed and Stamped)

Annexure-III

Consolidated Assets Certificate

Assets Acquired Wholly/ Substantially out of Government Grants

1.1 (Register to be maintained by Grantee Institution)

Name of the Sanctioning Authority: National Mission for Himalayan Studies

1. Sl. No. 1
2. Name of Grantee Institution: Shri Mata Vaishno Devi University, Katra
3. No. & Date of sanction order:GBPNI/NMHS-2017-18/SG12 Dated 28.02.2018 Rs.60,000/-, SKUASTJ/DAEE/NMHS/2019-19/198 Dated 16.03.20 Rs.90000/-
4. Amount of the Sanctioned Grant: Rs.1,50,000/-
5. Brief Purpose of the Grant: Mobile Workstation for Developing Digital Dashboard for the project.
6. Whether any condition regarding the right of ownership of Govt. in the property or other assets acquired out of the grant was incorporated in the grant-in-aid Sanction Order: N/A
7. Particulars of assets actually credited: Dell Mobile Workstation or acquired
8. Value of the assets as on: 31.03.21 Rs.1,46,160/-
9. Purpose for which utilised at present: Maintenance of Dashboard and Project Work
10. Encumbered or not : No
11. Reasons, if encumbered ___N/A____
12. Disposed of or not __No___
13. Reasons and authority, if any, for disposal : N/A____
14. Amount realised on disposal: N/A___

Any Other Remarks: _Nil_____

(PROJECT INVESTIGATOR)

(Signed and Stamped)

(FINANCE OFFICER)

Finance Officer
SMVD University

(Signed and Stamped)

(HEAD OF THE INSTITUTE)

Registrar
Shri Mata Vaishno Devi University
KATRA

(Signed and Stamped)

Annexure-IV

List or Inventory of Assets/ Equipment/ Peripherals

S. No.	Name of Equipment	Quantity	Sanctioned Cost	Actual Purchased Cost	Purchase Details
1.	Dell Mobile Workstation	1	1,50,000/-	1,46,160/-	Purchased from M/S Aman Technologies Jammu, Invoice No. G21337 Dated16.12.20

(PROJECT INVESTIGATOR)

(Signed and Stamped)

(FINANCE OFFICER)

Finance Officer
SMVD University

(Signed and Stamped)

(HEAD OF THE INSTITUTE)

Registrar
Shri Mata Vaishno Devi University
KATRA

(Signed and Stamped)

Annexure-IV

List or Inventory of Assets/ Equipment/ Peripherals

S. No.	Name of Equipment	Quantity	Sanctioned Cost	Actual Purchased Cost	Purchase Details
1.	Digital Camera (DSLR): Nikon D7200 Sg18-20	1	Rs. 90,000.00	Rs. 89,450.00	Purchased from Adhvay SVN Enterprises (2018-19) 223, Exchange Road Jammu on 05-11-2018. (Entered in stock register 2021-22 of Div. of Agricultural Extension Education at P. No. 71, S. No. 4)
2.	Printer: Canon PIXMA G4010: KLLM00805	1	Rs. 20,000.00	Rs. 17,346.00	Purchased from VP Sale & Servicing, 5A/A Gandhinagar, Jammu on 26-11-2018. (Entered in stock register 2021-22 of Div. of Agricultural Extension Education at P. No. 41, S. No. 14)
3.	Online UPS (2KVA): Microtek with UPS batteries (6 No.)	1	Rs. 25,000.00 +Rs. 40,000.00 =Rs. 65,000.00	Rs. 64,310.00	Purchased from VP Sale & Servicing, 5A/A Gandhinagar, Jammu on 26-11-2018. (Entered in stock register 2021-22 of Div. of Agricultural Extension Education at P. No. 31, S. No. 12)
4.	Hand held GPS Monitor: Samsung Galaxy Tab A 2017 (SM-T385) for SKUAST Jammu	2	Rs. 60,000.00	Rs. 37,996.00	Purchased from Divya Enterprises, Surya Vihar, Patta Bohr, Jammu on 13-12-2018 & 13-02-2019. (Entered in stock register 2021-22 of Div. of Agricultural Extension Education at P. No. 93, S. No. 1&2)

5.	Hand held GPS Monitor: Samsung Tablet T385 Tab-A 2017 Black 358s2086477886 for Amity Noida	1		Rs 17,990.00	Purchased by Amity Noida from Aeonian Hub India, Pandav Nagar, Patpar Ganj, New Delhi.
6.	Digital Voice Recorder: Tascam Linear PCM Recorder DR-05 for SKUAST Jammu	1	Rs. 30,000.00	Rs. 13,570.00	Purchased from VP Sale & Servicing, 5A/A Gandhinagar, Jammu on 23-01-2019. (Entered in stock register 2021-22 of Div. of Agricultural Extension Education at P. No. 45, S. No. 2)
7.	Tascam DR-05 (Version 2) Portable Handheld Digital Audio Recorder (Black)for Amity Noida	1		Rs. 15,862.00	Purchased by Amity Noida from EduDap, RZCI 80, Roshan Vihar, Najafgarh, New Delhi.
8.	SSD Drive 512 GB - WD	1	Rs. 30,000.00	Rs. 14,750.00	Purchased from Divya Enterprises, Surya Vihar on 14-02-19. (Entered in stock register 2021-22 of Div. of Agricultural Extension Education at P. No. 94, S. No. 1)
9.	Hard disk external 2 TB: Toshiba	1	Rs. 20,000.00	Rs. 7,080.00	Purchased from VP Sale & Service, Gandhinagar, Jammu on 14-02-19. (Entered in stock register 2021-22 of Div. of Agricultural Extension Education at P. No. 95, S. No. 1)
10.	High Performance Computer Cluster: Dell Power Edge T640 Server, Intel Xeon Silver 4214, 2.2G, 12C, 24T, 16x2GB, 4x2TB HDD, 480GB SSD, S.No: G877J23	1	Rs. 4,50,000.00	Rs. 3,90,000.00	Purchased from Aman Technologies, Bahu Plaza, Jammu on 15-02-20. (Entered in stock register 2021-22 of Div. of Agricultural

					Extension Education at P. No. 96, S. No. 1)
11.	High Performance Storage Server: Dell Power Edge T640 Server, Dell EMC 1xInt Intel DDR4 SD RAM ECC32 Ink/Xeon Silver 4216, Intel C621 GB-32, S.No: G1TV033	1	Rs. 4,80,000.00	Rs. 4,38,240.00	Purchased from Aman Technologies, Bahu Plaza, Jammu on 19-03-20. (Entered in stock register 2021-22 of Div. of Agricultural Extension Education at P. No. 97, S. No. 1)
12.	I/O Box, CAT 6, PVC Pipe, Patch Cable: D-Link and ors.	1	Rs. 8,000.00	Rs. 7,833.00	Purchased on 08-02-19.
13.	8 Port Switch: D-Link and optic fibre cable	1	Rs. 15,000.00	Rs. 12,081.00	Purchased on 11-02-19.
14.	Wireless router: D-Link and Wi-Fi Dongle	1	Rs. 13,000.00	Rs. 8,826.00	Purchased on 14-02-19.
15.	High Performance Workstation: DELL Mobile Workstation for SMVDU Katra	1	Rs. 60,000.00 (Permission by NMHS to adjust Rs. 90,000.00 from the equipment head of SKUAST-J to SMVDU Katra, Total: Rs. 1,50,000.00)	Rs. 1,46,160.00	Purchased by SMVDU Katra from Aman Technologies, Bahu Plaza, Jammu on 16-12-20. (Entered in register RP101, P. No. 05, S. No.1)
Total			**Rs. 13,41,000.00**	**Rs. 12,81,494.00**	**Bal: Rs. 59,506.00**

(PROJECT INVESTIGATOR)

Principal Investigator
National Mission on Himalayan Studies (NMHS)
SKUAST-Jammu

(FINANCE OFFICER)

Deputy Comptroller (Project)
S.K.University of Agri.Sci. & Tech.
Jammu

(HEAD OF THE INSTITUTE)

Director Research
SKUAST-Jammu, Chatha

Sher-e-Kashmir
University of Agricultural Sciences & Technology of Jammu
Main Campus, Chatha, Jammu - 180009

Annexure-V

Transfer of Equipment Purchased under the Project to the Institution

To,

The Convener, Mountain Division
Ministry of Environment, Forest & Climate Change (MoEF&CC)
Indira Paryavaran Bhawan
Jor Bagh, New Delhi-110003

Sub.: Transfer of Permanent Equipment purchased under Research Project titled "AVAILABILITY, UTILIZATION AND DIGITAL DOCUMENTATION OF NON-TIMBER BIORESOURCES FOR SUSTAINABLE RURAL LIVELIHOOD AND DECISION SUPPORT SYSTEM OF THE RURAL HOUSEHOLDS IN THE NORTHWEST HIMALAYAS" funded under the NMHS Scheme of MoEF&CC – reg.

Sir/ Madam,

This is hereby certified that the following permanent equipment purchased under the aforesaid project have been transferred to the Implementing Organization/ Nodal Institute after completion of the project:

1. Digital Camera (DSLR): Nikon D7200
2. Printer: Canon PIXMA G4010
3. Online UPS (2KVA): Microtek with UPS batteries (6 No.)
4. Hand held GPS Monitor: Samsung Galaxy Tab A 2017 (SM-T385) (2 No. at SKUAST Jammu and 1 No. at Amity Noida)
5. Digital Voice Recorder: Tascam Linear PCM Recorder DR-05 (1 No. at SKUAST Jammu and 1 No. at Amity Noida)
6. SSD Drive 512 GB – WD
7. Hard disk external 2 TB: Toshiba
8. High Performance Computer Cluster: Dell Power Edge T640 Server
9. High Performance Storage Server: Dell Power Edge T640 Server, Dell EMC
10. High Performance Workstation: DELL Mobile Workstation at SMVDU Katra
11. I/O Box, CAT 6, PVC Pipe, Patch Cable: D-Link and ors.
12. 8 Port Switch: D-Link and optic fibre
13. Wireless router: D-Link and wifi dongle

Date: 24-08-2022

24.08.2022

Director Research
SKUAST Jammu

Director Research
SKUAST-Jammu, Chatha

Copy to:

1. The Nodal Officer, NMHS-PMU, National Mission on Himalayan Studies (NMHS), G.B. Pant National Institute of Himalayan Environment (NIHE), Kosi-Katarmal, Almora, Uttarakhand-263643

AMITY UNIVERSITY
UTTAR PRADESH

AMITY FOOD & AGRICULTURE FOUNDATION (AFAF)

Annexure-V

To,

The Convener, Mountain Division
Ministry of Environment, Forest & Climate Change (MoEF&CC)
Indira Paryavaran Bhawan
Jor Bagh, New Delhi-110003

Sub.: Transfer of Permanent Equipment purchased under Research Project titled "Availability, Utilization and Digital Document of Non-Timber Bioresources for Sustainable Rural Livelihood and Decision Support System of the Rural Households in the Northwest Himalayas" funded under the NMHS Scheme of MoEF&CC – reg.

Sir/ Madam,

This is hereby certified that the following permanent equipment purchased under the aforesaid project have been transferred to the Implementing Organization/ Nodal Institute after completion of the project:

1. Samsung Tablet T385, Tab-A 2017 Black 35852086477886
2. Handheld Digital Audio Recorder (Black), Tascam DR-05 (Version 2) Portable

Head of Implementing Organization:
Name of the Implementing Organization: Dr. Nutan Kaushik
Stamp/ Seal: Dr. Nutan Kaushik Director General Food and Agriculture Foundation Amity University Uttar Pradesh, Noida
Date: 23.08.2022

Copy to:

1. The Nodal Officer, NMHS-PMU, National Mission on Himalayan Studies (NMHS), G.B. Pant National Institute of Himalayan Environment (NIHE), Kosi-Katarmal, Almora, Uttarakhand-263643

Annexure-VIII

1.3 Technology Transfer and/ or Intellectual Property Rights Certificate

With a view to encourage the institutions to file patent applications on their innovations, motivate them to transfer their technologies for commercialization, and facilitate them to reward their inventions, the following instructions are issued.

1. In these instructions:

(a) **"Institution"** means any technical, scientific or academic establishment where research work is carried out through funding by the Central / State Government.

(b) **"Intellectual Property Rights"** include patents, registered designs, copyrights and layout design of integrated circuits.

(c) **"Inventor"** means an employee of the institution whose duties involve carrying out of scientific or technical research.

2. Scope: These instructions apply to those institutions receiving funds for research projects from the DBT, Ministry of Science and Technology.

3. Inventions by institutions: Institutions shall be encouraged to seek protection of Intellectual Property Rights (IPR) to the results of research through R&D projects. While the patent may be taken in the name(s) of inventor(s), the institutions shall ensure that the patent is assigned to it & DBT, GOI. The institution shall take necessary steps for commercial exploitation of the patent on non-exclusive basis. The institution is permitted to retain the benefits and earnings arising out of the IPR. However, the institution may determine the share of the inventor(s) and other persons from such actual earnings. Such share(s) shall be limited to 1/3rd of the actual earnings.

4. Inventions by institutions and industrial concerns: IPR generated through joint research by institution(s) and industrial concern(s) through joint efforts can be owned jointly by them as may be mutually agreed to by them and accepted by the Department through a written agreement. The institution and industrial concern may transfer the technology to a third party for commercialization on exclusive/non-exclusive basis. The third party, exclusively licensed to market the innovation in India, must manufacture the product in India. The joint owners may share the benefits and earnings arising out of commercial exploitation of the IPR. The institution may determine the share of the inventor(s) and other persons from such actual earnings. Such share(s) shall not exceed 1/3rd of the actual earnings.

5. Patent Facilitating Fund: The institution shall set apart not less than 25 per cent of such earnings for crediting into a fund called Patent Facilitating Fund. This Fund shall be utilized by the institution for updating the innovation, for filing new patent applications, protecting their rights against infringements, for creating awareness and building competency on IPR and related issues.

6. Information: The institutions shall submit information relating to the details of the patents obtained, the benefits and earnings arising out of IPR and the turnover of the products periodically to the Department/Ministry, which has provided funds.

7. Royalty-free license: The Government shall have a royalty-free license for the use of the intellectual property for the purposes of the Government of India.

(HEAD OF THE INSTITUTE)

Director Research
SKUAST

(Signed and Stamped)

For official use only

Final Technical Report

(2018-2021)

AVAILABILITY, UTILIZATION AND DIGITAL DOCUMENTATION OF NON-TIMBER BIORESOURCES FOR SUSTAINABLE RURAL LIVELIHOOD AND DECISION SUPPORT SYSTEM OF THE RURAL HOUSEHOLDS IN THE NORTHWEST HIMALAYAS

Submitted to

National Mission on Himalayan Studies (NMHS),
Ministry of Environment, Forest and Climate Change

Principal Investigator

Dr. Rakesh Nanda

Professor & Head

Division of Agricultural Extension Education

Sher-e-Kashmir
University of Agricultural Sciences & Technology of Jammu
Chatha, Jammu (J&K), 180 009

2021

Principal Investigator:
Dr. Rakesh Nanda
Prof. & Head, Agricultural Extension Education
e-mail: rakeshnanda2@rediffmail.com
Phone: 9419703645

Co-Principal Investigators:
Dr. Rajinder Peshin
Professor, Agricultural Extension Education

Dr. N.S. Raina
Professor, Agroforestry

Dr. L.K. Sharma
Assoc. Prof., Agricultural Extension Education

Junior Research Fellows:
Dr. Rizwan Jeelani

Mr. Y. S. Bagal

Implementing Agency

Sher-e-Kashmir
University of Agricultural Sciences
and Technology of Jammu, J&K

Co-Principal Investigators:
Dr. B.S. Hansra
Professor Emeritus, AICPHT & CCM

Dr. R. S. Antil
Principal Advisor (Soil Sciences)

Junior Project Fellow:
Mr. Gaurav

Implementing Partner - I

Amity University, Noida
Uttar Pradesh

Co-Principal Investigators:

Er. Shashi Bhushan Kotwal
Asst. Prof., Electronics and Communication Engineering

Er. Ashish Suri
Asst. Prof., Electronics and Communication Engineering

Er. Swastik Gupta
Asst. Prof., Electronics and Communication Engineering

Junior Project Fellow:
Mr. Karan Gupta

Implementing Partner - II

Shri Mata Vaishno Devi University
Katra, J&K

Funding Agency:
National Mission on Himalayan Studies (NMHS),
Ministry of Environment, Forest and Climate Change

CONTENTS

1

EXECUTIVE SUMMARY

Food and Agriculture Organization of United Nations estimated that 252 million people living in forests and savannahs had incomes of less than USD 1.25 per day (FAO, 2018). About 34 percent of those lived in Asia, including India. Non-timber bioresources (NTBRs) are particularly important in providing food, income and nutritional diversity for hundreds of millions of people around the world in general and India in particular, notably women, children, landless farmers, indigenous peoples and others in vulnerable situations. The gathering of food, medicinal plants, craft materials, other NTBRs and woodfuel forms a significant component of women's contributions to household livelihoods.

Research on NTBRs has focused on their ability to be produced as commodities for rural incomes and markets, as an expression of traditional knowledge or as a livelihood option for rural household needs, and as a key component of sustainable forest management and conservation strategies. All research promotes forest products as valuable commodities and tools that can promote the conservation of forests. Other terms similar to NTBRs include special, non-wood, minor, alternative, and secondary forest products. NTBRs in particular highlight forest products which are of value to local people and communities, but have been overlooked in the wake of forest management priorities (for example, timber production and animal forage). In recent decades, interest has grown in using NTBRs as alternatives or supplements to forest management practices. In some forest types, under the right political and social conditions, forests can be managed to increase NTBR diversity, and consequently, to increase biodiversity and potentially economic diversity. The cultivation of black truffle in the Mediterranean area is a good example of a high profitability when well managed.

The vast natural resources of India's forests, including non-timber forest products (NTFPs), such as medicinal and aromatic plants, leaves, fruits, seeds, resins, gums, bamboos, and canes, offer employment that provides up to half the income of about 25 per cent of the country's rural labour force. However, poor harvesting practices and over-exploitation in the face of increasing market demand are threatening the sustainability of these resources, and thus the livelihoods of forest-dependent tribal communities.

The NTBR collection for the forest adjacent families is imperative for their livelihood generation. A livelihood is held to comprise the capabilities, assets and activities required for securing a means of living. It is considered sustainable when it can cope with and recover from stresses and shocks, maintaining or enhances its capabilities and assets in the present and through time. Therefore, the broad objective of the project was based on the foundation of sustainable livelihood and documentation of collection to the consumption system of NTBRs.

The specific objectives of the project entitled “Availability, Utilization and Digital Documentation of Non-Timber Bioresources for Sustainable Rural Livelihood and Decision Support System of the Rural Households in the Northwest Himalayas” were:

1. To find out the availability and use pattern of NTBR.
2. To identify the production to consumption chain and price spread of different NTBR.
3. To find out the contribution of NTBR income to household income.
4. To delineate the factors driving the dependence of households on NTBR for livelihood security.
5. To find out the constraints and the potential of NTBR for all stakeholders and future interventions required for sustainable livelihood of adjacent communities.
6. To generate a digital database and mapping of NTBR.

It was found that the the major non-timber bioresources (NTBR) available in the North-Western Himalayas were Kuth (*Saussurea costus*), Dhoop (*Commiphora wightii*), Ratanjot (*Anemone obtusiloba*), Zakhme hayat (*Bergenia ciliata*), Patis (*Aconitum heterophyllum* Wall. ex Royle), Van rohun/ jungle thong (*Allium ursinum* L.), Guchi/ morels (*Morchella esculenta*), Banafsha (*Viola odorata*), Kod (*Picrorhiza kurroa*), Nagchatri (*Trillium govanianum*), Jungli lahsun/ thomb, Beladona (*Atropa acuminata*) and Mushkbala (*Valeriana wallichii*).

Kuth (*Saussurea costus*), was locally being used for cough and as anti-cloth mite. Dhoop (*Commiphora wightii*) roots were processed by drying and grinding and used to make incence/ fragrance and also used as air purifier. Zakhme hayat (*Bergenia ciliata*) whole plant was being collected and generally grinded roots and leaves are being used for wound healing by local application. The roots and tuber of Patis (*Aconitum heterophyllum* Wall. ex Royle) was being collected and used for fever, cough and anthelminthics. Van rohun/ jungle thong (*Allium ursinum* L.) was

also collected for medicinal purposes. Guchi/ morels (*Morchella esculenta*) were collected being a local delicacy and as a treatment for stomach pain. Banafsha (*Viola odorata*), Kod (*Picrorhiza kurroa*).

Following five marketing channels for NTBR in North-Western Himalayas were found during the study:

Marketing Channels	**Marketing intermediaries**
Channel- A	NTBR collector – Consumer
Channel- B	NTBR collector – Local retailer – Consumer
Channel- C	NTBR collector – Local trader/ middleman – Contractor – Consumer
Channel- D	NTBR collector – Local trader/ middleman – Mandi (Amritsar/ Delhi) – Retailer – Consumer
Channel- E	NTBR collector – Local trader/ middleman – Contractor – Mandi (Amritsar/ Delhi) – Retailer – Consumer/ Export

The following production to consumption chain was explored for the different NTBRs being collected in the North-Western Himalayan region of Jammu and Kashmir and Himachal Pradesh:

S. No.	**Common Name**	**Scientific Name**	**Family**	**Marketing Channel in J&K**
1.	Guchi (Morel)	*Morchella esculenta*	*Morchellaceae*	A, C,D,E
2.	Banafsha	*Viola odorata*	*Violaceae*	B,C
3.	Kasrod (Fiddlehead Fern)	*Matteuccia struthiopteris*	*Onocleaceae*	A, B
4.	Harad	*Terminalia chebula*	*Combertaceae*	C
5.	Kutki	*Picrorhiza kurroa*	*Plantaginaceae*	C
6.	Chora	*Angelica glauca*	*Apiaceae*	C
7.	Kuth	*Saussurea costus*	*Asteraceae*	C
8.	Patis (Atis, Atees)	*Aconitum heterophyllum*	*Rananculaceae*	C
9.	Naagchatri	*Trillium govanianum*	*Melanthiaceae*	D, E
10.	Panja	*Dactylorhiza hatagirea*	*Orchidaceae*	C
11.	Jungli Lehsun	*Allium sativum*	*Amaryllidaceae*	C, D, E
12.	Chilgoza Pine	*Pinus gerardiana*	*Pinaceae*	A,B,C
13.	Dhoop	*Commiphora wightii*	*Burseraceae*	C

S. No.	Common Name	Scientific Name	Family	Marketing Channel in H.P
1.	Gucci	*Morchella esculenta*	*Morchellaceae*	C,D,E
2.	Banafsha	*Viola odorata*	*Violaceae*	B,C
3.	Kachnar	*Bauhinia variegata*	*Fabaceae*	A, B
4.	Lingdi (Fiddlehead Fern)	*Matteuccia struthiopteris*	*Onocleaceae*	A
5.	Kafal	*Myrica esculenta*	*Myricaceae*	B
6.	Khair	*Acacia catechu*	*Leguminosae*	Cutting by Forest dept. in 10 year cycle
7.	Chir Pine	*Pinus roxburghii*	*Pinaceae*	C
8.	Harar	*Terminalia chebula*	*Combertaceae*	C
9.	Khirak	*Celtis australis*	*Cannabaceae*	A (Fodder)
10.	Beul	*Grewia optiva*	*Malvaceae*	A (Fodder)
11.	Kutki	*Picrorhiza kurroa*	*Plantaginaceae*	C
12.	Chora	*Angelica glauca*	*Apiaceae*	C
13.	Kuth	*Saussurea costus*	*Asteraceae*	C
14.	Tejpata	*Cinnamomum tamala*	*Lauraceae*	A
15.	Dalchini	*Cinnamomum verum*	*Lauraceae*	C
16.	Aloevera	*Aloe barbadensis*	*Asphodelaceae*	C
17.	Atis-Patis	*Aconitum heterophyllum*	*Rananculaceae*	C
18.	Naagchattri	*Trillium govanianum*	*Melanthiaceae*	D, E (Export)
19.	Panja	*Dactylorhiza hatagirea*	*Orchidaceae*	C
20.	Ban Oak	*Quercus leucotrichophora*	*Fagaceae*	A (Fodder)
21.	Wild Lehsun	*Allium sativum*	*Amaryllidaceae*	C, D, E (Export)
22.	Chilgoza Pine	*Pinus gerardiana*	*Pinaceae*	A,B,C
23.	Taxus	*Taxus wallichiana*	*Taxaceae*	A (herbal tea)
24.	Walnut	*Juglans regia*	*Juglandaceae*	B
25.	Dhoop	*Commiphora wightii*	*Burseraceae*	C
26.	Daru	*Punica granatum*	*Punicaceae*	C

The price spread for various NTBRs was also reported:

S. No.	Name of NTBR	Price range per Kg (Rs./ INR)			
		NTBR collector	Contractor	Processed	Mandi (Amritsar/ Delhi)
1.	*Kuth*	100-150	300-400	No	350-500

2.	*Dhoop*	100	200-225	Yes	250-300
3.	*Ratanjot*	150-200	450-500	Yes	500-550
4.	*Zakhme hayat*	60-70	90	No	90-100
5.	*Kod*	300	A class: 450 B class: 350-400 C class: 300	Yes	1000-1100 800-900 600-700
6.	*Patis*	700-800	1200	No	>1500
7.	*Jungli lahsun*	2000-2500	2000-2500	No	5000-6000
8.	*Guchi*	5000-6000	10000	Yes	12000-15000 (Also exported directly to hotels in Mumbai, Kolkata, Bangalore).
9.	*Banafsha*	Flower: 6000 Root: 1000	7000-8000 2000-2500	Yes No	>10000 2500-3000
10.	*Diascorea*	5-10	20-25		25-30
11.	*Beladona*	60-70	70-100		100-120

The overall income contribution of NTBRs to the rural households in the Northwest Himalayan households of Jammu and Kashmir was found to be around Rs. 38,905/- per annum. The NTBR income contributed to about 18.98 per cent to the household incomes with the minimum contribution being 0.67 per cent and maximum contribution of about 78.13 per cent.

Overall, the variables positively affecting the dependence on NTBR collection were; number of males in family, number of females in family and practicing animal husbandry. The chi-square value was 101.529, with a p-value of 0.000 and Nagelkerke's R2 value was 0.269. Thus, 26.9 per cent variation in the decision to collect NTBR was due to the above factors. However, NTBR collection practice was declining with the possession of mobile phones by the respondents, having a nuclear family and practicing farming/ agriculture.

The most serious constraints as expressed by the NTBR collectors of North West Himalayas were untimely issuance of transport permission by forest department (90%), wild weeds (88%), bad weather (80%) and improper weighing system (81%).

The study has brought into focus many problems relating to the cultivation and marketing of NTBRs in the study areas. In order to meet the growing

requirements of NTBRs (mainly medicinal and aromatic plants) emphasis is needed on their marketing potential. Relying only on natural production sites will pose serious problems in sustainable management of NTBRs. Present system of extraction from the wild is also adding to the problems of extinction of some of the species.

There is a need to train local people in cultivation of the medicinal and aromatic plants. Information on market potential, their prices and market intelligence is required to be collected through regular market surveys so that proper marketing strategies could be formulated. The producer- industry linkages needs to develop model of contract farming should be developed to ensure better marketing for their harvest.

The online database with mapping of the NTBR and interactive dashboard with the findings of the project is hosted on a high performance computer cluster with a high performance storage server installed in the Division of Agricultural Extension Education, FoA, SKUAST Jammu, Main Campus, Chatha. The address to access the local database server set up in SKUAST Jammu is http://nmhs.skuast.org which is backed up on cloud storage for 24 hours access at the address https://ihyme.com/ntbr/index.php to cover power outrage and intermittent internet connectivity being a rural area.

2

INTRODUCTION

India is an agrarian country with agricultural land area of about 180 million hectares. Agriculture has a major role in Indian economy and despite the combined industrialization in last five decades, agriculture occupies a significant place. In 2016, the agriculture sector comprised 23 per cent of the total economy, as measured by the gross domestic product (GDP), and employed around 59 per cent of the country's total labour force (FAO, 2017).

The world's poorest people depend on forests to varying extents (Sunderlin *et al.*, 2005; Camara-Leret, Fortuna and Bascompte, 2019), but are generally more dependent on biodiversity and ecosystem services than the people who are better off (Reid and Huq, 2005; CBD, 2010). Human populations tend to be low in areas of low and middle-income countries with high forest cover and high forest biodiversity, but poverty rates in these areas tend to be high (Fisher and Christopher, 2007). FAO (2018) estimated that 252 million people living in forests and savannahs had incomes of less than USD 1.25 per day. Overall, about 63 per cent of these rural poor lived in Africa, 34 per cent lived in Asia and 3 per cent lived in Latin America. The 8 million forest-dependent poor in Latin America represent about 82 per cent of the region's rural extreme poor. Non-timber bioresources (NTBRs) are particularly important in providing food, income and nutritional diversity for hundreds of millions of people around the world, notably women, children, landless farmers, indigenous peoples and others in vulnerable situations. The gathering of food, medicinal plants, craft materials, other NTBRs and woodfuel forms a significant component of rural livelihoods. In some remote areas, the sale of NTBRs is the only source of cash available to women (Shackleton et al., 2011). In more prosperous economies, urban people are showing a growing interest in foods, cosmetics and other products from the forest, as illustrated by the appearance of products from forest species on supermarket shelves or in the recipes of cutting-edge chefs around the world (McDonell, 2019). Therefore the low and marginally low income forest dwelling communities can serve as a bridge for this transaction, providing a flow of non-wood forest products to the elite, in order to raise their socio-economic standards (FAO, 2020).

Forest ecosystems are a critical component of the world's biodiversity as many forests are more biodiverse than other ecosystems. Forests cover about 31 per cent of the global land area. Approximately half the forest area is relatively intact, and more than one-third is primary forest (i.e. naturally regenerated forests of native

species, where there are no visible indications of human activities and the ecological processes are not significantly disturbed). The total forest area of world is 4.06 billion hectares, or approximately 5000m^2 (50 x 100m) per person, but forests are not equally distributed around the globe. More than half of the world's forests are found in only five countries (Russian Federation, Brazil, Canada, United States of America and China) and two-thirds (66%) of the forests are found in rest of the countries. India has a forest cover of about 72 million hectares i.e. 1.8 per cent of the global forest cover (FAO, 2020).

Sustainable Development Goal (SDG) 15 of FAO i.e. Life on land and Indicator 15.2.1 i.e. Progress towards sustainable forest management validates the importance of forest resources and measures progress towards Sustainable Forest Management (SFM) through five subindicators viz. forest area annual net change rate, above-ground biomass stock in forest (t/ha), proportion of forest area within legally established protected areas, proportion of forest area under a long-term forest management plan and forest area certified. The indicator will contribute to track progress towards SDG target 15.2. i.e. by 2020, to promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally.

Non-timber bioresources (NTBRs), also known as non-timber forest products (NTFPs), non-wood forest products (NWFPs), minor forest produce (MFP), special, minor, alternative and secondary forest products, are useful substances, materials or commodities obtained from the forests which do not require harvesting (logging) trees. They include game animals, fur-bearers, nuts, seeds, berries, mushrooms, oils, foliage, pollarding, medicinal plants, peat, mast, fuel wood, fish, spices, and forage (Ministry of Forests and Range- Canada, 2008).

Research on NTBRs has focused on their ability to be produced as commodities for rural incomes and markets, as an expression of traditional knowledge or as a livelihood option for rural household needs, and as a key component of sustainable forest management and conservation strategies. All research promotes forest products as valuable commodities and tools that can promote the conservation of forests (Wikipedia, 2014).

The wide variety of NTBRs includes mushrooms, huckleberries, ferns, transplants, seed cones, piñon seeds, tree nuts, moss, maple syrup, cork, cinnamon, rubber, wild pigs, tree oils & resins, and ginseng. The United Kingdom's Forestry Commission defines NTBRs as "any biological resources found in woodlands except timber" (Forest Research-UK, 2006), and Forest Harvest, part of the Reforesting Scotland project, defines them as "materials supplied by woodlands- except the

conventional harvest of timber" (Anonymous, 2013). These definitions include wild and managed game, fish, and insects. NTBRs are commonly grouped into categories such as floral greens, decoratives, medicinal plants, foods, flavors and fragrances, fibers, and saps and resins (CIFOR, 2013).

Other terms similar to NTBRs include special, non-wood, minor, alternative, and secondary forest products. NTBRs in particular highlight forest products which are of value to local people and communities, but have been overlooked in the wake of forest management priorities (for example, timber production and animal forage). In recent decades, interest has grown in using NTBRs as alternatives or supplements to forest management practices. In some forest types, under the right political and social conditions, forests can be managed to increase NTBR diversity, and consequently, to increase biodiversity and potentially economic diversity. Black truffle cultivation in the Mediterranean area is a good example of a high profitability when well managed.

The vast natural resources of India's forests, including non-timber forest products (NTFPs), such as medicinal and aromatic plants, leaves, fruits, seeds, resins, gums, bamboos, and canes, offer employment that provides up to half the income of about 25 per cent of the country's rural labour force. However, poor harvesting practices and over-exploitation in the face of increasing market demand are threatening the sustainability of these resources, and thus the livelihoods of forest-dependent tribal communities.

Use of NTBRs

The use of NTBRs remains widespread throughout the world. People from a wide range of socioeconomic, geographical, and cultural contexts harvest NTFPs for a number of purposes, including household subsistence, maintenance of cultural and familial traditions, spiritual fulfillment, physical and emotional well-being, house heating and cooking, animal feeding, indigenous medicine and healing, scientific learning, and income. Other terms synonymous with harvesting include wild-crafting, gathering, collecting, and foraging. NTFPs also serve as raw materials for industries ranging from large-scale floral greens suppliers and pharmaceutical companies to microenterprises centered upon a wide variety of activities (such as basket-making, woodcarving, harvesting and processing of various medicinal plants).

Economic importance

To estimate the contribution of NTBRs to national or regional economies is difficult, broad-based systems for tracking the combined value of the hundreds of products that make up various NTBRs industries are lacking. One exception to this is the maple syrup industry, which in 2002 in the USA alone yielded 1.4 million gallons

(5,300 m^3) worth USD 38.3 million (Gale, 2008). In temperate forests like in the USA, wild edible mushrooms, medicinal plants and floral greens are high profit industries. While these high-value species may attract the most attention, a diversity of NTFPs can be found in most forests of the world.

In tropical forests, NTBRs can be an important source of income that can supplement farming or other activities. A value analysis of the Amazon rainforest in Peru found that exploitation of NTFPs could yield higher net revenue per hectare than would timber harvest of the same area, while still conserving vital ecological services. Their economic, cultural, and ecological values, when considered in aggregate, make managing NTBRs an important component of sustainable forest management and the conservation of biological and cultural diversity.

Use of NTBRs in India

NTBR of forest origin are used extensively in India as edible plant products, medicinal plants, aromatic plants, gums and resin exuding plants, dyes and colour-yielding plants, fiber and floss-yielding plants, jam-yielding plants, bamboo, canes, fodder and forage for livestock, fuelwood or firewood in household use, charcoal, large leaves for eating food (leaf plates) e.g. in South India, and branches for making traditional items like baskets,leaves for making disposable, brooms and firepots (*kangri*) e.g. in Kashmir.

In ethnic minority people's livelihoods

Minority people living away from the mainstream and Indian tribes and many other minority groups living in the viscinity of Himalayas are closely associated with forests since centuries. Much of their household subsistence and part of the income is generated from the sale of a variety of NTBR products. In india, NTBR collection and processing is spread almost throughout the year, so provides a sustained income for the ethnic minority people. From June to August, NTBRs are collected from forests and provides the bulk of household income. Several people among the families living around forests, go into the forest on a regular basis during this period, where they stay for 2 to 3 days and NTBRs are collected. The bamboo shoots in North East of India, mushrooms and vegetable collection are main source of income for their livelihoods. Among the items collected are fruits, berries, leaves, fish, bees honey, wild orchids and many more. The local markets are full of other wild plants put forward by these people for the tourists, both domestic and international, that flock there. Between 10-15 per cent of the total household income is derived from the sale of NTBRs. The harvesting of leaves in the diet of family goes round the year where different species are readily available in specific months. Water from forest areas is yet another service that is useful in the livelihoods of these people. They have micro-

hydro plants installed in streams that generate the much needed power for pounding (grain and seeds) and lighting too.

In the drier areas, the harvesting of curry leaves to be sold to traders is an important source of income. The harvesting of velvet tamarind (*Dialium ovoideum*) is also an important income source to the rural people. This tree which is endemic to the Himalayan dwellers provides a fruit that has a high-popularity during certain months of the year. The returns from the sale of these two products is an important addition to the household incomes of rural people. Similarly, in Jammu and Kashmir and Himachal Pradesh, during our pilot survey it was found that use of various NTBRs like *Morchella esculenta* (Gucci), *Grewia optiva* (Beul), *Bauhinia variegata* (Kachnar), *Pinus roxburghii* (Resin), *Acacia catechu* (katha and cutch), bamboo products and apiculture and *Viola odorata* (Banafsha) on regular basis by the farmers. A very high economic value for *Trillium govanianum* (Naagchatri), Allovera, *Allium sativum* (Jungli lehsun), *Saussureas costu* (Kuth) *Angelica glauca* (Chora), *Aconitum heterophyllum* (Atis or patis or patris), *Valeriana jatamansi* (Nihanu), *Picrorhiza kurroa* (Karu or kutki) and *Origanum vulgare* (Ban tulsi) was also found in the study area.

Research

Research on NTBRs has focused on three perspectives: NTBRs as a commodity with a focus on rural incomes and markets, as an expression of traditional knowledge or as a livelihood option for rural household needs, and finally, as a key component of sustainable forest management and conservation strategies. These perspectives promote forest products as valuable commodities and important tools that can promote the conservation of forests. In some contexts, the gathering and use of NTBRs can be a mechanism for poverty alleviation and local development.

Rationale behind the selection of research problem

The idea for the project originated from the large scale perception of lowering farming income due to fragmation of land and small holdings that is forcing dependence on forest for livelihood has increased day by day and the forest flora and fauna are degrading at a faster rate. The rationale behind the project was to get empirical data that will be digitally documented and will be available to the policymakers, researchers and stakeholders. The total forest area of the UT of Jammu and Kashmir and UT of Ladakh is about 20,230 sq km which is around 20 per cent of its geographical area. In Jammu, Kashmir and Ladakh regions it is reported to be 12,000 sq km, 8128 sq km and 36 sq km, respectively (DSE, 2013-14). In Himachal Pradesh state, the total forest cover is about 37,033 sq km. The

main timber forest species found in J&K, Ladakh and Himachal Pradesh are Abies, Kail (*Pinus*), *Pionusrox burghii* and *Cedrus deodara*. Whereas, some important non-timber forest products (NTFPs) like kuth, rasount, katha, bunafsha, retha, harad, wild apricot, wild pomegrenate (anardana), baledona, dioscoria, hyoscyamus, guchi, podophyllum and resin etc. form the major part as far as non-timber bioresources (NTBRs) are concerned. The people living in the vicinity of the forests and migrating tribes rearing goats and sheep collect non-timber bioresource (NTBR) for their livelihood sustainability and as an off-farm income for them.

There is hardly any such study or a digital database available on NTBR collectors for Himalyas of J&K, Ladkh and H.P, which may depict that how much non-farm products are collected, what is the socio-economic background of the people collecting them and what is its share in their non-farm income? NTBRs when compared with the other timber products, have historically been given least importance by the government. Rather this practice is going on legally or illegly.There are gaps in understanding the range of products used from forests, socio-economic values, technical packages and the policy contexts for their sustainable use in J&K, Ladakh and Himachal Pradesh of the North-West Himalayan region. NTBRs are a significant commodity, especially for the poor, because they are available at minimum or no cost, on common property or forest lands. They are used by the forest dwellers who have less alternative access to food and income.

Moreover, North-West Himalayan ranges are rich in naturally occurring medicinal plants and this may be attributed to the distinct geographical topography, climate and limited access of population to the high altitude forests, which have been successfully used by the Indigenous Technical Knowledge (ITK) users/ local healers for the treatment of human and animal ailments. Many of these medicinal plants offer viable alternatives to the conventional allopathic medicine. The local healers are usually farmers having their own indigenous knowledge of medicinal plants in their areas and their use for healing. Mostly, pastoralists and migratory livestock farmers rely on these medicinal plants found in the high altitude pastures of Jammu and Kashmir for the treatment and well being of their livestock. Presently, many indigenous knowledge systems are at risk of becoming extinct due to rapidly changing natural environment and fast pacing economic, political, and cultural changes on a global scale. Documentation of these indigenous technical knowledge practices by use of medicinal plants in Jammu and Kashmir, Ladakh and Himachal Pradesh is currently very limited and there is a chance of losing this precious knowledge and there is an urgent need to documentize this information before it is lost forever.

The challenge for coming years is to develop proper tools and methods for the sustainable extraction of NTBRs and its trade regulation. This can be achieved by efficiently using the existing knowledge and experience of NTBRs collectors, facilitators, entrepreneurs and researchers in the region. This involves steps such as identifying, connecting and engaging such people in a range of networking activities that stimulate the flow of information and learning, and those yield products of immediate interest and utility to the concerned NTBR conservation initiative. The main changes expected by implementing the project was the digital documentation of facts regarding the availability of forest products and their subsequent utilization or sale by the forest inhabitants. The project was formulated also with a view to draft a roadmap for effective market linkage to the NTBR collectors with the niche market areas.

About Himalayas

The word Himalaya is a Sanskrit word, literally meaning a snow dwelling (“hima” meaning "snow" and “a-laya” meaning "dwelling"). Himalaya is a mountain range in Asia separating the plains of the Indian subcontinent from the Tibetan Plateau. The range has many of earth's highest peaks, including the highest, Mount Everest shared by the territory of Nepal and China. The Himalayas include more than fifty mountains exceeding 7,200 m (23,600 ft) elevation, including ten of the fourteen 8,000-metre peaks (Yang and Zheng, 2004). The Himalayas are distinct from the other great ranges of central Asia, although sometimes the term 'Himalaya' (or 'Greater Himalayas') is loosely used to include the Karakoram and some of the other ranges. The Himalayas are inhabited by about 52.7 million people, and are spread across five countries: Bhutan, China, India, Nepal and Pakistan (Apollo, 2017).

The Himalaya extends over 2400 kilometers from the west-northwest (Nanga Parbat; 8125 m) and to the east (Namche Barwa; 7755 m) and lies between the Western and Eastern Syntaxis bends (Wadia, 1931), which are used by two rivers: the Indus and Tsangpo–Brahmaputra described as syntaxial rivers (Friend *et al.,* 2009). From the north, the chain is limited by a 50 to 60 km wide tectonic valley called the Indus–Tsangpo Suture (Valdiya, 1998).

Towards the South, it is bordered by the very low Gangetic plain (Le Fort, 1975). The range varies in width from about 350 kilometers in the west (Jammu and Kashmir, and Ladakh) to about 150 kilometers in Arunachal Pradesh. Various scholars have divided the Himalayas by their own criteria (Burrard, 1934; Bordet, 1961; Chatterjee, 1964; Gansser, 1964; Karan, 1966). The easiest way the

Himalayan Range can be divided is into three meso-physiographic regions i.e. Western, Central and Eastern (Chatterjee, 1964) (Fig. 1). According to Singh (1971) those regions can be further subdivided into 8 regions, however with some modifications (without the Purvanchal region) (table 1).

Western Himalaya: It also known as North-Western Himalaya is divided into (1) Jammu and Kashmir, and Ladakh (erstwhile Jammu and Kashmir state Himalaya) and (2) Punjab Himalaya (including Himachal Pradesh Himalaya). The 550 km long arc extends (longitudinally) from the Indus river gorge near Nanga Parbat through Kashmir, Himachal Pradesh to the gorge of Sutlej River in the east.

Central Himalaya: It is sometimes referred to, although incorrectly, as Nepalese Himalaya, due to the fact that the whole region is divided into (3) Kumaun Himalaya and (4) Nepal Himalaya. Those regions lie between Sutlej River in the west and Arun River in the east.

Eastern Himalaya: It is divided into four subregions (5) Sikkim Himalaya; (6) Darjeeling Himalaya; (7) Bhutan Himalaya and (8) Arunachal Himalaya. The eastern part of the Himalayan Range extends from the Arun river gorge to the Tsangpo–Brahmaputra valley in the east. It is worth noting that according to Singh (1971) there is another subregion in the very south-east of Eastern Himalaya–Purvanchal, however Burrard (1934) does not mention it, and Chatterjee (1964) excludes Purvanchal region from north-eastern ranges.

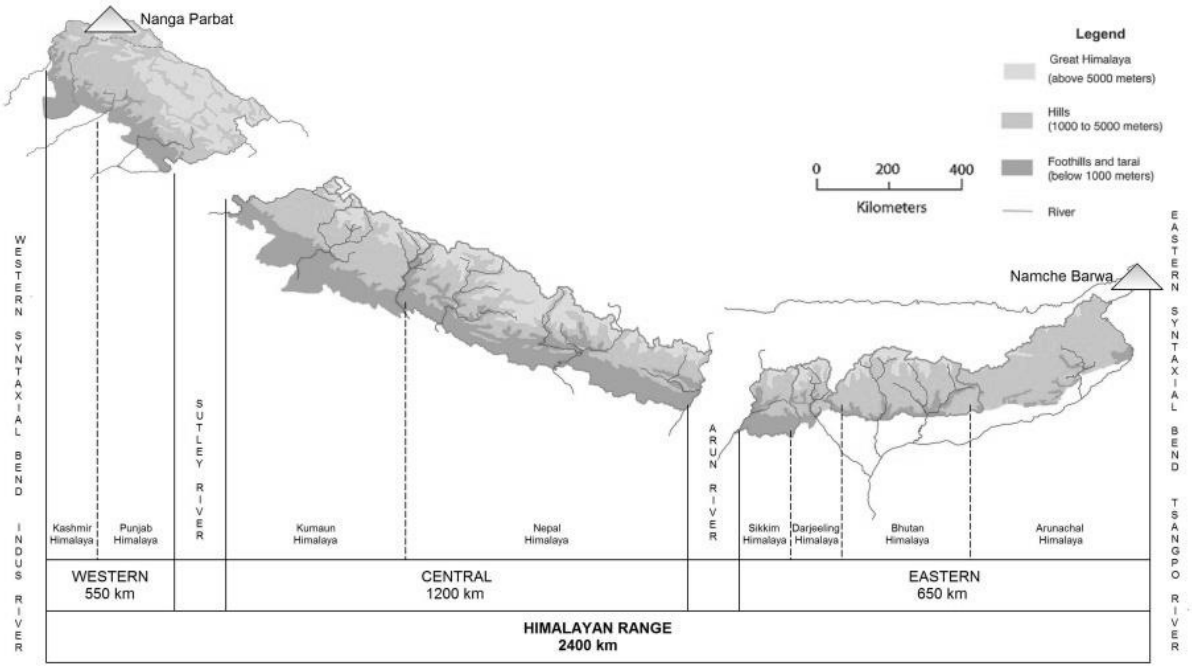


Fig. 1: Division of the Himalayas, Source: Zurick and Pacheco (2006)

Table 1: Himalayan Regions with administrative units

Region	State/ UT	Districts	No. of districts
1. Kashmir Himalaya	Jammu & Kashmir, Ladakh	Kathua, Jammu, Samba, Udhampur, Reasi, Rajouri, Poonch, Doda, Ramban, Kishtwar, Anantnag, Kulgam, Pulwama, Shopian, Budgam, Srinagar, Ganderbal, Bandipora, Baramulla, Kupwara, Kargil, Leh	22
2. Punjab Himalaya	a) Himachal Pradesh	Chamba, Kangra, Una, Hamirpur, Bilaspur, Mandi, Kulu, Shimla, Solan, Sirmur, Kinnaur, Lahul and Spiti	12
	b) Punjab	Gurdaspur, Hoshiarpur, Rupnagar	3
	c) Chandigarh	Chandigarh	1
	d) Haryana	Panchkula	1
3. Kumaun Himalaya	Uttarakhand	Uttarkashi, Chamoli, Tehri- Garhwal, Pauri Garhwal, Almora, Pithoragarh, Nainital, Dehradun, Bageshwar	9
4. Nepal Himalaya	a) Far-Western	Seti (w/o Kailali), Mahakali (w/o Kanchanpur)	2
	b) Mid-Western	Bheri (w/o Bardiya, Banke), Karnali, Rapti (w/o Dang)	3
	c) Western	Lumbini (w/o Kapilbastu, Rupandehi, Nawalparasi), Dhawalagiri, Gandaki	3
	d) Central	Bagmati, Narayani (w/o Chitwan, Parsa, Bara, Rautahat), Janakpur (w/o Sarlahi, Mabottari, Dhanusa)	3
	e) Eastern	Koshi (w/o Sunsari, Morang), Mechi (w/o Jhapa), Sagarmatha (w/o Siraha, Saptari)	3
5. Sikkim Himalaya	Sikkim	North Sikkim, East Sikkim, South Sikkim, West Sikkim	4
6. Darjeeling Himalaya	West Bengal	Darjeeling, Jalpaiguri	2
7. Bhutan Himalaya	a) Western	Samtse, Haa, Paro, Chukha, Thimpu	5
	b) Central	Gasa, Punakha, Wangdue Phodrang, Dagana, Tsirang	5
	c) Southern	Sarpang, Zhemgang, Trongsa, Bumthang	4
	d) Eastern	Samdrup Jongkhar, Pemagatshel, Mongar, Trashigang, Trashiyangtse, Lhuntse	6
8. Arunachal Himalaya	Arunachal Pradesh	Tawang, West Kameng, East Kameng, Papum Pare, Upper Subansiri, West Siang, East Siang, Upper Siang, Lower Subansiri, Kurung Kumey	10

*w/o – without, Source: Apollo, M. (2017)

Scope of the project

The project operated in the union territories of Jammu and Kashmir, and Ladakh (erstwhile Jammu and Kashmir state) and Himachal Pradesh state of the North-Western Himalayan region.

The main forest species found in North-West Himalayas are:

1. In Jammu and Kashmir:

1.1 Sub-tropical dry deciduous forests: These forests are generally found in the lower reaches of Shiwaliks (outer lower Himalayas) in Jammu region. The common tree species are *Acacia catechu (Khair), Dalbergia sissoo* (Indian rosewood), *Acacia modesta (Phulai), Albizia spp.* (Silk tree), *Salmlia malabarica (Semul/* silk cotton tree*), Eucalyptus spp.* and *Dendrocalamus strictus* (Bamboo).

1.2 Sub-tropical pine forests: These forests are situated in upper Shiwalik and outer Himalayas. The common species found here are *Pinus roxburghii* (Chir pine), *Albizzia spp.* (Silk tree), *Dalbergia sissoo* (Indian rosewood), *Olea cuspidate* (Indian olive) and other broad leaved associates.

1.3 Himalayan moist temperate forests: This type is found in Chenab Valley. The common tree species are *Cedrus deodara* (Himalayan cedar), *Pinus wallichiana* (Himalayan Pine/ kail), *Picea smithiana* (West Himalayan spruce), *Pinus gerardiana* (Chilgoza pine), *Abies pindrow* (West Himalayan fir) low level, *Juglans regia* (English walnut), *Acer spp.* (Maple), *Populus ciliate* (Himalayan poplar), *Prunus padus* (Bird cherry/ hackberry), *Aesculus indicia* (Indian horse-chestnut), *Fraxinus floribunda* (Himalayan ash), *Quercus spp.* (English oak) etc.

1.4 Himalayan dry temperate forests: This type include the main forests of Kashmir valley with the common tree species as *Cedrus deodara* (Himalayan cedar), *Pinus wallichiana* (Himalayan Pine), *Picea smithiana* (West Himalayan spruce), *Abies pindrow* (West Himalayan fir), *Juglans regia* (English walnut), *Acer spp.* (Maple), *Prunus spp. (*Plum/ cherry/ peach), *Aesculus indicia* (Indian horse-chestnut) and the typical under wood of *Parrotiopsis jacquemontiana* etc.

1.5 Alpine forests: These forests are situated above the main temperate zone. Common species found in this zone are *Abies pindrow* (West Himalayan fir) high level *and Pinus wallichiana* (Himalayan Pine/ kail), *Juniperus spp.* (Junipers), *Quercus spp.* (English oak), *Populus ciliate* (Himalayan poplar), *Betula spp.* (Birch), *Salix spp.* (Willow), *Rhododendron,* and a variety of wild flowers and grasses.

2. In Ladakh:

2.1 Forest in cold arid zone: Leh and Kargil districts fall in this zone, where natural forests are meager. *Juniperus spp.* (Junipers) exists sporadically. Plantations

of Poplar and Salix have been introduced by the forest department. *Robinia spp.* has been introduced in the recent past. The natural shrubs include *Hypophea and Myrciaria.* Among herbs *Artemisia* is abundantly found, besides other species of medicinal importance.

3. In Himachal Pradesh:

Himachal Pradesh is a predominantly mountainous state. Consequently, its climate is more congenial to forests. It comprises four zones; sub-tropical, sub-temperate, wet-temperate and dry-temperate.

3.1 Sub-tropical forests: This zone consists of foothills and valley up to an elevation of about 915 metres above sea level with a subtropical climate and an annual rainfall of 70-100 cm, of which 75 per cent falls during monsoon season. The maximum temperature goes up to 40^{o}C. It comprises dry deciduous, chir, pine, sal (2140 sq. km) and thorny forests (43 sq. km) mostly of *xerophytic* species.

3.2 Sub-temperate forests: These forests extend from 916 meters to about 1523 meters above sea level, has a mild climate and an annual rainfall of 90 to 120 cm, nearly 70 per cent of which is received during the monsoon season. Some upper hills get snowfall during winter, which does not stay for long. The maximum temperature in summer remains around 30^{o}C. Various species of pines, oak and broad-leafed species grow in this zone.

3.3 Wet-temperate forests: These extend from 1524 to 2472 metres above mean sea level, and have varies from 100 to 250 cm, with snowfall during winter, when the maximum temperature ranges between 15 and 20^{o}C. These forests have been categorized as lower Western Himalayan temperate forests consisting of conifers, oaks and various deciduous trees and Western Himalayan temperate forests, which consist of fir, oaks and *rhododendron* species found in alpine zones.

3.4 Dry-temperate forests: These extend to above 2472 metres. The mean annual temperature is around 10^{o}C and the mean annual precipitation about 25 cm, most of which is received as snow. The area contains scattered trees and bushes such as chilgoza willow, *robinia, ailanthus,* poplars and alpine pastures interspersed with bushes such as *ephedra.*

NTBR availability in Jammu and Kashmir and Himachal Pradesh

The union territory of Jammu and Kashmir is broadly divided in two UT divisions viz. Jammu division and Kashmir division. Further, the Jammu division has three major forest circles with prominent NTBR; (1) Chenab circle (2) East circle, and (3) West circle. The Kashmir division also comprises of three major forest circles; (1)

North circle (2) South circle, and (3) Srinagar circle. The details are given below in table 2.

Table 2. Details of forest circles, divisions and ranges of J&K with prominent NTBR:

S. No.	Forest circle	Forest division	Forest range
1.	Chenab	Batote	Batote
2.			Gandhri
3.			Marmat
4.		Bhaderwah	Bhalesa
5.			Cheralla
6.			Kellar
7.			Neeru
8.		Doda	Kuntwara
9.			Siraj
10.			Thakari
11.		Kishtwar	Kishtwar
12.			Nagsani
13.			Padder
14.		Marwah	Dachan
15.			Marwah
16.			Udil
17.		Ramban	Banihal
18.			Ramban
19.	Jammu East	Billawar	Bani
20.			Basoli
21.			Billawar
22.			Ramkote
23.		Jammu	Bahu
24.			Gladni Depot
25.			Jammu
26.			Jindrah
27.			Kalidhar
28.		Kathua	Jasrota
29.			Kathua
30.			Samba
31.		Ramnagar	Basantgarh
32.			Ramnagar North
33.			Ramnagar South
34.		Udhampur	Dudu
35.			Panchari
36.			Udhampur
37.		Urban Forestry Jammu	Estate Range
38.			MFP Godown
39.			Sunjawan Range
40.			TT Range
41.			TTO Bahu
42.			TTO Toph
43.	Jammu West	Mahore	Gool
44.			Gulabgarh

45.			Mahore
46.		Nowshera	Lambari
47.			Nowshera
48.			Sunderbani
49.		Poonch	Havali
50.			Mendhar
51.			Surankote
52.		Rajouri	Kalakote
53.			Kandi Range
54.			Rajouri
55.		Reasi	Katra
56.			Reasi
57.			Thakrakote
58.	North Kashmir	JV (Jhelum Valley) Baramulla	Baramulla
59.			Buniyar
60.			Doabgah
61.			Half Wrought Factory
62.			Uri
63.		Kamraj	Kandi Range
64.			Kupwara
65.			Matchil
66.			North Lolab
67.			South Lolab
68.			Special Range
69.		Kehmil	Karnah
70.			Keran
71.			Naihari
72.			Ramhal
73.		Langate	Magam
74.			Mawar
75.			Rafiabad
76.			Rajwar
77.	South Kashmir	Anantnag	Daksum
78.			Harnag
79.			Kokernag
80.			Kuthar
81.			Qazigund
82.			Verinag
83.		Kulgam	Dhamal Hanjipora
84.			Kulgam
85.			Veshev
86.		Lidder	Lidder, Bijbehara
87.			Mattan
88.			Pahalgam
89.			Tral
90.		Shopian	Kakapora Range
91.			Romeshi
92.			Shopian
93.	Srinagar	Bandipora	Ajas
94.			Gurez
95.			Khuihama
96.			Ningli

97.		PP (Pir Panchal) Division Badgam	Doodganga
98.			Raithan
99.			Sukhnag
100.		Sindh	Haran Shalbugh
101.			Manasbal
102.			Sindh
103.		Tangmarg	Pattan
104.			SPSP
105.			Tangmarg
106.		Urban Forestry Srinagar	Estate Range A
107.			Estate Range B
108.			Hariparbat Range
109.			S Park (Shankar Acharya)
110.			Timber Range
111.			TT Range, PC Depot

Table 3. Details of forests of Himachal Pradesh:

DISTRICT WISE FOREST COVER OF HIMACHAL PRADESH : As Per FSI Report 2017 (Area in Km2)					
District	**Geographical Area**	**Very Dense Forest**	**Mod. Desne Forest**	**Open Forest**	**Total**
Bilaspur	1167	23	161	191	375
Chamba	6522	775	986	682	2443
Hamirpur	1118	39	86	188	313
Kangra	5739	297	1274	626	2197
Kinnaur	6401	79	266	278	623
Kullu	5503	582	843	562	1987
Lahul Spiti	13841	15	31	147	193
Mandi	3950	368	722	671	1761
Shimla	5131	736	1039	624	2399
Sirmaur	2825	131	568	688	1387
Solan	1936	46	426	394	866
Una	1540	19	303	234	556
Grand Total	**55673**	**3110**	**6705**	**5285**	**15100**

Status of NTBR in North-Western Himalaya

Generally the NTBRs found in Jammu and Kashmir, and Himachal Pradesh are almost similar and are given in table 4 below. The data has been obtained from the Forest departments of J&K and Himachal Pradseh.

Table 4. List of some main commercially exploited NTBR species in J&K and Himachal Pradesh (*Source: Forest Department of J&K and H.P)*

S.No	**Botanical Name**	**Local Name**
1	*Abies spectabilis/ A.pindrow*	Talis Patra
2	*Acacia catechu*	Khair
3	*Aconitum dienorrhizum*	Vatsnaba/ Mohra

4	*Aconitum heterophyllum*	Atis/ Patis/ Karvi Patis
5	*Aconitum violaceum*	Mitha Telia/ Mitha Patis
6	*Acorus calamus*	Bach/ Bare/ Ghor bach
7	*Adhatoda zeylanica/ A. vasica*	Basuti/ Bansa
8	*Adianium lunulatum*	Dungtuli/ Hansraj
9	*Aegle marmelos*	Bilgiri
10	*Aesculus indica*	Khanor
11	*Ainsliae aptera*	Sathjalori
12	*Ajuga beacteosa*	Neelkanthi
13	*Alnus nitida*	Kosh cones
14	*Angelica glauca*	Chora
15	*Arctium lappa*	Jungli Kuth
16	*Arnebia euchroma/ A. benthami*	Ratanjot
17	*Artemisia brevifolia*	Seski
18	*Asparagus adscendens*	Shatavari/ Sanspai/ Safed Musali
19	*Atropa acuninata*	Belladona/ Jharka
20	*Berberis spp*	Kashmal/ Daruhaldi
21	*Bergenia ciliata/ B. stracheyi*	Pasahnbhed/ Patharchat
22	*Betula utilis*	Bhoj Pattar/ Birch pine
23	*Bunium persicum*	Kala Zira
24	*Carum carvi*	Shingu Zira
25	*Cedrus deodara*	Deodar Rosette
26	*Cinnamomum tamala*	Tejpatra
27	*Colebrookia oppositifolia*	Bindi Phool
28	*Coleus aromaticus*	Pathan Bail
29	*Curcuma angustifolia*	Ban Haldi
30	*Dactylorhiza hatageria*	Salam Panja/ Hath Panja
31	*Dioscorea deltoidea*	Singli Mingli/ Kins
32	*Emblica officinalis*	Amla
33	*Ephedra gerediana*	Somlata
34	*Fritillaria roylei*	Ban Lehsun/ Mushtanda
35	*Geranium nepalense*	Laljari/ Raktjari
36	*Girardiana diversifolia*	Bichhu Buti
37	*Hedychium acuminatum*	Kapur Kachri/ Kachur/ Van Haldi
38	*Heracleum spp (H. candicans, H.lanatum)*	Patishan/ Patrala
39	*Hyocymus niger*	Khurasani Ajwain
40	*Hypericum patulum/ H. perforatum*	Khaarera/ Basant
41	*Hyssopus officinalis*	Juffa
42	*Iris germanica*	Safed Bach
43	*Juglans regia*	Akhrot/ Khod
44	*Juniperus communis*	Hauber
45	*Juniperus recurva/ J. macropoda*	Bether Patta
46	*Jurinea macrocephala*	Dhoop/ Gaggal dhoop
47	*Lichens*	Chalora/Chharila/Stone Flower
48	*Mentha longifolia*	Jungli Pudina
49	*Morchella esculenta*	Guchhi/Cheun
50	*Mosses*	Green Moss Ghass
51	*Murraya koenigii*	Mitthi Nim
52	*Myrica esculenta*	Kaphal
53	*Nardostachys grandiflora*	Jatamansi
54	*Origanum vulgare*	Ban Tulasi
55	*Oroxylum indicum*	Shyonak, Tatpalanga
56	*Paris polyphylla*	Dudhia bach/ Satva

57	*Picrorhiza kurroa*	Karoo/ Kutki
58	*Pinus gerardiana*	Chilgoza/ Neoza
59	*Pinus roxburghii*	Chil Cones
60	*Pinus wallichiana*	Kail Cones
61	*Pistacia integerrima*	Kakarsingi
62	*Podophyllum hexandrum*	Bankakri
63	*Polygonatum spp.*	Salam Mishri/ Meda/ Mahameda
64	*Potentilla nepalensis*	Dori Ghas
65	*Prunus cerasoides*	Pajja/ Padam/ Padmakasht
66	*Punica granatum*	Daru/ Anar
67	*Pyrus pashia*	Kainth/ Shegal
68	*Rauvolfia serpentina*	Sarpagandha
69	*Rheum spp. (R. austral= R. emodi, R. speciforme)*	Revandchini
70	*Rhododendron anthopogon*	Talis patra
71	*Rhododendron arboreum*	Brash/ Burah
72	*Rhododendron campanulatum*	Kashmiri Patta
73	*Salvia moorcroftiana*	Thuth
74	*Sapindus mukorossi*	Ritha/Dodde
75	*Saussurea costus/ S. lappa*	Kuth
76	*Salinum spp. (S. vaginatum/ S.lenuifolium)*	Bhutkesi
77	*Swertia spp.*	Chirata
78	*Taraxacum officinale*	Dhudhi/Dandelion
79	*Taxus wallichiana = T. baccata*	Birmi/Thuna/Rakhal
80	*Terminalia bellirica*	Bahera
81	*Terminalia chebula*	Harar
82	*Thalictrum foliolosum*	Mamini
83	*Thymus serpyllum*	Banajwain
84	*Tinospora cordifolia*	Giloe/ Guduchi
85	*Toona ciliate/ Cedrela toona*	Bari phool
86	*Trillidium govanianum*	Nag Chhatri
87	*Valeriana spp.*	Mushakbala/Tagar/Nihanu
88	*Viola spp.*	Banafsha
89	*Withania somnifera*	Ashvagandha
90	*Woodfordia fruticosa*	Dhatki/Dhai
91	*Zanthoxylum armatum*	Tirmir

R&D based objectives

The NTBR collection for the forest adjacent families is imperative for their livelihood generation. A livelihood is held to comprise the capabilities, assets and activities required for securing a means of living. It is considered sustainable when it can cope with and recover from stresses and shocks, maintaining or enhances its capabilities and assets in the present and through time. Therefore the broad objective of the project was based on the foundation of sustainable livelihood and collection to the consumption system.

The specific objectives of the project entitled “Availability, Utilization and Digital Documentation of Non-Timber Bioresources for Sustainable Rural Livelihood

and Decision Support System of the Rural Households in the Northwest Himalayas" were:

1. To find out the availability and use pattern of NTBR.
2. To identify the production to consumption chain and price spread of different NTBR.
3. To find out the contribution of NTBR income to household income.
4. To delineate the factors driving the dependence of households on NTBR for livelihood security.
5. To find out the constraints and the potential of NTBR for all stakeholders and future interventions required for sustainable livelihood of adjacent communities.
6. To generate a digital database and mapping of NTBR.

3

METHODOLOGIES, STRATEGY AND APPROACH

This chapter on strategic research methodology deals with the procedural steps followed for the selection of locale, selection of the respondents, collection of data, variables and their measurement, tabulation and analysis of data.

Data were collected on an instrument, designed and tested for the purpose. The methodological steps followed in the present study are described under the following headings:

3.1 Methodologies used for the study

3.2 Preparatory actions and agencies involved

3.3 Details of scientific data collected and equipments used

3.4 Primary data collected

3.5 Details of field survey arranged

3.6 Strategic planning for each activities

3.7 Activity wise time frame followed

3.1 Methodologies used for the study

3.1.1 Research design

Non-equivalent control group exploratory research design was employed for the study. A non-equivalent group design is one, where the assignment of participants to groups is not controlled by the investigator. Since group assignment is not random, there is a chance that the groups are not similar, however, due care was taken for the control group of this research to be as similar to the experimental group as possible for criterias like age and location of data collection. Exploratory research is defined as a research used to investigate a problem which is not clearly defined. The objective of exploratory research is to gather preliminary information that will help define problems and suggest hypotheses.

3.1.2 Research methodology

Social research is the systematic method of discovering new facts or verifying old facts, their sequences, interrelationships, causal explanations, and the natural laws which govern them (Young, 1949). Social research methodology with multistage random sampling was used for the study. This study involved the application of scientific methods through data collection, for understanding, studying, and analyzing

the social life in UT of Jammu and Kashmir, Himechal Pradesh of North-West Himalayan region, in order to verify the existing sustainance practices and to help contribute concrete recommendations in order to uplift the same.

Multistage sampling contains two or more stages in sample selection. Large clusters of population are divided into smaller clusters in several stages in order to make primary data collection manageable. The union territory of Jammu and Kashmir and state of Himachal Pradesh was selected purposively. All of the forest circles from both the regions were initially selected for the study and among the forest circles, forest divisions where NTBR collection being practaised, were selected after consultation with the officials of respective forest departments.

3.1.3 Locale of the study

The study was conducted in the Union Territory of Jammu and Kashmir and Himachal Pradesh state. Out of the eight Himalayan regions falling in India, two Himalayan regions were purposily for the study (table 3.1):

Table 3.1: Selected Himalayan regions with administrative units

Region	State/ UT	Districts	No. of districts
Kashmir Himalaya	Jammu and Kashmir	Kathua, Jammu, Samba, Udhampur, Reasi, Rajouri, Poonch, Doda, Ramban, Kishtwar, Anantnag, Kulgam, Pulwama, Shopian, Budgam, Srinagar, Ganderbal, Bandipora, Baramulla and Kupwara	20
Punjab Himalaya	Himachal Pradesh	Chamba, Kangra, Una, Hamirpur, Bilaspur, Mandi, Kulu, Shimla, Solan, Sirmur, Kinnaur, Lahul and Spiti	12

The union territory of Jammu and Kashmir is broadly divided in two UT divisions viz. Jammu division and Kashmir division. Further, the Jammu division has three major forest circles with prominent NTBR; (1) Chenab circle (2) East circle, and (3) West circle. The Kashmir division also comprises of three major forest circles; (1) North circle (2) South circle, and (3) Srinagar circle. The details are given below in table 3.2.

Table 3.2: Details of forest circles, divisions and ranges of J&K with prominent NTBR

S. No.	Forest circle	Forest division	Forest range
1.	Chenab	Batote	Batote
2.			Gandhri
3.			Marmat

4.		Bhaderwah	Bhalesa
5.			Cheralla
6.			Kellar
7.			Neeru
8.		Doda	Kuntwara
9.			Siraj
10.			Thakari
11.		Kishtwar	Kishtwar
12.			Nagsani
13.			Padder
14.		Marwah	Dachan
15.			Marwah
16.			Udil
17.		Ramban	Banihal
18.			Ramban
19.	Jammu East	Billawar	Bani
20.			Basoli
21.			Billawar
22.			Ramkote
23.		Jammu	Bahu
24.			Gladni Depot
25.			Jammu
26.			Jindrah
27.			Kalidhar
28.		Kathua	Jasrota
29.			Kathua
30.			Samba
31.		Ramnagar	Basantgarh
32.			Ramnagar North
33.			Ramnagar South
34.		Udhampur	Dudu
35.			Panchari
36.			Udhampur
37.		Urban Forestry Jammu	Estate Range
38.			MFP Godown
39.			Sunjawan Range
40.			TT Range
41.			TTO Bahu
42.			TTO Toph
43.	Jammu West	Mahore	Gool
44.			Gulabgarh
45.			Mahore
46.		Nowshera	Lambari
47.			Nowshera
48.			Sunderbani
49.		Poonch	Havali
50.			Mendhar
51.			Surankote
52.		Rajouri	Kalakote
53.			Kandi Range
54.			Rajouri

55.		Reasi	Katra
56.			Reasi
57.			Thakrakote
58.	North Kashmir	JV (Jhelum Valley) Baramulla	Baramulla
59.			Buniyar
60.			Doabgah
61.			Half Wrought Factory
62.			Uri
63.		Kamraj	Kandi Range
64.			Kupwara
65.			Matchil
66.			North Lolab
67.			South Lolab
68.			Special Range
69.		Kehmil	Karnah
70.			Keran
71.			Naihari
72.			Ramhal
73.		Langate	Magam
74.			Mawar
75.			Rafiabad
76.			Rajwar
77.	South Kashmir	Anantnag	Daksum
78.			Harnag
79.			Kokernag
80.			Kuthar
81.			Qazigund
82.			Verinag
83.		Kulgam	Dhamal Hanjipora
84.			Kulgam
85.			Veshev
86.		Lidder	Lidder, Bijbehara
87.			Mattan
88.			Pahalgam
89.			Tral
90.		Shopian	Kakapora Range
91.			Romeshi
92.			Shopian
93.	Srinagar	Bandipora	Ajas
94.			Gurez
95.			Khuihama
96.			Ningli
97.		PP (Pir Panchal) Division Badgam	Doodganga
98.			Raithan
99.			Sukhnag
100.		Sindh	Haran Shalbugh
101.			Manasbal
102.			Sindh
103.		Tangmarg	Pattan
104.			SPSP
105.			Tangmarg

106.		Urban Forestry Srinagar	Estate Range A
107.			Estate Range B
108.			Hariparbat Range
109.			S Park (Shankar Acharya)
110.			Timber Range
111.			TT Range, PC Depot

Source: Forest department of UT of J&K and state of H.P

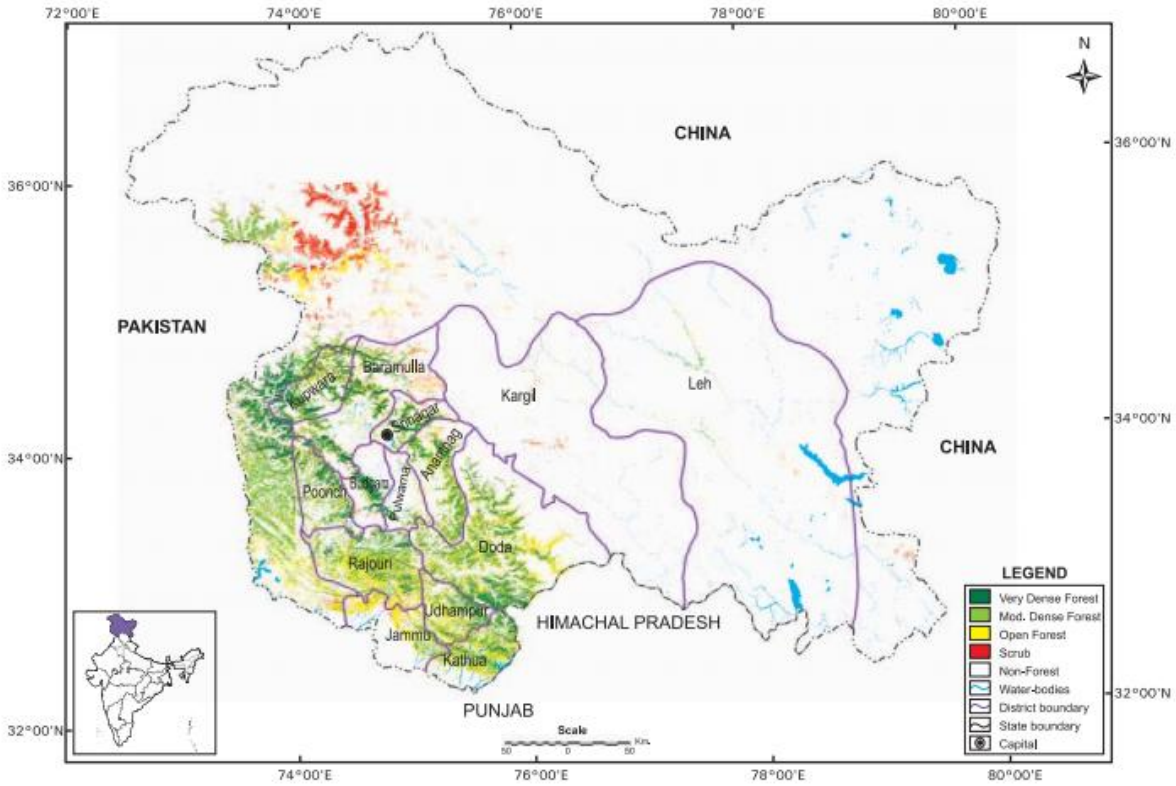


Fig: Jammu and Kashmir forest areas (Latitude : 32° 44' N Longitude : 74° 54' E)

The state of Himachal Pradesh comprises of nine forest circles.

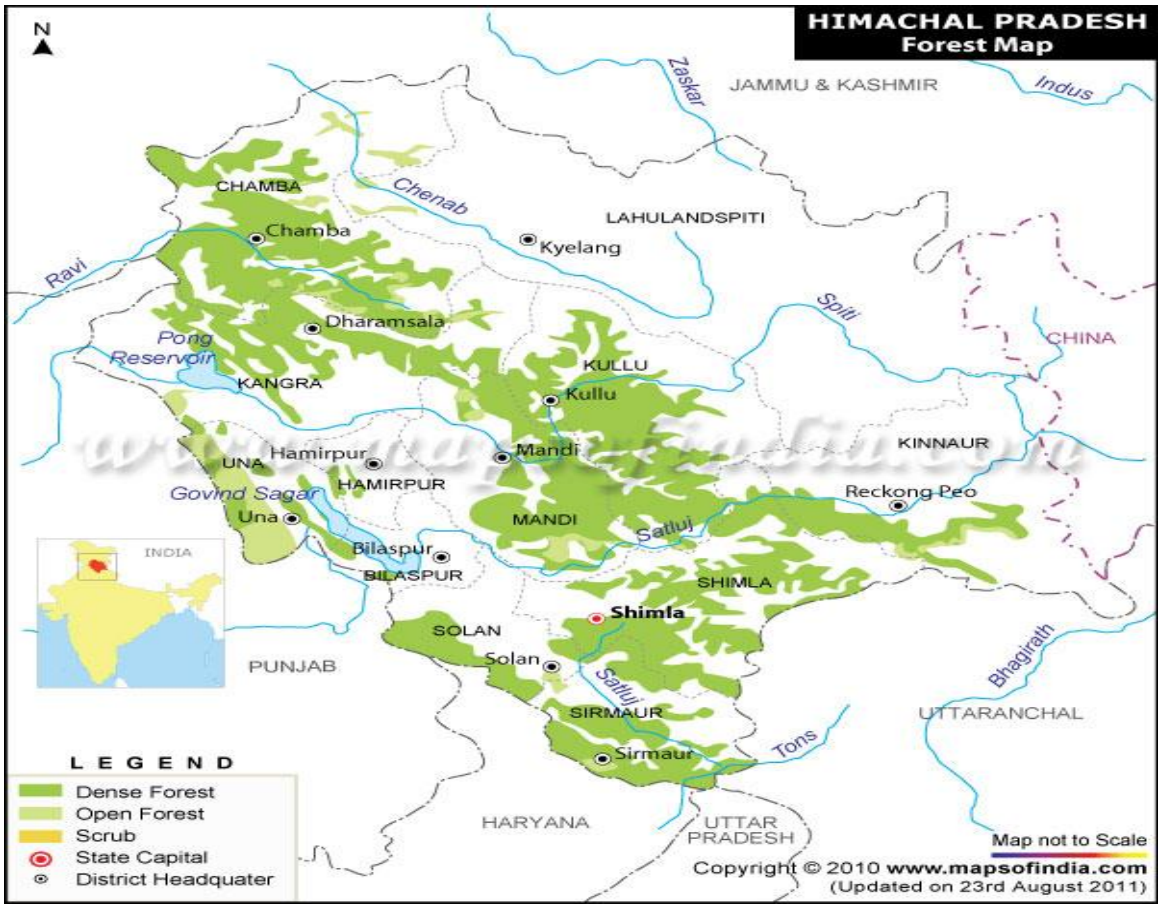


Fig: Himachal Pradesh forest areas (Latitude : 32° 29' N Longitude : 75° 10' E)

Table 3.3: Details of forests of Himachal Pradesh:

DISTRICT WISE FOREST COVER OF HIMACHAL PRADESH : As Per FSI Report 2017 (Area in Km^2)					
District	**Geographical Area**	**Very Dense Forest**	**Mod. Desne Forest**	**Open Forest**	**Total**
Bilaspur	1167	23	161	191	375
Chamba	6522	775	986	682	2443
Hamirpur	1118	39	86	188	313
Kangra	5739	297	1274	626	2197
Kinnaur	6401	79	266	278	623
Kullu	5503	582	843	562	1987
Lahul Spiti	13841	15	31	147	193
Mandi	3950	368	722	671	1761
Shimla	5131	736	1039	624	2399
Sirmaur	2825	131	568	688	1387
Solan	1936	46	426	394	866
Una	1540	19	303	234	556
Grand Total	**55673**	**3110**	**6705**	**5285**	**15100**

3.1.4 Selection of the study area

Jammu and Kashmir consists of 6 prominent forest circles, out of which 3 forest circles belong to Jammu division and 3 forest circles belong to Kashmir division of the Union Territory. Similarly, Himachal Pradesh consists of 9 forest circles. For this study, the survey was done in 3 forest circles of Jammu and Kashmir and 6 forest circles of Himachal Pradesh due to the conditions specified in this report itself at 3.5.

3.1.5 Selection of the respondents

Three types of respondents viz. NTBR collectors, non-collectors and contractors were the respondents for this scientific study (table 3.4).

3.1.5.1 Operational definitions used in study

I. **NTBR:** It referred to any non-timber bioresource, non-timber forest product (NTFP), non-wood forest products (NWFP), minor forest produce (MFP), special/minor/alternative and secondary forest product, useful substances, medicinal plants, materials or commodities obtained from the forests, which did not require harvesting (logging) trees and were naturally available in the North-Western Himalayas.

II. **NTBR collector:** It included those people who were collecting any non-timber bioresource (NTBR) from the North-West Himalayan region for household or commercial use.

III. **Non-collector:** It included those people from the selected forest circles, who were not collecting any NTBR from the adjoining forest areas.

IV. **Contractor:** A contractor who had participated in bidding arranged by the respective Forest Department, for the extraction and sale of NTBR products.

V. **Height/ slope:** It referred to the height above sea level (in metres), at which the particular NTBR collector was available and interviewed. The interview location was mapped with the handheld GPS device and later plotted on Google Maps to find out the altitude of that particular area. Following three categories were made as per the mean altitude above sea level:

Category	Height above sea level
Low:	<1000 metre
Medium:	1000-2000 metre
High:	>2000 metre

VI. **Availiablity:** This referred to the NTBRs available in a particular area, which were being collected by the NTBR collectors.

VII. **Use pattern:** It referred to the local use and utilization/ reason of collection of the NTBRs of forest origin by the NTBR collectors and forest dwellers in the North-Western Himalayan region.

VIII. **Consumption chain:** It reffered to the chain of collection till utilization of the NTBRs in the Indian Himalayan Region (IHR).

IX. **Price spread:** The price spread was the price fetched at each rung, by the particular NTBR to the NTBR collector, NTBR contractor and final market.

X. **Constraint:** It referred to the impediments/ bottlenecks faced by the NTBR collectors in the collection of NTBRs from North-Western Himalayas.

XI. **NTBR mapping:** It referred the coordinates of the location, where the NTBR collector was available and the interview was done.

3.1.5.2 Selection of NTBR collectors

Ultimate unit of the sample (NTBR collector respondents) were selected using snowball, without replacement of sampling technique. Data from 60 NTBR collectors from each of the selected 3 forest circles of Jammu and Kashmir and 6 forest circles of Himachal Pradesh were obtained on the pre-designed semi-structured interview schedule. Thus a total of 540 NTBR collectors were included in the study.

3.1.5.3 Selection of non-collectors

Ultimate unit of the sample (non-collector respondents) were selected randomly without replacement. Data from 15 non-collectors from each of the selected 3 forest circles of Jammu and Kashmir and 6 forest circles of Himachal Pradesh were obtained on the pre-designed semi-structured interview schedule. Thus a total of 180 from UT of J&K and 360 from state of HP where NTBR collectors were included in the study. Thus the total sample of collectors were 540.

3.1.5.4 Selection of contractors

A list of contractors was obtained from the respective offices of the Divisional Forest Officers of the forest circle and contractors who had in past done bidding for NTBR products were located, contacted and if agreed to provide data, were included in the study.

Table 3.4: Selection of the respondents from the locale of study

State/ UT (675)	Forest circle	
	NTBR collector	**Non-collector**
Jammu and Kashmir (180 + 45 = 225)	Jammu East (60)	Jammu East (15)
	Jammu West (60)	Jammu West (15)
	Chenab (60)	Chenab (15)
Himachal Pradesh (360 + 90 = 450)	Chamba (60)	Chamba (15)
	Kulu (60)	Kulu (15)
	Mandi (60)	Mandi (15)

	Rampur (60)	Rampur (15)
	Shimla (60)	Shimla (15)
	Solan (60)	Solan (15)

*Values in parenthesis indicates the number of respondents

3.2 Preparatory actions and agencies involved

Following preparatory actions and agencies were involved in the study:

3.2.1 Preparatory actions

Regular meetings were conducted with the implementing partners viz. Amity University, Noida, Uttar Pradesh and Sri Mata Vaishno Devi University (SMVDU), Katra, UT of Jammu and Kashmir. Liason was built up with the Forest Departments', Rural Development Departments' and Agriculture Departments' of J&K and HP state, and regular meetings were conduted with them.

3.2.2 Agencies involved

The project was inter-institutional and was implemented by three universities. Collaboration of various government departments was also taken for effective implementation of the project.

3.2.2.1 Implementing partners

(1) Sher-e-Kashmir University of Agricultural Sciences & Technology of Jammu (SKUAST-J), Jammu and Kashmir.

(2) Amity University, Noida, Uttar Pradesh.

(3) Sri Mata Vaishno Devi University (SMVDU), Katra, Jammu and Kashmir.

Project partner	Affiliations	Role and responsibilities
1. Dr. Rakesh Nanda (PI) 2. Dr. Rajinder Peshin 3. Dr. N. S. Raina 4. Dr. L. K. Sharma (Co-PI's)	Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu (SKUAST-J). www.skuast.org	In Jammu and Kashmir Dr. Rakesh Nanda, Dr. Rajinder Peshin, Dr. N. S. Raina and Dr. L.K. Sharma implemented the project with the collaborated scientists of partner universities. Data collection was done in 3 forest circles and analysis was done by SKUAST-J. Two day training cum workshop of Veterinarians was conducted at F.V.Sc & A.H, R. S. Pura, Jammu on 19-20 Feb, 2020. The high performance computer cluster and high performance storage server was installed at the Division of Agricultural Extension

		Education, SKUAST-J. Final project report was compiled by SKUAST Jammu.
5. Dr. B. S. Hansra 6. Dr. R. S. Antil (Co-PI's)	AMITY University, Uttar Pradesh (AAUP), Noida. www.amity.edu	In Himachal Pradesh, the project was supervised by Dr. B. S. Hansra and Dr. R. S. Antil. Data was collected from 6 forest circles. A meeting/ workshop was conducted with the NTBR collectors of Chamba circle of H.P. on 20-12-2019. Final report for Himachal Pradesh was compiled by AMITY University, Noida.
7. Er. S. B. Kotwal 8. Er. Swastik Gupta 9. Er. Ashish Suri (Co-PI's)	Shri Mata Vaishno Devi University (SMVDU), Katra Jammu. www.smvdu.ac.in	After the compilation of the data, it was digitized by Er. S. B. Kotwal, Er. Swastik Gupta and Er. Ashish Suri from SMVDU, Katra. They provided valuable assistance and technical inputs for purchase of computing equipment, their specification, installation and proper functioning. A workstation was purchased for the said purpose by SMVDU Katra.

3.2.2.1 Collaborating partners

The implementing partners collaborated with various government agencies for inputs, secondary data and hassle free movement and stay at remote locations. The agencies were:

(1) Forest Department, Jammu and Kashmir.

(2) Agricultural Production Department, Jammu and Kashmir.

(3) Rural Development Department, Jammu and Kashmir.

(4) Forest Department, Himachal Pradesh.

Collaborating partner	Affiliations	Role and responsibilities
Chief Conservator of Forests (CCF), Jammu division. Chief Conservator of Forests (CCF), Kashmir division.	Forest Department, Jammu and Kashmir.	
	Agricultural Production	

	Department, Jammu and Kashmir.	
	Rural Development Department, Jammu and Kashmir.	
DFO Nachan DFO Solan	Forest Department, Himachal Pradesh.	

3.3 Details of scientific data collected and equipments used

Scientific data was collected as primary and secondary data.

3.3.1 Primary data

Primary data pertaining to various socio-economic indicators of NTBRs collecters, their uses and problems encountered in collection (independent and dependent variables) was collected on the hard copy printed, pre-designed, pre-tested semi-structured interview schedule from the respondents.

3.3.2 Secondary data

Secondary data was obtained by the thorough review of existing literature from research articles, books and reports of the state departments like Forest department and Economics and Statistics departments.

3.3.3 Equipments used

Three types of interview schedules were used for the study, i.e. interview schedule for collectors, interview schedule for non-collectors and interview schedule for contractors. The interview schedule for NTBR collectors was used eliciting information from the households dependent on NTBR collection, its utilization, marketing and contribution of NTBRs to income for livelihood security. Constraints in NTBR collection was prepared with the help of experts from the Division of Agricultural Extension Education, FoA, SKUAST Jammu, Main Campus, Chatha and Co-PI's of the collaborating universities viz. Amity University, Noida and SMVDU Katra, and the forest departments of J&K and Himachal Pradesh. The interview schedule consisted of following independent variables and their measurement:

3.3.3.1 Age

It refers to the chronological age of the respondents (in years) at the time of data collection. The categories of respondents, on the basis of age, were made using the mean±SD formula, as follows:

a) Young Mean-SD

b) Middle aged Mean±SD

c) Old Mean+SD

3.3.3.2 Education

Education is the formal process by which society deliberately transmits its accumulated knowledge, skills, customs and values from one generation to another. In the present study, it refers to the number of years spent on formal education by the respondents. It was categorised using a modified scale as developed by Pareek and Trivedi (1964) and consisted of the following categories and scores:

a) Illiterate (no school education)

b) Up to primary school (upto 5^{th} class schooling)

c) Middle (from 6^{th} to 8^{th} class)

d) High and 10+2 (from 9^{th} to 12^{th} class)

e) Graduate and above (collegeate and above)

3.3.3.3 Family size and composition

In the present study, family was defined as a group of individuals living under one roof and usually under one head. Family size was worked out by recording the total number of members viz. males, females and children within a family. The categories of respondents, on the basis of family size, were made using the mean±SD formula, as follows:

a) Young Mean-SD

b) Middle aged Mean±SD

c) Old Mean+SD

3.3.3.4 Income

It referred to the overall annual earning of respondents from the various sources of earning in currency; Indian Rupees (₹/INR), like from agriculture, horticulture, animal husbandry, job/ service, business etc. including the earnings from NTBR collection. The various income heads viz. agricultural, animal husbandry and NTBR were calculated only for the items which were being sold by the respondents and fetched economic inflow to the respondents households.

3.3.3.5 Lifestyle

It refers to the lifestyle of respondents whether being settled at one place throughout the year or migratory, along with their herds. A schedule was developed to record the lifestyle of the respondents and it consisted of the following categories:

a) Settled

b) Migratory

3.3.3.6 Landholding

It is the units of land in hectares possessed by the respondents. The categorisation of land holding is based on the categorisation of the Government of India (MOA, 2011).

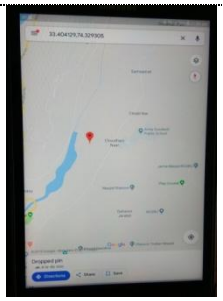
a) Landless
b) Marginal (<1ha)
c) Small (1-2 ha)
d) Semi medium (2-4 ha)
e) Medium (4-10 ha)
f) Large (>10 ha)

3.3.3.7 Social caste

It referred to the recognised community, to which a respondent belonged. The categorisation of the social category is based on the categorisation of the Government of India (Census, 2011) and the following scores were assigned:

a) General
b) Other Backward Class (OBC)
c) Scheduled Caste (SC)
d) Scheduled Tribe (ST)

3.3.4 Other equipment used

S. No.	Equipment Name (Qty)	Details (Make/ Model)	Cost (INR)	Date of Installation	Photographs of Equipment*	Lowest Quotation, if not purchased
1.	Camera (DSLR)	Nikon D7200	89,450/-	**05-11-2018**		1 No. SKUAST-J
2.	Printer (Inkjet: Print, Copy, Scan)	Canon PIXMA G4010	17,346/-	**26-11-2018**		1 No. SKUAST-J
3.	Online UPS (2KVA)	Microtek	64,310/-	**26-11-2018**		1 No. SKUAST-J
4.	Hand held GPS Monitor (3.No)	Samsung Tab A (SM-T385)	55,986/-	**13-12-2018**		2 No's. SKUASTJ 1 No. Amity
5.	Digital Voice Recorder (2.No)	Tascam Linear PCM Recorder	29,428/-	**23-01-2019**		1 No. SKUAST-J 1 No. Amity

6.	I/O Box, CAT 6, PVC Pipe, Patch Cable	D-Link and ors.	6,133/-	**08-02-2019**		1 No. each SKUAST-J
7.	8 Port Switch	D-Link	4,838/-	**11-02-2019**		1 No. SKUAST-J
8.	Wireless router	D-Link	2,124/-	**14-02-2019**		1 No. SKUAST-J
9.	Wi-Fi Dongle	Digisol	3,162/-	**14-02-2019**		1 No. SKUAST-J
10.	SSD (Solid State Drive)	WD My Passport 512GB	14,750/-	**14-02-2019**		1 No. SKUAST-J
11.	External Hard Disc	Toshiba 2TB	7,080/-	**14-02-2019**		1 No. SKUAST-J
12.	High Performance Storage Server	DELL PowerEdge T640 Server	4,38,240/-	**19-03-2020**		1 No. SKUAST-J

13.	High Performance Computer Cluster	DELL PowerEdge T640 Server	3,90,000/-	**14-01-2020**		1 No. SKUAST-J
14.	High Performance Workstation	DELL Mobile Workstation	1,46,160/-	**16-12-2020**		1 No. SMVDU

The digital camera was used to take photographs and make video documentaries of the NTBR collectors. Digital audio recorders were used to record the voice of respondents, where marking of responses on the interview schedule was not possible and handheld GPS monitors were used to ascertain the location mapping coordinates for the availiablity of various NTBRs in different locations of J&K and Himachal Pradesh. A high performance storage server and high performance computer cluster was installed in the Division of Agricultural Extension Education to host the interactive dashboard for data display. A workstation was used to remotely access the servers from SMVDU Katra.

3.3.5 Hardware Setup

Two enterprise grade servers (SERVER-1 and SERVER-2) were purchased and were installed in a clean room along with power supply with adequate power backup from an online UPS.

An optical fiber line for data network was laid from the network center of the SKUAST-J campus to this room where the servers had been installed. The optical fiber line was connected with Optical Network Terminator on both ends. The line end A in the network center was connected to a layer-3 switch. Two public and static IP addresses were assigned and multiplexed on the same line. Firewall was configured on the Layer-3 switch to allow inbound traffic to following ports:

1. 22 (SSH)
2. 80 (HTTP)
3. 443 (HTTPS)

4. 5432 (PostgreSQL DB)

The line end B in the network center was also connected with an Optical Network Terminator and was further connected to a 1GBPS 8-port switch. 2 CAT-6e patch cord were laid form the switch. One patch cord was connected with the LAN port of the each server thereby completing the network connection and enabling the global access of the servers.

3.3.6 Software Setup

Ubuntu Server 20.04 LTS (64 bit) was installed on both servers. The motivation behind using Ubuntu Server 20.04 LTS (64 bit) was to include the usage of FOSS in the project and better utilization of hardware resources.

NGNIX, a FOSS and highly efficient software was installed as a reverse proxy and web server on SERVER-1. Node.JS was also installed on the same machine to host the Web Service APIs.

PostgreSQL, a FOSS and highly efficient DB was installed on the SERVER-2.

Firewalls on both servers were configured to allow inbound traffic to the hosted services only and to drop all other traffic targeted towards any other service so as to protect the integrity of the servers.

3.3.7 Application Setup

The whole application was divided into three layers / tiers / modules to keep the whole system decoupled for better management, easy troubleshooting and scalability. Following are the 3 tiers that were adopted:

A. FROTEND LAYER: HTML/CSS/Javascript based web application GUI serving as DASHBOARD and fetching data from the backend services.

B. BACKEND LAYER: Express JS based web services to receive the data request from the frontend layer and fetch the data from Database.

C. DATA LAYER: A relational DB created in PostgreSQL for creating, reading, updating and deleting data.

3.3.8 Hardware Description

Figure: Dell T-640 Server

The servers used to create the digital eco-system for acquisition, storage, processing and assimilation of the NTBR data are enterprise grade servers with model no. T-640 from DELL. The specification of both servers is as follows:

800-BBDM : UEFI BIOS Boot Mode with GPT Partition
799-AAEQ : Mod Specs Info (India)
750-AABF : Power Saving Dell Active Power Controller
611-BBBF : Ubuntu 20.04 LTS Server Operating System
580-ADJC : Dell KB216 Wired Keyboard English
570-AAKV : Dell Optical Mouse MS116 - Black
542-BBCT : On-Board Dual-Port 10GbE LOM
540-BBCX : Broadcom 5720 Dual Port 1GbE B ASE-T Adapter, PCIe Full Height
528-BIYY : OpenManage Enterprise Advanced
450-AGDI : Jumper Cord - C13/C14, 2M, 250 V, 10A (India BIS)
450-ADWS : Dual, Hot-plug, Redundant Power Supply (1+1), 750W
450-AAMN : Power Cord - C13, 1.8M, 250V, 10A (India)
429-ABCK : DVD ROM, SATA, Internal
412-AAJW : Standard Heat Sink for Less = 150W
405-AANW : PERC H730P Adapter RAID Controller, 2GB
400-AXTR : 480GB SSD SATA Read Intensive 6Gbps 512 2.5in Hot-plug AG Drive,3.5in HYB CARR, 1 DWPD, 87 6 TBW
400-AURJ : 2.4TB 10K RPM SAS 12Gbps 512e 2.5in Hot-plug Hard Drive, 3.5 in HYB CARR

385-BBKT : iDRAC9,Enterprise
370-AEQF : 16GB RDIMM, 2933MT/s, Dual Rank
370-AEPP : 2933MT/s RDIMMs
338-BSDL : Intel Xeon Silver 4214 2.2G, 1 2C/24T, 9.6GT/s, 16.5M Cache, Turbo, HT (85W) DDR4-2400
329-BEPB : PowerEdge T640 MLK Motherboard
325-BCON : Dell EMC Logo Push Pin
325-BCNE : Tower Standard Bezel for T640
321-BCXD : Chassis with up to 8 x 3.5 SAS /SATA Hard Drives, Tower Configuration

Each server is connected with an LCD monitor, USB optical mouse and ASCII keyboard. Each server has two inbuilt power ports to receive power from two different power sources so as to avoid service interruption in case of any kind of power outage. One of the power port of each server is connected to normal AC supply available in the room and the other power port is being fed by an online UPS providing a constant voltage of 230 V AC. In case, the normal AC supply goes down, the server will start drawing power from the UPS without any interruption.

The servers are deployed in a dust-free zone with adequate air conditioning and with extremely limited access to the public thereby creating a secure clean room for them to operate which decreases the chance of any kind of service outage.

3.3.9 Network Topology

Each server has an in-built 10GBPS dual-port Ethernet Network Interface Card (NIC). One of the port of this NIC of each server is connected with a port of 10 GBPS 8 port Ethernet switch using eight-conductor 100-ohm balanced twisted-pair Cat 7 cable with RJ-45 jacks connected at its both ends using T568B scheme.

One port of the of 10 GBPS 8 port Ethernet is connected to an Optical Network Terminator (ONT) which is responsible for converting the optical signal to electrical signal without disturbing the data. This ONT is connected to an all-weather overhead optical cable which has been laid down from the clean room, where the servers have been deployed, to the network center of the SKUAST Jammu campus.

The other end of this optical cable is connected to another ONT situated in the network center. This ONT in the network center is connected to a layer 3 switch using eight-conductor 100-ohm balanced twisted-pair Cat 7 cable with RJ-45 jacks connected at its both ends using T568B scheme.

The layer 3 switch is also connected to an optical cable provided by the internet service provider thus completing the connection of the servers with the internet.

The port of layer 3 switch is configured to which the optical cable is connected is bound to communicate with two static IP addresses which are further assigned to each server.

3.3.10 Software Description

64 bit Ubuntu Server 20.04 LTS OS is installed on both servers for hosting the necessary applications. It is a Linux based Operating System which is commonly deployed on enterprise grade server hardware for better hardware resource utilization and low power consumption. Also it is immune from viruses and provides better safety against cyber-attacks and forced intrusion as compared to its contemporaries.

The GUI has been removed from the OS as the servers are not going to be managed on frequent basis once all applications have been deployed. The necessary commands to the OS are being provided by an interactive command prompt or interactive shell.

Using the interactive shell the NIC of the server has been configured with appropriate network configuration so that the server could get connected to internet seamlessly.

Following commands have been used to configure the network.

$ ip a

This commands list all interfaces (NIC) available on the server with their current

```
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen
1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
       valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
       valid_lft forever preferred_lft forever
2: enp0s25: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc noqueue state UP group
default qlen 1000
    link/ether 00:16:3e:e2:52:42 brd ff:ff:ff:ff:ff:ff link-netnsid 0
    inet xx.xx.xx.xx/xx brd xx.xx.xx.xx scope global dynamic eth0
       valid_lft 3600sec preferred_lft 3600sec
    inet6 xxx.xxx.xxx.xxx.xxx.xxx/x scope link
       valid_lft forever preferred_lft forever
```

configuration and the logically addressable names. The output of this command looks like as shown below

The enp0s25 denotes the logical name of the NIC. This interface has been configured appropriately so as to get connected with the network. To configure this interface, a configuration file has been created using following command.

$ sudo nano /etc/netplan/00-installer-config.yaml

The command above opens up a file a command line editor called nano with a file name *00-installer-config.yaml*.

In this file, the network configuration is written in a predefined format as shown below:

```
network:
   version: 2
   ethernets:
      enp0s25:
      addresses: [192.168.20.160/24]
      gateway4: 192.168.20.2
      nameservers:
      addresses: [8.8.8.8,8.8.4.4]
```

Once the file editing is complete, it is saved using [ctrl] + x command. Once saved, following command is executed to apply the configuration.

$ sudo netplan apply

This command configures the NIC interface with the configuration specified in the name *00-installer-config.yaml* file. Once configured and if connected with the network, the server is connected with internet.

3.3.11 Application Infrastructure Description

To host the web based dashboard and data entry tool and protect it from the unwanted access, a reverse proxy is installed on the SERVER-1. The name of the reverse proxy software is NGINX (pronounced as Engine-X). It is a freely available and open source software characterized by its easy configurability and high scalability. Following commands are used to install NGINX on the SERVER-1

$ sudo apt update
$ sudo apt install nginx

The web server used to deploy the web-based applications is a highly popular, freely available, open source and scalable software called Apache Web Server. It is frequently used to host the static web applications. Following commands are used to install Apache Web Server on the SERVER-1

$ sudo apt update

$ sudo apt install apache2

The JavaScript engine used to run the web services (API) is a V8 engine by Google and commercially available in fully featured system called as NodeJS. It is an event driven and non-blocking I/O Javascript processing engine commonly used to run server side web application or web services (API)

$ sudo apt update

$ sudo apt install nodejs

The Database used to store the data is a highly popular, freely available, open source and scalable software called PostgreSQL. It is a relational database system and hence provides huge amount of flexibility in processing and storing data. The necessary table as described in section below have been created in this database to store the information.

$ sudo apt update

$ sudo apt install postgresql postgresql-contrib

3.3.12 Dashboard Implementation Steps

Step 1: Development of Modules

Technologies Used:

- **Frontend:** HTML5, CSS3, Jquery (3.1.0 and 3.3.1)
- **Backend:** PHP, MySQL (PDO)
- **Other Libraries:** JS Foundation, AJAX, CSS Selector Engine (2.3.3), Perfect Scrollbar (1.4.0), Bootstrap (4.2.1), Metismenu (3.0.3)

Project Modules/Pages:

S. No.	Module Name	Module/Page Link
1	Descriptive Stats (NTBR Collectors)	/ntbr_collectors.php
2	Descriptive Stats (NTBR Non-Collectors)	/ntbr_noncollectors.php
3	NTBR Availability	/ntbr_availability.php
4	NTBR Marketing Channels	/ntbr_channels.php
5	NTBR Pricing	/ntbr_pricing.php
6	NTBR Mapping	/ntbr_mapping.php
7	NTBR Income	/ntbr_income.php
8	NTBR Constraints	/ntbr_constraints.php
9	Gallery (Site Photos)	/gallery1.php
10	Gallery (Sample Photos)	/gallery2.php
11	Administration Panel	/admin.php
12	Login	/login.php
13	Register	/register.php

14	Logout	/logout.php
15	Edit Profile	/editprofile.php
16	User Management (Create/Edit/Delete/View)	/manage_users.php
17	Gallery (Photo Upload/Edit/Delete)	/upload_photos.php
18	Data Entry Forms (Non Collector)	/data_noncollector.php
19	Data Entry Forms (Contractor)	/data_contractor.php
20	Data Entry Forms (Mapping)	/data_mapping.php

Step 2: Migration of Files and Database

Before migration, an Apache Webserver has been installed on production environment by using the following command:

Command: apt-get install apache2

After complete installation, all the files (.php, .css, .js and .sql) has been moved from development environment to production environment under directory /var/www/html.

Step 3: MySQL DB Creation and Connectivity

For creation of MySQL Database, the first step is to login into root by using the following command:

Command: mysql –u root

Other than root, a new user has been created for security purposes,

Command: GRANT ALL PRIVILEGES ON *.* TO 'nmhsdbadmin'@'localhost' IDENTIFIED BY 'password';

Furthermore, a new DB has been created under same user “nmhsdbadmin”

Command: CREATE DATABASE nmhsdb;

In PHP, the following connection settings has been modified:

```
<?php

define(‘DB_NAME’,’nmhsdb’);
define(‘DB_USER’,’nmhsdbadmin’);
define(‘DB_PASSWORD’,’password’);
define(‘DB_HOST’,’localhost’);

?>
```

Step 4: Testing

A final testing has been made with respect to Database connectivity and PHP errors.

1. Descriptive Stats (NTBR Collectors)

Particulars Used

Age, Education, Lifestyle, Family type, Head of family, Social caste, Phone connection, Smart phone, Family size, Family composition, Involvement in agriculture, Agriculture landholding, Landholding type, Involvement in animal husbandry, Income

States

Jammu & Kashmir and Himachal Pradesh

Proof of Concept

DESCRIPTIVE STATS OF NTBR COLLECTOR

Use the form below to check the descriptive statistics of the NTBR collectors with respect to their socio-personal and economic attributes.

NTBR Collector | Jammu and Kashmir | Education | Submit

This table represents the Descriptive statistics:

Particulars	Forest circle			Overall (n=180)	Difference between the circles
	West Jammu (n=60)	East Jammu (n=60)	Chenab (n=60)		
Education					
Average education (years)	7.20	6.70	8.63	7.51	
Standard error (SE)	0.62	0.57	0.56	0.34	f-value/p-value:2.96/ 0.543
Standard deviation (SD)	4.80	4.42	4.33	4.57	
Observed range	0-17	0-12	0-15	0-17	
Categorization					
a) Illiterate	16 (26.67)	16 (26.67)	8 (13.33)	40 (22.22)	
b) Up to primary	2 (3.33)	3 (5.00)	5 (8.33)	10 (5.56)	
c) Middle	11 (18.33)	18 (30.00)	14 (23.33)	43 (23.89)	χ2/p-value:6.618/ 0.3577

Figures in parenthesis depict percentage, *p significant <0.05, **p significant <0.01

2. Descriptive Stats (NTBR Non-Collectors)

Particulars Used

Age, Education, Lifestyle, Family type, Head of family, Social caste, Phone connection, Smart phone, Family size, Family composition, Involvement in agriculture, Agriculture landholding, Landholding type, Involvement in animal husbandry, Income

States

Comparison of Jammu & Kashmir and Himachal Pradesh

Proof of Concept:

DESCRIPTIVE STATS OF NTBR NON-COLLECTOR

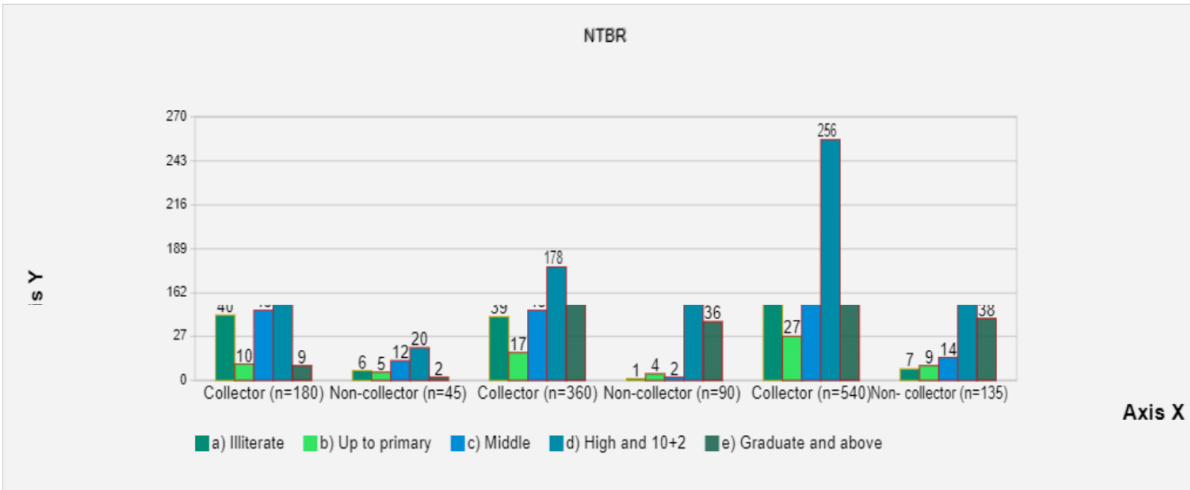
Use the form below to check the descriptive statistics of the NTBR Non-collectors with respect to their socio-personal and economic attributes.

NTBR Non-Collector | Comparison of Both (JK and HP) | Education | Submit

This table represents the Descriptive statistics:

Particulars	State				Overall	
	J&K		HP			
	Collector (n=180)	Non-collector (n=45)	Collector (n=360)	Non-collector (n=90)	Collector (n=540)	Non- collector (n=135)
Education (years)						
Average education	7.51	7.84	10.46	12.34	9.48	10.84
Standard error (SE)	0.34	0.59	0.25	0.33	0.21	0.35
Standard deviation (SD)	4.57	3.95	4.65	3.20	4.82	4.05
Observed range	0-17	0-15	0-19	0-20	0-19	0-20
Categorization						
a) Illiterate	40 (22.22)	6 (13.30)	39 (10.80)	1 (1.10)	79 (14.60)	7 (5.20)
b) Up to primary	10 (5.56)	5 (11.10)	17 (4.70)	4 (4.40)	27 (5.00)	9 (6.70)
c) Middle	43 (23.89)	12 (35.70)	43 (11.90)	2 (2.20)	86 (15.90)	14 (10.40)
d) High and 10+2	78 (43.33)	20 (44.40)	178 (49.40)	47 (52.20)	256 (47.40)	67 (49.60)
e) Graduate and above	9 (5.00)	2 (4.40)	83 (23.10)	36 (40.0)	92 (17.00)	38 (28.10)

Figures in parenthesis depict percentage, *p significant <0.05, **p significant <0.01



3. NTBR Availability

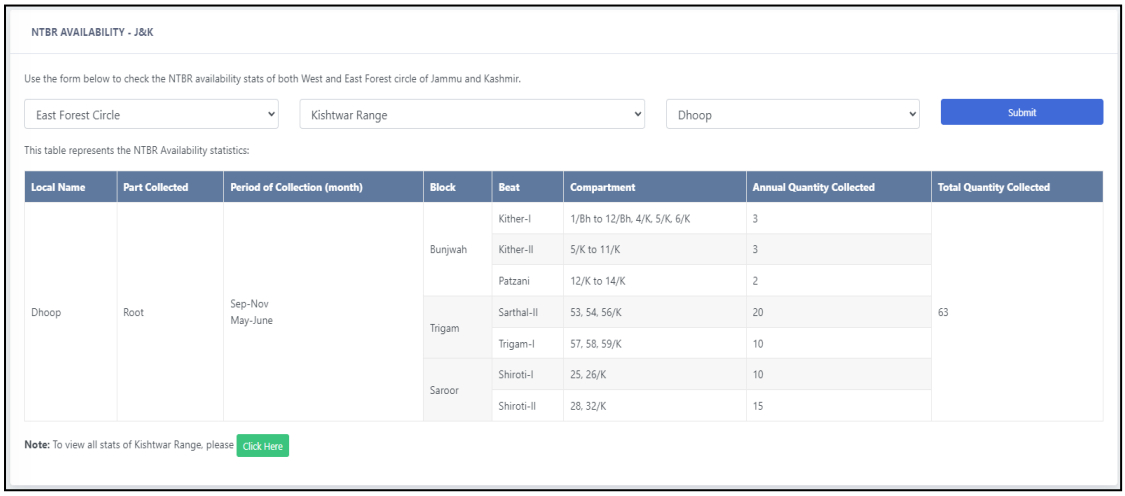
Forest Circles: West Forest Circle and East Forest Circle

Ranges: Gulabgarh (WEST), Nagseni (EAST), Paddar (EAST), Kishtwar (EAST)

Local Names:

1. **Gulabgarh**
   - Dhoop, Kuth, Kod, Mushkbala, Jungli lahsun, Patis, Nagchatri, Beladona
2. **Nagseni**
   - Dhoop, Kuth, Kod, Mushkbala, Diascorea, Patis, Nagchatri
3. **Paddar**
   - Dhoop, Kuth, Kod, Mushkbala, Jungli lahsun, Patis, Nagchatri, Zakhme hayat
4. **Kishtwar**
   - Dhoop, Kuth, Kod, Mushkbala, Diascorea, Patis, Nagchatri, Zakhme hayat, Beladona, Chora

Proof of Concept:



NTBR AVAILABILITY - J&K

Use the form below to check the NTBR availability stats of both West and East Forest circle of Jammu and Kashmir.

East Forest Circle | Kishtwar Range | Dhoop | Submit

This table represents the NTBR Availability statistics:

Local Name	Part Collected	Period of Collection (month)	Block	Beat	Compartment	Annual Quantity Collected	Total Quantity Collected
Dhoop	Root	Sep-Nov May-June	Bunjwah	Kither-I	1/Bh to 12/Bh, 4/K, 5/K, 6/K	3	63
				Kither-II	5/K to 11/K	3	
				Patzani	12/K to 14/K	2	
			Trigam	Sarthal-II	53, 54, 56/K	20	
				Trigam-I	57, 58, 59/K	10	
			Saroor	Shiroti-I	25, 26/K	10	
				Shiroti-II	28, 32/K	15	

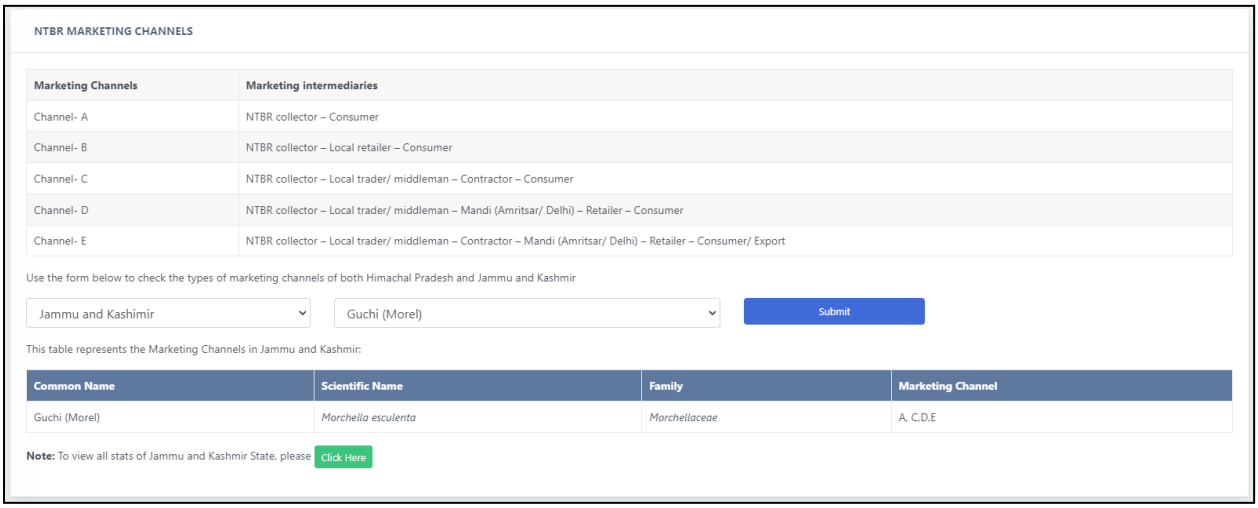
Note: To view all stats of Kishtwar Range, please Click Here

4. NTBR Marketing Channels

States: Jammu & Kashmir and Himachal Pradesh

Common Name:

1. **Jammu and Kashmir –**
   - Guchi (Morel), Banafsha, Kasrod (Fiddlehead Fern), Harad, Kutki, Chora, Kuth, Patis (Atis, Atees), Naagchatri, Panja, Jungli Lehsun, Chilgoza Pine, Dhoop
2. **Himachal Pradesh –**
   - Gucci, Banafsha, Kachnar, Lingdi (Fiddlehead Fern), Kafal, Khair, Chir Pine, Harar, Khirak, Beul, Kutki, Chora, Kuth, Tejpata, Dalchini, Aloevera, Atis-Patis, Naagchattri, Panja, Ban Oak, Wild Lehsun, Chilgoza Pine, Taxus, Walnut, Dhoop, Daru



NTBR MARKETING CHANNELS

Marketing Channels	Marketing intermediaries
Channel- A	NTBR collector – Consumer
Channel- B	NTBR collector – Local retailer – Consumer
Channel- C	NTBR collector – Local trader/ middleman – Contractor – Consumer
Channel- D	NTBR collector – Local trader/ middleman – Mandi (Amritsar/ Delhi) – Retailer – Consumer
Channel- E	NTBR collector – Local trader/ middleman – Contractor – Mandi (Amritsar/ Delhi) – Retailer – Consumer/ Export

Use the form below to check the types of marketing channels of both Himachal Pradesh and Jammu and Kashmir

Jammu and Kashimir | Guchi (Morel) | Submit

This table represents the Marketing Channels in Jammu and Kashmir:

Common Name	Scientific Name	Family	Marketing Channel
Guchi (Morel)	*Morchella esculenta*	*Morchellaceae*	A, C,D,E

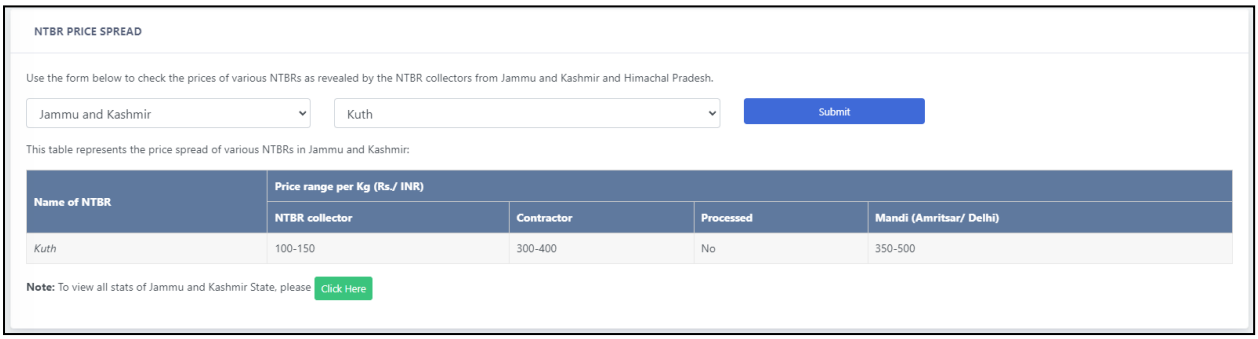
Note: To view all stats of Jammu and Kashmir State, please Click Here

5. NTBR Pricing

States: Jammu & Kashmir and Himachal Pradesh

Local Name:

1. **Jammu & Kashmir**
   - Kuth, Dhoop, Ratanjot, Zakhme hayat, Kod, Patis, Jungli lahsun, Guchi, Banafsha, Diascorea, Beladona
2. **Himachal Pradesh**
   - Sath jalori, Karoo, Dhoop, Chora, Banafsha, Mushk bala, Mamri, Banajwain, Guchchi, Dori, Kakarsinghi, Salm Mishri, Thuth, Kala zira, Butkesh, Gloe, Salam panja, Nihani, Buch, Kail cones, Dusgtuli, Chalora, Tajpatra, Kapper Kuchri, Patishan roots, Bichu Buti, Deodar Rossette, Kush cones, Bari phool, Kainth, Bindi phool, Brass phool, Pathan Bail, Green Mous Ghass, Khaarera/ Basanti, Ban Haldi, Bether patta, Chillaru



NTBR PRICE SPREAD

Use the form below to check the prices of various NTBRs as revealed by the NTBR collectors from Jammu and Kashmir and Himachal Pradesh.

Jammu and Kashmir | Kuth | Submit

This table represents the price spread of various NTBRs in Jammu and Kashmir:

Name of NTBR	Price range per Kg (Rs./ INR)			
	NTBR collector	Contractor	Processed	Mandi (Amritsar/ Delhi)
Kuth	100-150	300-400	No	350-500

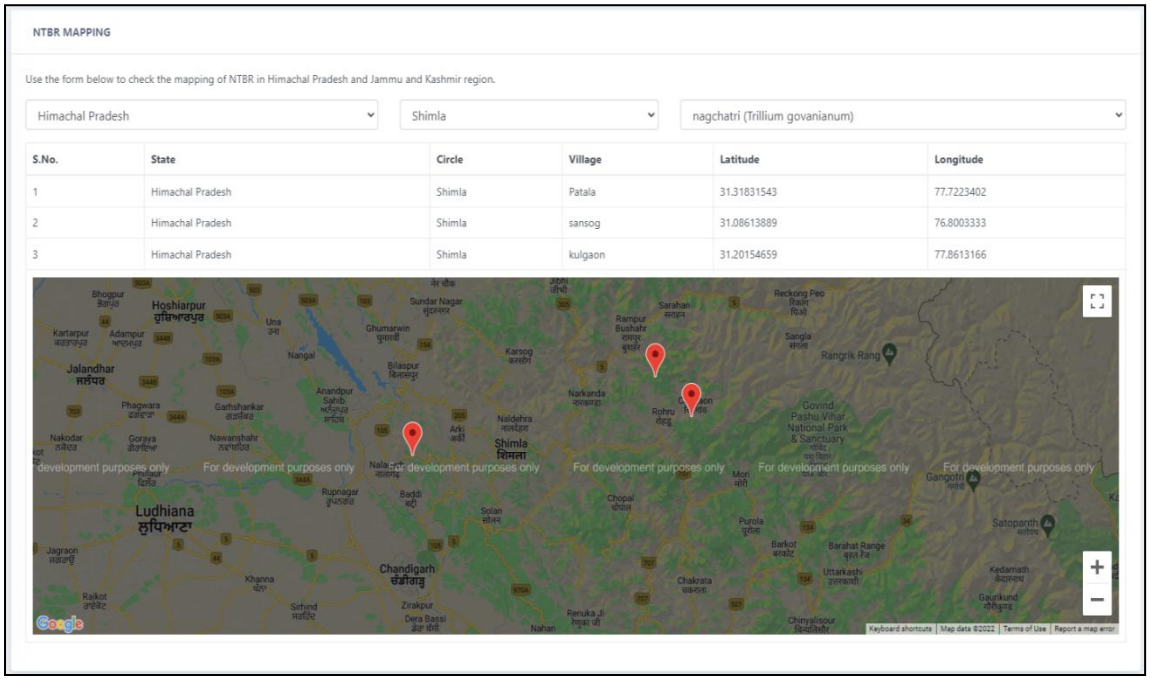
Note: To view all stats of Jammu and Kashmir State, please Click Here

6. NTBR Mapping

States: Jammu & Kashmir and Himachal Pradesh

Circles:

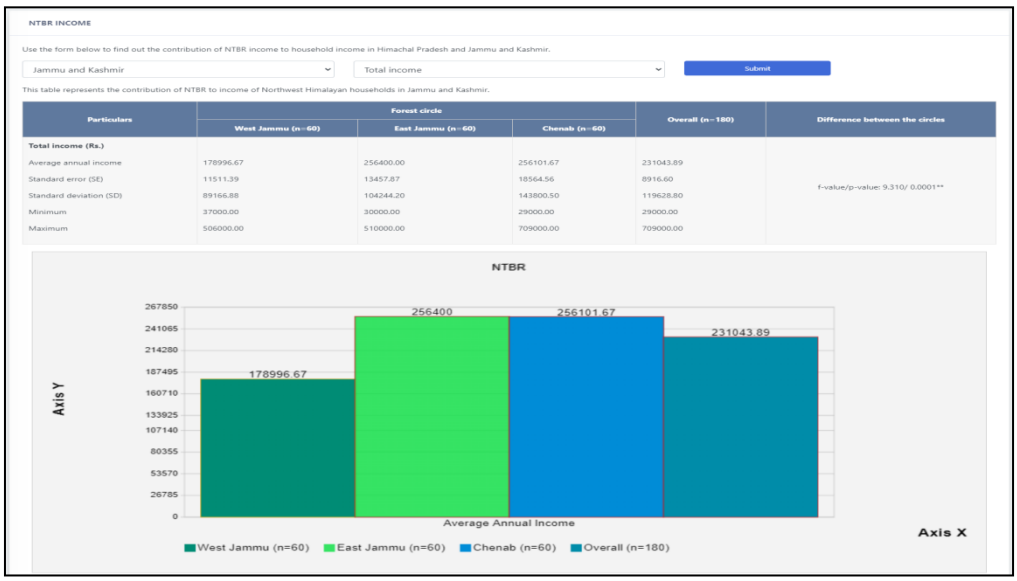
- **Jammu & Kashmir:** West, Chenab and East
- **Himachal Pradesh:** Chamba, Kullu, Mandi, Rampur, Shimla and Solan



7. NTBR Income

States: Jammu & Kashmir and Himachal Pradesh

Particulars: Total Income, Agriculture Income, Animal Husbandry Income, Other Income, NTBR Income, NTBR Income Contribution



8. NTBR Constraints

Graphical representation is available in the dashboard.

Access can be made available to the interested parties upon a suitable request made to the PI through proper channel.

3.4 Primary data collected

The data collection was based on the sample survey, by the aid of a semi-structured, pre-tested interview schedule (hard copy). Earlier it was decided to feed data digitally, on the spot at the respondent GPS locations using direct entry on google forms. However due to non-availiablity of wireless internet at remote locations and intermittent internet shut down due to government security restrictions, data could not be collected in online mode. Therefore the data collected on hard copies of interview schedule were manually fed into the database. Though, a record of GPS coordinates using GPS location tracker and movement timeline was saved to acertain and incorporate the position of respondents, along with audio recordings, where ever possible, as the respondents were reluctant to share personal details and refused to talk on camera.

For digital documentation, a data entry tool was developed and deployed which uses the endpoints from the above described API. This data entry tool is created in HTMl5 and JavaScript, is hosted on SERVER-1 and is served using Apache Web Server. Only the system administrators can access this tool via a web browser.

This data entry tool is used by the administrators/PI/Co-PIs/Project Associates/Research Fellows to enter the data collected from the different regions into the database making it a single point of data consolidation.

An administrator can not only add the data but can also delete and edit a specific record with help of the corresponding buttons given against each row. An administrator need to enter data in following fields to create a record in the database.

A dashboard has been developed which could be accessed by any user around the world as it is a web based application and all needed to view this dashboard is an internet connection and a browser. This dashboard also used the same API endpoints but doesn't allow any used to alter or update the data. It is also created in HTMl5 and JavaScript, is hosted on SERVER-1 and is served using Apache Web Server.

Since continuous integration and continuous deployment is enabled on these repositories, access to them is limited to a specific set of administrators who are aware of the functionality and features of the platform. Currently and in the foreseeable future, the management of these source code repositories will lie with the SMVDU.

3.5 Details of field survey arranged

Field surveys were conducted in the Jammu division of the union territory of Jammu and Kashmir as well as Himachal Pradesh. Interviews were arranged with a total of 60 NTBR collectors from each of the 3 selected forest circles from Jammu and Kashmir, comprising a total sample size of 180 respondents and 60 respondents from each of the 6 selected forest circles of Himachal Pradesh comprising a total sample size of 360. Thus a total of 540 NTBR collectors were included in the study.

Also 15 non-collectors were randomly interviewed to ascertain the drivers to collection of NTBR which were statistically analysed by working out the binary logistic regression with selected socio-economic variables. A total of 15 non-collectors were selected from each selected forest circle, comprising a total sample size of 45 respondents from Jammu and Kashmir and 90 respondents from Himachal Pradesh. Thus a total of 135 non-collectors were included in the study.

Field surveys in Kashmir division were started in June, 2019 after obtaining permission from Chief Conservator of Forests, Kashmir but movement was restricted in the forest areas due to militancy activities. A survey of medicinal plants was done from the Daksum forest range of Anantnag district and interviews were scheduled with the NTBR collectors, however, some local people created hurdles and even the questionnaires and stationary was snatched from the research fellow. Thereafter, survey of Srinagar forest circle was taken up in July, 2019 and started from the Hari Parbat and Shankaracharya forest ranges, however, both were protected ranges and no NTBR collection by the local population was reported. However, before the 5th of August, 2019 the researcher had to return back to the headquarters in Jammu due to total lockdown in Kashmir division due to abrogation of article 370.

Surveys in the Jammu division started in September, 2019 and data were collected on the pre-designed interview schedule from 180 collectors and 45 non-collectors in the three forest circles of Jammu division viz. East circle, West circle and Chenab circle. Similarly, surveys from the six forest circles of H.P viz. Chamba, Solan, Mandi, Rampur, Shimla and Solan were successfully conducted and data was collected from 360 NTBR collectors and 90 non-collectors. Due to coronavirus pandemic outbreak in March, 2020, data from remaining circles of H.P. could not be

collected due to movement restrictions and countrywide lockdown. The data so collected was entered in the excel and SPSS database and statistical analysis was done to properly tabulate the data.

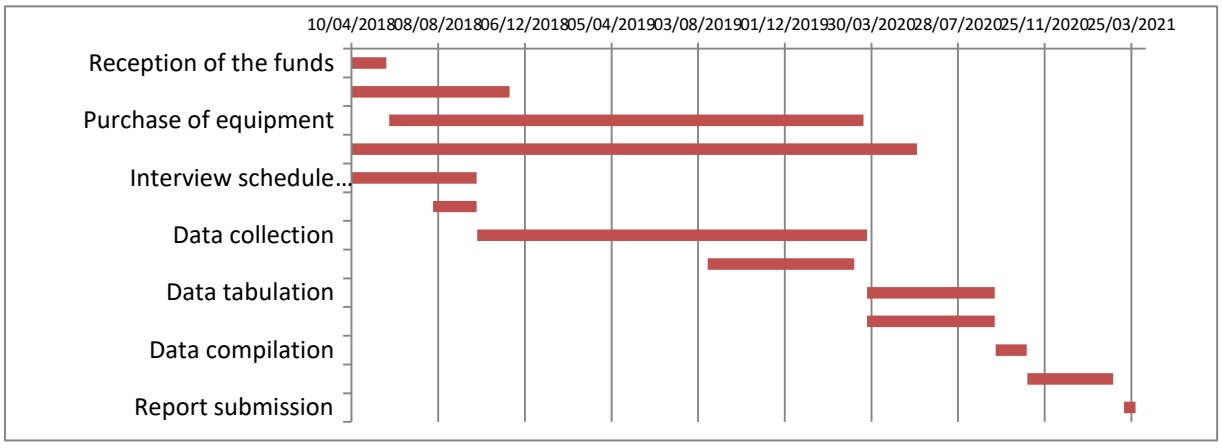
3.6 Strategic planning for each activities

Meetings with forest department officials were regularly arranged since the start of the project in order to finalize the study areas in Jammu and Kashmir and Himachal Pradesh. Permissions were taken from the forest department and accordingly routes of survey were decided. The researchers used to collaborate with the incharges of government guest houses or local leaders or panchayat members of the selected locations prior to leaving the headquarters for stay arrangements, as it took a minimum of 3 to 4 days at each forest division to collect the data from the respondents.

As there was no list of NTBR collectors available with the forest departments of Jammu and Kashmir and Himachal Pradesh, the NTBR collectors were thereafter located after reaching the location, by the help of a local contractor or local leader. Meetings with the NTBR collectors were fixed by the help of these contractors and local leaders as NTBR collection was a subsidiary income source, they used to be busy in their primary occupations. Moreover, the NTBR collectors refused to meet or provide any data in the delusion of being targeted by government or forest department to be framed in criminal offences as forest related work is being done illegally.

However, very reluctantly some NTBR collector respondents provided data after assurances of non identity disclosure and mostly did not provide their personal details like name, parentage or quantities of NTBR collected and sold or prices received for sale of NTBR.

3.7 Activity wise time frame followed



4

KEY FINDINGS AND RESULTS

The key findings and results of the present study have been presented under the following heads in accordance with the objectives set forth for the study:

4.1 Profile of the respondents.

4.2 To find out the availability and use pattern of NTBR.

4.3 To identify the production to consumption chain and price spread of different NTBR.

4.4 To find out the contribution of NTBR income to household income.

4.5 To delineate the factors driving the dependence of households on NTBR for livelihood security.

4.6 To find out the constraints and the potential of NTBR for all stakeholders and future interventions required for sustainable livelihood of adjacent communities.

4.7 To generate digital database and mapping of NTBR.

4.1 Profile of the respondents

The descriptive statistics of the respondents covered in this study viz. NTBR collectors and non-collectors with respect to their socio-personal and economic attributes are given below in the following subheads:

4.1.1 Profile of the NTBR collectors

The descriptive statistics of the NTBR collectors of Jammu and Kashmir and Himachal Pradesh with respect to their socio-personal and economic attributes are given in tables 4.1 and 4.2 respectively. Table 4.3 shows a comparison of socio-economic attributes of NTBR collectors of Jammu and Kashmir and Himachal Pradesh. The findings are briefly described below:

4.1.1.1 Age

The average age of the NTBR collectors of the Jammu and Kashmir (J&K) was 47 years (table 4.1) and for respondents from Himachal Pradesh (HP), it was 42 years (table 4.2). The t-statistic and p-value was 4.176 and 0.0000, respectively (p significant at <0.01) with Cohen's *d* =0.394991, Glass's *delta* =0.448468 and Hedges' *g* =0.380957 (table 4.3). The overall average age of the respondents was 44 years (SD:±12.87). The

respondents were categorized into three groups viz. young, middle and old by employing the Mean±SD method. Most of these NTBR collectors (63.90%) were in the middle age group (32-56 years), followed by the young (19.30%) and old (16.90%) age group respondents (fig.4.1). The χ^2 statistic was 48.362 with a p-value of 0.0000 (p significant at <0.01), thus the difference of age of the respondents among the various categories between Jammu and Kashmir and Himachal Pradesh was significant (table 4.3). The youngest respondent was about 14 years old and the eldest NTBR collector was 85 years old.

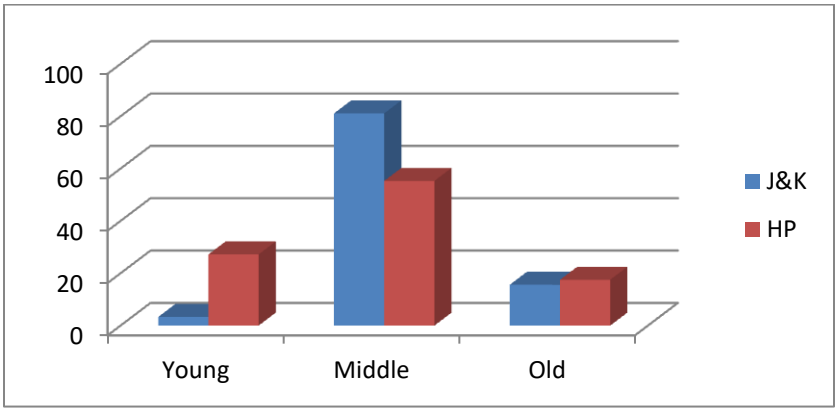


Fig. 4.1: Age of the NTBR collectors

4.1.1.2 Education

The mean education level of NTBR collectors was 7.51 years (table 4.1) and 10.46 years (table 4.2) from Jammu and Kashmir and Himachal Pradesh, respectively with a t-statistic and p-value of 6.998 and 0.0000, respectively (p significant at <0.01) (Cohen's *d* =0.639889, Glass's *delta* =0.645514, Hedges' *g* =0.63804). The overall mean education of the NTBR collectors was 9.48 years of formal schooling. Majority of the respondents from Jammu and Kashmir (43.33%), as well as Himachal Pradesh (49.40%) were educated up to high school and 10+2. Overall, most of the respondents (47.40%) were educated up to high school and 10+2, followed by graduate and above (17%), up to middle school (15.90%), illiterate (14.60%) and up to primary school (5%) (Fig. 4.2). The χ^2 statistic was 45.463 with a p-value of 0.0000 (p significant at <0.01), thus the difference in education level among the various categories of respondents in Jammu and Kashmir and Himachal Pradesh was significant (table 4.3).

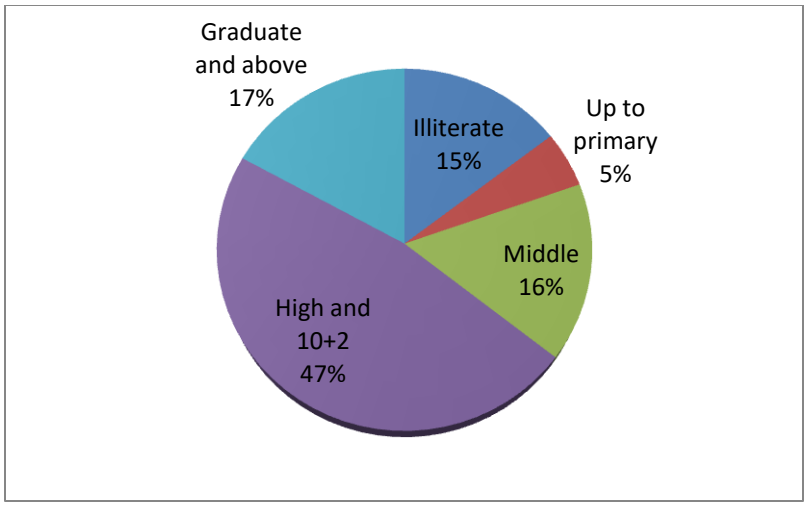


Fig. 4.2: Education status of the NTBR collectors

4.1.1.3 Lifestyle

Majority of the respondents from Jammu and Kashmir (70%), as well as Himachal Pradesh (96.40%) had a settled lifestyle. However, a considerable number of NTBR collectors from Jammu and Kashmir (30%) were having a migratory lifestyle (table 4.1) and a meagre number of 3.60 per cent respondents from Himachal Pradesh, belonging to Chamba forest circle were migratory (table 4.2, fig. 4.3). The difference between the lifestyle of NTBR collectors between the two Himalayan regions was statistically significant (χ^2 =76.891, p-value =0.0000, p significant at <0.01) (table 4.3).

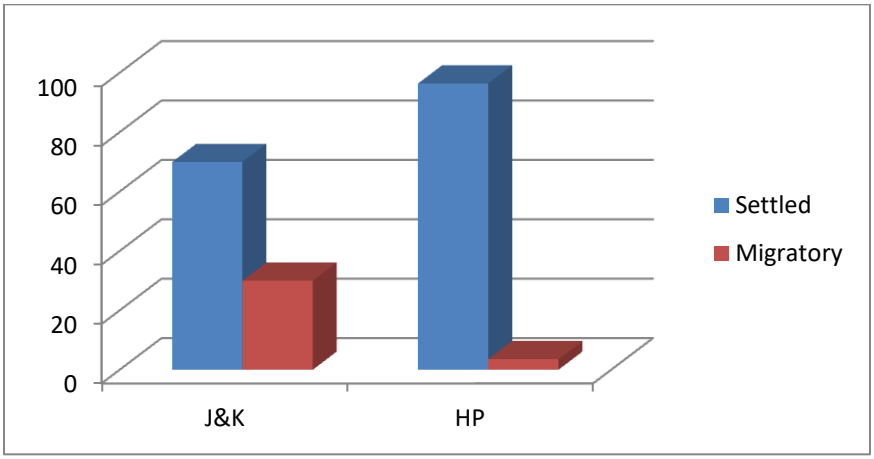


Fig.4.3: Lifestyle of the NTBR collectors

4.1.1.4 Social caste

Majority of the respondents from Jammu and Kashmir (36.60%) belonged to the general (socially unreserved) caste, followed by scheduled tribe (28.30%), other social castes (26.10%) and scheduled caste (10%) (table 4.1). In Himachal Pradesh, 63.10 per cent of the NTBR collectors were from the general caste, followed by scheduled caste (15.80%), scheduled tribe (14.20%) and other social castes (6.90%) (table 4.2). Overall, majority of the NTBR collectors belonged to the general social caste (53.90%), followed by scheduled tribe (18.90%). The difference between the social caste of NTBR collectors between Jammu and Kashmir and Himachal Pradesh was statistically significant (χ^2 =65.593, p-value =0.0000, p significant at <0.01) (table 4.3) (Fig. 4.4).

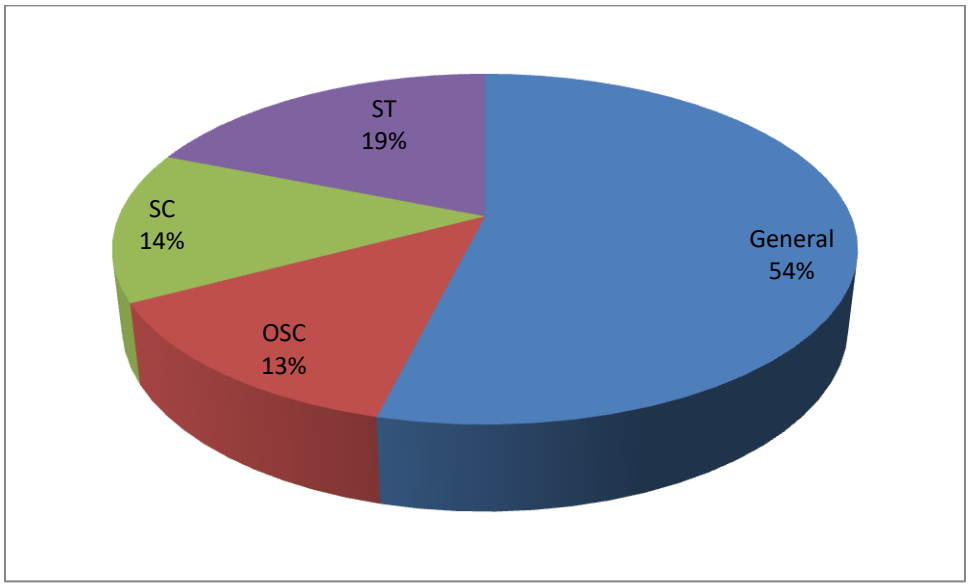


Fig.4.4: Social caste of the NTBR collectors

4.1.1.5 Family type

Majority of the respondents from Jammu and Kashmir (76.10%) belonged to joint families, whereas, majority of the respondents from Himachal Pradesh (58.90%) belonged to nuclear families (table 4.1, 4.2). The difference within the social caste categories of NTBR collectors between Jammu and Kashmir and Himachal Pradesh was statistically significant (χ^2 =58.982, p-value =0.0000, p significant at <0.01) (table 4.3).

4.1.1.6 Head of the family

Most of the respondents from Jammu and Kashmir (59.40%) were not the heads of their respective families, whereas, majority of the respondents from Himachal Pradesh (61.10%) were heads of their family (table 4.1, 4.2). The difference was statistically significant (χ^2 =20.430, p-value =0.0000, p significant at <0.01) (table 4.3).

4.1.1.7 Family size

The mean family size of the NTBR collectors of the Jammu and Kashmir was about 8 members (table 4.1) and for respondents from Himachal Pradesh, it was about 6 members (table 4.2). The t-statistic and p-value was 10.006 and 0.0000, respectively (p significant at <0.01) (table 4.3). The overall family size of the respondents was approximately 7 members (SD:±2.72). The respondents were categorized into three groups viz. small, medium and large by employing the Mean±SD method. Most of these NTBR collectors (53.50%) were in the medium family size group (5-8 members), followed by the small (24.30%) and large (22.20%) family size category (fig. 4.5). The χ^2 statistic was 80.557 with a p-value of 0.0000 (p significant at <0.01), thus the difference of family size of the respondents among the various categories between Jammu and Kashmir and Himachal Pradesh was significant (table 4.3). The family size ranged from 1 to 15 members.

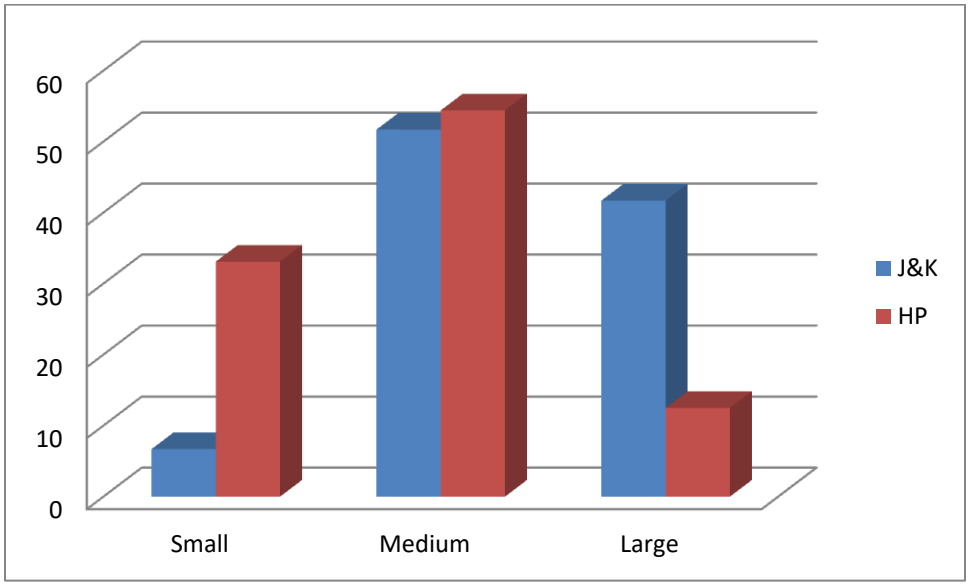


Fig. 4.5: Family size of the per cent NTBR collectors

4.1.1.8 Family composition

The average males in the family of the NTBR collectors of the Jammu and Kashmir, as well as respondents from Himachal Pradesh was about 3 (table 4.1, 4.2), with a t-statistic and p-value of 0.68 and 0.248 (p non-significant) (table 4.3). However, the difference between mean females in the families of respondents from J&K and HP was significant (J&K =3 females, HP =2 females, t-statistic =7.01, p-value =0.0000, p significant at <0.01). Similarly, the difference between number of children in the families of respondents from J&K and HP was also significant (J&K =3 children, HP =1 child, t-statistic =13.6, p-value =0.0000, p significant at <0.01).

4.1.1.9 Involvement in agriculture

Majority of the respondents from Jammu and Kashmir (66.70%), as well as Himachal Pradesh (84.20%) were involved in agricultural activities. About 33.30 per cent NTBR collectors from Jammu and Kashmir were not involved in agriculture (table 3.1) and 15.80 per cent respondents from Himachal Pradesh had no agricultural involvement (table 4.2,). The difference between the agricultural involvement of NTBR collectors between J&K and HP was significant (χ^2 =21.653, p-value =0.0000, p significant at <0.01) (table 4.3).

4.1.1.10 Agricultural landholding

The mean agricultural landholding of the NTBR collectors of the Jammu and Kashmir was about 0.67 hectares (ha) and for the NTBR collectors of Himachal Pradesh was about 1.17 ha (table 4.1). The respondents were categorized based on the size of their operational agricultural landholding into six categories viz. landless, marginal, small, semi-medium, medium and large as per the Government of India (GoI) scale for landholding. Majority of the respondents from J&K (36.67%) were in the marginal (<1 ha) category, followed by landless (33.89%), small (18.89%), semi-medium (9.44%) and medium landholding category (1.11%).

The average irrigated landholding size of NTBR collectors of Jammu and Kashmir was 0.26±0.04 ha (Mean±SE), chiefly being used for cultivation of paddy and wheat. Un-irrigated landholding size size was about 0.41±0.06 ha for cultivation of maize and pulses, of which 0.07±0.03 ha was being used for horticulture activities like growing of fruits like apple and walnut. Similarly, the irrigated landholding size of NTBR collectors

of Himachal Pradesh was 0.23±0.03 ha and un-irrigated landholding size was 1.51±0.10 ha, which was used for horticulture activities.

Table 4.1 Descriptive statistics for NTBR collectors of Jammu and Kashmir

Particulars	Forest circle			Overall (n=180)	Difference between the circles
	West Jammu (n=60)	East Jammu (n=60)	Chenab (n=60)		
Age (years)					f-value/ p-value: 0.485/ 0.6162
Average age	48.40	46.63	46.82	47.28	
Standard error (SE)	1.51	1.24	1.43	0.80	
Standard deviation (SD)	11.66	9.58	11.04	10.77	
Observed range	28-80	24-64	27-70	24-80	
Categorization(f)					χ^2/p-value: 2.128/ 0.7122
a) Young (< 31 years)	2 (3.30)	2 (3.30)	2 (3.30)	6 (3.30)	
b) Middle (32-56 years)	47 (78.30)	52 (86.70)	47 (78.30)	146 (81.10)	
c) Old (> 57 years)	11 (18.30)	6 (10.00)	11 (18.30)	28 (15.60)	
Education					f-value/ p-value: 2.96/ 0.543
Average education (years)	7.20	6.70	8.63	7.51	
Standard error (SE)	0.62	0.57	0.56	0.34	
Standard deviation (SD)	4.80	4.42	4.33	4.57	
Observed range	0-17	0-12	0-15	0-17	
Categorization(f)					χ^2/p-value: 6.618/ 0.3577
a) Illiterate	16 (26.67)	16 (26.67)	8 (13.33)	40 (22.22)	
b) Up to primary	2 (3.33)	3 (5.00)	5 (8.33)	10 (5.56)	
c) Middle	11 (18.33)	18 (30.00)	14 (23.33)	43 (23.89)	
d) High and 10+2	28 (46.67)	23 (38.33)	27 (45.00)	78 (43.33)	
e) Graduate and above	3 (5.00)	0	6 (10.00)	9 (5.00)	
Lifestyle (f)					χ^2/p-value: 0.48/ 0.79
Categorization					
a) Settled	41 (68.30)	44 (73.30)	41 (68.30)	126 (70.00)	
b) Migratory	19 (31.70)	16 (26.70)	19 (31.70)	54 (30.00)	
Family type (f)					χ^2/p-value: 3.18/0.20
Categorization					
a) Nuclear	13 (21.70)	19 (31.70)	11 (18.30)	43 (23.90)	
b) Joint	47 (78.30)	41 (68.30)	49 (81.70)	137 (76.10)	

Head of family (f) *Categorization* a) Others b) Self	 33 (55.00) 27 (45.00)	 36 (60.00) 24 (40.00)	 38 (63.30) 22 (36.70)	 107 (59.40) 73 (40.60)	χ^2/p-value: 0.88/0.65
Social caste (f) *Categorization* a) General b) OBC c) SC d) ST	 17 (28.30) 16 (26.70) 1 (1.70) 26 (43.30)	 20 (33.30) 14 (23.30) 17 (28.30) 9 (15.00)	 27 (45.00) 17 (28.30) 0 (0.00) 16 (26.70)	 64 (35.60) 47 (26.10) 18 (10.00) 51 (28.30)	χ^2/p-value: 38.17/ 0.000**
Phone connection (f) *Categorization* a) No b) Yes	 21 (35.00) 39 (65.00)	 19 (31.70) 41 (68.30)	 19 (31.70) 41 (68.30)	 59 (32.80) 121 (67.20)	χ^2/p-value: 0.20/0.904
Smart phone (f) *Categorization* a) No b) Yes	**(n=39)** 33 (84.62) 6 (15.38)	**(n=41)** 28 (68.29) 13 (31.71)	**(n=41)** 22 (53.66) 19 (46.34)	**(n=121)** 83 (68.60) 38 (31.40)	χ^2/p-value: 8.89/ 0.011*
Family size (No.) Average family size Standard error (SE) Standard deviation (SD) Observed range	 7.27 0.32 2.47 4-15	 7.68 0.35 2.67 4-14	 9.27 0.37 2.89 3-14	 8.07 0.21 2.80 3-15	f-value/ p-value: 9.29/ 0.001**
*Categorization***(f)** a) Small (< 4 members) b) Medium (5-8 members) c) Large (> 9 members)	 3 (5.00) 42 (70.00) 15 (25.00)	 6 (10.00) 33 (55.00) 21 (35.00)	 3 (5.00) 18 (30.00) 39 (65.00)	 12 (6.70) 93 (51.70) 75 (41.70)	χ^2/p-value:
Family composition (n) Male (Mean ±SE) Female (Mean ±SE) Children (Mean ±SE)	 2.52±0.14 2.67±0.13 2.08±0.21	 2.63±0.14 2.78±0.14 2.27±0.19	 2.98±0.14 3.02±0.14 3.27±0.17	 2.71±0.08 2.82±0.08 2.54±0.12	-
Involvement in agriculture (f) *Categorization* a) No b) Yes	 22 (36.70) 38 (63.30)	 14 (23.30) 46 (76.70)	 24 (40.00) 36 (60.00)	 60 (33.30) 120 (66.70)	χ^2/p-value: 4.20/0.12
Agriculture landholding (ha) Average landholding Standard error (SE) Standard deviation (SD) Observed range	 0.92 0.16 1.23 0-5.00	 0.37 0.05 0.38 0-1.50	 0.72 0.11 0.85 0-3.30	 0.67 0.68 0.91 0-5.00	f-value/ p-value: 2.76/ 0.657

Categorization **(f)**					
a) Landless (0)	23 (38.33)	14 (23.33)	24 (40.00)	61 (33.89)	
b) Marginal (<1 ha)	16 (26.67)	33 (55.00)	17 (28.33)	66 (36.67)	χ^2/p-value:
c) Small (1-2 ha)	9 (15.00)	12 (20.00)	13 (21.67)	34 (18.89)	19.14/
d) Semi medium (2-4 ha)	10 (16.67)	1 (1.67)	6 (10.00)	17 (9.44)	0.003**
e) Medium (4-10 ha)	2 (3.33)	0	0	2 (1.11)	
f) Large (>10 ha)	0	0	0	0	
Landholding type (Ha.)					
Irrigated (Mean ±SE)	0.24±0.08	0.10±0.03	0.42±0.05	0.26±0.04	-
Un-irrigated (Mean ±SE)	0.67±0.15	0.27±0.04	0.30±0.08	0.41±0.06	
Horticulture (Mean ±SE)	0	0	0.21±0.07	0.07±0.03	
Involvement in animal husbandry (f)					χ^2/p-value:
Categorization					9.65/
a) No	23 (38.33)	26 (43.33)	39 (65.00)	88 (48.89)	0.008**
b) Yes	37 (61.67)	34 (56.67)	21 (35.00)	92 (51.11)	
Income (Rs.)					
Avg. annual income	178996.67	256400.00	256101.67	231043.89	f-value/
Standard error (SE)	11511.39	13457.87	18564.56	8916.60	p-value:
Standard deviation (SD)	89166.88	104244.20	143800.50	119628.80	9.310/
Observed range	37000.00-506000.00	30000.00-510000.00	29000.00-709000.00	29000.00-709000.00	0.0001**

Figures in parenthesis depict percentage, *p significant <0.05, **p significant <0.01

The descriptive statistics for the NTBR collectors of Himachal Pradesh are given below in table 4.2:

Table 4.2 Descriptive statistics for NTBR collectors of Himachal Pradesh

Particulars	Forest circle						Overall (n=360)
	Chamba (n=60)	Kulu (n=60)	Mandi (n=60)	Rampur (n=60)	Shimla (n=60)	Solan (n=60)	
Age (years)							
Average age	48.22	37.78	39.52	40.03	41.52	46.63	42.45
Standard error (SE)	1.69	1.58	1.47	1.54	1.91	1.92	0.71
Standard deviation (SD)	13.07	12.23	11.37	11.95	14.81	14.87	13.53
Observed range	18-62	17-70	14-70	20-70	16-78	15-85	14-85
Categorization **(f)**							
a) Young (< 31 years)	9 (15.00)	23 (38.30)	18 (30.00)	18 (30.00)	18 (30.00)	12 (20.00)	98 (27.20)
b) Middle (32-56 yrs)	26 (43.30)	32 (53.30)	39 (65.00)	37 (61.70)	31 (51.70)	34 (56.70)	199 (55.30)
c) Old (> 57 years)	25 (41.70)	5 (8.30)	3 (5.00)	5 (8.30)	11 (18.30)	14 (23.30)	63 (17.50)

Education (years) Average education Standard error (SE) Standard deviation (SD) Observed range	 6.23 0.52 4.05 0-12	 12.03 0.51 3.92 0-19	 12.42 0.35 2.71 5-19	 11.60 0.48 3.75 0-19	 11.20 0.66 5.09 0-17	 9.30 0.64 4.97 0-17	 10.46 0.25 4.65 0-19
Categorization **(f)** a) Illiterate b) Up to primary c) Middle d) High and 10+2 e) Graduate and above	 17 (28.30) 0 29 (48.30) 14 (23.30) 0	 3 (5.00) 2 (3.30) 2 (3.30) 35 (58.30) 18 (30.00)	 0 1 (1.70) 4 (6.70) 37 (61.70) 18 (30.00)	 2 (3.30) 4 (6.70) 3 (5.00) 37 (61.70) 14 (23.30)	 8 (13.30) 2 (3.30) 2 (3.30) 25 (41.70) 23 (38.30)	 9 (15.00) 8 (13.30) 3 (5.00) 30 (50.00) 10 (16.70)	 39 (10.80) 17 (4.70) 43 (11.90) 178 (49.40) 83 (23.10)
Lifestyle (f) *Categorization* a) Settled b) Migratory	 47 (78.30) 13 (21.70)	 60 (100.0) 0	 60 (100.0) 0	 60 (100.0) 0	 60 (100.0) 0	 60 (100.0) 0	 347 (96.40) 13 (3.60)
Family type (f) *Categorization* a) Nuclear b) Joint	 49 (81.70) 11 (18.30)	 32 (53.30) 28 (46.70)	 29 (48.30) 31 (51.70)	 30 (50.00) 30 (50.00)	 35 (58.30) 25 (41.70)	 37 (61.70) 23 (38.30)	 212 (58.90) 148 (41.10)
Head of family (f) *Categorization* a) Others b) Self	 43 (71.70) 17 (28.30)	 37 (61.70) 23 (38.30)	 24 (40.00) 36 (60.00)	 7 (11.70) 53 (88.30)	 26 (43.30) 34 (56.70)	 3 (5.00) 57 (95.00)	 140 (38.90) 220 (61.100
Social caste (f) *Categorization* a) General b) OBC c) SC d) ST	 20 (33.30) 9 (15.00) 11 (18.30) 20 (33.30)	 49 (81.70) 0 0 11 (18.30)	 35 (58.30) 8 (13.30) 17 (28.30) 0	 34 (56.70) 4 (6.70) 2 (3.30) 20 (33.30)	 45 (75.00) 4 (6.70) 11 (18.30) 0	 44 (73.30) 0 16 (26.70) 0	 227 (63.10) 25 (6.90) 57 (15.80) 51 (14.20)
Phone connection(f) *Categorization* a) No b) Yes	 16 (26.70) 44 (73.30)	 10 (16.70) 50 (83.30)	 49 (81.70) 11 (18.30)	 58 (96.70) 2 (3.30)	 37 (61.70) 23 (38.30)	 15 (25.00) 45 (75.00)	 185 (51.40) 175 (48.60)
Smart phone (f) *Categorization* a) No b) Yes	**(n=44)** 44 (100. 0) 0 (0)	**(n=50)** 6 (12.00) 44 (88.00)	**(n=11)** 7 (63.64) 4 (36.36)	**(n=2)** 0 (0) 2 (100.0)	**(n=23)** 14 (60.87) 9 (39.13)	**(n=45)** 24 (53.33) 21 (46.67)	**(n=175)** 95 (54.29) 80 (45.71)
Family size (No.) Average family size Standard error (SE) Standard deviation (SD) Observed range	 5.63 0.28 2.19 3-12	 5.40 0.26 1.99 3-11	 6.70 0.29 2.21 3-12	 5.70 0.31 2.43 1-12	 6.07 0.35 2.74 2-15	 5.25 0.27 2.12 2-12	 5.79 0.12 2.33 1-15

Categorization **(f)**							
a) Small (< 4 members)	20 (33.30)	22 (36.70)	8 (13.30)	21 (35.00)	18 (30.00)	30 (50.00)	119 (33.10)
b) Medium (5-8)	31 (51.70)	33 (55.00)	42 (70.00)	29 (48.30)	34 (56.70)	27 (45.00)	196 (54.40)
c) Large (> 9 members)	9 (15.00)	5 (8.30)	10 (16.70)	10 (16.70)	8 (13.30)	3 (5.00)	45 (12.50)
Family composition							
Male (Mean ±SE)	2.67 ±0.14	2.63 ±.015	2.83±0.15	2.70±0.16	2.58±0.17	2.42±0.15	2.64±0.06
Female (Mean ±SE)	2.07 ±0.13	2.07 ±0.12	2.22±0.13	2.18±0.13	2.20±0.15	2.18±0.14	2.15±0.06
Children (Mean ±SE)	0.90 ±0.12	0.70 ±0.10	1.65±0.13	0.82±0.13	1.28±0.14	0.65±0.12	1.00±0.06
Involvement in agriculture (f)							
a) No	20 (33.30)	5 (8.30)	4 (6.70)	6 (10.00)	7 (11.70)	15 (25.00)	57 (15.80)
b) Yes	40 (66.70)	55 (91.70)	56 (93.30)	54 (90.00)	53 (88.30)	45 (75.00)	303 (84.20)
Agriculture landholding (ha)							
Average landholding	0.31	2.64	1.40	3.39	1.62	1.04	1.74
Standard error (SE)	0.03	0.33	0.24	0.38	0.18	0.18	0.11
Standard deviation (SD)	0.24	2.57	1.86	2.94	1.38	1.37	2.18
Observed range	0-0.64	0-12	0-7.20	0-12	0-6.40	0-7.22	0-12
Categorization **(f)**							
a) Landless (0)	20 (33.30)	7 (11.70)	4 (6.70)	6 (10.00)	7 (11.70)	15 (25.00)	59 (16.40)
b) Marginal (<1 ha)	40 (66.70)	12 (20.00)	42 (70.00)	4 (6.70)	18 (30.00)	24 (40.00)	140 (38.90)
c) Small (1-2 ha)	0 (0)	13(21.70)	3 (5.00)	17 (28.30)	17 (28.30)	16 (26.70)	66 (18.30)
d) Semi medium (2-4 ha)	0 (0)	14 (23.30)	2 (3.30)	15 (25.00)	14 (23.30)	1 (1.70)	46 (12.80)
e) Medium (4-10 ha)	0 (0)	13 (21.70)	9 (15.00)	16 (26.70)	4 (6.70)	4 (6.70)	46 (12.80)
f) Large (>10 ha)	0 (0)	1 (1.70)	0 (0)	2 (3.30)	0 (0)	0 (0)	3 (0.80)
Landholding type							
Irrigated (Mean ±SE)	0	0.46±0.10	0.07±0.02	0.46±0.09	0	0.38±0.11	0.23±0.03
Un-irrigated (Mean ±SE)	0.31±0.03	2.18±0.29	1.33±0.23	2.93±0.35	1.62±0.18	0.67±0.12	1.51±0.10
Horticulture (Mean ±SE)	0.31±0.03	2.18±0.29	1.33±0.23	2.88±0.34	1.62±0.18	0.67±0.12	1.51±0.10
Involvement in animal husbandry (f)							
a) No	0	4 (6.70)	4 (6.70)	6 (10.00)	8 (13.30)	10 (16.70)	32 (8.90)
b) Yes	60 (100.00)	56 (93.30)	56 (93.30)	54 (90.00)	52 (86.70)	50 (83.30)	328 (91.10)
Income (Rs.)							
Avg. annual income	218757.33	180652.50	139347.47	155443.00	252994.33	167635.33	185804.99
Standard error (SE)	22903.31	20910.00	11832.43	23073.11	21413.31	14886.22	8221.19
Standard deviation (SD)	177408.26	161972.48	91669.09	178723.00	165866.79	115308.19	155986.19
Observed range	46700.00-636000.00	41200.00-925900.00	41700.00-453000.00	24700.00-981400.00	52100.00-680000.00	36620.00-526000.00	24700.00-981400.00

Figures in parenthesis depict percentage, *p significant <0.05, **p significant <0.01

The comparative descriptive statistics for the NTBR collectors of Jammu and Kashmir and Himachal Pradesh are given below in table 4.3:

Table 4.3 Comparison of descriptive statistics between NTBR collectors of J&K and HP

Particulars	State/ UT		Overall (n=540)	Difference between the circles
	J&K (n=180)	HP (n=360)		
Age (years)				t-value/ p-value: 4.176/ 0.0000**
Average age	47.28	42.45	44.06	
Standard error (SE)	0.80	0.71	0.55	
Standard deviation (SD)	10.77	13.53	12.87	
Observed range	24-80	14-85	14-85	
Categorization **(f)**				χ^2/p-value: 48.362, 0.0000**
a) Young (< 31 years)	6 (3.30)	98 (27.20)	104 (19.30)	
b) Middle (32-56 years)	146 (81.10)	199 (55.30)	345 (63.90)	
c) Old (> 57 years)	28 (15.60)	63 (17.50)	91 (16.90)	
Education (years)				t-value/ p-value: 6.998/ 0.0000**
Average education	7.51	10.46	9.48	
Standard error (SE)	0.34	0.25	0.21	
Standard deviation (SD)	4.57	4.65	4.82	
Observed range	0-17	0-19	0-19	
Categorization **(f)**				χ^2/p-value: 45.463/ 0.0000**
a) Illiterate	40 (22.22)	39 (10.80)	79 (14.60)	
b) Up to primary	10 (5.56)	17 (4.70)	27 (5.00)	
c) Middle	43 (23.89)	43 (11.90)	86 (15.90)	
d) High and 10+2	78 (43.33)	178 (49.40)	256 (47.40)	
e) Graduate and above	9 (5.00)	83 (23.10)	92 (17.00)	
Lifestyle (f)				χ^2/p-value: 76.891/ 0.0000**
Categorization				
a) Settled	126 (70.00)	347 (96.40)	473 (87.60)	
b) Migratory	54 (30.00)	13 (3.60)	67 (12.40)	
Family type (f)				χ^2/p-value: 58.982/ 0.0000**
Categorization				
a) Nuclear	43 (23.90)	212 (58.90)	255 (47.20)	
b) Joint	137 (76.10)	148 (41.10)	285 (52.80)	

Head of family (f) *Categorization* a) Others b) Self	 107 (59.40) 73 (40.60)	 140 (38.90) 220 (61.10)	 247 (45.70) 293 (54.30)	χ^2/p-value: 20.430/ 0.0000**
Social caste (f) *Categorization* a) General b) OSC c) SC d) ST	 64 (35.60) 47 (26.10) 18 (10.00) 51 (28.30)	 227 (63.10) 25 (6.90) 57 (15.80) 51 (14.20)	 291 (53.90) 72 (13.30) 75 (13.90) 102 (18.90)	χ^2/p-value: 65.593/ 0.0000**
Phone connection *Categorization* **(f)** a) No b) Yes	 59 (32.80) 121 (67.20)	 185 (51.40) 175 (48.60)	 244 (45.20) 296 (54.80)	χ^2/p-value: 16.782/ 0.0001**
Smart phone (f) *Categorization* a) No b) Yes	**(n=121)** 83 (68.60) 38 (31.40)	**(n=175)** 95 (54.29) 80 (45.71)	**(n=296)** 178 (60.14) 118 (39.86)	-
Family size (No.) Average family size Standard error (SE) Standard deviation (SD) Observed range	 8.07 0.21 2.80 3-15	 5.79 0.12 2.33 1-15	 6.55 0.12 2.72 1-15	t-value/ p-value: 10.006/ 0.0000**
Categorization **(f)** a) Small (< 4 members) b) Medium (5-8 members) c) Large (> 9 members)	 12 (6.70) 93 (51.70) 75 (41.70)	 119 (33.10) 196 (54.40) 45 (12.50)	 131 (24.30) 289 (53.50) 120 (22.20)	χ^2/p-value: 80.557/ 0.0000**
Family composition Avg. males (Mean ±SE) Avg. females (Mean ±SE) Avg. children (Mean ±SE)	 2.71±0.08 2.82±0.08 2.54±0.12	 2.64±0.06 2.15±0.06 1.00±0.06	 2.66±0.05 2.38±0.05 1.51±0.06	t/p-value 0.68/ 0.248^{NS} 7.01/ 0.00** 13.6/ 0.00**
Involvement in agriculture *Categorization* **(f)** a) No b) Yes	 60 (33.30) 120 (66.70)	 57 (15.80) 303 (84.20)	 117 (21.70) 423 (78.30)	χ^2/p-value: 21.653/ 0.0000**
Agriculture landholding (ha) Average landholding Standard error (SE) Standard deviation (SD) Observed range	 0.67 0.68 0.91 0-5	 1.17 0.11 2.18 0-12	 1.38 0.08 1.92 0-12	-

Categorization **(f)** a) Landless (0) b) Marginal (<1 ha) c) Small (1-2 ha) d) Semi medium (2-4 ha) e) Medium (4-10 ha) f) Large (>10 ha)	 61 (33.89) 66 (36.67) 34 (18.89) 17 (9.44) 2 (1.11) 0	 59 (16.40) 140 (38.90) 66 (18.30) 46 (12.80) 46 (12.80) 3 (0.80)	 120 (22.22) 206 (38.15) 100 (18.52) 63 (11.66) 48 (8.89) 3 (0.56)	-
Landholding type Irrigated (Mean ±SE) Un-irrigated (Mean ±SE) Horticulture (Mean ±SE)	 0.26±0.04 0.41±0.06 0.07±0.03	 0.23±0.03 1.51±0.10 1.51±0.10	 0.25±0.03 0.96±0.07 0.79±0.06	-
Involvement in animal husbandry (f) a) No b) Yes	 88 (48.89) 92 (51.11)	 32 (8.90) 328 (91.10)	 120 (22.22) 420 (77.78)	-
Income (Rs.) Avg. annual income Standard error (SE) Standard deviation (SD) Observed range	 231043.89 8916.60 119628.80 29000.00-709000.00	 185804.99 8221.19 155986.19 24700.00-981400.00	 200844.53 6297.31 146336.47 24700.00 981400.00	t-value/ p-value: 3.419/ 0.0003**

Figures in parenthesis depict percentage, *p significant <0.05, **p significant <0.01

4.1.2 Profile of the NTBR non-collectors

The descriptive statistics of the NTBR non collectors with respect to their socio-personal and economic attributes are given described below:

4.1.2.1 Age

The average age of the non-collectors of the Jammu and Kashmir (J&K) was 45 years (table 4.4) and for respondents from Himachal Pradesh (HP), it was 38 years. The overall average age of the respondents was 40 years (SD:±13.50), whereas in case of NTBR collectors, the mean age was about 44 years. The respondents were categorized into three groups viz. young, middle and old by employing the Mean±SD method. Most of the non-collectors (60.0%) were in the middle age group (32-56 years), followed by the young (28.10%) and old (11.90%) age group respondents. The youngest respondent was about 16 years old and the eldest NTBR collector was 85 years old.

4.1.2.2 Education

The mean education level of non-collectors was 7.84 years (table 4.4) and 12.34 years (table 4.4) from Jammu and Kashmir and Himachal Pradesh, respectively. The overall mean education of the non-collectors was 10.48 years of formal schooling as compared to the 9.48 years of education in case of NTBR collectors. Majority of the respondents from Jammu and Kashmir (44.40%), as well as Himachal Pradesh (52.20%) were educated up to high school and 10+2. Overall, most of the respondents (49.60%) were educated up to high school and 10+2, followed by graduate and above (28.10%), up to middle school (10.40%), up to primary school (6.70%) and illiterate (5.20%).

4.1.2.3 Lifestyle

All of the respondents from Jammu and Kashmir, as well as Himachal Pradesh had a settled lifestyle. None of the non-collector had a migratory lifestyle as opposed to the NTBR collectors, where 12.40 per cent respondents were migratory.

4.1.2.4 Social caste

Majority of the respondents from Jammu and Kashmir (84.40%) belonged to the general (socially unreserved) caste, followed by scheduled caste (11.10%) and scheduled tribe (4.40%) (table 4.4). In Himachal Pradesh, 62.20 per cent of the non-collectors were from the general caste, followed by scheduled caste (31.10%), scheduled tribe (5.60%) and other social castes (1.10%) (table 3.2). Overall, majority of the non-collectors belonged to the general social caste (69.60%), followed by scheduled caste (24.40%).

4.1.2.5 Family type

Majority of the respondents from Jammu and Kashmir (68.90%) belonged to nuclear families, similarly, majority of the respondents from Himachal Pradesh (60.00%) belonged to nuclear families (table 4.4). Overall majority of the non-collectors (63.00%) belonged to the nuclear type of family structure.

4.1.2.6 Head of the family

Most of the respondents from Jammu and Kashmir (75.60%) were the heads of their respective families, similarly, majority of the respondents from Himachal Pradesh (60.00%) were heads of their family (table 4.4).

4.1.2.7 Family size

The mean family size of the non-collectors of the Jammu and Kashmir was about 6 members (table 4.4) and for respondents from Himachal Pradesh, it was about 5 members (table 4.4). The overall family size of the respondents was approximately 5 members (SD:±2.52). The respondents were categorized into three groups viz. small, medium and large by employing the Mean±SD method. Most of these non-collectors (49.60%) were in the medium family size group (5-8 members), followed by the small (44.40%) and large (5.90%) family size category. The family size ranged from 1 to 23 members.

4.1.2.8 Family composition

The average males in the family of the non-collectors of the Jammu and Kashmir, as well as respondents from Himachal Pradesh was about 2 (table 4.4). Overall there were 2 males, 2 females and 1 child.

4.1.2.9 Involvement in agriculture

All of the respondents from Jammu and Kashmir (100.0%), and majority of the non-collectors from Himachal Pradesh (87.80%) were involved in agricultural activities (table xx) and 12.20 per cent respondents from Himachal Pradesh had no agricultural involvement. Overall, 91.90 per cent respondents were involved in agriculture.

4.1.2.10 Agricultural landholding

The mean agricultural landholding of the non-collectors of the Jammu and Kashmir was about 0.80 ha and respondents from Himachal Pradesh was 0.98 ha (table 4.4). The respondents were categorized based on the size of their operational agricultural landholding. Majority of the respondents from J&K (73.30%) were in the marginal (<1 ha) category, followed by small (20.00%) and semi-medium (6.70%) landholding category. Similarly, majority of the respondents from Himachal Pradesh

(57.80%) were in the marginal (<1 ha) category, followed by small (21.10%), landless (12.20%), semi-medium (6.70%) and medium (2.20%) landholding category. The average irrigated landholding size of non-collectors of Jammu and Kashmir was 0.33 0.07 ha (Mean SE) and un-irrigated landholding size and horticulture landholding size was 0.46 0.07 ha and 0.17 0.43 ha, respectively. Similarly, the irrigated landholding size of non-collectors of Himachal Pradesh was 0.06 0.18 ha (Mean SE) and un-irrigated landholding size and horticulture landholding size was 0.92 0.09 ha and 0.78 0.09 ha, respectively.

4.1.2.11 Income

The average overall income of the non-collectors was about Rs. 18,000/- (SD:±10291), per month. The mean monthly income of the respondents from Jammu and Kashmir and Himachal Pradesh was approximately Rs. 15,000/- and Rs. 20,000/- respectively.

Table 4.4 Comparison of descriptive statistics in J&K and HP between collectors and non-collectors:

Particulars	State				Overall	
	J&K		HP			
	Collector (n=180)	**Non-collector (n=45)**	**Collector (n=360)**	**Non-collector (n=90)**	**Collector (n=540)**	**Non-collector (n=135)**
Age (years)						
Average age	47.28	45.36	42.45	38.16	44.06	40.56
Standard error (SE)	0.80	2.31	0.71	1.24	0.55	1.16
Standard deviation (SD)	10.77	15.52	13.53	11.74	12.87	13.50
Observed range	24-80	22-74	14-85	16-64	14-85	16-85
Categorization						
a) Young (< 31 years)	6 (3.30)	5 (11.10)	98 (27.20)	33 (36.70)	104 (19.30)	38 (28.10)
b) Middle (32-56 years)	146 (81.10)	29 (64.40)	199 (55.30)	52 (57.80)	345 (63.90)	81 (60.0)
c) Old (> 57 years)	28 (15.60)	11 (24.40)	63 (17.50)	5 (5.60)	91 (16.90)	16 (11.90)
Education (years)						
Average education	7.51	7.84	10.46	12.34	9.48	10.84
Standard error (SE)	0.34	0.59	0.25	0.33	0.21	0.35
Standard deviation (SD)	4.57	3.95	4.65	3.20	4.82	4.05
Observed range	0-17	0-15	0-19	0-20	0-19	0-20

Categorization						
a) Illiterate	40 (22.22)	6 (13.30)	39 (10.80)	1 (1.10)	79 (14.60)	7 (5.20)
b) Up to primary	10 (5.56)	5 (11.10)	17 (4.70)	4 (4.40)	27 (5.00)	9 (6.70)
c) Middle	43 (23.89)	12 (35.70)	43 (11.90)	2 (2.20)	86 (15.90)	14 (10.40)
d) High and 10+2	78 (43.33)	20 (44.40)	178 (49.40)	47 (52.20)	256 (47.40)	67 (49.60)
e) Graduate and above	9 (5.00)	2 (4.40)	83 (23.10)	36 (40.0)	92 (17.00)	38 (28.10)
Lifestyle						
Categorization						
a) Settled	126 (70.00)	45 (100.0)	347 (96.40)	90 (100.0)	473 (87.60)	135 (100.0)
b) Migratory	54 (30.00)	0 (0)	13 (3.60)	0 (0)	67 (12.40)	0 (0)
Family type						
Categorization						
a) Nuclear	43 (23.90)	31 (68.90)	212 (58.90)	54 (60.00)	255 (47.20)	85 (63.00)
b) Joint	137 (76.10)	14 (31.10)	148 (41.10)	36 (40.00)	285 (52.80)	50 (37.00)
Head of family						
Categorization						
a) Others	107 (59.40)	11 (24.40)	140 (38.90)	30 (33.30)	247 (45.70)	41 (30.40)
b) Self	73 (40.60)	34 (75.60)	220 (61.10)	60 (66.70)	293 (54.30)	94 (69.60)
Social caste						
Categorization						
a) General	64 (35.60)	38 (84.40)	227 (63.10)	56 (62.20)	291 (53.90)	94 (69.60)
b) OSC	47 (26.10)	0 (0)	25 (6.90)	1 (1.10)	72 (13.30)	1 (0.70)
c) SC	18 (10.00)	5 (11.10)	57 (15.80)	28 (31.10)	75 (13.90)	33 (24.40)
d) ST	51 (28.30)	2 (4.40)	51 (14.20)	5 (5.60)	102 (18.90)	7 (5.20)
Phone connection						
Categorization						
a) No	59 (32.80)	2 (4.40)	185 (51.40)	39 (43.30)	244 (45.20)	41 (30.40)
b) Yes	121 (67.20)	43 (95.60)	175 (48.60)	51 (56.70)	296 (54.80)	94 (69.60)
Smart phone	**(n=121)**	**(n=43)**	**(n=175)**	**(n=51)**	**(n=296)**	**(n=94)**
Categorization						
a) No	83 (68.60)	35 (81.40)	95 (54.29)	8 (15.69)	178 (60.14)	43 (45.74)
b) Yes	38 (31.40)	8 (18.60)	80 (45.71)	43 (84.31)	118 (39.86)	51 (54.25)
Family size (No.)						
Average family size	8.07	6.09	5.79	4.77	6.55	5.21
Standard error (SE)	0.21	0.53	0.12	0.17	0.12	0.22
Standard deviation (SD)	2.80	3.55	2.33	1.64	2.72	2.52
Observed range	3-15	3-23	1-15	1-10	1-15	1-23
Categorization						
a) Small (< 4 members)	12 (6.70)	13 (28.90)	119 (33.10)	47 (52.20)	131 (24.30)	60 (44.40)
b) Medium (5-8 members)	93 (51.70)	25 (55.60)	196 (54.40)	42 (46.70)	289 (53.50)	67 (49.60)
c) Large (> 9 members)	75 (41.70)	7 (15.60)	45 (12.50)	1 (1.10)	120 (22.20)	8 (5.90)

Family composition						
Avg. males (Mean ±SE)	2.71±0.08	2.31±0.23	2.64±0.06	2.23±0.12	2.66±0.05	2.26±0.11
Avg. females (Mean ±SE)	2.82±0.08	1.76±0.15	2.15±0.06	1.80±0.10	2.38±0.05	1.79±0.08
Avg. children (Mean ±SE)	2.54±0.12	2.02±0.26	1.00±0.06	0.73±0.10	1.51±0.06	1.16±0.12
Involvement in agriculture						
a) No	60 (33.30)	0 (0)	57 (15.80)	11 (12.20)	117 (21.70)	11 (8.10)
b) Yes	120 (66.70)	45 (100.0)	303 (84.20)	79 (87.80)	423 (78.30)	124 (91.90)
Agriculture landholding (ha)						
Average landholding	0.67	0.80	1.17	0.98	1.38	0.92
Standard error (SE)	0.68	0.12	0.11	0.10	0.08	0.76
Standard deviation (SD)	0.91	0.77	2.18	0.94	1.92	0.89
Observed range	0-5.00	0.05-3.30	0-12	0-5.60	0-12	0-5.60
Categorization						
a) Landless (0)	61 (33.89)	0 (0)	59 (16.40)	11 (12.20)	120 (22.22)	11 (8.10)
b) Marginal (<1 ha)	66 (36.67)	33 (73.30)	140 (38.90)	52 (57.80)	206 (38.15)	85 (63.0)
c) Small (1-2 ha)	34 (18.89)	9 (20.0)	66 (18.30)	19 (21.10)	100 (18.52)	28 (20.70)
d) Semi medium (2-4 ha)	17 (9.44)	3 (6.70)	46 (12.80)	6 (6.70)	63 (11.66)	9 (6.70)
e) Medium (4-10 ha)	2 (1.11)	0 (0)	46 (12.80)	2 (2.20)	48 (8.89)	2 (1.50)
f) Large (>10 ha)	0 (0)	0 (0)	3 (0.80)	0 (0)	3 (0.56)	0 (0)
Landholding type						
Irrigated (Mean ±SE)	0.26±0.04	0.33±0.07	0.23±0.02	0.06±0.18	0.25±0.03	0.15±0.03
Un-irrigated (Mean ±SE)	0.41±0.06	0.46±0.07	1.14±0.07	0.92±0.09	0.96±0.07	0.76±0.07
	0.07±0.03	0.17±0.43	1.02±0.07	0.78±0.09	0.79±0.06	0.58±0.06
Involvement in animal husbandry						
Categorization						
a) No	88 (48.89)	8 (17.80)	32 (8.90)	19 (21.10)	120 (22.22)	27 (20.0)
b) Yes	92 (51.11)	37 (82.20)	328 (91.10)	71 (78.90)	420 (77.78)	108 (80.0)
Income (Rs.)						
Avg. annual income	231043.89	307680.00	185804.99	19666.67	200844.53	18014.81
Standard error (SE)	8916.60	19127.00	8221.19	1228.56	6297.31	885.73
Standard deviation (SD)	119628.80	128307.85	155986.19	11655.16	146336.47	10291.27
Observed range	29000.00-709000.00	66000.00-725000.00	24700.00-981400.00	10000-70000	24700.00 981400.00	3000-70000

Figures in parenthesis depict percentage, *p significant <0.05, **p significant <0.01

4.2 To find out the availability and use pattern of NTBR

4.2.1 Availablity and use pattern of NTBRs in Jammu West Forest Circle of Jammu

4.2.1.1 Availablity of NTBRs in Jammu West Forest Circle of Jammu

The Chenab Forest circle encloses Rajouri, Nowshera, Poonch, Reasi and Mahore forest divisions. The non-timber bioresources available in the West Forest Circle of the Jammu Forest Division of the Jammu and Kashmir were Kuth (*Saussurea costus*), Dhoop (*Commiphora wightii*), Ratanjot (*Anemone obtusiloba*), Zakhme hayat (*Bergenia ciliata*), Patis (*Aconitum heterophyllum Wall. ex Royle*), Van rohun/ jungle thong (*Allium ursinum L.*), Guchi/ morels (*Morchella esculenta*), Banafsha (*Viola odorata*), Kod (*Picrorhiza kurroa*), Nagchatri (*Trillium govanianum*), Jungli lahsun/ thomb, Beladona (*Atropa acuminata*) and Mushkbala (*Valeriana wallichii*). The detailed NTBR availiablity and utilization is given in table 4.5. The most prominent NTBR rich areas in the West Forest Circle of Jammu and Kashmir included Loran Mandi in Poonch and Gulab Garh in Mahore. Similarly, on the basis of information obtained from Forest Department, the NTBR availiablity detail of Gulabgarh forest range of Mahore forest division in the Reasi district is as below:

Table 4.5 NTBR availability in Jammu West forest circle of Jammu and Kashmir

S. No	Local name of NTBR	Scientific name	Part collected	Quantity Available	Slope/ height	Accessible	Ready market	Local use	Collected by collectors (n=60)	Reason of collection
1.	Kuth*	*Saussurea costus*	Root	+ + +	Intermediate	Yes	No	Cough, anti cloth mite	60 (100.0)	Medicinal, Economic
2.	Chikhel/ pine	*Pinus wallichiana*	Resin, cone	+ + +	Intermediate	Yes	No	Antiseptic, anthelmintic	4 (6.67)	Economic
3.	Dhoop/ gugal	*Commiphora wightii*	Root	+ + +	Intermediate	Yes	Yes	Fragrance, air purifier	52 (86.67)	Economic
4.	Ratanjot	*Anemone obtusiloba*	Root, seeds	+ + +	Intermediate	Yes	Yes	Blistering agent, induce vomiting	31 (51.67)	Medicinal
5.	Zakhme Hayat	*Bergenia ciliata*	Whole plant	+ +	High	No	Yes	Wound healing	54 (90.00)	Medicinal
6.	Anjbar/ Masloon ki chai	*Polygonum Viviparum*	Root, leaf	+ + +	Low	Yes	No	Astringent, sore throat	2 (3.33)	Household use
7.	Mastani booti	*Filipendula vestita - (Wall.)Maxim*	Root, Leaf	+	Intermediate	No	No	Anti-toxic, antirheumatic, anti-inflammatory	2 (3.33)	Household use
8.	Ravind*, pambchalan	*Rheum emodi*	Rhizome	+ +	High	No	No	Fever, ulcer, wound, fracture	10 (16.67)	Household use/ domestic animal use
9.	Chora	*Angelica glauca*	Root, Rhizome	+ +	Intermediate	No	No	Insecticide, stomach ache, condiment	2 (3.33)	Household use
10.	Rich Kuth	*Arctium lappa - L.*	Root	+	High	No	No	Arthritis, anti-toxic, sore	5 (8.33)	Medicinal

								throat, antifungal, carminative		
11.	Patris/ patis*	*Aconitum heterophyllum Wall. ex Royle*	Root/ tuber	+ +	High	No	Yes	Fever	52 (86.67)	Economic, medicinal
12.	Surm ganda	*Arisaema jacquemontii*	Root, leaves	+	High	No	No	Antiseptic, antifungal	10 (16.67)	Domestic animal use
13.	Van wangun/ jungly baingan	*Solanum erianthum*	Root, leaves	+	High	No	No	Digestive ailments, Abortifacient, diuretic	11 (18.33)	Household use
14.	Van rohun/ jungly thong/ plaan/ jungly lasun*	*Allium ursinum L.*	Bulb	+ +	High	No	Yes	Anthelmintic, antiasthmatic, anticholesterolemic, antiseptic, antispasmodic, astringent, diuretic, expectorant, hypotensive, rubefacient, stimulant, stomachic, tonic	48 (80.00)	Medicinal, economic
15.	Van gande/ jungly pyaz	*Urginea indica (Kunth.)* Hyacinthaceae	Bulb, leaf	+ +	High	No	No	Expectorant, scalp tonic	24 (40.00)	Household use

16.	Tehtwan	*Artemisia vulgaris - L.*	Leaf	+ + +	Intermediate	Yes	No	Stomach ache, anthelminthic	42 (70.00)	Medicinal
17.	Guchi/ kankach*	*Morchella esculenta*	Whole	+ +	Intermediate	Yes	Yes	Food delicacy, stomach ache	60 (100.0)	Economic
18.	Neri	*Skimmia laureola*	Leaf	+ +	High	No	No	Antibacterial	4 (6.67)	
19.	Mora	*Aconitum violaceum*	Root	+ +	High	No	No	Snake bite antidote, anti-inflammatory	4 (6.67)	Household use, medicinal
20.	Kod/ kutki	*Picrorhiza kurroa*	Root	+ +	High	No	No	Fever, liver problems, breathing problems	43 (71.67)	Economic
21.	Banafsha*	*Viola odorata*	Flower	+ +	Intermediate	Yes	Yes	Headache, cough, fever	57 (95.00)	Economic
22.	Nagchatri/ tripatri	*Trillium govanianum*	Root	+ +	High	No	No	Analgesic, anti-inflammatory	16 (26.67)	Economic
23.	Diascorea	*Dioscorea deltoidea*	Root/ tuber/ Rhizome	+ + +	Intermediate	Yes	Yes	Round worm treatment, constipation	5 (8.33)	Household use
24.	Beladona	*Atropa belladonna*	Root	+ + +	Intermediate	Yes	Yes	Pain reliever, muscle relaxer, anti-inflammatory,	46 (76.67)	Economic
25.	Mushkbala	*Valeriana jatamansi*	Root	+ + +	Intermediate	Yes	Yes	Sleep, anti-depressant	55 (91.67)	Economic
26.	Buthwa/ koone hakh	*Chenopodium album*	Leaves	+ + +	Intermediate	Yes	Yes	Food, uric acid treatment	32 (53.33)	Household use
27.	Kahzaban*	*Borago officinalis*	Leaves/ flower	+ + +	Intermediate	Yes	Yes	Fever, cough, appetite,	23 (83.33)	Economic

								digestion		
28.	Koda aru/ peach seed	*Prunus persica*	Seeds	+ + +	Low	Yes	No	Improves digestion	10 (16.67)	Household use
29.	Harud*/ Haritaki	*Terminalia chebula*	Fruit	+ + +	Low		Yes	Sore throat, asthma, constipation, diabetes	10 (16.67)	Economic
30.	Amla*	*Phyllanthus emblica*	Fruit	+ + +	Low		Yes	Digestive health, immunity	16 (26.67)	Economic
31.	Behada/ Bibhitaki*	*Terminalia bellirica*	Fruit	+ + +	Low		Yes	Sore throat, asthma, constipation, diabetes	10 (16.67)	Economic
32.	Jogi phool*	*Saussurea simpsoniana* Asteraceae	Flower	+	High	No	No	Treatment of boils, cultural significance	2 (3.33)	Household use
33.	Malkangni*	*Celastrus paniculatus*	Seed	+ + +	Low	Yes	Yes	Pain killer, cognitive booster,	10 (16.67)	Economic

*Collectors want to grow in their own fields, Quantity available: +: Scarce, ++: Moderate, +++: Abundant

Table 4.6: Compartment wise NTBR collection detail of Gulabgarh Range of Mahore Forest Division of Jammu West Forest Circle in Jammu and Kashmir

S. No	Local name of NTBR	Part collected	Period of collection (month)	Block	Beat	Compartment	Annual quantity collected (Qtl)
1.	Dhoop	Root	Sep-Nov	Khour	Shadole	16 to 26/GG	10
					Khour	27 to 36/GG	10
				Dewal	Gulabgarh	37 to 43/GG	1.10
2.	Kuth	Root	Sep-Nov	Dewal	Gulabgarh	37 to 43/GG	0.40
3.	Kod	Root	Sep-Nov	Khour	Shadole	16 to 26/GG	1
					Khour	27 to 36/GG	1
4.	Mushkbala	Rhizome	Sep-Nov	Khour	Khour	27 to 36/GG	3
5.	Jungli lahsun	Corm	June-July	Khour	Shadole	16 to 26/GG	0.10
					Khour	27 to 36/GG	0.10
6.	Patis	Tuber	Sep-Nov	Khour	Shadole	16 to 26/GG	0.4
					Khour	27 to 36/GG	0.3
7.	Nagchatri	Root	Sep-Nov	Khour	Shadole	16 to 26/GG	0.30
					Khour	27 to 36/GG	0.20
8.	Beladona	Root, Leaf		Khour	Shadole	16 to 26/GG	1
					Khour	27 to 36/GG	1

*Source: Forest Department, Jammu and Kashmir (2019)

4.2.1.2 Use pattern of NTBRs in Jammu West Forest Circle of Jammu

The chief non-timber bioresources collected from West Forest Circle of the Jammu Forest Division of the Jammu and Kashmir were the roots of Kuth (*Saussurea costus*), locally used for cough and as anti cloth mite. Dhoop (*Commiphora wightii*) roots were processed by drying and grinding and used to make incence/ gragrance and also used as air purifier. Zakhme hayat (*Bergenia ciliata*) whole plant was being collected and generally grinded roots and leaves were used for wound healing by local application. The roots and tuber of Patis (*Aconitum heterophyllum Wall. ex Royle*) was being collected and used for fever, cough and anthelminthics. Van rohun/ jungle thong (*Allium ursinum L.*) was also collected for medicinal purposes. Guchi/ morels (*Morchella esculenta*) were collected being a local delicacy and as a treatment for stomach pain. Tenders were being floated annually for collection of Nagchatri (*Trillium govanianum*), Beladona (*Atropa acuminata*), Banafsha (*Viola odorata*), Kod (*Picrorhiza kurroa*) and Mushkbala (*Valeriana wallichii*) therefore were being collected for economic reasons (table 4.5).

4.2.2 Availablity and use pattern of NTBRs in Jammu East Forest Circle of Jammu

4.2.2.1 Availablity of NTBRs in Jammu East Forest Circle of Jammu

The East Forest circle encompasses Udhampur, Ramnagar, Basohli and Billawar forest divisions. The non-timber bioresources available in the East Forest Circle of the Jammu Forest Division of the Jammu and Kashmir were Kuth (*Saussurea costus*), Dhoop (*Commiphora wightii*), Ratanjot (*Anemone obtusiloba*), Zakhme hayat (*Bergenia ciliata*), Patis (*Aconitum heterophyllum Wall. ex Royle*), Van rohun/ jungle thong (*Allium ursinum L.*), Guchi/ morels (*Morchella esculenta*), Banafsha (*Viola odorata*), Kod (*Picrorhiza kurroa*), Nagchatri (*Trillium govanianum*), Jungli lahsun/ thomb, Beladona (*Atropa acuminata*) and Mushkbala (*Valeriana wallichii*). The details can be seen from table 4.7. The important areas in East Forest Circle of Jammu and Kashmir with prominent NTBR avaliliablity were Chatriadi and Dudu Basantgarh in Ramnagar, Udhampur district, and Bani, Basohli in Kathua district of Jammu and Kashmir.

4.2.2.2 Use pattern of NTBRs in East Forest Circle of Jammu

The various NTBR were being used as described in table 4.7.

4.2.3 Availablity and use pattern of NTBRs in Chenab Forest Circle of Jammu

4.2.3.1 Availablity of NTBRs in Chenab Forest Circle of Jammu

The Chenab Forest circle further has Doda, Batote, Ramban, Bhaderwah, Kishtwar and Marwah forest divisions. The major non-timber bioresources available in the Chenab Forest Circle of the Jammu Forest Division of the Jammu and Kashmir were Guchi (*Morchella esculenta)*, Kuth (*Saussurea costus*), Dhoop (*Commiphora wightii*), Diascorea, Kod, Nagchatri, Mushkbala, Zakhme hayat, Beladona and Patis. The list of NTBRs from Chenab circle is shown in Table 4.8.

Prominent compartments for NTBR availability in the Bhaderwah area of Chenab Forest Circle included the following areas in Neeru Forest Range:

1. Ramtund (Co. 46/N)
2. Chattargala (40/N to 42/N)
3. Padri (1/N to 7/N)

4. Batal Gatti (54/N)
5. Bish Bagh (54/N)
6. Dratala (17/N)

The most active area of collection in Bhaderwah Forest range was reported to be village Thanala via Sartangal area, which is about 20 Km distant from the Bhaderwah town. Here more than 70 per cent of the population is living in and adjoining the forest areas. The most prominent NTBRs of the area included Nagchatri, Rasaunt, Mushkbala, Banafsha, Wild garlic/ jungly lahsun, Kuth, Dhoop, Kasroad and Kich/Kankach/Guchi and some local forest products like Kroth, Datoora and Bisundod (bark used for making tea). The wild animals encountered in the area included leopards, Himalayan black bears, musk deer and nilgai.

Similarly, on the basis of data obtained from Forest Department of Jammu and Kashmir, the NTBR availiablity detail of Kishtwar forest division in the Chenab forest range is shown in tables 4.9-4.12:

Table 4.7 NTBR availability in East Jammu forest circle of Jammu and Kashmir

S. No	Local name of NTBR	Scientific name	Part collected	Quantity Available	Slope/ height	Accessible	Ready market	Local use	Collected by collectors (n=60)	Reason of collection
1.	Kuth*	*Saussurea costus*	Root	+ + +	High	No	No	Cough, anti cloth mite	54 (90.00)	Economic
2.	Mora	*Aconitum violaceum*	Root	+ +	Intermediate	Yes	No	Snake bite antidote, anti-inflammatory	4 (6.67)	Household use, medicinal
3.	Kod/ kutki*	*Picrorhiza kurroa*	Root	+ +	High	No	No	Fever, liver problems, breathing problems	35 (58.33)	Economic
4.	Chora	*Angelica glauca*	Root, Rhizome	+ + +	Intermediate	Yes	No	Insecticide, stomach ache, condiment	45 (75.00)	Household use
5.	Guchi	*Morchella esculenta*	Whole	+ + +	High	No	Yes	Food delicacy, stomach ache	60 (100.0)	Economic
6.	Patis	*Aconitum heterophyllum Wall. ex Royle*	Root/ tuber	+ +	High	No	No	Fever, cough	56 (93.33)	Economic, Medicinal
7.	Nagchatri	*Trillium govanianum*	Root	+ +	High	No	No	Analgesic, anti-inflammatory	42 (70.00)	Economic
8.	Dhoop	*Commiphora wightii*	Root	+ +	High	No	Yes	Fragrance, air purifier	60 (100.00)	Economic

9.	Kasrod*	*Matteuccia struthiopteris*	Stem	+ + +	Low	Yes	Yes	Food delicacy	25 (41.67)	Household use, economic
10.	Bronth	NA	Leaf/ root	+ +	Intermediate	Yes	No	Anti toxic	6 (10.00)	
11.	Goon	NA	Leaf/ root	+ +	Intermediate	Yes	No	Anti toxic	2 (3.33)	
12.	Walnut	*Juglans regia*	Fruit	+ +	Intermediate	Yes	No	Food	9 (15.00)	Economic
13.	Banafsha*	*Viola odorata*	Flower	+ +	Intermediate	Yes	No	Headache, cough, fever	26 (43.33)	Economic
14.	Kakarsangi	*Pistacia integerrima*	Leaf galls, bark	+ +	Intermediate	Yes	No	Cough, asthma, snake bite	12 (20.00)	Economic
15.	Rasaunt	*Berberis aristata*	Root	+ +	Intermediate	Yes	No	Wound healing, inflammation	18 (30.00)	Economic
16.	Tripatri	*Trillium govanianum*	Root	+ +	Intermediate	Yes	No	Analgesic, anti-inflammatory	23 (38.33)	Medicinal

*Collectors want to grow in their own fields, Quantity available: +: Scarce, ++: Moderate, +++: Abundant

Table 4.8 NTBR availability in Chenab forest circle of Jammu and Kashmir

S. No	Local name of NTBR	Scientific name (Family)	Part collected	Quantity Available	Slope/ height	Accessible	Ready market	Local use	Collected by collectors (n=60)	Reason of collection
1.	Diascorea	*Dioscorea deltoidea*	Root/ tuber/ Rhizome	+ + +	Intermediate	Yes	No	Piles, dysentery, cough	13 (21.67)	Medicinal, economic
2.	Kod/ kutki	*Picrorhiza kurroa*	Root	+ +	+ + +	No	No	Fever, liver problems, breathing problems	52 (86.67)	Economic
3.	Dhoop*	*Commiphora wightii*	Root	+	+ + +	No	Yes	Air freshener	58 (96.67)	Economic
4.	Nagchatri	*Trillium govanianum*	Root	+ + +	High	No	No	Analgesic, anti-inflammatory	60 (100.0)	Economic
5.	Mushkbala	*Valeriana jatamansi*	Root	+ + +	Intermediate	Yes	Yes	Sleep, anti-depressant	48 (80.00)	Economic
6.	Zakhme hayat	*Bergenia ciliata*	Whole plant	+ +	High	No	No	Wound healing	38 (63.33)	Medicinal, economic
7.	Patis/ atis	*Aconitum heterophyllum*	Root/ tuber	+ +	High	No	No	Cough, Fever	51 (85.00)	Economic
8.	Churi	*Diploknema butyracea*	Bark	+	Intermediate	No	No	Indigestion, anthelminthic	26 (43.33)	Economic
9.	Kuth*	*Saussurea costus*	Root	+ + +	High	No	No	Joint pain, cough, anti cloth mite	46 (76.67)	Economic
10.	Guchi	*Morchella esculenta*	Whole	+ + +	High	No	Yes	Food delicacy	43 (71.67)	Economic
11.	Nagchatri	*Trillium govanianum*	Root	+ + +	High	No	No	Analgesic, anti-	53 (83.33)	Economic

								inflammatory		
12.	Beladona	*Atropa belladonna*	Root	+ + +	Intermediate	Yes	Yes	Arthritis, cough, analgesic	25 (41.67)	Medicinal
13.	Jungly lasun*	*Allium ursinum L.*	Bulb	+ +	High	No	No	Stomach ache, urinary infection, eczema	13 (21.66)	Medicinal, economic
14.	Chilgoza	*Pinus gerardiana*	Fruit/ seed	+ + +	Intermediate	Yes	yes	Dry fruit	12 (20.00)	Economic, household use
15.	Kala zeera	*Bunium persicum*	Seed	+ + +	Low	Yes	yes	Spice	13 (21.67)	Economic, household use
16.	Banafsha*	*Viola odorata*		+ + +	Intermediate	Yes	Yes	Cough, jaundince, fever	12 (20.00)	Economic
17.	Thangi	*Corylus jacquemontii - Decne.*	Fruit/ seed	+ +	Intermediate	No	Yes	Dry fruit	12 (20.00)	Economic, household use
18.	Pambchalan	*Rheum emodi*	Rhizome	+ +	High	No	No	Fever, ulcer, wound, fracture	10 (16.67)	Household use/ domestic animal use
19.	Kahzaban	*Borago officinalis*	Leaves/ flower	+ + +	Intermediate	Yes	Yes	Fever, cough, appetite, digestion	26 (43.33)	Economic
20.	Panja*	*Dactylorhiza hatagirea*	Root	+ + +	Low	Yes	No	NA	1 (1.67)	Economic

*Collectors want to grow in their own fields, Quantity available: +: Scarce, ++: Moderate, +++: Abundant

Moreover, there were some other NTBR reported in the Chenab region during our survey, for which samples were not available with the NTBR collectors so their identity could not be established. However we have documented those by their local names only so that they could be identified in the near future. The NTBR were; **Tilla, Sisam, Mundal, Baziun, Hong, Boot zadi, Wankasfood, Chorai, Gulnafsh, Thoshdu, Ferni, Gharshag, Bhuwaer, Mourma, Kanas, Bathyar** and **Thund**. Thoshdu and ferni were powdered leaves of some wild plants/grass being used as local spices, being added to food preparations in the Chenab circle for their aroma and taste enhancing property.

Table 4.9: Estimated annual NTBR availability detail of Kishtwar Forest Division of Chenab Forest Circle in Jammu and Kashmir

S. No	Local name of NTBR	Scientific name	Family	Kishtwar Range (Qtl)	Nagseni Range (Qtl)	Paddar Range (Qtl)	Total availability (Qtl)
1.	Diascorea	*Dioscorea deltoidea*	*Dioscoreaceae*	148	70	0	**218**
2.	Kod			11	42	82.10	**135.10**
3.	Dhoop	*Commiphora wightii*	*Burseraceae*	63	107	137.80	**307.80**
4.	Nagchatri	*Trillium govanianum*	*Melanthiaceae*	73	11	4	**88**
5.	Mushkbala	*Valeriana jatamansi*	*Valerianaceae*	65	64	2	**131**
6.	Zakhme hayat	*Bergenia ciliata*	*Saxifrages*	177	0	2	**179**
7.	Beladona	*Atropa belladonna*	*Solanaceae*	25	0	0	**25**
8.	Patis	*Aconitum heterophyllum*	*Rananculaceae*	8	2.20	2	**12.20**
9.	Chora	*Angelica glauca*	*Apiaceae*	8	0	0	**8**
10.	Kuth	*Saussurea costus*	*Asteraceae*	3	50	25.25	**78.25**
Total				**581**	**346.20**	**255.15**	**1182.35**

*Source: Forest Department, Jammu and Kashmir (2019)

Table 4.10: Compartment wise NTBR collection detail of Nagseni Range of Kishtwar Forest Division of Chenab Forest Circle in Jammu and Kashmir

S. No	Local name of NTBR	Part collected	Period of collection (month)	Block	Beat	Compartment	Annual quantity collected (Qtl)	Total quantity collected (Qtl)
1.	Dhoop	Root	Sep-Nov	Pullar	Cherji	1, 2, 3 c/N	4	**107**
					Pullar	4a, 4b/N	50	
					Chichha	5, 6a, 6bN	30	
				Chirool-I	Pyas	7, 8, 9, 10/N	3	
					Chirool-I	14, 15, 16/N	20	
2.	Kuth	Root	Sep-Nov	Pullar	Cherji	1, 2, 3 c/N	10	**50**
					Pullar	4a, 4b/N	30	
				Chirool-I	Pyas	7, 8, 9, 10/N	10	
3.	Kod	Root	Sep-Nov	Pullar	Cherji	1, 2, 3 c/N	8	**62**
					Chichha	5, 6a, 6b/N	30	
				Chirool-I	Pyas	7, 8, 9, 10/N	4	
					Chirool-I	14, 15, 16/N	20	
4.	Mushkbala	Rhizome	Sep-Nov	Pullar	Cherji	1, 2, 3c/N	4	**44**
				Chirool-1	Galhar	11, 12, 13/N	30	
				Chirool-II	Dool	20a, 20b, 20c/N	10	
5.	Diascorea	Rhizome	Sep-Nov	Pullar	Cherji	1, 2, 3 c/N	3	**70**
					Pullar	4a, 4b/N	10	
				Chirool-I	Pyas	7, 8, 9, 10/N	40	
				Chirool-II	Chirool-II	17, 18, 19/N	7	
					Dool	20a, 20b, 20c/N	10	
6.	Patis	Tuber	Sep-Nov	Pullar	Chichha	5, 6a, 6b/N	2	**22**
				Chirool-I	Chirool-I	14, 15, 16/N	20	
7.	Nagchatri	Root	Sep-Nov	Chirool-I	Pyas	7, 8, 9, 10/N	1	**11**
					Chirool-I	14, 15, 16/N	10	

*Source: Forest Department, Jammu and Kashmir (2019)

Table 4.11: Compartment wise NTBR collection detail of Paddar Range of Kishtwar Forest Division of Chenab Forest Circle in Jammu and Kashmir

S. No	Local name of NTBR	Part collected	Period of collection (month)	Block	Beat	Compartment	Annual quantity collected (Qtl)	Total quantity collected (Qtl)
1.	Dhoop	Root	Oct-Dec	Machail	Sazar	1a/P	14	**137.08**
					Salar-I	1c/P	12	
					Machail-I	4b, 4c/P	12	
					Salar-II	5a, 5b/P	14	
				Atholi	Jarkadel-II	39, 40/P	15	
					Atholi-I	25, 26/P	10	
					Atholi-II	31, 32/P	0.08	
				Garh	Garh-I	7, 8/P	4	
					Machail-II	5a, 5b/P	6	
				Gandhari	Chitoo	19, 20, 23/P	25	
					Gandhari	16, 17a, 17b/P	25	
2.	Kuth	Root	Oct-Dec	Machail	Sazar	1a/P	5	**25.25**
					Salar-I	1c/P	4	
					Machail-I	4b, 4c/P	4	
					Salar-II	5a, 5b/P	3	
				Garh	Garh-I	7, 8/P	2	
					Machail-II	5a, 5b/P	2	
				Gandhari	Chitoo	19, 20, 23/P	1	
					Gandhari	16, 17a, 17b/P	3	
				Atholi	Atholi-I	25, 26/P	1	
					Atholi-II	31, 32/P	0.25	
3.	Kod	Root	Oct-Dec	Machail	Sazar	1a/P	4	**82.10**
					Salar-I	1c/P	3	
					Machail-I	4b, 4c/P	4	
					Salar-II	5a, 5b/P	3	
				Garh	Garh-I	7, 8/P	3	
					Machail-II	5a, 5b/P	3	
				Atholi	Jarkadel-II	39, 40/P	5	
					Atholi-I	25, 26/P	50	
					Atholi-II	31, 32/P	0.10	
				Gandhari	Chitoo	19, 20, 23/P	2	
					Gandhari	16, 17a, 17b/P	5	
4.	Mushkbala	Rhizome	Oct-Dec	Gandhari	Chitoo	19, 20, 23/P	1	**2**
					Gandhari	16, 17a, 17b/P	1	
5.	Jungli lahsun	Corm	June-July	Machail	Sazar	1a/P	1	**24.50**
					Salar-I	1c/P	1	
					Machail-I	4b, 4c/P	1	

					Salar-II	5a, 5b/P	1	
				Atholi	Jarkadel-II	39, 40/P	12	
					Atholi-I	25, 26/P	1	
					Atholi-II	31, 32/P	0.50	
				Garh	Garh-I	7, 8/P	1	
					Machail-II	5a, 5b/P	3	
				Gandhari	Chitoo	19, 20, 23/P	1	
					Gandhari	16, 17a, 17b/P	2	
6.	Patis	Tuber	Oct-Dec	Gandhari	Chitoo	19, 20, 23/P	1	**2**
					Gandhari	16, 17a, 17b/P	1	
7.	Nagchatri	Root	Oct-Dec	Machail	Sazar	1a/P	1	**4**
					Salar-I	1c/P	1	
					Machail-I	4b, 4c/P	1	
					Salar-II	5a, 5b/P	1	
8.	Zakhme hayat	Root	Oct-Dec	Gandhari	Chitoo	19, 20, 23/P	1	**2**
					Gandhari	16, 17a, 17b/P	1	

*Source: Forest Department, Jammu and Kashmir (2019)

Table 4.12: Compartment wise NTBR collection detail of Kishtwar Range of Kishtwar Forest Division of Chenab Forest Circle in Jammu and Kashmir

S. No	Local name of NTBR	Part collected	Period of collection (month)	Block	Beat	Compartment	Annual quantity collected (Qtl)	Total quantity collected (Qtl)
1.	Dhoop	Root	Sep-Nov May-June	Bunjwah	Kither-I	1/Bh to 12/Bh, 4/K, 5/K, 6/K	3	**63**
					Kither-II	5/K to 11/K	3	
					Patzani	12/K to 14/K	2	
				Trigam	Sarthal-II	53, 54, 56/K	20	
					Trigam-I	57, 58, 59/K	10	
				Saroor	Shiroti-I	25, 26/K	10	
					Shiroti-II	28, 32/K	15	
2.	Kuth	Root	Sep-Nov	Saroor	Chandali-II	47, 48/K	3	**3**
3.	Kod	Root	Sep-Nov May-June	Bunjwah	Kither-I	1/Bh to 12/Bh, 4/K, 5/K, 6/K	2	**11**
					Kither-II	5/K to 11/K	2	
				Saroor	Chandali-I	41 to 46/K	5	
					Chandali-II	47, 48/K	2	
4.	Mushkbala	Rhizome	Sep-Nov	Trigam	Sarthal-II	53, 54, 56/K	10	**65**
					Trigam-I	57, 58, 59/K	5	
					Trigam-II	60, 61/K	10	
				Saroor	Shiroti-I	25, 26/K	30	
					Shiroti-II	28, 32/K	10	

5.	Diascorea	Rhizome	Sep-Nov	Nagni	Nagni-II	13/Bh to 25/Bh	5	**148**
				Bunjwah	Kither-I	1/Bh to 12/Bh, 4/K, 5/K, 6/K	5	
					Patzani	12/K to 14/K	3	
				Trigam	Trigam-I	57, 58, 59/K	10	
					Trigam-II	60, 61/K	15	
				Saroor	Shiroti-I	25, 26/K	50	
					Shiroti-II	28, 32/K	30	
					Chandali-I	41 to 46/K	20	
					Chandali-II	47, 48/K	10	
6.	Patis	Tuber	Sep-Nov	Saroor	Chandali-I	41 to 46/K	6	**8**
					Chandali-II	47, 48/K	2	
7.	Nagchatri	Root	July-Nov	Bunjwah	Kither-I	1/Bh to 12/Bh, 4/K, 5/K, 6/K	3	**73**
				Trigam	Sarthal-II	53, 54, 56/K	5	
					Trigam-I	57, 58, 59/K	5	
				Saroor	Shiroti-I	25, 26/K	15	
					Shiroti-II	28, 32/K	10	
					Chandali-I	41 to 46/K	30	
					Chandali-II	47, 48/K	5	
8.	Zakhme hayat	Stem and root	Sep-Nov	Trigam	Sarthal-II	53, 54, 56/K	10	**177**
					Trigam-I	57, 58, 59/K	5	
					Trigam-II	60, 61/K	50	
				Saroor	Shiroti-I	25, 26/K	100	
					Shiroti-II	28, 32/K	12	
9.	Beladona	Berries	Sep-Nov	Trigam	Sarthal-II	53, 54, 56/K	5	**25**
					Trigam-II	60, 61/K	5	
				Saroor	Shiroti-II	28, 32/K	5	
					Chandali-II	47, 48/K	10	
10.	Chora	Root	Sep-Nov	Saroor	Chandali-I	41 to 46/K	5	**8**
					Chandali-II	47, 48/K	3	

*Source: Forest Department, Jammu and Kashmir (2019)

4.2.3.2 Use pattern of NTBRs in Chenab Forest Circle of Jammu

Kuth (*Saussurea costus*), locally used for cough and as anti cloth mite. Dhoop (*Commiphora wightii*) roots were processed by drying and grinding and used to make incence/ gragrance and also used as air purifier. Zakhme hayat (*Bergenia ciliata*) whole

plant was being collected and generally grinded roots and leaves were used for wound healing by local application. The roots and tuber of Patis (*Aconitum heterophyllum Wall. ex Royle*) was being collected and used for fever, cough and anthelminthics. Van rohun/ jungle thong (*Allium ursinum L.*) was also collected for medicinal purposes. Guchi/ morels (*Morchella esculenta*) were collected being a local delicacy and as a treatment for stomach pain. Banafsha (*Viola odorata*), Kod (*Picrorhiza kurroa*). Tenders were being floated annually for collection of Nagchatri (*Trillium govanianum*), Beladona (*Atropa acuminata*) and Mushkbala (*Valeriana wallichii*) therefore were being collected for economic reasons (table 4.8).

4.2.4 Availablity and use pattern of NTBRs in Chamba Circle of Himachal Pradesh

4.2.4.1 Availablity of NTBRs in Chamba Forest Circle of Himachal Pradesh

The non-timber bioresources available in the Chamba Circle of Himachal Pradesh were Kuth (*Saussurea costus*), Dhoop (*Commiphora wightii*), Jungli lahsun/ thomb (*Allium ursinum L.*), Nagchatri (*Trillium govanianum*), Chora, Guchi/ morels (*Morchella esculenta*) and walnut (table 4.13).

3.2.4.2 Use pattern of NTBRs in Chamba Forest Circle of Himachal Pradesh

The use pattern of NTBR from the Chamba circle is given in table 4.13. The main reason of collection was economic.

3.2.5 Availablity and use pattern of NTBRs in Kulu Circle of Himachal Pradesh

3.2.5.1 Availablity of NTBRs in Kulu Circle of Himachal Pradesh

The non-timber bioresources available in the Kulu Circle of Himachal Pradesh were Patis (*Aconitum heterophyllum Wall. ex Royle*), Jungli lahsun/ thomb (*Allium ursinum L.*), Nagchatri (*Trillium govanianum*), Panja, Taxus and Lingdi (table 4.14).

3.2.5.2 Use pattern of NTBRs in Kulu Circle of Himachal Pradesh

The use pattern of NTBRs in Kulu Circle of Himachal Pradesh state is shown in the table 4.14.

Table 4.13 NTBR availability in Chamba forest circle of Himachal Pradesh

S. No	Local name of NTBR	Scientific name	Part collected	Quantity Available	Slope/ height	Accessible	Ready market	Local use	Collected by collectors (n=60)	Reason of collection
1.	Dhoop*	*Commiphora wightii*	Root	+ + +	High	Yes	Yes	Air freshener	60 (100.0)	Economic
2.	Nagchatri	*Trillium govanianum*	Root	+ +	High	Yes	Yes	Pain reliever	20 (33.33)	Economic
3.	Chora	*Angelica glauca*	Root	+ + +	High	Yes	Yes	Digestive problems	60 (100.0)	Economic
4.	Kuth*	*Saussurea costus*	Root	+ + +	High	Yes	Yes	Insecticide	60 (100.0)	Economic
5.	Guchi	*Morchella esculenta*	Whole	+ + +	High	Yes	Yes	Food delicacy	41 (68.33)	Economic

*Collectors want to grow in their own fields, Quantity available: +: Scarce, ++: Moderate, +++: Abundant

Table 4.14 NTBR availability in Kulu forest circle of Himachal Pradesh

S. No	Local name of NTBR	Scientific name	Part collected	Quantity Available	Slope/ height	Accessible	Ready market	Local use	Collected by collectors (n=60)	Reason of collection
1.	Patis	*Aconitum heterophyllum Wall. ex Royle*	Root/ tuber	+ + +	Intermediate	Yes	No	Fever	60 (100.0)	Economic
2.	Nagchatri	*Trillium govanianum*	Root	+ +	High	Yes	Yes	Pain reliever	20 (33.33)	Economic
3.	Panja*	*Dactylorhiza hatagirea*	Root	+ + +	Low	Yes	No	NR	1 (1.67)	Economic
4.	Jungli Lahsun	*Allium ursinum L.*	Bulb	+	High	Yes	No	NR	60 (100.0)	Economic
5.	Taxus	*Taxus wallichiana*	Leaves, bark	+ +	High	Yes	No	Cold, cough, fever	49 (81.67)	Economic
6.	Lingdi*	*Matteuccia struthiopteris*	Stem	+ + +	Low	Yes	Yes	Local vegetable	9 (15.00)	Economic
7.	Kuth*	*Saussurea costus*	Root	+ +	High	Yes	No	Joint pain	11 (18.33)	Economic
8.	Guchi	*Morchella esculenta*	Whole	+ +	High	Yes	Yes	Local vegetable	60 (100.0)	Economic

*Collectors want to grow in their own fields, Quantity available: +: Scarce, ++: Moderate, +++: Abundant

Table 4.15 NTBR availability in Mandi forest circle of Himachal Pradesh

S. No	Local name of NTBR	Scientific name	Part collected	Quantity Available	Slope/ height	Accessible	Ready market	Local use	Collected by collectors (n=60)	Reason of collection
1.	Guchi	*Morchella esculenta*	Whole	+ +	High	Yes	Yes	Food delicacy	50 (83.33)	Economic
2.	Nagchatri*	*Trillium govanianum*	Root	+	High	Yes	Yes	NR	24 (40.00)	Economic
3.	Chora	*Angelica glauca*	Root	+ + +	High	Yes	Yes	NR	24 (40.00)	Economic
4.	Patis	*Aconitum heterophyllum*	Root	+ + +	High	Yes	No	Fever	30 (50.00)	Economic
5.	Taxus	*Taxus wallichiana*	Leaves, bark	+ + +	High	Yes	No	Cold, cough, fever	34 (56.67)	Economic
6.	Jungli lahsun*	*Allium ursinum L.*	Bulb	+	High	Yes	No	NR	6 (10.00)	Economic
7.	Walnut*	*Juglans regia*	Fruit, seed	+	High	Yes	Yes	Dry fruit	27 (45.00)	Economic
8.	Kuth	*Saussurea costus*	Root	+ +	High	Yes	No	Arthritis	11 (18.33)	Economic
9.	Kasrod	*Matteuccia struthiopteris*	Stem	+ + +	Intermediate	Yes	Yes	Vegetable	15 (25.00)	Economic
10.	Khair	*Acacia catechu*	Leaf, extract, bark	+ + +	Low	Yes	Yes	Diarrhoea, stomach problems	15(25.00)	Economic
11.	Chir pine	*Pinus roxburghii*	Bark, leaf, resin	+ +	High	Yes	No	Digestive, deodrant	15 (25.00)	Economic
12.	Kafal	*Myrica esculenta*	Bark, leaf	+ + +	Low	Yes	Yes	NR	8 (18.33)	Economic

*Collectors want to grow in their own fields, Quantity available: +: Scarce, ++: Moderate, +++: Abundant, NR: Not reported

Table 4.16 NTBR availability in Rampur forest circle of Himachal Pradesh

S. No	Local name of NTBR	Scientific name	Part collected	Quantity Available	Slope/ height	Accessible	Ready market	Local use	Collected by collectors (n=60)	Reason of collection
1.	Guchi*	*Morchella esculenta*	Whole	+ +	High	No	Yes	Food, stomach ache	60 (100.0)	Economic
2.	Banafsha	*Viola odorata*	Flower	+ +	Intermediate	Yes	No	NR	40 (66.67)	Economic
3.	Lingdi*	*Matteuccia struthiopteris*	Stem, whole	+ + +	Low	Yes	No	Local vegetable	46 (76.67)	Economic, household
4.	Kafal	*Myrica esculenta*	Leaves, bark	+ +	Low	Yes	Yes	NR	40 (66.67)	Economic
5.	Chilgoza pin	*Pinus gerardiana*	Fruit	+ + +	High	Yes	Yes	NR	19 (31.67)	Economic
6.	Khirak	*Celtis australis*	Leaves, fruit	+ + +	Low	Yes	No	NR	41 (68.33)	Economic
7.	Beul	*Grewia optiva*	Root, stem, leaf	+ + +	Low	Yes	No	NR	27 (45.00)	Economic

*Collectors want to grow in their own fields, Quantity available: +: Scarce, ++: Moderate, +++: Abundant, NR: Not reported

Table 4.17 NTBR availability in Shimla forest circle of Himachal Pradesh

S. No	Local name of NTBR	Scientific name	Part collected	Quantity Available	Slope/ height	Accessible	Ready market	Local use	Collected by collectors (n=60)	Reason of collection
1.	Guchi	*Morchella esculenta*	Whole	+ +	High	Yes	Yes	Food/ stomach ache	58 (96.67)	Economic
2.	Kutki/ kod	*Picrorhiza kurroa*	Root	+ +	High	Yes	No	NR	2 (3.33)	Economic
3.	Chora	*Angelica glauca*	Root	+ + +	High	Yes	No	NR	11 (18.33)	Economic
4.	Kuth	*Saussurea costus*	Root	+ +	High	Yes	No	NR	19 (31.67)	Economic
5.	Tejpata	*Cinnamomum tamala*	Leaf	+ +	Low	Yes	No	Spice	1 (1.67)	Economic
6.	Dalchini	*Cinnamomum verum*	Bark	+ +	Low	Yes	No	Spice	1 (1.67)	Economic
7.	Alovera	*Aloe barbadensis*	Leaf	+ +	Low	Yes	No	Skin problems	1 (1.67)	Economic
8.	Patis	*Aconitum heterophyllum*	Root	+ + +	Intermediate	Yes	No	NR	18 (30.00)	Economic
9.	Nagchatri	*Trillium govanianum*	Root	+	High	Yes	No	NR	18 (30.00)	Economic
10.	Panja	*Dactylorhiza hatagirea*	Root	+ + +	Low	Yes	No	NR	1 (1.67)	Economic
11.	Ban oak	*Quercus leucotrichophora*	Bark, leaf, fruit	+ + +	High	Yes	No	Toothache	28 (46.67)	Economic
12.	Tagar	*Not identified*	NA	+ + +	High	Yes	No	NR	9 (15.00)	Economic
13.	Jungli lahsun	*Allium ursinum L.*	Bulb	+	High	Yes	Yes	NR	17 (28.33)	Economic
14.	Banafsha	*Viola odorata*	Flower	+ +	Intermediate	Yes	No	NR	12 (20.00)	Economic

15.	Kainth	*Pyrus pashia*	Branches, wood	+ + +	Low	Yes	No	NR	4 (6.67)	Economic
16.	Kafal	*Myrica esculenta*	Bark, leaf	+ + +	Low	Yes	No	NR	7 (11.67)	Economic
17.	Kashmal	*Berberies aristata*	Root, stem, leaf	+ + +	Low	Yes	No	NR	7 (11.67)	Economic
18.	Lingdi	*Matteuccia struthiopteris*	Stem, whole	+ + +	Low	Yes	Yes	Vegetable	9 (15.00)	Economic, household

*Collectors want to grow in their own fields, Quantity available: +: Scarce, ++: Moderate, +++: Abundant, NR: Not reported

Table 4.18 NTBR availability in Solan forest circle of Himachal Pradesh

S. No	Local name of NTBR	Scientific name	Part collected	Quantity Available	Slope/ height	Accessible	Ready market	Local use	Collected by collectors (n=60)	Reason of collection
1.	Guchi/ morels	*Morchella esculenta*	Whole	+	Intermediate	Yes	No	Food/ stomach ache	23 (38.33)	Economic
2.	Banafsha	*Viola odorata*	Flower	+ +	Low	Yes	No	Respiratory/ stomach problems	25 (41.67)	Economic
3.	Kachnar	*Bauhinia variegata*	Buds	+ +	Intermediate	Yes	No	Spice	20 (33.33)	Economic
4.	Lingdi/ kasrod/ fiddlehead fern	*Matteuccia struthiopteris*	Stem	+ + +	Low	Yes	No	Local vegetable	15 (25.00)	Economic, Household use
5.	Kafal	*Myrica esculenta*	Bark, leaf	+ + +	Low	Yes	No	NR	15 (25.00)	Economic
6.	Kashmal	*Berberies aristata*	Root, stem, leaf	+ + +	Low	Yes	No	NR	4 (6.67)	Economic
7.	Chillaru	*Pine needles*	Leaves	+ + +	Intermediate	Yes	No	NR	6 (10.00)	Economic
8.	Resin	*Pinus wallichiana*	Resin	+ + +	Intermediate	Yes	Yes	NR	10 (16.67)	Economic
9.	Khair*	*Acacia catechu*	Leaf, extract, bark	+ + +	Low	Yes	Yes	NR	10 (16.67)	Economic
10.	Harar*	*Terminalia chebula*	Fruit	+ +	Intermediate	Yes	Yes	Fruit	7 (11.67)	Economic
11.	Pincorn	Not identified	NA	+	Low	Yes	No	NR	5 (8.33)	Economic
12.	Khirak	*Celtis australis*	Leaves, fruit	+ + +	Low	Yes	No	NR	12 (20.00)	Economic

13.	Beul*	*Grewia optiva*	Root, stem, leaf	+ + +	Low	Yes	No	NR	13 (21.67)	Economic
14.	Behda	*Terminalia bellirica*	Fruit	+ +	Low	Yes	Yes	Cough	5 (8.33)	Economic
15.	Amla*	*Phyllanthus emblica*	Fruit	+ +	Low	Yes	Yes	Digestion	1 (1.67)	Economic

*Collectors want to grow in their own fields, Quantity available: +: Scarce, ++: Moderate, +++: Abundant, NR: Not reported

4.2.6 Availablity and use pattern of NTBRs in Mandi Circle of Himachal Pradesh

4.2.6.1 Availablity of NTBRs in Mandi Circle of Himachal Pradesh

The non-timber bioresources available in the Mandi Circle of Himachal Pradesh were Kuth (*Saussurea costus*), , Jungli lahsun/ thomb (*Allium ursinum L.*), Guchi/ morels (*Morchella esculenta*), Nagchatri (*Trillium govanianum*), Chora, Aris, Taxus, Walnut, Kasrod/ lingdi, Khair, Chir pine and Kafal (table 4.15).

4.2.6.2 Use pattern of NTBRs in Mandi Circle of Himachal Pradesh

The use pattern is shown in table 4.15.

4.2.7 Availablity and use pattern of NTBRs in Rampur Circle of Himachal Pradesh

4.2.7.1 Availablity of NTBRs in Rampur Circle of Himachal Pradesh

The non-timber bioresources available in the Rampur Circle of Himachal Pradesh were Guchi/ morels (*Morchella esculenta*), Banafsha (*Viola odorata*), Kachnar, Lingdi/ kasrod, Kafal, Kashmal, Chilgoza pin (*Pinus gerardiana)*, Khirak and Beul (table 4.16).

4.2.7.2 Use pattern of NTBRs in Rampur Circle of Himachal Pradesh

The use pattern is shown in table 4.16.

4.2.8 Availablity and use pattern of NTBRs in Shimla Circle of Himachal Pradesh

4.2.8.1 Availablity of NTBRs in Shimla Circle of Himachal Pradesh

The non-timber bioresources available in the Shimla Circle of Himachal Pradesh were Guchi/ morels (*Morchella esculenta*), Kukti, Chora, Kuth, Tejpata, Dalchini, Alovera, Patis, Nagchatri, Panja, Bam oak, Jungli lahsun/ thomb, Banafsha, Kainth, Kafal, Kashmal and Lingdi/ kasrod (table 4.17).

4.2.8.2 Use pattern of NTBRs in Shimla Circle of Himachal Pradesh

The use pattern is shown in table 4.17.

4.2.9 Availablity and use pattern of NTBRs in Solan Circle of Himachal Pradesh

4.2.9.1 Availablity of NTBRs in Solan Circle of Himachal Pradesh

The non-timber bioresources available in the Solan Circle of Himachal Pradesh were Guchi/ morels (*Morchella esculenta*), Banafsha (*Viola odorata*), Kachnar (*Bauhinia variegata*), Lingdi/ kasrod/ fiddlehead fern (*Matteuccia struthiopteris*), Kafal, Kashmal, Pine needles, Resin, Khair, Harar, Khirak, Beul, Behda and Amla (table 4.18).

4.2.9.2 Use pattern of NTBRs in Solan Circle of Himachal Pradesh

The majorly collected NTBRs from Solan Circle of Himachal Pradesh included Guchi/ morels (*Morchella esculenta*), Banafsha (*Viola odorata*), Kachnar (*Bauhinia variegata*), Lingdi/ kasrod/ fiddlehead fern (*Matteuccia struthiopteris*), Kafal, Kashmal, Pine needles, Resin, Khair, Harar, Beul and Amla. Banafsha (*Viola odorata*) was being locally used for respiratory and stomach problems (table 4.18).

4.2.10 Additional information regarding some important medicinal plants found in Northwest Himalayas:

I. Kuth

Scientific Name: *Saussurea costus*- (Falc.)Lipsch.

Family: *Asteraceae*

General information: It is a perennial growing to 3m by 1m. It flowers from July to August, and the seeds ripen from August to September. The species is hermaphrodite (has both male and female organs) and is pollinated by insects. It prefers moist soil.

Suitable for: Light (sandy), medium (loamy) and heavy (clay) soils.

Suitable pH: Acid, neutral and basic (alkaline) soils. It can grow in semi-shade (light woodland) or no shade.

Habitat: A casual in irrigated areas, 2000 - 3300 metres from Pakistan to Himachal Pradesh. Usually found in moist shady situations in Jammu and Kashmir, sometimes forming the undergrowth in birch forests.

Use as per respondents: Used locally in the North Western Himalayan households for treatment of cough, intestinal parasites, joint pain and as anti cloth mite.

Use as per review of literature: The findings are in agreement with WebMD -medical web portal which describes it as effective for treatment of infestation of the intestines by internal parasites (endoparasites). Early research shows that costus root might work for reducing the number of worm eggs in the feces of children. Egg reduction is a measure of how well the treatment works. Other uses are digestive problems, gas, asthma, cough, dysentery, cholera, haemorrhoids, menstrual problems, diabetes, painful joints, kidney problems, liver problems, skin diseases and headache (local application). Costus roots seem to contain chemicals that seem to kill worms (nematodes) and slow down the intestines (PFAF, 2019).

Cultivation details: Succeeds in most soils in a sunny well-drained position. Cultivated as a medicinal plant and for its use in perfumery in the Himalayas. The dried root has something of the mossy smell of violets when fresh, becoming fur-like or even unpleasantly goat-like with age. Most of the roots are exported to China and Japan and the plant forms quite a large article of commerce in Kashmir, the trade being controlled by the government. Wild plants have been greatly over-collected and the plant has been placed on the CITES I list of endangered species - it is now illegal to dig them up for export (PFAF, 2019).

Propagation: Seed - we have no information for this species but suggest sowing the seed in a cold frame in the spring. Surface sow, or only just cover the seed, and make sure that the compost does not dry out. Prick out the seedlings into individual pots when they are large enough to handle and grow them on in the greenhouse or cold frame for their first winter. Plant them out in late spring after the last expected frosts. Division in spring might be possible (PFAF, 2019).

II. Zakhme Hayat, Pathar phor buti

Scientific Name: *Bergenia ciliata* - (Haw.)Sternb.

Family: *Saxifragaceae*

General information: The plant is harvested from the wild for use as a medicine and sometimes also for food. It is an evergreen perennial growing to 0.3m by 0.5m. It is in

leaf all year, in flower from March to May. The species is hermaphrodite and prefers moist soil.

Suitable for: Light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay and nutritionally poor soils.

Suitable pH: Acid, neutral and basic (alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

Habitat: Found in Northern India in Jammu and Kashmir and Himachal Pradesh. Grows on moist rocks and under forest shade, 1900 - 2600 metres in Jammu and Kashmir.

Use as per respondents: The locals expressed use of whole plant (leaves and roots) for wound healing by tropical application and for kidney stones by ingestion in powdered form mixed in water.

Use as per review of literature: Various studies advocate its use in Ayurveda and has other medicinal properties. It is a highly cited medicinal plant in the Himalayan states of India. A juice or powder of the whole plant is used to treat urinary troubles. The juice of the leaves is used as drops to relieve earaches. The root is used as a tonic in the treatment of fevers, diarrhoea and pulmonary affections. The root juice is used to treat coughs and colds, haemorrhoids, asthma and urinary problems. Externally, the root is bruised and applied as a poultice to boils and ophthalmia. It is also considered helpful in relieving backache. The root of this plant has a high reputation in indigenous systems of medicine for dissolving stones in the kidneys. Pharmacological studies reported that it has good antioxidant, anti-inflammatory, anti-tussive, anti-ulcer and anti-neoplastic activities (PFAF, 2019).

Cultivation details: Succeeds in full sun or light shade in most soils but prefers a deep fertile soil that does not dry out fully. Grows well in heavy clay soils. Plants are at their best in a medium-heavy soil. Succeeds in shade or semi-shade. The plant is hardy to about -20°c, but the flowers and young leaves are rather sensitive to frost so it is best to choose a position with shade from the early morning sun. This species is only hardy in sheltered gardens of south and west Britain. If the leaves are cut back by frost then they are soon replaced by fresh leaves in the spring. The roots of this plant are commonly collected from the wild for medicinal purposes. Over collection in many areas of its range are a cause for conservation concern. Plants seem to be immune to the predations of

rabbits. The different species of this genus will hybridise freely when grown near each other (PFAF, 2019).

Propagation: Seed - surface sow in a greenhouse. Make sure that the compost does not dry out. Two weeks cold stratification can speed up germination which usually takes 1 - 6 months at 15°c. Fresh seed, sown as soon as it is ripe in late spring is liable to germinate better than stored seed. When they are large enough to handle, prick the seedlings out into individual pots and grow them on in light shade in the greenhouse for at least their first winter. Plant them out into their permanent positions in late spring or early summer, after the last expected frosts. Division in late spring after flowering or in autumn. Very easy, larger divisions can be planted straight into their permanent positions whilst smaller clumps are best potted up and kept in a cold frame until they are growing away well (PFAF, 2019).

III. Dhoop, Gugal, Gugul, Indian bdellium-tree

Scientific Name: *Commiphora wightii* - (Arn.) Bhandari.

Family: *Burseraceae*

General information: It is a flowering small tree or shrub grown in northern Africa to Central Asia. It reaches up to 4 m in height. It has thin papery bark, thorny branches, simple or trifoliate leaves, red to pink flowers, and small round fruits. The plant's bark yields gummy resin that is commonly used in perfumery and in incense. Also used in Ayurvedic medicine. In fact, its extensive use in India has resulted to scarcity in Gujarat and Rajastan and it has been enlisted as endangered species. The gum extract is believed to decrease cholesterol synthesis in the liver. It is used to treat muscular rheumatism. Young branches are used as a toothbrush. It is a deciduous Shrub growing to 4 m (13ft) by 4 m (13ft) at a slow rate.

The plant is not self-fertile.

Suitable for: light (sandy) and medium (loamy) soils, prefers well-drained soil and can grow in nutritionally poor soil.

Suitable pH: Acid, neutral and basic (alkaline) soils. It cannot grow in the shade. It prefers dry or moist soil and can tolerate drought.

Habitat: East Asia - Pakistan, Central and Northern India. Rocky and open hilly areas or rough terrain and sandy tracts in warm and semiarid to arid areas at elevations from 250 - 1,800 metres.

Use as per respondents: Processed into fragrance sticks and air purifier locally in Jammu and Kashmir and Himachal Pradesh.

Use as per review of literature: The tree is the source of Guggul or Indian Bdellium, a gum-resin that exudes from the branches. It is largely used as an incense and in perfumery. The resin is alterative, antiseptic, antispasmodic, aphrodisiac, astringent, carminative, demulcent, emmenagogue, expectorant and stomachic. It is used in the treatment of muscular rheumatism. The gum resin has been used extensively by Ayurvedic physicians for centuries to treat a wide variety of disorders. It is a natural health product, used primarily to reduce elevated blood cholesterol levels. It has been used for many years as a hypocholesterolemic agent in India, where it is has received prescription drug status, due to its high level of efficacy as determined by clinical trials (PFAF, 2019).

Cultivation details: A plant of arid and semi-arid areas in the tropics where it can be found at elevations from 250 - 1,800 metres. It is found in areas where the mean annual rainfall is within the range 225 - 500mm and the temperature ranges from 20 – 35C. The plant requires a sunny position. Found in the wild in sandy and rocky soils. A slow growing plant, it takes 8 to 10 years to reach a height of 3 - 3.5 metres. Pruning or the removal of branches in the early stages of the plant's growth helps to achieve better growth, increases the girth of growing branches and thereby leads to better gum yield. The plant generally takes ten years to reach tapping maturity under the dry climatic conditions of its native environment. The yields are in the order of 200 - 500 gm of dry guggul per tree per season. Plants are dimorphic, one form having bisexual and male flowers, whilst the other has female flowers with staminodes. It is inferred that pollen grains from bisexual or male flowers, present on the first form of plants are needed for the production of normal fruits on plants with only female flowers (PFAF, 2019). It has become so scarce in its two habitats in India - Gujarat and Rajasthan - that the World Conservation Union (IUCN) has enlisted it in its Red Data List of endangered species.

Propagation: From seed; stratify if sowing indoors. Seed collecting: Collect seed head/ pod when flowers fade; allow to dry.

IV. Ratanjot

Scientific Name: *Anemone obtusiloba* -D. Don.

Family: *Ranunculaceae*

General information: It is a perennial growing plant up to 0.3 m and flowers in June. The species is hermaphrodite and is pollinated by bees, flies etc. The plant is self-fertile.

Suitable for: light (sandy), medium (loamy) and heavy (clay) soils.

Suitable pH: Acid, neutral and basic (alkaline) soils. It cannot grow in the shade. It prefers moist soil.

Habitat: East Asia - Himalayas from Kashmir to Sikkim. Moist open slopes, 2000 - 3400 metres in Jammu and Kashmir.

Use as per respondents: Itch, rash, diarrhoea, joint pain.

Use as per review of literature: The roots, mixed with milk, are administered internally in the treatment of contusions. They are used externally as a blistering agent. The juice of the root is opthalmic. The seeds taken internally induce vomiting, whilst an oil extracted from them is used in the treatment of rheumatism (PFAF, 2019).

Cultivation details: Succeeds in ordinary garden soil but prefers a rich sandy loam. The plant requires a well-drained humus-rich soil in full sun and a warm sheltered position. Plants seem to be immune to the predations of rabbits. It is a greedy plant, inhibiting the growth of nearby plants, especially legumes (PFAF, 2019). This species is very closely related to *Anemone rupestris.*

Propagation: Seed is best sown in a cold frame as soon as it is ripe in the summer. Surface sow or only just cover the seed and keep the soil moist. Sow stored seed as soon as possible in late winter or early spring. The seed usually germinates in 1 - 6 months at 15°c. When large enough to handle, prick the seedlings out into individual pots and grow them on in light shade in the greenhouse for at least their first year. When the plants are large enough, plant them out in the spring. Division in late summer after the plant dies down, or in early spring (PFAF, 2019).

V. Choura

Scientific Name: *Angelica glauca* - Edgew.

Family: *Apiaceae*

General information: *Angelica glauca* is a perennial growing up to 2m. It is not frost tender. It is in flower from July to August, and the seeds ripen from July to August. The species is hermaphrodite (has both male and female organs) and is pollinated by Insects. The plant is self-fertile and prefers moist soil.

Suitable for: light (sandy), medium (loamy) and heavy (clay) soils.

Suitable pH: acid, neutral and basic (alkaline) soils. It can grow in semi-shade (light woodland) or no shade.

Habitat: East Asia to Western Himalayas, Jammu and Kashmir to Shimla, Himachal Pradesh. Usually found amongst scrub on humus-rich soils, 2000 - 3200 metres and grows in shady edges.

Use as per respondents: Used as an insecticide in households.

Use as per review of literature: The plant is stomachic and used as a cordial stimulant in the treatment of dyspepsia and constipation. The root is aromatic and is used as a food flavouring (condiment).

Cultivation details: Based on the general needs of the genus. It requires a deep moist fertile soil in dappled shade or full sun. Plants are reliably perennial if they are prevented from setting seed.

Propagation: Seed - best sown in a cold frame as soon as it is ripe since the seed only has a short viability. Seed can also be sown in the spring, though germination rates will be lower. It requires light for germination. When large enough to handle, prick the seedlings out into individual pots and grow them on in a cold frame for their first winter, planting them out into their permanent positions in the spring. The seed can also be sow in situ as soon as it is ripe (PFAF, 2019).

Known hazards: All members of this genus contain furocoumarins, which increase skin sensitivity to sunlight and may cause dermatitis.

VI. Patis, Patris, Atis

Scientific Name: *Aconitum heterophyllum* - Wall. ex Royale

Family: *Ranunculaceae*

General information: *Aconitum heterophyllum* is a perennial growing to 1.5m. It is in flower from August to September, and the seeds ripen from September to October. The flowers are pollinated by Bees.

Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and can grow in heavy clay soil.

Suitable pH: acid, neutral and basic (alkaline) soils. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

Habitat: East Asia to Western Himalayas. Usually found on humus-rich soils in the alpine and subalpine zones, and in forests, 2300 - 2900 metres.

Use as per respondents: Used orally for treatment of fever in humans as well as livestock.

Use as per review of literature: The dried root is analgesic, anti-inflammatory, antiperiodic, aphrodisiac, astringent, cholagogue, febrifuge and tonic. It is used in India in the treatment of dyspepsia, diarrhoea and coughs. It is also used in Tibetan medicine, where it is said to have a bitter taste and a cooling potency. It is used to treat poisoning from scorpion or snake bites, the fevers of contagious diseases and inflammation of the intestines. The root is best harvested in the autumn as soon as the plant dies down and is dried for later use. This is a toxic plant and should only be used with extreme caution and under the supervision of a qualified practitioner (PFAF, 2019).

Cultivation details: Thrives in most soils and in the light shade of trees. Grows well in heavy clay soils. Prefers a moist soil in sun or semi-shade. Prefers a calcareous soil. Grows well in open woodlands. The roots of this plant are extensively collected from the wild for medicinal use and the species is becoming much rarer in many areas of its range. Members of this genus seem to be immune to the predations of rabbits and deer. A greedy plant, inhibiting the growth of nearby species, especially legumes (PFAF, 2019).

Propagation: Seed is best sown as soon as it is ripe, in a cold frame. The seed can be stratified and sown in spring but will then be slow to germinate. When large enough to handle, prick the seedlings out into individual pots and grow them on in a cold frame for their first winter. Plant them out in late spring or early summer. Division - best done in spring but it can also be done in autumn. Another report says that division is best carried out in the autumn or late winter because the plants come into growth very early in the year (PFAF, 2019).

Known hazards: The whole plant is highly toxic - simple skin contact has caused numbness in some people. One report says that this plant does not contain the toxic alkaloid aconitine, and so is not poisonous. It does, however, still contain an intensely bitter alkaloid.

VII. Jungli lahsun, Jungli thong, Plaan, Wild garlic

Scientific Name: *Allium ursinum* - L.

Family: *Alliaceae*

General information: It is a bulb growing to 0.3m by 0.3m. It is not frost tender. It is in leaf from February to June, in flower from May to June, and the seeds ripen from May to July. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, insects.

Suitable for: light (sandy) and medium (loamy) soils.

Suitable pH: acid, neutral and basic (alkaline) soils. It can grow in full shade (deep woodland) semi-shade (light woodland) or no shade. It prefers moist soil.

Habitat: Most parts of Europe, including Britain, east to the Caucasus and West Asia. Damp soils in woods, copses, valleys and similar moist shady localities.

Use as per respondents: Fever, cough

Known hazards: There have been cases of poisoning caused by the consumption, in very large quantities and by some mammals, of this species. Dogs seem to be particularly susceptible.

VIII. Tethwan, Common wormwood, Mugwort

Scientific Name: *Artemisia vulgaris* - L.

Family: Asteraceae

General information: Artemisia vulgaris is a perennial growing to 1.2m by 0.7m at a fast rate. It is not frost tender. It is in flower from July to September. The species is hermaphrodite and is pollinated by Wind. It is noted for attracting wildlife. It can grow in semi-shade (light woodland) or no shade. It prefers dry or moist soil and can tolerate drought.

Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil.

Suitable pH: acid, neutral and basic (alkaline) soils and can grow in very alkaline soils. **Habitat:** Common on hedgebanks and waysides, uncultivated and waste land. Throughout most temperate regions of the northern hemisphere.

Use as per respondents: Used for cure of stomach ache and as anthelminthic against internal intestinal parasites.

Use as per review of literature: *Artemisia* has a long history of use in herbal medicine especially in matters connected to the digestive system, menstrual complaints and the treatment of worms. It is slightly toxic, however, and should never be used by pregnant women, especially in their first trimester, since it can cause a miscarriage. Large, prolonged dosage can damage the nervous system. All parts of the plant are anthelmintic, antiseptic, antispasmodic, carminative, cholagogue, diaphoretic, digestive, emmenagogue, expectorant, nervine, purgative, stimulant, slightly tonic and used in the treatment of women's complaints. The leaves are also said to be appetizer, diuretic, haemostatic and stomachic. They can be used internally or externally. An infusion of the leaves and flowering tops is used in the treatment of nervous and spasmodic affections, sterility, functional bleeding of the uterus, dysmenorrhoea, asthma and diseases of the brain. The leaves have an antibacterial action, inhibiting the growth of *Staphylococcus aureus, Bacillus typhi, B. dysenteriae, streptococci, E. coli, B. subtilis, Pseudomonas* etc. The leaves are harvested in August and can be dried for later use. The stem is also said to be anti-rheumatic, antispasmodic, and stomachic. The roots are tonic and

antispasmodic. They are said to be one of the best stomachics. They are harvested in the autumn and dried for later use. The leaves, placed inside the shoes, are said to be soothing for sore feet. The compressed dried leaves and stems are used in moxibustion (a traditional Chinese medicine therapy) (PFAF, 2019).

The fresh or the dried plant repels insects, it can be used as a spray but caution is advised since it can also inhibit plant growth. A weak tea made from the infused plant is a good all-purpose insecticide. An essential oil from the plant kills insect larvae. The down on the leaves makes good tinder for starting fires. A number of species of Lepidoptera (butterflies and moths) feed on the leaves and flowers.

Cultivation details: Easily grown in a well-drained circumneutral or slightly alkaline loamy soil, preferring a sunny position and a moist soil. Plants are longer lived, more hardy and more aromatic when they are grown in a poor dry soil. Tolerates a pH in the range 4.8 to 8.2. Established plants are drought tolerant. It is an aggressive and invasive plant, it inhibits the growth of nearby plants by means of root secretions. The sub-species *A. vulgaris parviflora. Maxim.* is the form that is eaten in China. There are some named varieties. 'White' is a taller plant than the type species, growing to 1.5 metres. It has a strong, rather resinous or floral taste similar to chrysanthemum leaves and is used in soups or fried as a side dish (PFAF, 2019).

Propagation: Seed - surface sow from late winter to early summer in a greenhouse and do not allow the compost to dry out. When large enough to handle, prick out the seedlings into individual pots. If growth is sufficient, they can be planted out into their permanent positions in the summer, otherwise grow them on in a cold frame for their first winter and then plant them out in the spring. Division in spring or autumn. Basal cuttings in late spring. Harvest the young shoots when about 10-15cm long, pot up in a lightly shaded position in a greenhouse or cold frame and plant them out when well rooted (PFAF, 2019).

Known hazards: The plant might be poisonous in large doses. Skin contact can cause dermatitis in some people. Probably unsafe for pregnant women as it may stimulate the uterus to contract and induce abortion.

IX. Banafsha, Sweet violet, English violet.

Scientific Name: *Viola odorata* - L.

Family: Violaceae

General information: *Viola odorata* is an evergreen perennial growing to 0.1m by 0.5 m (1ft 8in) at a fast rate. It is hardy to zone (UK) 5 and is not frost tender. It is in leaf all year, in flower from February to April, and the seeds ripen from April to June. The species is hermaphrodite (has both male and female organs) and is pollinated by Bees, Cleistogomy (self-pollinating without flowers ever opening). The plant is self-fertile. It can grow in semi-shade (light woodland) or no shade. It prefers moist soil.

Suitable for: light (sandy), medium (loamy) and heavy (clay) soils and prefers well-drained soil.

Suitable pH: acid, neutral and basic (alkaline) soils.

Habitat: Fields, hedgerows and woodlands, especially on calcareous soils. Europe, including Britain, from Norway (south and east) to North Africa, Western Asia and Syria.

Use as per respondents: Cough, asthma, breathing problems.

Use as per review of literature: Young leaves and flower buds; raw or cooked are edible. Usually available all through the winter. The leaves have a very mild flavour, though they soon become quite tough as they grow older. They make a very good salad, their mild flavour enabling them to be used in bulk whilst other stronger-tasting leaves can then be added to give more flavour. The leaf extract is also used to flavour sweets, baked goods and ice cream.

Flowers; raw and used to decorate salads and desserts. A sweet mild flavour with a delicate perfume, the flowers are an especially welcome decoration for the salad bowl since they are available in late winter. The flowers are also used fresh to flavour and colour confectionery. A soothing tea can be made from the leaves and flowers.

Banafsha has a long and proven history of folk use, especially in the treatment of cancer and whooping cough. It also contains salicylic acid, which is used to make aspirin. It is therefore effective in the treatment of headaches, migraine and insomnia. The whole plant is anti-inflammatory, diaphoretic, diuretic, emollient, expectorant, and

laxative. It is taken internally in the treatment of bronchitis, respiratory catarrh, coughs, asthma, and cancer of the breast, lungs or digestive tract. Externally, it is used to treat mouth and throat infections. The plant can either be used fresh, or harvested when it comes into flower and then be dried for later use. The flowers are demulcent and emollient. They are used in the treatment of biliousness and lung troubles. The petals are made into a syrup and used in the treatment of infantile disorders. The roots are much stronger expectorant than other parts of the plant but they also contain the alkaloid violine which at higher doses is strongly emetic and purgative. They are gathered in the autumn and dried for later use. The seeds are diuretic and purgative. They have been used in the treatment of urinary complaints are considered to be a good remedy for gravel. A homeopathic remedy is made from the whole fresh plant. It is considered useful in the treatment of spasmodic coughs and rheumatism of the wrist. An essential oil from the flowers is used in aromatherapy in the treatment of bronchial complaints, exhaustion and skin complaints (PFAF, 2019).

An essential oil from the flowers and leaves is used in perfumery. 1000kg of leaves produces about 300-400g absolute. The flowers are used to flavour breath fresheners. A pigment extracted from the flowers is used as a litmus to test for acids and alkalines. Plants can be grown for ornamental purpose as a ground cover when spaced about 30cm apart each way. They make an effective weed-excluding cover. A dynamic accumulator gathering minerals or nutrients from the soil and storing them in a more bioavailable form - used as fertilizer or to improve mulch.

Cultivation details: Landscape Uses: Alpine garden, Border, Container, Ground cover, Massing, Rock garden, Woodland garden. Succeeds in most soils but prefers a cool moist well-drained humus-rich soil in partial or dappled shade and protection from scorching winds. When grown in the open it prefers a moderately heavy rich soil. Plants have done very well in a hot dry sunny position on our Cornish trial grounds. Tolerates sandstone and limestone soils. Plants are hardy to about -20°c. Sweet violets are very ornamental plants, there are many named varieties. They produce their delicately scented flowers in late winter and early spring - these are designed for fertilization by bees and since there are few bees around at this time of year these flowers seldom set seed. However, the plants also produce a second type of flower later in the year. These never open, but seed is produced within them by self-fertilization. The plants will often self-sow freely when well-sited. They can also spread fairly rapidly at the roots when

they are growing well. Responds well to an annual replanting in rich loose leafy soils. All members of this genus have more or less edible leaves and flower buds, though those species with yellow flowers can cause diarrhoea if eaten in large quantities. Special Features: Edible, Not North American native, Invasive, Naturalizing, Suitable for cut flowers, Extended bloom season in Zones 9A and above, Fragrant flowers. For polyculture design as well as the above-ground architecture (form - tree, shrub etc. and size shown above) information on the habit and root pattern is also useful and given here if available. An evergreen. The plant growth habit is a runner spreading indefinitely by rhizomes or stolons. The root pattern is rhizomatous with underground stems sending roots and shoots along their length. The root pattern is stoloniferous rooting from creeping stems above the ground (PFAF, 2019).

Propagation: Seed - best sown in the autumn in a cold frame. The seed requires a period of cold stratification and the germination of stored seed can be erratic. Prick out the seedlings into individual pots when they are large enough to handle and plant them out in the summer. Division in the autumn or just after flowering. Larger divisions can be planted out direct into their permanent positions, though we have found that it is best to pot up smaller divisions and grow them on in light shade in a greenhouse or cold frame until they are growing away well. Plant them out in the summer or the following spring (PFAF, 2019).

Known hazards: May cause vomiting. Possible additive effect with laxatives.

4.3 To identify the production to consumption chain and price spread of different NTBR

4.3.1 Production to consumption chain of NTBR

Broadly, five marketing channels were identified and used for classification:

Table 4.19: Types of marketing channels identified during the study

Marketing Channels	Marketing intermediaries
Channel- A	NTBR collector – Consumer
Channel- B	NTBR collector – Local retailer – Consumer
Channel- C	NTBR collector – Local trader/ middleman – Contractor – Consumer

Channel- D	NTBR collector – Local trader/ middleman – Mandi (Amritsar/ Delhi) – Retailer – Consumer
Channel- E	NTBR collector – Local trader/ middleman – Contractor – Mandi (Amritsar/ Delhi) – Retailer – Consumer/ Export

Table 4.20: Marketing Channels of various NTBRs identified in Jammu and Kashmir and Himachal Pradesh

Following marketing channels were identified for various NTBR in Jammu and Kashmir:

S. No.	Common Name	Scientific Name	Family	Marketing Channel
1.	Guchi (Morel)	*Morchella esculenta*	*Morchellaceae*	A, C,D,E
2.	Banafsha	*Viola odorata*	*Violaceae*	B,C
3.	Kasrod (Fiddlehead Fern)	*Matteuccia struthiopteris*	*Onocleaceae*	A, B
4.	Harad	*Terminalia chebula*	*Combertaceae*	C
5.	Kutki	*Picrorhiza kurroa*	*Plantaginaceae*	C
6.	Chora	*Angelica glauca*	*Apiaceae*	C
7.	Kuth	*Saussurea costus*	*Asteraceae*	C
8.	Patis (Atis, Atees)	*Aconitum heterophyllum*	*Rananculaceae*	C
9.	Naagchatri	*Trillium govanianum*	*Melanthiaceae*	D, E
10.	Panja	*Dactylorhiza hatagirea*	*Orchidaceae*	C
11.	Jungli Lehsun	*Allium sativum*	*Amaryllidaceae*	C, D, E
12.	Chilgoza Pine	*Pinus gerardiana*	*Pinaceae*	A,B,C
13.	Dhoop	*Commiphora wightii*	*Burseraceae*	C

Table 4.21: Marketing Channels of various NTBRs identified in Himachal Pradesh

Following marketing channels were identified for various NTBR in Himachal Pradesh:

S. No.	Common Name	Scientific Name	Family	Marketing Channel
1.	Gucci	*Morchella esculenta*	*Morchellaceae*	C,D,E
2.	Banafsha	*Viola odorata*	*Violaceae*	B,C
3.	Kachnar	*Bauhinia variegata*	*Fabaceae*	A, B
4.	Lingdi	*Matteuccia*	*Onocleaceae*	A

	(Fiddlehead Fern)	*struthiopteris*		
5.	Kafal	*Myrica esculenta*	*Myricaceae*	B
6.	Khair	*Acacia catechu*	*Leguminosae*	Cutting by Forest dept. in 10 year cycle
7.	Chir Pine	*Pinus roxburghii*	*Pinaceae*	C
8.	Harar	*Terminalia chebula*	*Combertaceae*	C
9.	Khirak	*Celtis australis*	*Cannabaceae*	A (Fodder)
10.	Beul	*Grewia optiva*	*Malvaceae*	A (Fodder)
11.	Kutki	*Picrorhiza kurroa*	*Plantaginaceae*	C
12.	Chora	*Angelica glauca*	*Apiaceae*	C
13.	Kuth	*Saussurea costus*	*Asteraceae*	C
14.	Tejpata	*Cinnamomum tamala*	*Lauraceae*	A
15.	Dalchini	*Cinnamomum verum*	*Lauraceae*	C
16.	Aloevera	*Aloe barbadensis*	*Asphodelaceae*	C
17.	Atis-Patis	*Aconitum heterophyllum*	*Rananculaceae*	C
18.	Naagchattri	*Trillium govanianum*	*Melanthiaceae*	D, E (Export)
19.	Panja	*Dactylorhiza hatagirea*	*Orchidaceae*	C
20.	Ban Oak	*Quercus leucotrichophora*	*Fagaceae*	A (Fodder)
21.	Wild Lehsun	*Allium sativum*	*Amaryllidaceae*	C, D, E (Export)
22.	Chilgoza Pine	*Pinus gerardiana*	*Pinaceae*	A,B,C
23.	Taxus	*Taxus wallichiana*	*Taxaceae*	A (herbal tea)
24.	Walnut	*Juglans regia*	*Juglandaceae*	B
25.	Dhoop	*Commiphora wightii*	*Burseraceae*	C
26.	Daru	*Punica granatum*	*Punicaceae*	C

4.3.2 Price spread of various NTBRs

The prices of various NTBRs as revealed by the NTBR collectors from Jammu and Kashmir and Himachal Pradesh is depicted below:

4.3.2.1 Price spread of various NTBRs in Jammu and Kashmir

The NTBR marketing system in Jammu and Kashmir works on the system of tendering as devised by the Forest Department, Government of Jammu and Kashmir, wherein licensed contractors participate in the tenders floated by the Divisional Forest Officer of the forest department for a respective area and thereafter the licensed

contractors hire local people of the particular area on daily wage basis or on the basis of fixed price system for particular item. The prices of a particular specie of NTBR is fixed by the government and a royalty fee needs to be deposited by the contractors before the extraction of NTBRs from that area. Thereafter the contractors collect the extracted material from the NTBR collectors and apply for a transit permission from Forest Department. The price spread of various traded NTBR from Jammu and Kashmir is given below:

Table 4.22: Price spread of various NTBRs in Jammu and Kashmir:

S. No.	Name of NTBR	Price range per Kg (Rs./ INR)			
		NTBR collector	**Contractor**	**Processed**	**Mandi (Amritsar/ Delhi)**
1.	*Kuth*	100-150	300-400	No	350-500
	Dhoop	100	200-225	Yes	250-300
	Ratanjot	150-200	450-500	Yes	500-550
	Zakhme hayat	60-70	90	No	90-100
	Kod	300	A class: 450 B class: 350-400 C class: 300	Yes	1000-1100 800-900 600-700
	Patis	700-800	1200	No	>1500
	Jungli lahsun	2000-2500	2000-2500	No	5000-6000
	Guchi	5000-6000	10000	Yes	12000-15000 (Also exported directly to hotels in Mumbai, Kolkata, Bangalore).
	Banafsha	Flower: 6000 Root: 1000	7000-8000 2000-2500	Yes No	>10000 2500-3000
	Diascorea	5-10	20-25		25-30
	Beladona	60-70	70-100		100-120

4.3.2.2 Price spread of various NTBRs in Himachal Pradesh

A permit system of Forest Department for trade of NTBRs (Non-Timber Bio Resources) is prevalent in the state of Himachal Pradesh. Local people have rights to collect NTBRs from the forest, but if they want to sell some quantity of NTBRs in the market then they need to make permit from the Forest Department of Himachal Pradesh including information like where intending to sell, quantity to be sold and route map of the selling place.

Forest guard of the respective area makes recommendations to issue a pass after verifying that the species for which such pass is to be issued are not banned for export and that the species are extracted from the prescribed area in the approved extraction cycle and that the extraction has been done in a sustainable manner and has not caused any ecological or environmental damage.

Table 4.23: Transit fees on various NTBRs in Himachal Pradesh:

S. No.	Botanical name	Local name of the Item	Export Fee (in Rs. per Quintal)
1.	*Anselia aptra*	Sath jalori	50/-
2.	*Picrorhiza kurrooa*	Karoo	540/-
3.	*Jurinea macrocephala*	Dhoop	500/-
4.	*Angelica glauca*	Chora	125/-
5.	*Viola odorata*	Banafsha	2,250/-
6.	*Valeriana wallichi*	Mushk bala	600/-
7.	*Thalictrum spp*	Mamri	335/
8.	*Thymus sephyllum*	Banajwain	100/-
9.	*Morchella esculanta*	Guchchi	10,000/-
10.	*Potentilla nepalensis*	Dori	40/
11.	*Pistachia integerima*	Kakarsinghi	1,000/-
12.	*Polygonatum verticiliatum*	Salm Mishri	1,000/-
13.	*Salvia moorcroftlana*	Thuth	180/-
14.	*Bunium persicum*	Kala zira	2,000/-
15.	*Selinum vaginatum*	Butkesh	400/-
16.	*Tinospora cordifolia*	Gloe	100/-

17.	*Orchis latifolia*	Salam panja	6,000/-
18.	*Valeriana hardwickii*	Nihani	600/-
19.	*Acorus calamus*	Buch	130/-
20.	*Pinus wallichiana*	Kail cones	150/-
21.	*Adiantum lunulatum*	Dusgtuli	80/-
22.	*Lichens*	Chalora	225/-
23.	*Abies webbiana*	Tajpatra	85/-
24.	*Hedychium acuminatum*	Kapper Kuchri	70/-
25.	*Heracleum spp*	Patishan roots	25/-
26.	*Gerardiana heterophylla*	Bichu Buti	150/-
27.	*Cedar rosette*	Deodar Rossette	150/-
28.	*Birch pine*	Kush cones	150/-
29.	*Cedrella Spp*	Bari phool	50/-
30.	*Pyrus pashia*	Kainth	30/-
31.	*Colebrookea oppositifolia*	Bindi phool	50/-
32.	*Rhododendron spp*	Brass phool	150/-
33.	*Coleus aromaticus*	Pathan Bail	30/-
34.	*Lichens and Mosses*	Green Mous Ghass	250/-
35.	*Hypericum patulum*	Khaarera/ Basanti	250/-
36.	*Curcuma spp*	Ban Haldi	50/-
37.	*Juniper recurva*	Bether patta	100/-
38.	*Dry pine needles*	Chillaru	5/-

4.4 To find out the contribution of NTBR income to household income.

The contribution of NTBR income to the household income was calculated on the basis of prices revealed by the NTBR collectors during the data collection and the prices correspond to the rates fetched for the year 2019-20, however some of the respondents were not ready to reveal the exact quantity and exact price fetched by the collected material in the market, rather they revealed the average NTBR annual income, range of average prices and quantities of various NTBRs sold by them during the last year. It is pertinent to mention here, that some of the banned items/ forest products may also have been sold by the respondents via various marketing channels as described above.

The descriptive statistics regarding the income contribution of NTBRs to the rural households in the Northwest Himalayan households of Jammu and Kashmir, and Himachal Pradesh are given below:

4.4.1 Contribution of NTBR income to household income

The overall contribution of NTBRs to the rural households in the Northwest Himalayan households of Jammu and Kashmir was found to be around Rs. 38905.00 and from Himachal Pradesh was 28478.61. The mean annual income of the NTBR collectors from all sources was about Rupees Two Lakh. Out of the total income, about Rupees Thirty Two Thousand was contributed by NTBR income in J&K and Himachal Pradesh.

Table 4.24: Contribution of NTBR to income of Northwest Himalayan households in Jammu and Kashmir

Particulars	Forest circle			Overall (n=180)	Difference between the circles
	West Jammu (n=60)	East Jammu (n=60)	Chenab (n=60)		
Total income (Rs.)					
Average annual income	178996.67	256400.00	256101.67	231043.89	f-value/ p-value: 9.310/ 0.0001**
Standard error (SE)	11511.39	13457.87	18564.56	8916.60	
Standard deviation (SD)	89166.88	104244.20	143800.50	119628.80	
Minimum	37000.00	30000.00	29000.00	29000.00	
Maximum	506000.00	510000.00	709000.00	709000.00	
Having agricultural income					χ^2/p-value: 11.136/ 0.0038**
Yes	53 (83.33)	52 (86.67)	40 (66.67)	145 (80.55)	
No	7 (11.67)	8 (13.33)	20 (33.33)	35 (19.44)	
Agricultural income (Rs.)	*(n=53)*	*(n=52)*	*(n=40)*	*(n=145)*	
Average annual ag. income	36641.51	29346.15	57937.50	39900.00	f-value/ p-value: 6.242/ 0.0025**
Standard error (SE)	4528.58	2974.36	9484.86	3388.14	
Standard deviation (SD)	32968.57	21448.42	59987.54	40798.66	
Minimum	9000.00	10000.00	9000.00	9000.00	
Maximum	200000.00	120000.00	240000.00	240000.00	

Having animal Husbandry income Yes No	 45 (75.00) 15 (25.00)	 46 (76.67) 14 (23.33)	 21 (35.00) 39 (65.00)	 112 (62.22) 68 (37.78)	χ^2/p-value: 28.41/ 0.0000**
Animal Husbandry income (Rs.) Average annual A.H. income Standard error (SE) Standard deviation (SD) Minimum Maximum	*(n=45)* 92106.67 10042.27 67365.58 5000.00 250000.00	*(n=46)* 65304.34 7830.57 53109.48 5000.00 250000.00	*(n=21)* 112223.81 18226.74 83525.41 4900.00 252000.00	*(n=112)* 84870.54 6353.32 67237.24 4900.00 252000.00	f-value/ p-value: 4.172/ 0.0180*
Having other income Yes No	24 (40.00) 36 (60.00)	45 (75.00) 15 (25.00)	53 (88.33) 7 (11.67)	122 (67.78) 58 (32.22)	χ^2/p-value: 80.557/ 0.0000**
Other income (Rs.) Average annual other income Standard error (SE) Standard deviation (SD) Minimum Maximum	*(n=24)* 138500.00 8697.20 42607.41 60000.00 240000.00	*(n=45)* 188266.67 9540.90 64002.27 96000.00 300000.00	*(n=53)* 142188.68 14885.56 108368.50 60000.00 600000.00	*(n=122)* 158459.02 7791.82 86063.51 60000.00 600000.00	f-value/ p-value: 4.543/ 0.0126*
NTBR income (Rs.) Average annual NTBR income Standard error (SE) Standard deviation (SD) Minimum Maximum	22116.67 2080.59 16116.20 3000.00 60000.00	39700.00 3506.68 27126.60 4000.00 80000.00	54898.33 5972.30 46261.22 2000.00 178000.00	38905.00 2597.67 34851.38 2000.00 178000.00	f-value/ p-value: 15.440/ 0.0000**
NTBR income contribution Average contribution (%) Minimum (%) Maximum (%)	(15.30) (1.92) (78.13)	(18.18) (1.06) (70.59)	(23.57) (0.67) (74.07)	(18.98) (0.67) (78.13)	-

Figures in parenthesis depict percentage, *p significant <0.05, **p significant <0.01

Table 4.25 : Contribution of NTBR to income of Northwest Himalayan households in Himachal Pradesh

Particulars	Forest circle						Overall (n=360)
	Chamba (n=60)	Kulu (n=60)	Mandi (n=60)	Rampur (n=60)	Shimla (n=60)	Solan (n=60)	
Total income (Rs.)							
Average annual income	218757.33	180652.50	139347.47	155443.00	252994.33	167635.33	185804.99
Standard error (SE)	22903.31	20910.00	11832.43	23073.11	21413.31	14886.22	8221.19
Standard deviation (SD)	177408.26	161972.48	91669.09	178723.00	165866.79	115308.19	155986.19
Minimum	46700.00	41200.00	41700.00	24700.00	52100.00	36620.00	24700.00
Maximum	636000.00	925900.00	453000.00	981400.00	680000.00	526000.00	981400.00
Having agricultural income							
Yes	40 (66.67)	52 (86.67)	51 (85.00)	49 (81.67)	48 (80.00)	41 (68.33)	281 (78.06)
No	20 (33.33)	8 (13.33)	9 (15.00)	11 (18.33)	12 (20.00)	19 (31.67)	79 (21.94)
Agricultural income (Rs.)	*(n=40)*	*(n=52)*	*(n=51)*	*(n=49)*	*(n=58)*	*(n=41)*	*(n=281)*
Average annual ag. income	40653.00	40493.27	46467.00	43234.29	53561.67	56680.98	46672.59
Standard error (SE)	4853.49	4438.94	4885.64	4866.07	5879.82	6979.88	2179.82
Standard deviation (SD)	30696.16	32009.65	34890.44	34062.50	40736.56	44693.03	36540.46
Minimum	5500.00	5750.00	6350.00	6000.00	7000.00	6900.00	5500.00
Maximum	165000.00	172500.00	190500.00	180000.00	210000.00	207000.00	210000.00
Having animal Husbandry income							
Yes	60 (100.0)	56 (93.33)	55 (91.67)	53 (88.33)	51 (85.00)	41 (68.33)	316 (87.78)
No	0 (0)	4 (6.67)	5 (8.33)	7 (11.67)	9 (15.00)	19 (31.67)	44 (12.22)
Animal Husbandry income (Rs.)	*(n=60)*	*(n=56)*	*(n=55)*	*(n=53)*	*(n=51)*	*(n=41)*	*(n=316)*
Average annual A.H. income	164155.00	37655.36	48600.00	19426.42	54288.24	21248.78	61077.53
Standard error (SE)	25308.99	3124.75	5529.56	1404.64	3409.87	1654.22	5726.42
Standard deviation (SD)	196042.60	23393.49	41008.29	10225.91	24351.35	10592.15	101795.10
Minimum	29700.00	19800.00	19800.00	13200.00	19800.00	13200.00	13200.00
Maximum	624000.00	89100.00	247500.00	52800.00	118800.00	52800.00	624000.00
Having other income							
Yes	4 (6.67)	14 (23.33)	11 (18.33)	17 (28.33)	23 (38.33)	25 (41.67)	94 (26.11)
No	56 (93.33)	46 (76.67)	49 (81.67)	43 (71.67)	37 (61.67)	35 (58.33)	266 (73.89)
Other income (Rs.)	*(n=4)*	*(n=14)*	*(n=11)*	*(n=17)*	*(n=23)*	*(n=25)*	*(n=94)*
Average annual other income	126000.00	291428.00	196363.64	300000.00	303391.30	216000.00	257680.85
Standard error (SE)	6000.00	55626.47	27520.33	52910.58	28947.12	20411.76	16329.07
Standard deviation (SD)	12000.00	208135.21	91274.61	218155.90	138825.50	102058.81	158316.00
Minimum	120000.00	120000.00	120000.00	108000.00	42000.00	60000.00	42000.00
Maximum	144000.00	840000.00	372000.00	840000.00	600000.00	480000.00	840000.00

NTBR income (Rs.)							
Average annual NTBR income	19100.00	42413.33	19300.00	17975.00	47700.00	24383.33	28478.61
Standard error (SE)	1621.96	5929.10	1773.80	1618.98	5723.10	2870.47	1648.15
Standard deviation (SD)	12563.67	45926.63	13739.77	12540.59	44330.92	22234.57	31271.52
Minimum	9500.00	7300.00	7000.00	9000.00	5000.00	3000.00	3000.00
Maximum	55000.00	190000.00	60000.00	55000.00	200000.00	80000.00	200000.00
NTBR income contribution							
Average contribution (%)	14.12	28.96	19.28	21.57	22.78	21.64	21.39
Minimum (%)	1.66	1.62	2.36	1.46	2.44	1.18	1.18
Maximum (%)	49.94	81.73	69.44	69.44	77.16	85.84	85.84

Figures in parenthesis depict percentage, *p significant <0.05, **p significant <0.01

Table 4.26 : Comparative contribution of NTBR to income of Northwest Himalayan households in Himachal Pradesh

Particulars	State/ UT		Overall (n=540)	Difference between the circles
	J&K (n=180)	HP (n=360)		
Total income (Rs.)				
Average annual income	231043.89	185804.99	200844.53	t-value/ p-value: 3.419/ 0.0003**
Standard error (SE)	8916.60	8221.19	6297.31	
Standard deviation (SD)	119628.80	155986.19	146336.47	
Minimum	29000.00	24700.00	24700.00	
Maximum	709000.00	981400.00	981400.00	
Having agricultural income				
Yes	145 (80.55)	281 (78.06)	426 (78.89)	χ^2/p-value: 0.450, 0.5022^{NS}
No	35 (19.44)	79 (21.94)	114 (21.11)	
Agricultural income (Rs.)	*(n=145)*	*(n=281)*	*(n=426)*	t-value/ p-value: 1.741/ 0.0412*
Average annual ag. income	39900.00	46672.59	44367.37	
Standard error (SE)	3388.14	2179.82	1847.45	
Standard deviation (SD)	40798.66	36540.46	38130.95	
Minimum	9000.00	5500.00	5500.00	
Maximum	240000.00	210000.00	240000.00	
Having animal Husbandry income				
Yes	112 (62.22)	316 (87.78)	428 (79.26)	χ^2/p-value: 47.674, 0.0000**
No	68 (37.78)	44 (12.22)	112 (20.74)	

Animal Husbandry income (Rs.)	*(n=112)*	*(n=316)*	*(n=428)*	t-value/ p-value:
Average annual A.H. income	84870.54	61077.53	67303.74	2.301/
Standard error (SE)	6353.32	5726.42	4567.54	0.0109*
Standard deviation (SD)	67237.24	101795.10	94494.00	
Minimum	4900.00	13200.00	4900.00	
Maximum	252000.00	624000.00	624000.00	
Having other income				χ^2/p-value:
Yes	122 (67.78)	94 (26.11)	216 (40.00)	86.806,
No	58 (32.22)	266 (73.89)	324 (60.00)	0.0000**
Other income (Rs.)	*(n=122)*	*(n=94)*	*(n=216)*	t-value/ p-value:
Average annual other income	158459.02	257680.85	201638.88	5.887/
Standard error (SE)	7791.82	16329.07	8985.93	0.0000**
Standard deviation (SD)	86063.51	158316.00	132065.66	
Minimum	60000.00	42000.00	42000.00	
Maximum	600000.00	840000.00	840000.00	
NTBR income (Rs.)				t-value/ p-value:
Average annual NTBR income	38905.00	28478.61	31954.07	3.514/
Standard error (SE)	2597.67	1648.15	1413.50	0.0002**
Standard deviation (SD)	34851.38	31271.52	32846.72	
Minimum	2000.00	3000.00	2000.00	
Maximum	178000.00	200000.00	200000.00	
NTBR income contribution				-
Average contribution (%)	(18.98)	(21.39)	(20.59)	
Minimum (%)	(0.67)	(1.18)	(0.67)	
Maximum (%)	(78.13)	(85.84)	(58.84)	

Figures in parenthesis depict percentage, *p significant <0.05, **p significant <0.01

4.5 To delineate the factors driving the dependence of households on NTBR for livelihood security.

The factors driving the dependence of households on NTBR for their livelihood security was calculated using binary logistic regression between the independent and dependent variables of the NTBR collectors and non-collectors/ locals.

4.5.1 Factors driving the dependence of households on NTBR for livelihood security

Overall, the variables positively affecting the dependence on NTBR collection were; number of males in family, number of females in family and practicing animal husbandry. The chi-square value was 101.529, with a p-value of 0.000 and Nagelkerke's

R^2 value was 0.269. Thus, 26.9 per cent variation in the decision to collect NTBR was due to the above factors. However, NTBR collection practice was declining with the possession of mobile phones by the respondents, having a nuclear family and practicing farming/ agriculture.

Table 4.27: Logistic regression results for factors driving dependence of households on NTBR

Practice	Driving factors	Coefficient (B)	S.E	Wald	Prob	Remarks
Collection of NTBR for livelihood security	Phone	-.764	.277	7.586	.006	
	Family type	-.862	.327	6.936	.008	
	Males in family	.427	.167	6.539	.011	
	Females in family	.634	.188	11.386	.001	χ^2=101.529** p=0.000 Nagelkerke's R^2=0.269
	Farming	-.2.461	.671	13.439	.000	
	Animal Husbandry	2.289	.604	14.362	.000	
	Constant	.702	.879	.638	.424	

4.5.2 Factors driving the dependence of households on NTBR for livelihood security in Jammu and Kashmir

The only variable positively affecting the dependence on NTBR collection was age. This implies that younger people were less likely to depend on NTBR income for their livelihood in Jammu and Kashmir. This may also be due to the factor that NTBR collection requires experience and experience comes with age. The chi-square value was 175.82, with a p-value of 0.000 and Nagelkerke's R^2 value was 0.857. Thus, 85.7 per cent variation in J&K for the decision to collect NTBR was due to the above factors. However, NTBR collection practice was declining due to the factors like being the head of family, having more male members, having horticulture based landholdings and with increasing income.

Table 4.28: Logistic regression results for factors driving dependence of households on NTBR in Jammu and Kashmir

Practice	Driving factors	Coefficient (B)	S.E	Wald	Prob	Remarks
Collection of NTBR for livelihood security	Head of family	-3.22	1.297	6.152	.013	
	Male members	-1.70	.746	5.181	.023	χ^2=175.82** p=0.000 Nagelkerke's R^2=0.857
	Age	.166	.059	7.797	.005	
	Horticulture	-2.690	1.567	4.489	.034	
	Income	-.001	.000	9.750	.002	
	Constant	24.387	3864.03	.000	.995	

4.5.3 Factors driving the dependence of households on NTBR for livelihood security in Himachal Pradesh

There were no variables positively affecting the dependence on NTBR collection in Himachal Pradesh. The chi-square value was 87.911, with a p-value of 0.000 and Nagelkerke's R^2 value was 0.573. However, NTBR collection practice was declining with the possession of smartphone by the respondents, practicing farming/ agriculture and having more land holding.

Table 4.29: Logistic regression results for factors driving dependence of households on NTBR in Himachal Pradesh

Practice	Driving factors	Coefficient (B)	S.E	Wald	Prob	Remarks
Collection of NTBR for livelihood security	Smartphone	-2.045	.713	8.226	.004	χ^2=87.911** p=0.000 Nagelkerke's R^2=0.573
	Farming	-3.595	1.538	5.461	.019	
	Land holding	-1.764	.817	4.657	.031	
	Constant	-1.251	2.022	.383	.536	

4.6 To find out the constraints and the potential of NTBR for all stakeholders and future interventions required for sustainable livelihood of adjacent communities.

4.6.1 Constraints expressed by the NTBR collectors

The overall most serious constraints as expressed by the NTBR collectors of North West Himalayas were Untimely issuance of Form 16 (90%), wild weeds (88%), bad weather (80%) and improper weighing system (81%) and are enumerated in table below:

Table 4.30: Overall constraints expressed by the NTBR collectors in the collection and marketing of NTBRs

Particulars *	J&K n= 180	H.P n= 380	Total n= 560	Rank
	MPS	MPS	MPS	
Untimely issuance of transportation permit	95	88	90	I
Wild weeds	72	85	88	II
Hindrance due to bad weather (Rainfall and snowfall)	60	90	80	IV
Improper weighing system	79	82	81	V
Difficulty in identification of useful	66	60	62	VI

herbs/sherbs				
Danger from wild animals	64	80	75	VII
Sloppy and slippery terrains	82	68	72	VIII
Lack of market facility	95	50	63	IX
Robbery of collected materials by co-collectors	40	0	13	X

Multiple responses

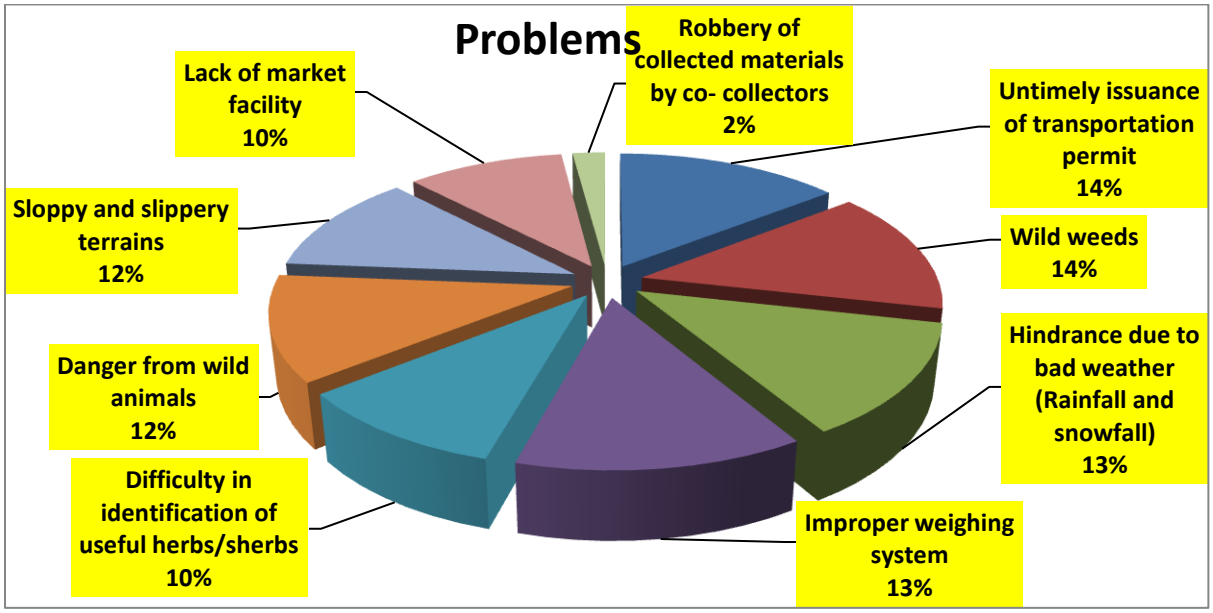


Fig. 4.6. Constraints in the collection and marketing of NTBR

Individually, constraints as expressed by the NTBR collectors of J&K in the collection and marketing of NTBRs are enumerated in tables 4.31 below:

Table 4.31 : Constraints expressed by the NTBR collectors of Jammu and Kashmir in the collection and marketing of NTBRs

Particulars	MPS	Rank
Untimely issuance of transportation permit	95	I
Lack of market facility	95	II
Unnecessary conflict with policemen over collection of NTFPs	90	III
Conflict arises with forest officials during collection of NTFPs from	88	IV

restricted forest area		
Conflict with contractor over price	85	V
Danger of forest fire	85	VI
Lack of skill oriented training programme related to collection, processing and marketing of NTFPs	85	VII
Sloppy and slippery terrains	82	VIII
Improper weighing system	79	IX
Lack of storage facilities	75	X
Wild weeds	72	XI
Non availability of medical facilities	70	XII
Collection of NTFPs by outsiders	67	XIII
Difficulty in identification of useful herbs/ shrubs	66	XIV
Conflict within group over distribution of collected material	65	XV
Danger from wild animals	64	XVI
Deforestation	64	XVII
Hindrance due to bad weather (Rainfall and snowfall)	60	XVIII
Robbery of collected materials by co- collectors	40	XIX

Constraints as expressed by the NTBR collectors of Himachal Pradesh in the collection and marketing of NTBRs are enumerated in tables 4.32 below:

Table 4.32: Constraints expressed by the NTBR collectors of Himachal Pradesh in the collection and marketing of NTBRs

Particulars	MPS	Rank
Hindrance due to bad weather (Rainfall and snowfall)	90	I
Untimely issuance of transportation permit	88	II
Wild weeds	85	III

Deforestation	83	IV
Improper weighing system	82	V
Danger from wild animals	80	VI
Collection of NTFPs by outsiders	78	VII
Conflict with contractor over price	77	VIII
Non availability of medical facilities	76	IX
Unnecessary conflict with policemen over collection of NTFPs	74	X
Danger of forest fire	74	XI
Lack of storage facilities	71	XII
Conflict arises with forest officials during collection of NTFPs from restricted forest area	70	XIII
Sloppy and slippery terrains	68	XIV
Lack of skill oriented training programme related to collection, processing and marketing of NTFPs	65	XV
Difficulty in identification of useful herbs/ shrubs	60	XVI
Lack of market facility	50	XVII
Conflict within group over distribution of collected material	45	XVIII

4.6.2 Constraints faced by the NTBR contractors in NTBR trade in Jammu and Kashmir

1. Timing of the tender and allotment of work is mainly in September- October, followed by snowfall in the months of October to March, therefore no collection can be done in winter time.
2. Testing for authenticity of items (medicinal herbs/ plants/ plant parts) is compulsory for reputed government institutes, which currently done by CSIR institute is expensive (average @ Rs. 3000/- per test). So both, cost of test and location of testing labs is a constraint, as the cost of test is sometimes more than cost of product, if quantity to be sent is small and the cost has to be borne by the supplier.

3. Harassment even after having full sanctions and documents, the forest department checkpoints and police demand bribes for transportation.
4. Another contractor revealed that he was working

4.6.3 Opinion of NTBR contractors, regarding collectors of Jammu and Kashmir

1. Registered NTBR contractors pay royalty to the department, then collection charges to the collectors, then transportation charges but ultimately sometimes the collectors sell off their material clandestinely to smugglers or dealers of outside states.
2. Collectors keep on collecting huge quantities of NTBR opportunistically, whenever possible during their routine forest visits, then stock the items at a local store at site and wait till the tenders are floated by the forest department, or sell them off to dealers of outside states.

4.6.4 Suggestions given by the NTBR contactors of Jammu and Kashmir

1. The tenders by forest department should be floated in the months of May or June every year, so that sanction and official documentation could complete by September every year for timely extraction and transportation of NTBRs before snowfall.
2. There should be a uniform rule for banned forest items throughout the country, e.g. Kod is banned in Jammu and Kashmir, but not in Himachal Pradesh.

In due course a mail was received by a contractor which is annexed at appendix – 4.

4.7 To generate digital database and mapping of NTBR.

A digital database was generated for the mapping of NTBR in North West Himalayas and the dashboard is available at the address:

https://nmhs.skuast.org/ (Hosted on the local servers at SKUAST Jammu)

https://ihyme.com/ntbr/index.php (Mirror copy hosted at the cloud storage)

A dashboard has been developed which could be accessed by any user around the world as it is a web based application and all needed to view this dashboard is an internet connection and a browser. This dashboard also used the same API endpoints

but doesn't allow any used to alter or update the data. It is also created in HTMl5 and JavaScript, is hosted on SERVER-1 and is served using Apache Web Server. The information accessible from the dashboard and a snapshots of the dashboard are given below:

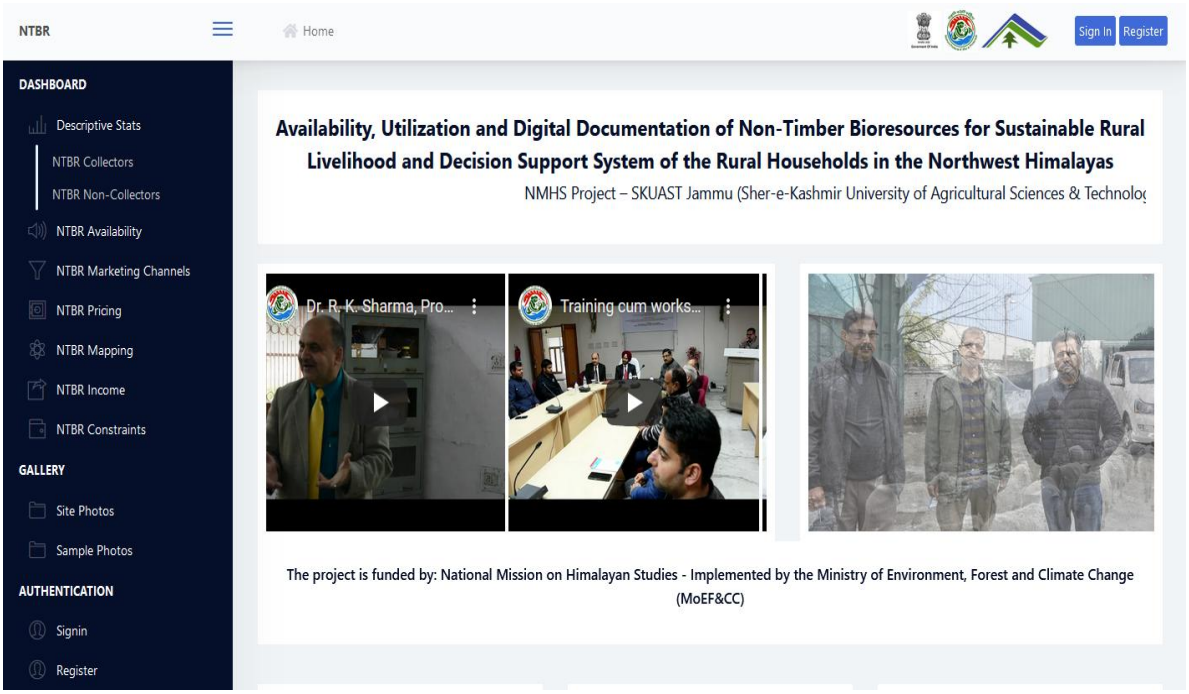


Fig. 4.7: Digital dashboard developed under the project

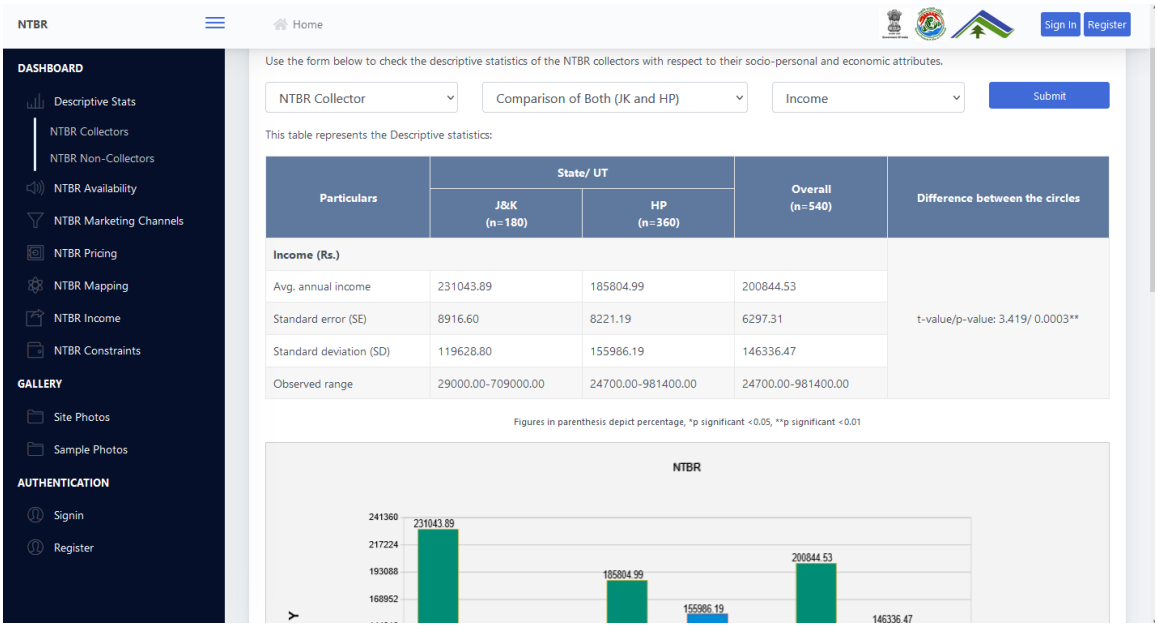


Fig. 4.8: Descriptive statistics of the respondents

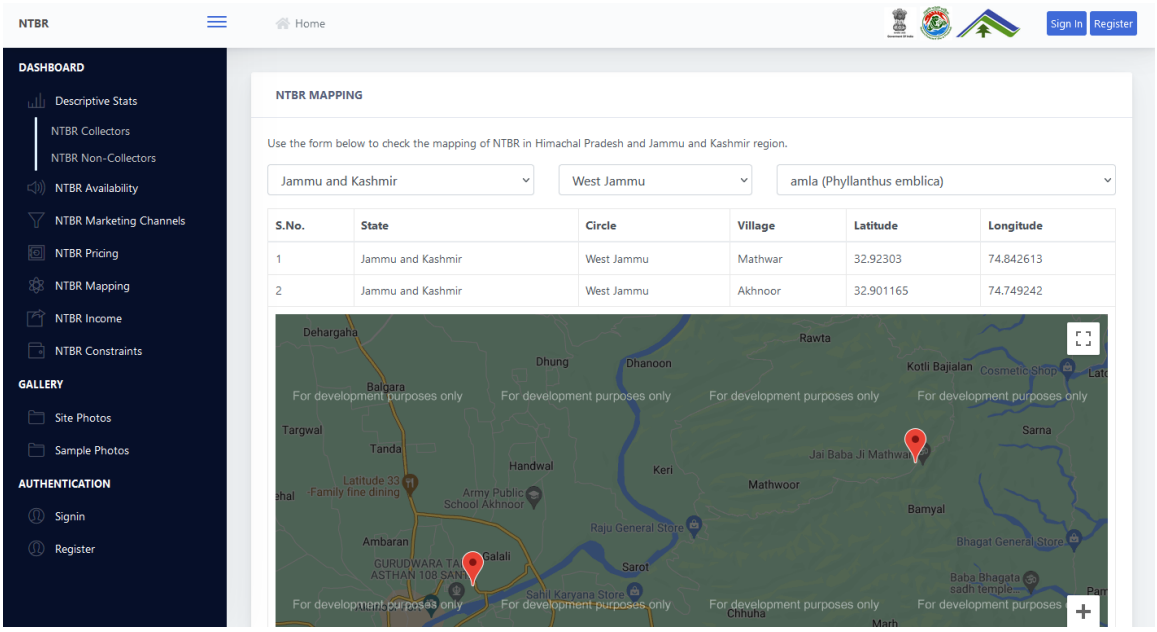


Fig. 4.9: NTBR mapping in the digital dashboard

A user can select a particular item form the first dropdown starting from left on top of the page. This dropdown shows the local name in conjunction with the scientific name.

Once an item name is selected, the next dropdown gets populated with the name of the regions in which the selected item is available.

Once a region name is selected, the next dropdown gets populated with the name of the circles in that particular region in which the selected item is available.

Upon selecting all three dropdowns, the widgets below the dropdown gets populated with the attributes as stored in that database for that combination of item, region and circle.

Following databases are available on the dashboard:

1. Descriptive statistics of the NTBR collectors.
2. Descriptive statistics of the non-collectors of the respective areas.
3. NTBR availiablity.
4. NTBR marketing channels.
5. NTBR marketing channels.
6. NTBR pricing.
7. NTBR mapping.
8. NTBR income.
9. NTBR collection constraints.
10. Site photos of the project.
11. Sample photos of various NTBR.

5

OVERALL ACHIEVEMENTS

The overall achievements of the study have been presented under the following heads in accordance with the objectives set forth and results obtained:

5.1 Achievement on Project Objectives

5.2 Establishing New Database/Appending new data over the Baseline Data

5.3 Generating Model Predictions for different variables

5.4 Technological Intervention

5.5 On field Demonstration and Value-addition of Products

5.6 Promoting Entrepreneurship in IHR

5.7 Developing Green Skills in IHR

5.8 Addressing Cross-cutting Issues

5.1 Achievement on Project Objectives

The achievements pertaining to the set forth objectives of the study are presented under following heads in table 5.1.

Table 5.1: Achievements in derivables set forth as per the objectives of the study:

Project Objectives	Quantifiable Output against each objective	Progress made against Monitoring Indicators (specified in Sanction Letter)	Remarks
1. To find out the availability and use pattern of NTBR	Digital data base with documentation of the facts regarding availability of forest products and their subsequent utilization/ sale by the forest inhabitants	No. of New Database/ Datasets/ Maps generated on NTBR/Use pattern of NTBR **(Nos)**	Out of total 9 forest circles of H.P. data has been collected from 6 selected forest circles and out of total 7 circles of J&K data has been collected from 3 selected forest circles. A total of 9 digital databases have been created as per the objectives of this study, which is available at https://nmhs.skuast.org/ (Hosted on the local servers at SKUAST Jammu) https://ihyme.com/ntbr/index.php (Mirror copy hosted at the cloud

			storage)
2. To identify the production to consumption chain and price spread of different NTBR	Mobile-based and web-based Apps to provide a DASHBOARD for decision-support system	No. of Capacity Building, Awareness Generation and Livelihood Generation Trainings or workshops conducted **(Nos)**	A workshop/ meeting was conducted with the NTBR collectors of Chamba region in Himachal Pradesh on 20-12-2019. Training cum workshop for veterinarians of Animal Husbandry Department (J&K) at SKUAST Jammu was conducted on 19-20 Feb, 2020. A two days workshop on **"Important Non-Timber Bio resources: Source of Livelihood for Rural Folks"** was held at Narag, District Sirmaur (Nahan Forest Circle, Himachal Pradesh) w.e.f. February, 4-5, 2021 Video links: 1. https://youtu.be/0mYEiF-svJs 2. https://youtu.be/5VDt0maujgA
3. To find out the contribution of NTBR income to household income	Effective market linkage to the NTFP collectors with the niche market area for selected villages	No. of Stakeholders benefitted **(No. of Rural Youth, No. of Women, and Total No. of Beneficiaries)** with establishing linkages with niche market and recognition with a sound framework	17 NTBR collectors of Chamba region in Himachal Pradesh were sensitized with niche markets for the trade of NTBRs on 20-12-2019. About 30 participants, farmers and farm women participated in two days workshop at Narag, District Sirmaur (Nahan Forest Circle, Himachal Pradesh) w.e.f. February, 4-5, 2021 (Appendix -3). Video links: 1. https://youtu.be/tdUK-SNv0jM 2. https://youtu.be/Zwniixc5Bl0
4. To delineate the factors driving the dependence of households on NTBR for livelihood security		**No of data base** added to Mobile-based and web-based Apps to provide a DASHBOARD for decision-support system	A total of 9 digital databases have been created as per the objectives of this study.

5. To find out the constraints and the potential of NTBR for all stakeholders and future interventions required for sustainable livelihood of adjacent communities		Other Publications and Knowledge Products (Nos.)	Research articles are in process of publication with reputed journals having NAAS rating more than 4. A training manual with ISBN has been published.
6. To generate digital database and mapping of NTBR		Data being uploaded.	Digital databases developed under the project are available at https://nmhs.skuast.org/ (Hosted on the local servers at SKUAST Jammu) https://ihyme.com/ntbr/index.php (Mirror copy hosted at the cloud storage) with a web and mobile based interface.

5.2 Establishing New Database/Appending new data over the Baseline Data

Two dedicated high performance computer servers and cloud storage hosting over internet, were used to create and store the digital database and mapping of the non-timber forest products of North-Western Himalayas.

5.3 Generating Model Predictions for different variables

Modelling was done using binary logistic regression and following predictions regarding the factors driving the households towards dependence on NTBR were obtained:

5.3.1 Factors driving the dependence of households on NTBR for livelihood security

Overall, the variables positively affecting the dependence on NTBR collection were; number of males in family, number of females in family and practicing animal husbandry. The chi-square value was 101.529, with a p-value of 0.000 and Nagelkerke's R^2 value was 0.269. Thus, 26.9 per cent variation in the decision to collect NTBR was

due to the above factors. However, NTBR collection practice was declining with the possession of mobile phones by the respondents, having a nuclear family and practicing farming/ agriculture.

Table 5.1: Logistic regression results for factors driving dependence of households on NTBR in locale of study (overall in J&K and H.P)

Practice	Driving factors	Coefficient (B)	S.E	Wald	Prob	Remarks
Collection of NTBR for livelihood security	Phone	-.764	.277	7.586	.006	
	Family type	-.862	.327	6.936	.008	
	Males in family	.427	.167	6.539	.011	χ^2=101.529** p=0.000 Nagelkerke's R^2=0.269
	Females in family	.634	.188	11.386	.001	
	Farming	-.2.461	.671	13.439	.000	
	Animal Husbandry	2.289	.604	14.362	.000	
	Constant	.702	.879	.638	.424	

5.3.2 Factors driving the dependence of households on NTBR for livelihood security in Jammu and Kashmir

The only variable positively affecting the dependence on NTBR collection was age. This implies that younger people were less likely to depend on NTBR income for their livelihood in Jammu and Kashmir. This may also be due to the factor that NTBR collection requires experience and experience comes with age. The chi-square value was 175.82, with a p-value of 0.000 and Nagelkerke's R^2 value was 0.857. Thus, 85.7 per cent variation in J&K for the decision to collect NTBR was due to the above factors. However, NTBR collection practice was declining due to the factors like being the head of family, having more male members, having horticulture based landholdings and with increasing income. The reasons for which may be theorized as the older aged respondents may be already possessing traditional knowledge and identification of the NTBRs may be comparatively easy for them. Similary, the responsibility of head of the family may be more in a family, due to which he may be unable to leave the family and go to forest areas for collection of the material. As the number of male members in a family increased, this may have decreased the family dependence on alternative sources of income of pursuing local economic activities, as depicted by the involment of collectors in alternative occupations like practicing horticulture and increased income contributing to decresed dependence of collectors on NTBR.

Table 5.2: Logistic regression results for factors driving dependence of households on NTBR in Jammu and Kashmir

Practice	Driving factors	Coefficient (B)	S.E	Wald	Prob	Remarks
Collection of NTBR for livelihood security	Head of family	-3.22	1.297	6.152	.013	
	Male members	-1.70	.746	5.181	.023	χ^2=175.82**
	Age	.166	.059	7.797	.005	p=0.000
	Horticulture	-2.690	1.567	4.489	.034	Nagelkerke's
	Income	-.001	.000	9.750	.002	R^2=0.857
	Constant	24.387	3864.03	.000	.995	

5.3.3 Factors driving the dependence of households on NTBR for livelihood security in Himachal Pradesh

There were no variables positively affecting the dependence on NTBR collection in Himachal Pradesh. The chi-square value was 87.911, with a p-value of 0.000 and Nagelkerke's R^2 value was 0.573. However, NTBR collection practice was declining with the possession of smartphone by the respondents, practicing farming/ agriculture and having more land holding.

Table 5.3: Logistic regression results for factors driving dependence of households on NTBR in Himachal Pradesh

Practice	Driving factors	Coefficient (B)	S.E	Wald	Prob	Remarks
Collection of NTBR for livelihood security	Smartphone	-2.045	.713	8.226	.004	χ^2=87.911**
	Farming	-3.595	1.538	5.461	.019	p=0.000
	Land holding	-1.764	.817	4.657	.031	Nagelkerke's
	Constant	-1.251	2.022	.383	.536	R^2=0.573

5.4 Technological Intervention

Rogers (2003) usually used the word "technology" and "innovation" as synonyms. For Rogers, "a technology is a design for instrumental action that reduces the uncertainty in the cause-effect relationships involved in achieving a desired outcome". No direct technological interventions were there during the course of this project, however during the data collection and during the workshops and awareness camps, a lot of knowledge exchange between the NTBR collectors, minor forest product contractors, stakeholders i.e. state departments of forest, agriculture, animal husbandry and the faculty members/ project investigators took place. This was done to enhance and imprint the importance of NTBRs in the North-Western Himalayas and their

sustainable usage. The NTBR collectors were advised not to harvest the premature plant materials from the forests as the sustainable cycle of natural regeneration requires the seeds to mature and fall on ground to ensure germination in the next season. The collectors were made aware of the actions which caused many important NTBRs like medicinal plants to become extinct or near extinct. In the due course, suggestions from the collectors and contractors were recorded. The collectors expressed deep anguish over the government policies for which they were being given grazing rights over the lands they have thrived on, for decades but they were prohibited to take out any NTBR from those grazing lands and found impedements in the sale and marketing of NTBRs. They suggested that if they were given rights as per the Forest Rights Act, 2006, they would not only try to save the local NTBRs and medicinal plants, but also ensure a sustainable harvest cycle for their own sustainance.

The information communication technological intervention was the the two dedicated servers and cloud storage hosting over internet, that have been used to create and store the digital database and mapping of the non-timber forest products of North-Western Himalayas.

5.5 On field Demonstration and Value-addition of Products

A workshop cum training of the veterinarians of Department of Animal Husbandry, Department of Sheep Husbandry and veterinary graduates was successfully conducted on February, 19-20, 2020 and during the course, the trainees were given practical demonstrations like utilization of tree and shrub foliage as potential feed resources for livestock, Quality assurance and nutrient evaluation of feed resources, Nutritive potential of highland weeds in North-West Himalayas etc. (Full list of lectures and demonstrations enclosed as a published training manual entitled “Utilization of Non-Timber Bioresources of North West Himalayas for Optimizing Livestock Health and Production”, ISBN: 978-93-5406-285-8).

The value addition of plant materials from the Himalayan region by formulation and preparation of Multi-Nutrient and Densified Complete Feed Blocks was also demonstrated to the stakeholeders who are in continous contact of the local population of the far flung areas of Jammu and Kashmir.

5.6 Promoting Entrepreneurship in IHR

The post harvest technologies were promoted during the workshops and regular meetings of the project personnel with the stakeholders. Some contractors had excellent infrastructure and equipment in place, which needs to be replicated and bought in the forefront. The ideal industrial unit with facilities like washing of NTBR to remove dirt and debris, drying under sun or artificially in electric oven/ incubator to remove moisture for preservation and to prevent spoilage, size sorting machines, value addition using grinding machines and packaging machines is recommended for NTBR sale. This can be coupled with online ordering and home delivery system in pattern of already existing online shopping stores/ websites.

5.7 Developing Green Skills in IHR

Workshops/ trainings/ camps were organized in Jammu and Kashmir and Himachal Pradesh region for awareness of respondents for green skills as:

i. Maintaining essential ecological processes and life supporting system by educating about life cycle of important plants of North West Himalayas.
ii. Preservation of the diversity of species found in North West Himalayas.
iii. Encouraging the sustainable utilization of North Western Himalayan non-timber forest products/ species for non-disturbed ecosystem.

5.8 Addressing Cross-cutting Issues

The issues pertaining to the NTBR trade and marketing were out of scope for the project team as the grievences of contractors and collectors concerned mainly with the local government institutions like Forest Department and Police Department. The contractors and collectors bought to record in audio, visual and written format were concerned about the economic losses due to forest laws and delay in permissions for transport of material. Similarly some NTBRs and weeds which had grown on the farmers/ collectors lands e.g. harud (*Terminalia chebula*) or malkangni (*Celastrus paniculatus*), but had economic and trade value were pessimistic about it as they described the past impediments concerning the activity. Some collectors mailed us their grievience in written form, which is annexed in Annexure-I of this report, and throw a light on the seriousness of the issue.

6

PROJECT'S IMPACTS IN IHR

The project's impacts in Indian Himalayan Region are presented under the following heads in accordance with the NMHS pro forma:

6.1 Socio-Economic Development
6.2 Scientific Management of Natural Resources in IHR
6.3 Conservation of Biodiversity in IHR
6.4 Protection of Environment
6.5 Developing Mountain Infrastructures
6.6 Strengthening Networking in IHR

6.1 Socio-Economic Development

i. Socio-economic development of the communities living around IHR by creating awareness in meetings/ workshops about the sustainable NTBR harvesting and processing.

ii. Disseminating the information about scientific management of the NTBRs found in the IHR e.g. not extracting the NTBRs before the seed falls to ground, storage methods to increase the shelf life and keeping quality of NTBRs.

6.2 Scientific Management of Natural Resources in IHR

Himalayan region is a fragile region with respect to the NTBRs. Day by day the species are getting endangered or even extinct and the collection process of different species is going on indiscriminately. Although the various governments over time have issued several orders to not extract various species of forest products, but the collection is still going on. As during our research it was explored that people collect these NTBRs whether it is in the stage of harvesting or not. They were mostly collecting NTBRs for their greed and need for sustainability. A strategy needs to be formulated after discussions with the scientists, NTBR collectors and officials of Forest department to draw an outline for the collection of NTBR and the same should be followed and propagated extensively in the Himalayan regions.

It is also proposed that the present system of awarding a contract/ tender to one contractor without proper estimation of the availability of NTBR in that particular range or circle should be reassessed. The forest areas are so vast and

large and he often does not have control over the collection of NTBR by going in conflict with the locals and therefore he engages them as labour force to extract the NTBR or buys the already collected NTBRs at much less prices from them, which they hoard whenever possible. We suggest for educating the collectors about the issue and giving them a demarcated area for collection. Instead of individual selling, government should frame a mechanism wherein a collector may sell his collection in a more transparent and effective manner. In this way the NTBR collector will collect only the NTBRs which are ready to be harvested and will also take care for his future needs by not uprooting the NTBRs unnecessarily before the flowering stage. This will ensure his collection for the next season also and he will also safeguard his demarcated area effectively and not let anyone else collect from his area. Moreover, with this strategy, the collectors will develop knowledge and have interest to get the exact money as they deserve. This will in turn help check the illegal collection of NTBRs and the NTBRs will have a sustainable future in the Indian Himalayan Region. This was also discussed with the NTBR collectors and they agreed for this strategy to be sustainable.

6.3 Conservation of Biodiversity in IHR

Conservation of biodiversity is protection, upliftment and scientific management of biodiversity as to maintain it at threshold level and derive sustainable benefits for the present and future generation. In other words, conservation of biodiversity is the proper management of biosphere by human beings in such a way that it gives maximum benefits for the present generation and also develops its potential so as to meet the needs of the future generation. In the course of this project, awareness in respondents was created for:

i. To maintain essential ecological processes and life supporting system by educating about life cycle of important plants of North West Himalayas.
ii. To preserve the diversity of species found in North West Himalayas.
iii. To encourage the sustainable utilization of North Western Himalayan non-timber forest products/ species and to prevent ecosystem disturbance.

6.4 Protection of Environment

Following strategies can be undertaken to conserve biodiversity in the North West Himalayas:

Safeguarding the biodiversity: This strategy aims at conserving the Himalayan region habitats and ecosystem, so that the people living around forests could benefit from their multiple functions, as follows:

i. Implementation of the species conservation and recovery programmes.
ii. Rehabilitation of the areas that have previously been degraded.
iii. Extension of green corridors to counter the land fragmentation.
iv. Utilization of national parks for existing conservation and to house and recreate the ecosystems, that have been lost or degraded.

Consider biodiversity issue in policy and decision making: Government approaches to support biodiversity conservation and sustainable use are required at all levels with supportive laws and policies to be developed by central government, providing security of the tenure and authority essential for sustainable management at lower levels of administration.

Improving knowledge of biodiversity and the natural environment:

i. Encouraging and facilitating research in particular ecosystem and species specific biodiversity conservation.
ii. Monitoring the health of ecosystem and species as part of management process.
iii. Developing and maintaining of central information portal on biodiversity.
iv. Maintain a red data book with photographs and description of plants and animal species in the Indian Himalayan Region.

6.5 Developing Mountain Infrastructures

The infrastructure is already existing in both the UT of J&K and state of Himachal Pradesh. There is need to revamp the structure in the area of information technology. This can be made more effective with respect to surveillance and safeguarding the forest dwellers. Forest dwellers and forests have co-existance and one cannot survive in isolation. Therefore, if the forest dwellers are guided properly and given some rights, which they are already using in the name of "*patta*" is some areas, this will ensure the development of more infrastructure through innovation and wants. Moreover they should be allowed to

divide the area of that *patta* on the basis of their family. They should be given education to safeguard the fragile system of forest so that their co-existence may be sustainable.

6.6 Strengthening Networking in IHR

Satellite imagery, precision farming, drone surveillance, human guards having surveillance with IT instruments can go a long way in strengthening the networking in Indian Himalayan Regions.

7

EXIT STRATEGY AND SUSTAINABILITY

The exit strategy and sustainability of the project is presented under the following heads, in accordance with the NMHS pro forma:

7.1 How effectively the project findings could be utilized for the sustainable development of IHR

7.2 Efficient ways to replicate the outcomes of the project in other parts of IHR

7.3 Identify other important areas not covered under this study needs further attention

7.4 Major recommendations for sustaining the outcome of the projects in future

7.1 How effectively the project findings could be utilized for the sustainable development of IHR

7.2 Efficient ways to replicate the outcomes of the project in other parts of IHR

- The project can be replicated in other areas of IHR along with improvements with regard to exploring the NTBRs available.
- Similar studies should be done in the regions of UT of Ladakh and Kashmir division as they are rich in NTBR resources, which could not be covered during the tenure of this project due to travel restrictions on account of Covid-19 and socio-political factors which arose after the reorganization of the state of Jammu and Kashmir to the union territories of Ladakh and Jammu and Kashmir, during the last years.

7.3 Identify other important areas not covered under this study needs further attention

- Studies for use of satellite imagery, precision farming, drone surveillance and surveillance with IT instruments.
- Extensive mapping of NTBR resources in IHR, as was not available during this study.
- Documentation of Indigenous Technical Knowledge of the forest dwellers with regard to the use and consumption of NTBRs.

7.4 Major recommendations for sustaining the outcome of the projects in future

- The major recommendation of this study is to frame a pattern of organized collection, storage, processing and marketing of NTBR resources of IHR which will greatly contribute to the enhanced income and sustainability of the NTBR collectors and forest dwellers of the region.
- The present system of awarding a contract/ tender to one contractor without proper estimation of the availability of NTBR in that particular range or circle should be reassessed.
- Educating the collectors about the issue and giving them a demarcated area for collection is the need of hour.
- Forest dwellers can be given some rights, which they are already using in the name of "*patta*" is some areas like Himachal Pradesh, which will ensure the development of more infrastructure through innovation and wants.

Suggestions

- The study has brought into focus many problems relating to the cultivation and marketing of NTBRs in the study areas. In order to meet the growing requirements of NTBRs (mainly medicinal and aromatic plants) emphasis is needed on their marketing potential. Relying only on natural production sites will pose serious problems in sustainable management of NTBRs.
- Present system of extraction from the wild is also adding to the problems of extinction of some of the species.
- There is a need to train local people in cultivation of the medicinal and aromatic plants.
- Information on market potential, their prices and market intelligence is required to be collected through regular market surveys, so that proper marketing strategies could be formulated.
- The producer- industry linkages needs to develop model of contract farming should be developed to ensure better marketing for their harvest.

8

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9

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Dr. Rakesh Nanda
Principal Investigator

Appendix 1

Technical details/ site photographs/ sample photographs

High performance cluster computer and storage server at the Div. of Agricultural Extension, FoA, SKUAST Jammu

Principal Secretary, Agriculture (UT of J&K) and Prof. J. P. Sharma, Hon'ble Vice-Chancellor, SKUAST Jammu, releasing the ISBN training manual under the NMHS project

Co-PI, Dr. L. K. Sharma collecting data from NTBR collectors of Saranwan area of Kishtwar district

Co-PI collecting data from NTBR collector in Paddar

JRF, Dr. Rizwan Jeelani, collecting data from NTBR collector in Gulabgarh region of Paddar, Chenab Circle

NTBR collectors of Chenab Forest Circle providing data and samples

Please find the links to official website and dashboard for high resolution photos and videos related to the project "*Availability, Utilization and Digital Documentation of Non-Timber Bioresources for Sustainable Rural Livelihood and Decision Support System of the Rural Households in the Northwest Himalayas*"

Official website of project with selected photographs and videos:
skuastjnmhs.wordpress.com

Dashboard:
https://ihyme.com/ntbr
https://nmhs.skuast.org/

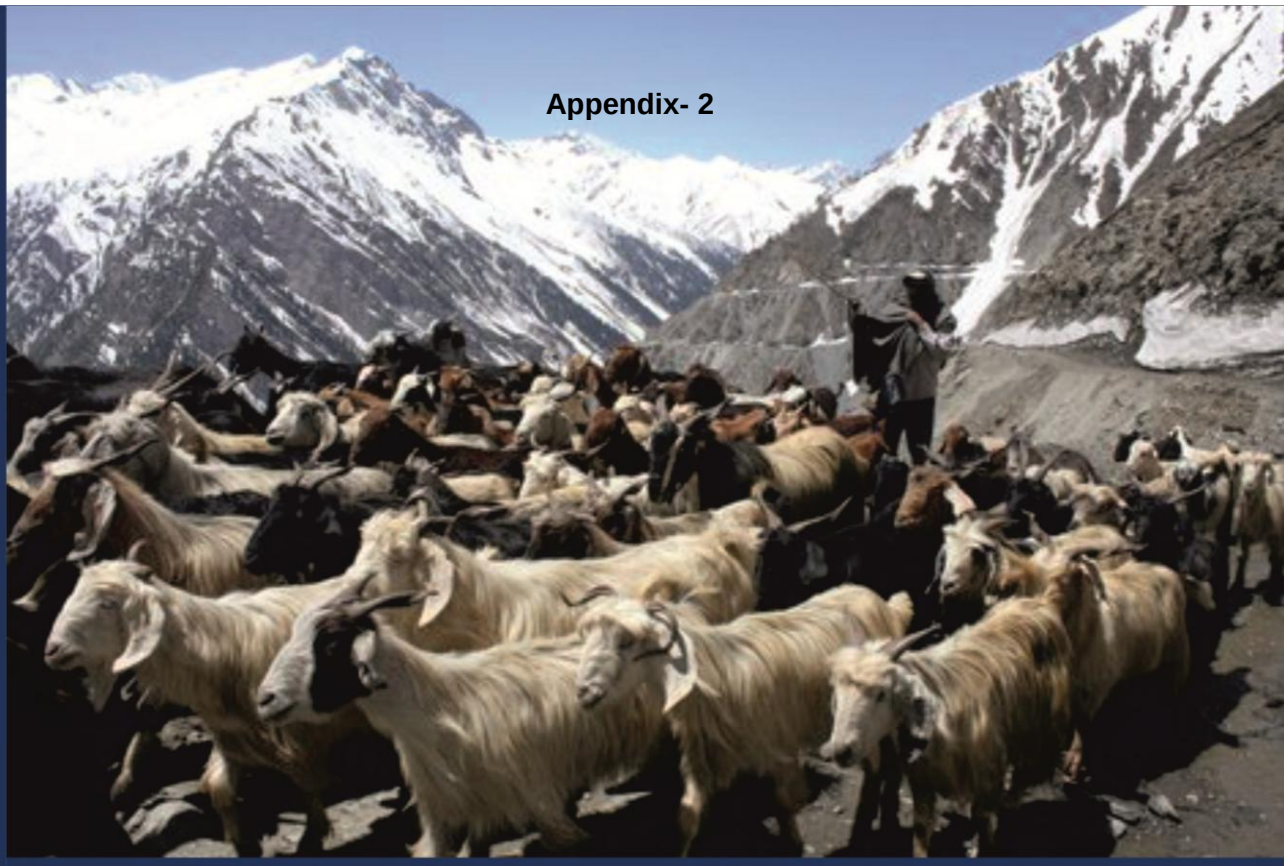
Coordinates of locations for data collection

Circle	Village	Latitude	Longitude
Chamba	Saho	32.60299	76.23332
Chamba	Kalsra	32.72184	76.04642
Chamba	Nirohi	32.72272	76.04599
Chamba	Dand	32.72323	76.05088
Chamba	Shaldn	32.72391	76.05354
Chamba	Guwadi	32.72243	76.05689
Chamba	Salwan	32.71882	76.05386
Chamba	Banjedu	32.71916	76.05824
Chamba	Kasni	32.7201	76.0476
Chamba	Maida	32.75256	75.98557
Chamba	Meru	32.72024	76.04339
Chamba	Muled	32.7201	76.04734
Chamba	Jaroy	32.72133	76.04142
Chamba	Duggu	32.72797	76.03691
Chamba	Bhir	32.72111	76.05566
Kullu	Sainj	31.76483	77.30076
Kullu	Banjar	31.63555	77.35353
Kullu	Jari	31.99913	77.24292
Kullu	Kasol	32.00486	77.31059
Kullu	Bhutti	31.33254	77.52406
Kullu	Keylong	32.57658	77.02269
Mandi	Bhekli	31.46354	77.31566
Mandi	Pawara	31.45797	77.31854
Mandi	Baila	31.47097	77.3038

Mandi	Baksajal	31.45574	77.32124
Mandi	Kataru	31.46202	77.30738
Mandi	Sarachi	31.4726	77.30182
Mandi	Pushadgarh	31.47787	77.29508
Mandi	Pangna	31.38625	77.11917
Mandi	Jhungi	31.39378	77.10764
Mandi	Barnog	31.40769	77.11661
Mandi	Mahunag	31.29784	77.21691
Mandi	Mana	31.34283	77.12985
Mandi	Thora jajar	31.35895	77.12178
Mandi	Baghair	31.3761	77.1017
Mandi	Dali	31.66749	76.72586
Rampur	Kamroo	31.43502	78.2642
Rampur	Bari	31.53561	77.92298
Rampur	Boning saring	31.42259	78.27717
Rampur	Sangla	31.42443	78.26362
Rampur	Narkanda	31.26041	77.45889
Rampur	Nankhari	31.30901	77.58187
Shimla	Gumna	31.24441	77.83823
Shimla	Patala	31.31832	77.72234
Shimla	Kaderla	31.25259	77.6499
Shimla	Thachli	31.17777	77.10331
Shimla	Khabal	31.08614	76.80033
Shimla	Sansog	31.08614	76.80033
Shimla	Kulgaon	31.20155	77.86132
Shimla	Paijail	31.04524	77.16059
Shimla	Goro	31.04664	77.15853
Shimla	Banadi	31.048	77.15755
Shimla	Anand pur	31.04728	77.14822
Shimla	Pulbaal	30.92728	77.45159
Shimla	Rarat	31.00248	77.55791
Shimla	Gurla	31.03006	77.11003
Shimla	Bisha	31.00212	77.13459
Shimla	Kunala	31.04293	77.14532
Solan	Chail	35.97275	77.19431
Solan	Dharampur	30.90097	77.02133
Solan	Solan	30.86491	77.16723
Solan	Rangah	30.86936	77.16861
Solan	Annu	30.87356	77.17135
Solan	Badhlag	31.06224	76.90598
Solan	Verti natti	30.92548	77.08225
Solan	Joghon	31.10692	76.60383
Solan	Ramgarh	31.08614	76.80033
West Jammu	Reasi	33.08	74.83659

West Jammu	Arnas	33.18348	74.81954
West Jammu	Kodi	33.1591	74.865
West Jammu	Mahore	33.31333	74.85588
West Jammu	Gool	33.2679	75.00443
West Jammu	Gulabgarh reasi	33.42258	74.92547
West Jammu	Sungri	33.35154	74.77767
West Jammu	Chasana	33.35879	74.74066
West Jammu	Poonch	33.76681	74.09753
West Jammu	Maendhar	33.60509	74.14244
West Jammu	Loran	33.83269	74.32521
West Jammu	Mandi	33.79438	74.25431
West Jammu	Surankote	33.63896	74.26133
West Jammu	Mathwar	32.92303	74.84261
West Jammu	Akhnoor	32.90117	74.74924
Chenab Jammu	Bhaderwah	32.980728,	75.72218
Chenab Jammu	Thanala	32.92117	75.77124
Chenab Jammu	Marmat	33.05414	75.46724
Chenab Jammu	Doda	33.14125	75.54435
Chenab Jammu	Batote	33.12163	75.31644
Chenab Jammu	Kishtwar	33.3248	75.75832
Chenab Jammu	Gulabgarh padar	33.26648	76.15575
Chenab Jammu	Haako palali	33.35565	76.21157
Chenab Jammu	Qaderna	33.64711	75.70518
Chenab Jammu	Astangam	33.667	75.7132
Chenab Jammu	Yurod	33.66488	75.71672
Chenab Jammu	Paddar	33.26279	76.14534
Chenab Jammu	Atholi	33.26522	76.16203
East Jammu	Ramnagar	32.80664	75.31433
East Jammu	Chatriadi	32.79119	75.44802
East Jammu	Basantgarh	32.81026	75.54684
East Jammu	Billawar	32.61871	75.60288
East Jammu	Basohli	32.50168	75.81519
East Jammu	Bani	32.70751	75.81605
East Jammu	Dudu	32.81002	75.54619
East Jammu	Barmota	32.77457	75.79694
East Jammu	Lowang	32.78115	75.79578
East Jammu	Kindli	32.75074	75.60593
East Jammu	Machedi	32.70248	75.59922

Appendix- 2



Utilization of Non-Timber Bioresources of North West Himalayas for Optimizing Livestock Health and Production

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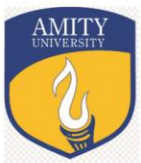
National Mission on Himalayan Studies (NMHS) Project
"Availability, Utilization and Digital Documentation of Non-Timber Bioresources for Sustainable Rural Livelihood and Decision Support System of the Households in North-West Himalayas"



Utilization of Non-Timber Bioresources of North West Himalayas for Optimizing Livestock Health and Production

Nanda, Sharma, Pathak, Raina, Peshin, Sharma & Jeelani

Appendix 3-A

A workshop/ meeting was conducted with the NTBR collectors was held at Saho Village (Chamba Forest Circle, Himachal Pradesh) on December, 20, 2019, under the National Mission on Himalayan Studies (NMHS) Project of Ministry of Environment, Forest and Climate Change **"Availability, Utilization and Digital Documentation of Non-Timber Bio resources for Sustainable Rural Livelihood and Decision Support System of the Rural Households in North-West Himalayas"**

The workshop/ meeting was inaugurated by Dr. Rakesh Nanda, Principal Investigator, SKUAST Jammu, Dr. B. S. Hansra, Co-PI, Amity University, Noida and Dr. Rajinder Peshin, Co-PI, SKUAST Jammu. During the meeting they apprised the participants about the objectives of the project. The session was satisfactory with prolonged discussion of the organizers with the NTBR collectors of Chamba region. The NTBR collectors discussed their problems and constraints in NTBR collection and also provided suggestions.

A total of 17 NTBR collectors of Chamba region in Himachal Pradesh were sensitized with niche markets for the trade of NTBRs. Dr. Rizwan Jeelani, JRF, SKUAST Jammu and Mr. Gaurav, JPF, Amity University, Noida, Uttar Pradesh ensured the documentation and smooth conduct of meeting.

PI and Co-PI interacting with the NTBR collectors of the Chamba Forest Circle in Himachal Pradesh.

NTBR collectors of the Chamba Forest Circle in Himachal Pradesh.

Please find the links to high resolution photos and videos related to the project "*Availability, Utilization and Digital Documentation of Non-Timber Bioresources for Sustainable Rural Livelihood and Decision Support System of the Rural Households in the Northwest Himalayas*"

Photo links:

skuastjnmhs.wordpress.com Official website of project with selected photographs and videos.

Video links:

https://youtu.be/0mYEiF-svJs **Gujjar leader of Chamba speaking about the constraints faced by their community in forests of HP.**

https://youtu.be/tdUK-SNv0jM **PI, Co-PI's and Research Fellows interacting with the NTBR collectors in Chamba, Himachal Pradesh.**

https://youtu.be/Zwniixc5Bl0 **Co PI creating awareness in NTBR collectors.**

https://youtu.be/5VDt0maujgA **Gujjar leader giving suggestions for upliftment of hilly community in Chamba HP.**

Attendance of Participants

Attendance Sheet

Attendance sheet of the participants in meeting/ workshop on date: 20-12-19 at place: Chamba (H.P) ..... under National Mission on Himalayan Studies (NMHS) funded project **"Availability, Utilization and Digital Documentation of Non-Timber Bioresources for Sustainable Rural Livelihood and Decision Support System of the Rural Households in the Northwest Himalayas"**

S. No.	Name of Participant	Signature
1.	Hazi Akbar 8894251644	
2.	Fateh Mohammad 8894110598	
3.	Hasan Din	
4.	Fateh Mohammad 9816053371	
5.	Sadik Mohammad 6230301982	
6.	Gulam Rassul 9805912950	
7.	Mushtaq Ali 7907404301	
8.	Bashir 9805712585	
9.	Mohammad Saim Kakul 8628811255	
10.	Dalbir 9857173538	
11.	Mohammad Rafi	
12.	Gulam Rasool 8894170957	
13.	Yusuf	
14.	Fateh Mohammad 9816221663	
15.	Ismail 9805116501	
16.	Nizamudin	
17.	Mohammad Khan 9805201176	

Appendix 3-B

A two days training cum workshop of the veterinarians of Jammu and Kashmir entitled, "**Role of Non-Timber Bioresources in Rural Livelihood of North West Himalayan Region**" was held at Faculty of Veterinary Sciences & Animal Husbandry, SKUAST Jammu, R. S. Pura on February, 19-20, 2020., under the National Mission on Himalayan Studies (NMHS) Project of Ministry of Environment, Forest and Climate Change **"Availability, Utilization and Digital Documentation of Non-Timber Bio resources for Sustainable Rural Livelihood and Decision Support System of the Rural Households in North-West Himalayas"**

The workshop cum training was inaugurated by Dr. Rajinder Raina, Dean, Faculty of Veterinary Sciences & Animal Husbandry, SKUAST Jammu, R. S. Pura and Dr. R. K. Sharma, Head, Division of Animal Nutrition, Faculty of Veterinary Sciences & Animal Husbandry, SKUAST Jammu, R. S. Pura.

A total of 21 veterinarians from Animal/Sheep Husbandry Departments of Jammu and Kashmir and SKUAST Jammu participated in the training, who would act as change agents in their respective places of posting in the North-Western Himalayan regions of Jammu and Kashmir.

Time	Topics
Day 1	
1000-1030 hrs	Registration and inaugural session
1030-1130 hrs	Tree and shrub foliages as potential feed resources for livestock of North-West Himalayas (Theory) Dr. R. K. Sharma
1130-1230 hrs	Quality assurance and nutrient evaluation of feed resources of North-West Himalayas (Theory) Dr. R. K. Sharma
1230-1330 hrs	Nutritive potential of highland weeds in North-West Himalayas (Theory) Dr. Ankur Rastogi
1330-1415 hrs	Lunch
1415-1500 hrs	Overcoming nutritional disorders in the migratory livestock of North-West Himalayas (Theory) Dr. Nazam Khan
1500-1700 hrs	Formulation and preparation of Multi-Nutrient and Densified Complete Feed Blocks by use of feed resources of North-West Himalayas (Practical) Dr. A. K. Pathak
Day 2	
1000-1100 hrs	Overcoming nutritional stress in the migratory livestock of North-West Himalayas (Theory) Dr. Ankur Rastogi
1100-1200 hrs	Anti-nutritional factors present in feeds and fodders of North-West Himalayas and their management (Theory) Dr. Nazam Khan
1200-1300 hrs	Medicinal plants of North-West Himalayas and their role in health and production of livestock (Theory) Dr. Rizwan Jeelani
1300-1345 hrs	Lunch
1345-1430 hrs	Availability of NTBRs and their extraction methods in North-West Himalayas for sustainable livelihood security of the local community (Theory) Dr. Rizwan Jeelani
1430-1630 hrs	Quality enhancement of feed resources of North-West Himalayas by Urea-Ammoniation and ensiling (Practical) Dr. A. K. Pathak
1630-1700 hrs	Valedictory Session

Dr. K. S. Risam, the Hon'ble Vice-Chancellor of SKUAST Jammu was the chief guest at the valedictory function. The participants expressed satisfaction from the training cum workshop. Dr. Rizwan Jeelani, JRF, SKUAST Jammu presented the vote of thanks.

Training cum workshop participants at SKUAST Jammu along with Ex-VC- Dr. K. S. Risam, Ex-Dean, F.V.Sc & A.H.- Dr. Rajinder Raina, Training Coordinator- Dr. R. K. Sharma, PI-Dr. Rakesh Nanda and JRF-Dr. Rizwan Jeelani

Demonstration of making compact feed blocks from tree leaves/ forest shrubs for livestock (block created and being shown to participants)

Demonstration of making compact feed blocks from tree leaves/ forest shrubs for livestock (compressing)

Lecture being delivered by Dr. R. K. Sharma, Prof. & Head, Div. of Animal Nutrition, to the training participants at F.V.Sc & A.H, SKUAST Jammu, R. S. Pura on 19-02-2020

Attendance Sheet

Attendance sheet of the participants in workshop cum training programme on date: 19-02-2020 at place: Division of Animal Nutrition, SKUAST-Jammu under National Mission on Himalayan Studies (NMHS) funded project **"Availability, Utilization and Digital Documentation of Non-Timber Bioresources for Sustainable Rural Livelihood and Decision Support System of the Rural Households in the Northwest Himalayas"**

S. No.	Name of Participant	Signature
1.	Dr. J. P. Sumbria	19/02/2020
2.	Dr Jaswant Singh	
3.	Dr Imran Gaffar	
4.	Dr. Saleem Qazi	
5.	Dr. Faheem Abdul Basit	
6.	Dr. Ghulam Mustafa	
7.	Dr Arif Ashraf Kichloo	
8.	Varsha Sharma	
9.	Dr. Ambika Meena	
10.	Dr. Shakshi Gupta	
11.	Dr. Komal Chauhan	
12.	Dr. Gagandeep Kour	
13.	Dr. Rakesham Jeelani	
14.	Dr Parveen Kumar	
15.	Dr. Rohan Kumar Sharma.	
16.	Dr. Nitu Dubey	
17.	Dr-Ravi Kumar	
18.	Dr. Rohit Kumar	
19.	Dr. Varsha Goswamy	
20.	Dr. Deepsanjali Verma	
21.	Dr. Nitika Singh Jamwal	
22.		

Attendance Sheet

Attendance sheet of the participants in workshop cum training programme on date: 20-02-2020. at place: Division of Animal Nutrition, SKUAST-Jammu under National Mission on Himalayan Studies (NMHS) funded project **"Availability, Utilization and Digital Documentation of Non-Timber Bioresources for Sustainable Rural Livelihood and Decision Support System of the Rural Households in the Northwest Himalayas"**

S. No.	Name of Participant	Signature
1.	Ambika Meenia	Ambika
2.	Shakshi Gupta	Shakshi Gupta
3.	Komal Chauhan	Komal
4.	Dr. Nitika Singh Jalmeria	Nitika
5.	Rohan Kumar Sharma	
6.	Dr. Ketan Dubey	
7.	Dr Jaswant Singh	
8.	Imran Ahmad Ganai	Imran
9.	Ghulam Mustafa	
10.	Faheem Ahm. Bhat	Faheem
11.	Asif Ashraf Kirmani	
12.	Gagandeep Kour	Gagandeep Kour
13.	Rakhshan Jeelani	
14.	Dr Parveen Kumar	Parveen
15.	Dr. J.P. Sumbria	
16.	Saheem Goni	
17.	Varsha Sharma	
18.	Dr. Ravi Arora	
19.	Dr Rohit Kumar	
20.	Dr. Varsha Goswamy	
21.	Dr. Deepanjali Verma	Deepanjali
22.		

Appendix 3-C

A two days workshop on **"Important Non-Timber Bio resources: Source of Livelihood for Rural Folks"** was held at Narag, District Sirmaur (Nahan Forest Circle, Himachal Pradesh) w.e.f. February, 4-5, 2021, under the National Mission on Himalayan Studies (NMHS) Project of Ministry of Environment, Forest and Climate Change **"Availability, Utilization and Digital Documentation of Non-Timber Bio resources for Sustainable Rural Livelihood and Decision Support System of the Rural Households in North-West Himalayas"**

Inaugural Session

The Workshop was inaugurated by Dr. O.P. Sharma, Ex- Director of Extension, Dr. Y.S. Parmar University of Horticulture and Forestry, Solan. During his inaugural address he discussed the role of Non-Timber Bio resources in developing rural economy particularly from wild pomegranate (*Daru*) in Narag area. He said that this crop is predominant in the area in Himachal Pradesh. The plants grew in the forest areas and now some farmers had also planted them in their own fields for sustaining their livelihood. He further pointed out that there is no regulated marketing system of this produce in the region.

Dr. B. S. Hansra, Co-PI, Cordinator of the workshop from Amity University, Noida, Uttar Pradesh, in his welcome address to the guests and farmers (male and female) shared the importance of Non-Timber Bioresources in the area and also apprised them about the purpose of the workshop. In all 30 participants, farmers and farm women participated in this workshop. Mrs. Vaishali Tomar Pradhan of Narag Panchayat thanked the organizers for choosing their panchayat as venue for the workshop. She also deliberated for the wild pomegranate (*Daru*) to be very important NTBR of the area and dependence of locals on it for their livelihood.

(Workshop in progress)

(Participants with the Co-PI, JRF and experts)

Day 1

A total of three lectures were delivered to the participants:

1. **Non-Timber Bioresources and their importance,** by; *Dr. O. P Sharma, Former Director Extension ,YSPU Horticulture and Forestry, Nauni, H.P*.
2. **Scenario of Non-Timber Bio resources in Himachal Pradesh,** by; *Dr. Prashant Sharma, Department of Agro-forestry, YSPU Horticulture and Forestry, Nauni, H.P.*
3. **Community Dependence on Non-Timber Bio resources**, by; *Mr. Varun Barwal Department of Agro-forestry YSPU Horticulture and forestry, Nauni, H.P*.

Day 2

A total of three lectures were delivered to the participants:

1. **Problems faced by Collectors in Collection of Wild Pomegranate**, by; Mr. Vinod Ranta Forest Range Officer, Rajgarh Forest Division Department of Forest Himachal Pradesh.
2. **Availability of NTBRs and their Extraction Methods in Himachal Pradesh for Sustainable Livelihood Security of the Local Community**, by; Mr.Gaurav JPF, Amity University Uttar Pradesh
3. **Commercial cultivation of Non Timber Bio resources**, by; Dr. Priyank Sharma Department of Agribusiness Management, YSPU Horticulture and forestry, Nauni.
4. **Marketing of NTBRs for the improvement of Rural Livelihood**, by; Dr Pankaj Thakur Department of Agribusiness Management, YSPU Horticulture and forestry, Nauni.

Valedictory Session

Mr. Vinod Ranta, Forest Range Officer, Rajgarh Forest Division, Department of Forest, Himachal Pradesh was the chief guest of the session. He thanked the organizers for organizing this important workshop. He lauded the organizers for topics to be relevant for this region and expressed satisfaction that the farmers will follow the recommendations from the workshop.

Mrs. Vaishal Tomar Pradhan of Gram Panchayat Narag, thanked the chief guest and organizers for this appropriate and timely workshop for the NTBR collectors. Mr. Gaurav, JPF, Amity University, Noida, Uttar Pradesh proposed the vote of thanks.

(Inaugural of the workshop at Nauni, Himachal Pradesh)

(Experts delivering the lectures during the workshop)

Attendance of the Participants

Attendance Sheet

Attendance sheet of the participants in meeting/ workshop on date: 4 Feb 2021 at place: NARAG, SIRMAUR ...under National Mission on Himalayan Studies (NMHS) funded project **"Availability, Utilization and Digital Documentation of Non-Timber Bioresources for Sustainable Rural Livelihood and Decision Support System of the Rural Households in the Northwest Himalayas"**

S. No.	Name of Participant	Signature
1.	Robert Atri	
2.	Jangvir Singh.	
3.	Jethender Singh	
4.	Nisha Thakur	
5.	Hemlata	
6.	Anjana Panwar	
7.	Navneet Singh	
8.	VIKRANT PANWAR	
9.	Sandeep	Sandeep
10.	Nagender Atri	
11.	Sachin	Sachin
12.	Sukh dev	
13.	VIKRAM SINGH	
14.	Prashant Panwar	
15.	Mukesh Verma	
16.	Shanker Sag	

17.	Vaishalee Tomar	Vaishalee.
18.	Tara Chand	
19.	Ramesh Singh	
20.	Jagdev Singh	
21.	Vinod Kumar	
22.	Kuldeep Singh	
23.	Kailash Panwar	
24.	Mohd Panwar	
25.	Arun Panwar	
26.	Priyanka	
27.	23/4/21	
28.	Nek Ram Thakur	
29.	Radha Bala	
30.	Kushan Kumar	Kushan Kumar
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Attendance Sheet

Attendance sheet of the participants in meeting/ workshop on date: 5 Feb 2024 at place: .....Naraq, Sirmaur.....under National Mission on Himalayan Studies (NMHS) funded project **"Availability, Utilization and Digital Documentation of Non-Timber Bioresources for Sustainable Rural Livelihood and Decision Support System of the Rural Households in the Northwest Himalayas"**

S. No.	Name of Participant	Signature
1.	Bhupender Panwar	
2.	Sitaram	
3.	Bhupender Singh	
4.	Sita Ram	
5.	Mukesh Verma	
6.		
7.	Kamal Panwar	
8.	Hemlata	
9.		
10.	Ajay Sharma	
11.		
12.	Narpat Singh	Narpat Singh
13.	Naresh Panwar	
14.		
15.	Avinash Panwar	
16.	Karan Singh	

17.	Jagdev Singh	
18.	Vaffali Tomar	
19.	Sachin	Sachin
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Appendix –4

(Mail received from a contractor)

With due respect. I Arshid Raja prop of Arshid Raja Enterprises want to say that Since 2005, I am working with herbs and shrubs, firstly, on my father's card and in 2014,I got my own card I.e A-Class MFP forest Contractor card.We face a lot of problems in work as in 2003 MFP (Major Forest Products) and many petty items were banned. Than, in 2013 the tender was issued but only for one item and i.e varch meetha(Naag Shatri) but at the time when its season was gone. And on that time some person's didn't go for the reasonable tendering and give high rates and also didn't pay it's royalty. Those person's should be black listed but they were not and nor any action were taken against them. Again in 2014, the tender was issued in which, I also take the tender from shopian division and also pay it's royality of Rs 6-7 Lacs to government but unfortunately flood occurs and I can't start working on it. My, that royality is still with the government and the government department didn't adjust that royality. Sir, I want to say that in Kashmir, we have many MFP and petty items but the forest department doesn't pay any attention. The (forest department) is not issuing tender for these items, so many families and Gujars Will get their earnings from it and also government department get the GST and royality benefit from it.

In short, we want to know the reason, why the forest department is not giving attention to it. The forest department also makes hinderance to the items which we cultivate from private lands like obuj, Haand, Moharkash Aftimoon and many more items. They didn't make us to function our work smoothly.

At the time of LOC trading, I buy the items from locals as, I have my own registered Depo and again they create hinderance. I have to send these items to out of the state as I work with many pharmacies. The forest department forced us to manage full truck inspite of the required quality that may be 500 kg's to 1000 kg's.

Another problem which we are facing is, if we want to send our costly items like moral mushrooms in cargo or through by Air they didn't issue us Form 25.

In kashmir division we have many MFP products like Aatis, Aag, kuthki, Mushkbala, kali zeeri, Asrateen, Belladonna leaves and roots, Findak, Guchies, Gawzaban, Dhoop, Dandelion, jungli lasan, pushkar mool, Resha Khatami, Ring seed, Soe Mool, suranjan kadvi, Yarrow and many more items.

With Regards

Arshid Raja

ARSHID RAJA ENTERPRISES.
A-Class Forest Contractor Regd. with Forest Dept.
Industrial Estate Zainakote HMT Srinagar Kashmir J&K-190012.
Deals in: Herbs & Shrubs, Medicinal Plants & Aromatic Plants, Dry Fruits & Spices.