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TRADITIONAL ECOLOGICAL WISDOM AND MANAGEMENT OF BIORESOURCES AMONG GADDI COMMUNITY OF CHAMBA

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ABSTRACT:

Forests act as main source of food, fiber and building materials required for the survival and income generation by the indigenous people besides acting as safety net at the time of difficulty. Living in vicinity to these resources and their consistent use enables the Gaddi communities to evolve a mechanism for the protection and sustainable utilization of bio-resources. The indigenous wisdom is expressed in various cultural practices of local people and constitutes an integral component of Gaddi community. Generally known as conventional ecological wisdom, such wisdom is used by the Gaddis to develop bio-resource management systems, procedures and practices so as to ensure the continuous supply of forest products and other benefits. This paper is an outcome of the study conducted on Gaddi community living in selected panchayats of Chamba district of Himachal Pradesh. The forest conservation is an important component of Gaddi's conservation practices developed over the years and passed down from one generation to another. The management practices followed by Gaddis have evolved under different biophysical and cultural settings and thus vary from rest of the society. The study enumerated the ethno-botanical uses of

74 plants, in addition to conservational practices followed by them and concluded that natives inhabiting the study area possess rich ethno-ecological knowledge, which needs to be preserved.

KEY WORD: *Traditional Ecological Wisdom, Bioresources, Pastoralism, Ethno-biological.*

INTRODUCTION:

Modern economy is resource based economy and the development of a nation is based on the availability of its resources. Natural resource includes air, water, soil, minerals, flora and fauna etc. In this changing scenario of unrestricted exploitation of bio-resources, the indigenous communities have traditionally inherited the mechanism of conserving nature's bounty. Today, 80 percent of world's population relies on indigenous knowledge for fulfilling its basic needs including the therapeutic support and remaining half to two third of world's population depend on traditional utilization of plants and animals for its sustenance (RAFI, 1997). The Indigenous Knowledge (IK) is the knowledge that the people in a community have developed over a period of time and continue to develop. This knowledge is unique to every culture or society and governs the management of its natural resources, provides basis for decision making in agriculture, healthcare, etc.

Wade (1987) studied the management of Common Property Resources (CPRs) in south India and concluded that private property regimes and state controlled regime are expensive than collective action in the management of community property resources. Bora, *et al.* (2003) studied the traditional utilization pattern of natural resources by Galos community in Arunachal Himalayas with emphasis on *jhum* and terrace agriculture, cropping pattern and ecological pest control methods. A research investigation by WWF (2004) on traditional ecological wisdom and role of traditional institutions in sustainable utilization of natural resource in Sikkim and Darjeeling Hills revealed that in order to understand the interaction between the ecological and social pressure, there is need of realizing the traditional ecological knowledge. A survey conducted by Menon and Vadivelu (2006) to assess the utilization of CPRs across different agro-climatic conditions concluded that landless poor in hilly areas are dependent on CPRs.

Oli and Dhakel (2008) studied the significance of traditional knowledge pertaining to utilization of natural resources in Himalayan region. Raj (2010) conducted case studies on Adi's tribes of eastern Himalayas and found that the traditional ecological wisdom, management techniques and democratic system called '*Kebang*' have facilitated in sustainable utilization of resources. Kala (2011) studied the traditional ecological knowledge in the conservation of Biodiversity in Pachmarhi Biosphere reserve and found that traditionally laid customary practices help the local communities in the conservation of sacred grooves. Nimchow *et al.* (2011) after studying the traditional conservation

mechanism of bio- resource management by Aka tribe of Arunachal Pradesh concluded that these tribes have diverse beliefs and convictions regarding the utilization of forest produce which help in conservation of forest resources. Baruah (2014) investigated the role of Rajbongshi community in natural resource management and found that biophysical and social factors such as immigration and migration have changed the belief system of these communities. He analyzed that the rules and regulation and adherence to traditional taboos and totems are crucial for conservation and management of resources. Kandri, *et al.* (2014) evaluated the role of traditional and indigenous communities in conservation of grooves. Being sacred, the sociocultural and religious practices used by the rural communities, help in the conservation of bio-resources. Rao (1997) in his study on bioresource management in Himalayas inferred that principles of conservation and preservation of bioresources are deeply embedded in the religious, cultural traditions of indigenous people and emphasized on revitalization of age-old cultural values. Sharma, *et al.* (2014) carried out study on pastoralism in the Gaddi, Gujjars and Kinnaurs communities and described the transhumance practices, ethnicities and migration pattern among these pastoralist communities. They observed that each pastoralist communities follow traditional rules in distributing and managing the bioresources among themselves.

METHODS AND METHODS:

The study was conducted in Guwad Panchayat and Sarahan Panchayat of district Chamba. The study area has fertile and farmable agricultural lands, which permits the cultivation of a variety of crops and vegetables. The main crops grown in the area are *Triticum aestivum*, *Hordeum vulgare*, *Brassica rapa*, *Dolichos Biflorus*, *Zea mays*, *Pisum sativum*, *Paspalum scrobiculatum* and *Cicer arietinum*. Study site has rich floral and faunal wealth.

DATA COLLECTION

To document the traditional ecological wisdom and management of bioresources among Gaddi community, a pilot survey followed by a number of field surveys were carried out in the study area. Respondents, comprising of village heads, herbalists and priests, women groups who had good knowledge of plants, were consulted. Semi-structured questionnaires, interviews and participatory rural appraisal methods were employed to gather information from the informants besides other standard methods of getting ethno-botanical information suggested by Jain, 1997, Martin, 1995 and Cotton, 1996. Information on vernacular name of plant, part utilized and purpose was documented. The plants enumerated during surveys were identified using the available Floras.

DEMOGRAPHIC PROFILE OF SURVEYED PANCHAYATS

Gaddis are the nomadic herders who travel in the winter season with flock of sheep from higher pastures to lower ones and in summers from lower pastures to higher ones. The term Gaddi is a generic name but they have different social classes. They are found around Dhauladhar Mountains. They call this region *Gadheran* or 'the land of Gaddis'. For Gaddis, the mighty Dhauladhar is not just a mountain range, but like a mother's lap. At present they can be categorized as- voyaging Gaddis who still follow the nomadic way of life and the sedentary group, which is settled at one place and continue with farming as a major occupation. The present study focuses at the Gaddis of Guwad and Sarahan panchayat, many of those who are sedentary. The study area is located in district Chamba of Himachal Pradesh. Households and population details of the two panchayats are presented in table 1. In all, there are 987 households in both the panchayats, consisting of 375 households in Guwad panchayat and 612 in Sarahan panchayat. Total population of two panchayats as per Panchayat Parivar Register is 4412 consisting of 2213 males and 2199 females. Total scheduled caste population as per Panchayat Parivar Register in the two panchayats is 619, comprising of 306 males and 313 females.

PROFILE OF THE RESPONDENTS

In all 31.6 percent female respondents and 68.4 percent male respondents (table 2) were interviewed using semi-structured questionnaire. The age-wise distribution of respondents is presented in Table 3. Majority of respondents (28.5 percent) belonged to the age group of 36-45 years, followed by 25 percent from 46-55 years of age group and 21.4 percent from 26-35 years age group. Only 15 percent of the respondents were from 15-25 years age group. Education is a vital factor for speeding up the process of economic development of any society as it represents the quality of available human resource. The educational status of the respondents is presented in Table 4. Educational qualification of respondents was recorded and placed under six categories, i.e., illiterate, up to fifth standard, matric, up to 12th, up to Graduation and up to Post-Graduation. The distribution of respondents in different educational groups shows that bulk of the respondents (n=50) were illiterate, followed by matriculate (n=14), up to 5th (n=10) and up to 12th (n=4). Only 3.4 percent of the respondents were Graduates and Post Graduates.

RESULTS:

TRADITIONAL KNOWLEDGE AND MANAGEMENT OF BIORESOURCES

The significance of forests in Gaddis way of life is evident in their ethnicities and customs. In the yesteryears and even today, various forest products have been used in one way or the other in almost

every phase of socio-cultural mores. While there is a big demand for timber, large patches of dense forests can still be seen in the study area. This can be attributed to the conventional forest management ways followed by the indigenous communities from the times of yore. Traditionally the forests are classified as:

Banaru- Dense forests of oak (*Quercus* sp.)

Chilaru: Dense forests of pine (*Pinus roxburghii*)

Piakaari: Dense forest of piak (*Alnus nitida*)

Chindhard: Forest of chindi (*Neolistea pallens*)

Bhujlu ri bhi: Forests with distribution bhujlu (*Amaphalis adanata*)

Dev Van: Sacred forest

The sacred and restricted forests offer services, for instance, fortification of upper watershed catchments, protection of biodiversity and medicinal plants and each forest type is believed to offer different services to the people.

The concept of sacredness and its relationship with deity helps in the conservation and protection of entire community. Besides this, there are certain mountain areas dedicated to local deity where destruction of forest is prohibited. Before starting any work in the forests, the people take a pledge in front of the deity that the forests will be utilized in judicious manner. In Guwad Panchayat the main sacred grooves are located at Bhaala and Jammuhar. These grooves are occupied by trees of diar (*Cedrus deodara*). In Sarahan Panchayat, the sacred grooves are located at Barehi and Raan.

The Gaddis association with forests and mountains has a socio-religious connotation. Their activities are innately linked with land and forests and have important bearing on the conservation of forest. The Gaddis have faith in innumerable mystic phenomenon associated with mountains, water sources, trees, etc. and they adore them. Forests, farming lands, sacred groves, water springs and mountaintops are believed to be the transcendental realms of supernatural entities and thus numerous socio-religious rituals are performed at these places. The forest, rivers and trees are considered holy and damaging or misusing them is strictly prohibited. Such beliefs and practices have helped legalized the use of forest products and management of land and forests resources.

The plants besides having biological importance, have socio-religious and sacred connotations. Forest patches have been dedicated for local deities and norms have been devised for sustainable utilization of these. A number of plants have religious significance, the reason being, that these are either related to the deities or offered to the deities. Some of them are:

Akroat (*Juglan regia*): The fruit is considered sacred and used for performing worship at the time of birthday. In this, the priest uses walnut along with *dori*, the sacred thread and *druv* (*Cynodon dactylon*);

Aaru (*Prunus persica*): The tree is considered auspicious. The hair collected at the time of *Mundan*, the hair cutting ceremony, are tied in a cloth and kept on the branches of this tree, before offering them to the deity;

Galgai (*Citrus pseudolimon*): The leaves of this plant are intertwined with the ropes of *Bichhubuti* (*Urtica dioica*) or *Dhaman* (*Grewia optiva*), which is known as *Shaand*, and tied around the house during the house energizing ceremony;

Diar (*Cedrus deodara*): The trees are linked with *Nag devta* or the serpent deity. Cutting of Deodar is strictly prohibited in the sacred patches and temple premises;

Chil (*Pinus roxburghii*): These are associated with *Nag devta*. Pine needles are used to decorate gates during the religious functions or marriage ceremony;

Chihu (*Rhododendron arboreum*): The rhododendron flowers are worshiped along with the colors on the auspicious occasion of Holi festival. Its leaves are used for making leaf plates and bowls;

Peepal (*Ficus religiosa*): Considered sacred, hence worshipped by the people;

Shapdotri (*Berginia ligulata*): For making *pattal* (leaf plate) and *dunna* (leaf bowls) for worship and serving food. The leaf plates are also used during the social functions.

Karngora (*Prinsepia utilis*): Considered sacred bush, thus its twigs are kept at the doors and entrance of house on the occasion of *Mahashivratri*. The twigs are retained till Holi festival and burnt on the eve of Holi.

The timber is also considered sacred because the same is used by local deity.

COLLECTION OF MINOR FOREST PRODUCTS

Curative herbs, wild edibles, rhizomes and fodder are gathered for self-consumption and domestic animals. List of the plants collected from forests are listed in Table 6. The information of enumerated plants pertains to- vernacular name, botanical name, parts used and ethno-botanical use (Table 6). The study identified 74 plants out of which 21.6 percent were used for medicinal purpose in addition to other uses. Most of the plants were herbs (40.5 percent) followed by trees (39.1 percent), shrubs (14.8 percent), and grasses (5.4 percent). Some of the enumerated plants are used for other purposes like magico-religious purpose, wild edibles, fodder and fuel.

However, the people are not much aware of the commercial values of wild edibles. According to 86.67 percent respondents, wild edibles are not sold, though chihu (*Rhododendron arboreum*) and kasrod (*Diplazium esculantum*) are sold seasonally in the local market (table 5).

In all, according to 63.33 percent respondents, the livelihood of people is dependent on forests. 66.66 percent informants revealed that forests are used for getting fuel wood, followed by 51.66 percent who obtain medicinal plants (table 7). Respondents told that in the past only the traditional healers and folk herbalists used to gather the medicinal plants. The plant was not gathered if its utility was not known. But, with the increasing demand in the market, the medicinal plants are gathered harshly without taking into account the conservational issues.

All respondents collect fuel wood and fodder from the forests. Even though the people are not provided with rights to collect the forest products, they hold customary rights, which govern the utilizing of forest products in a sustainable manner and 38.4 percent respondents were of the view that forest products have been utilized through conventionally evolved mechanism (table 8).

73.33 percent of the respondents were satisfied with the mechanism being followed for fair utilization of forest products (table 5). All respondents expressed that forest products are getting depleted due to increase in population and negligence on the part of forest department. People stated that because of depleting forest resources, they are facing problems, for instance, availability of fuel wood and fodder has reduced. People said that probable causes for depletion of forests includes, illegal felling of timber, negligence of forest department, illegal trade of medicinal plants and cutting of trees for fuel wood, timber, etc. Patches of *Cedrus deodara* and *Abies pindrow* have decreased and this has affected the availability of fodder, fuel wood and wild edibles. However, the damage to crops by wild animals has also increased tremendously because of destruction of their habitat. A few species are on the verge of extinction. 91.76 percent of the respondents revealed that in the last few years some plants and animals have reduced to a greater extent, for instance, the animals like *Hemitragus jemlahicus*, *Panthera pardus*, *Sus scrofa* are on the verge of extinct.

All respondents expressed that the forest resources have reduced, the reason being deforestation. Respondents expressed that there are methods which can replenish the decreasing forest cover (table 5). These include, use of timber as per need, afforestation and use of old and dry plants. 88.33 percent of the respondents were aware of the traditional way of forest management, remaining were reluctant in giving their viewpoint. People take into account that the dried or damaged trees are utilized for socio-religious purpose. Only branches are cut for fodder. The plants, which act as hosts for symbionts, like *Morchella esculenta* and are not cut because of the belief that these act as hosts for other plants and benefit them through symbiotic relationship. They select a particular patch of forest for one year, from where the fodder and other products are collected. Next year, some other patch is selected. The patch where the forest cover is decreasing is left fallow for years so that the same can

be revived. Extraction of turpentine is also carried out from *Cedrus deodara* by the herders, who use it for preventing the parasitic infection in sheep and goat.

According to 86.67 percent respondents, there are rituals linked with the worship of forest, trees and plants. Plants, like *Juglan regia*, *Prunus persica*, *Citrus pseudolimon*, *Cedrus deodara* and *Pinus roxburghii* have socio-religious connotations. According to 86.67 percent respondents, there are techniques for regular maintenance of forest resources, which govern proper utilization of forest resources (table 5). 96.67 percent informants revealed that local people are involved in the conservation of forest resources. 66.67 percent informants were satisfied with the techniques being followed for regular maintenance of forest resources; however, it needs to be strengthened to ensure that the resources can be made available to future generations. Renewing and replenishing the forests will ensure the availability of fodder for animal in the vicinity. In all 85 percent of the respondents were aware of the laws being enforced by the government for the protection of forests and everyone was of the view that these are respected. As far as the procedure followed for the management of resources is concerned, there was mixed opinion of people.

Forest fire is one of the main reasons which destroy the forest. People were enquired to know, if there was any incidence of forest fire in the last three years. All of them responded that such incidences are common in the area. Certain preventive measures followed to avoid such events are:

- In order to prevent forest fires, people cut bushes and remove the dry foliage from ground. The process is locally known as *chheka*;
- People, before burning the leftover of crops, demarcate the area and take into account that fire don't spread to the nearby forest

In their daily life, forest resources are used by the Gaddis and other natives for various purposes. Their food also includes seasonal wild edibles, wild mushrooms, rhizomes, tubers and wild fruits gathered from the forests. Likewise, different parts of plants and animals are used in traditional healthcare for treating various ailments and injuries. Plants are used for making furniture, containers, mats and baskets, which utilize the raw material collected from the forests. Even the tools and implements, musical instruments are made using the forest products.

Forest based activity is a vital component of Gaddi's economy. It involves collection of wild edibles, fuel wood, medicinal plants, construction material, fodder, besides hunting. Forest products are good source of income, mainly for the people who collect minor forest products like wild edibles, mushrooms, broom grass, herbs, etc. and sell them to enhance their income. The legitimacy that Gaddis depends on forest resources has facilitated them to attain a deep knowledge of its environment. They are familiar with the flora and fauna, their distribution, life history, seasonal

growth and use. The ethno-biological and ethno-ecological wisdom of Gaddis is deeply linked with their daily life and experience, which has helped them in sustainably using these forest resources. This wisdom is passed on through a word of mouth from one generation to another in form of fables, folksongs, folk axioms, traditional ethics, dogmas, sacraments and local commandments. Their wisdom pertaining to socio-economic practices includes their knowledge regarding various constituents of nature, for example, they determine the fertility of soil on the basis of its colour, water content. Continuing the preceding dialogue, it can be established that forests are deeply intertwined with the life of Gaddis. Since they are dependent on land and forest resources, they have evolved practices which have helped them to utilize these resources in a sustainable manner and protect these for upcoming generations. A few traditional methods with regard to utilization of forests in the surveyed panchayats are:

- Check and ceiling against illegal exploitation of forest resources;
- Check on destruction of forests and habitats of animals, birds and forest fires;
- Check on mishandling of sacred forest patches for undertaking any unlawful actions like alcohol consumption, etc.;
- While gathering fuel wood and fodder, it is taken into account that the entire tree or plant is not chopped-off or uprooted completely;

When trees are cut down for timber, the entire forest is not cleared at once. People take into account that the young trees are not harmed and leave them to grow properly.

DISCUSSION:

The present study has tried to look into the ecological traditions of forest resource management being practiced for generations by the Gaddi community. Gaddis are aware of the natural resources, their use and management, which is regulated through time-honored ecological practices. Living in vicinity to these resources and their constant use facilitates the Gaddi community to develop a procedure for the safeguarding and sustainable utilization of forest resources. Based on the distribution of various plants and tree species, Gaddis have classified the forest types. Before using forest resources, the people take a pledge in front of the deity that the forests will be utilized in judicious manner. The plants besides having biological importance, have socio-religious and sacred implications. Forest patches and sacred landscapes have been dedicated to local deities and norms have been devised for the sustainable utilization of these. However, it was observed that religious beliefs and taboos that significantly contributed for the protection of natural resources are fading into oblivion and consequently the present status of resources is rather insecure. The anthropogenic

pressures resultant of development, misuse of resources and increase in human population are posing threats to the bio-resources. Thus, the observation made in the present study are in harmony with the observations made by Saxena *et al.* 1998, Singh *et al.* 1998 on the sacred groves of Himalayan region, which pointed out that the economic forces are changing the attitudes of traditional communities to ignore the community based conservation of natural resources.

Forest based activity is a vital component of their economy. It involves collection of wild edibles, fuel wood, medicinal plants, construction material, fodder, besides hunting. Plants are used in traditional healthcare, making furniture, containers, mats and baskets. The ethno-biological and ethno-ecological wisdom of Gaddis is deeply connected with their day-today life, which has helped them in sustainably using the bio-resources. The traditional methods are putting a ceiling against illegal exploitation of forest resources. The Gaddis plant trees in and around their fields, barren patches of land village surroundings. They take into account that the dried or damaged trees are utilized. Only the branches are cut for fodder. There are rituals linked with the veneration of forest, trees and plants. Certain plants have a socio-religious connotation, which confirms their sustainable utilization and conservation. Importance of the sociologically identified plants which have association with the deities of the groves in upholding the ecological balance was addressed in the same manner by Rodgers (1994). Ramakrishnan (2002) stated that sociologically accepted plants are 'sacred', and the concept of 'sacred plants' could be recognized as a social evolution. Likewise, traditional knowledge, local institutions involved in the conservation of forest resources and their significance was studied by Gupta (2008) using *Churdhar* protected area, located in Himachal Himalayas, where the villagers were individual right holders, and pastoralists were issued grazing permits. The institutional provisions include self-initiated systems, cooperatives, corporate clan-owned forests, sacred forests, and co-managed forest. These results are in agreement with the findings of the present study. There are incidences of forest fires, which are managed by the Gaddi community at their own level. Thus, management practices which take into account involvement of people in order to strike a balance between the conservation of forest resources and meeting of fundamental socio-economic requirements of resource dependent communities is crucial. This viewpoint is supported by the conclusions made by Berzetti 1993 and Dhar *et al.* 1994, who has talked about people's participation biodiversity conservation. This can be achieved by bringing out multifaceted dimensions of the socioeconomic and virtuous aspects of natural resource management, following an inclusive approach (Toman and Ashton 1995).

CONCLUSION:

The time-honored customary rules may vary from place to place but the goal is same, which respects the similar viewpoint. These traditional laws often disallow the felling of trees, except when these are required for construction of religious structures. Consequently, such limitations have helped in the conservation of biodiversity for generations, and even hold good in the present era. In the management of natural resources efforts must be made to maintain the sanctity of these resources. Young generation must be made aware of customary conservation methods and they should be encouraged to uphold their sanctity and values. The need of hour is to recognize the values of traditional institutions of natural resource management for their usefulness in conservation and create space for such thoughts while formulating conservation policies.

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Table 1: Demographic profile of surveyed Panchayats

Particulars	Guwad Panchayat			Sarahan Panchayat			Total		
	M	F	Total	M	F	Total	M	F	Total
Total population as per Panchayat Parivar Register	879	852	1731	1334	1347	2681	2213	2199	4412
SC population as per Panchayat Parivar Register	36	35	71	270	278	548	306	313	619
OBC Population as per Panchayat Parivar Register	-	-	-	81	73	154	81	73	154

Source: Panchayat Office

Table 2: Gender-wise distribution of Respondents

Gender	Guwad Panchayat		Sarahan Panchayat		Total	
	N	%	N	%	N	%
Male	21	70	20	66.67	41	68.4
Female	9	30	10	33.33	19	31.6
Total	30	100	30	100	60	100

Source: Primary Data

Table 3: Age-wise distribution of Respondents

Age Group	Guwad Panchayat		Sarahan Panchayat		Total	
	N	%	N	%	N	%
15-25	3	10	6	20	9	15
26-35	9	30	4	13.33	13	21.4
36-45	10	33.34	7	23.34	17	28.5
46-55	3	10	12	40	15	25
56-65	4	13.33	1	3.33	5	8.4
66-75	1	3.33	0	0	1	1.7
Total	30	100	30	100	60	100

Source: Primary Data

Table 4: Distribution of Respondents according to Education Qualification

Education Qualification	Guwad Panchayat		Sarahan Panchayat		Total	
	N	%	N	%	N	%
Illiterate	14	46.67	16	53.33	30	50
Up to 5th	3	10.00	7	23.34	10	16.6
10 th	9	30.00	5	16.67	14	23.3
12th	3	10.00	1	3.33	4	6.7
Graduate	0	0	1	3.33	1	1.7
Post Graduate	1	3.33	0	0	1	1.7
Total	30	100	30	100	60	100

Source: Primary Data

Table 5: People's Perceptions on Management of Forest Resources

Statement	Guwad Panchayat				Sarahan Panchayat				Total			
	Yes		No		Yes		No		Yes		No	
	N	%	N	%	N	%	N	%	N	%	N	%
Wild edibles for sold in the market	3	10	27	90	5	16.67	25	83.33	8	13.33	52	86.67
The livelihood of people depends on forest	14	45.16	16	53.33	24	80	6	20	38	63.33	22	36.67
Customary forest rights are given to local people for collection of forest products	30	100	0	0	30	100	0	0	60	100	0	0
The mechanism being followed for the fair utilization of forest products is satisfactory	22	73.33	8	26.67	22	73.33	8	26.67	44	73.33	16	26.67
Forest resources are being depleted	30	100	0	0	30	100	0	0	60	100	0	0
There are problems associated with depletion of forest resources	30	100	0	0	30	100	0	0	60	100	0	0
A few plant/animal have extinct in the recent past	28	93.33	2	6.67	27	90	3	10	55	91.67	5	8.33
The quantity of forest products has diminished in the recent years	30	100	0	0	30	100	0	0	60	100	0	0
There are traditional methods for replenishing decreasing forest cover	26	86.67	4	13.33	27	90	3	10	53	88.33	7	12.67
People are aware of traditional mechanism of forest management	26	86.67	4	13.33	22	73.33	8	26.67	48	80	12	20
There are rituals linked with worship of forest/trees/plants	25	83.33	5	16.67	27	90	3	10	52	86.67	8	13.33
Forest/tree/plant are linked with folk deity	27	90	3	10	27	90	3	10	54	90	6	10
There is mechanism of sustainable utilization of forest resources	24	80	6	20	25	83.33	5	16.67	49	81.67	11	18.33
Local people are involved in maintenance of forest resources	28	93.33	2	6.67	30	100	0	0	58	96.67	2	3.33
Mechanism followed for the maintenance of forest resources is satisfactory	18	60	12	40	22	73.33	8	26.67	40	66.67	20	33.33
Laws are being enforced by government for forest protection	28	93.33	2	6.67	21	70	9	30	49	81.67	11	18.33
Presently, government laws are taken into account for forest protection	30	100	0	0	21	70	9	30	51	85	9	15
There are incidences of forest fire in last three years	30	100	0	0	30	100	0	0	60	100	0	0

Source: Primary Data

Table 6: List of Important Plants found in and around Surveyed Panchayats

HERBS					
Vernacular Name	Habitat	Botanical Name	Family	Part Used	Ethno-Botanical Use
Aein	Herb	<i>Urtica dioica</i>	Urticaceae	Leaf	Cooked as vegetable
Amlodi	Herb	<i>Oxalis corniculata</i>	Polygonaceae	Leaves	Used for preparing chutney
Ban Haldi	Herb	<i>Hedychium spicatum</i>	Zingiberaceae	Leaves	For making mats
Bana	Herb	<i>Vitex negundo</i>	Lamiaceae	Leaves	For fomentation
Banafsha	Herb	<i>Viola canescens</i>	Violaceae	Flower	For cough and cold
Ban-jwain	Herb	<i>Thymus serpyllum</i>	Lamiaceae	Seeds	Seed edible
Bathu	Herb	<i>Chenopodium album</i>	Amaranthaceae	Seeds	Seeds edible
Bhang	Herb	<i>Cannabis sativa</i>	Cannabaceae	Leaves and seeds	As an intoxicant
Bhasrole	Herb	<i>Arisaema tortuosum</i>	Araceae	Tuber	Poison
Bhujalu	Herb	<i>Anaphalis adanata</i>	Asteraceae	Leaves	Used for treating snake bite
Choula	Herb	<i>Amaranthus tricolor</i>	Amaranthaceae	Seed	For preparing an ethnic food called phlahar
Congress grass	Herb	<i>Parthenium hysterophorus</i>	Asteraceae	Entire plant	Weed
Datura	Herb	<i>Datura stramonium</i>	Solanaceae	Leaves	Poison
Dharakashaag	Herb	<i>Rumex nepalensis</i>	Polygonaceae	Leaves	Leaves are edible
Fafu	Herb	<i>Fagopyrium dibotrys</i>	Polygonaceae	Leaves	Used to prepare chutney
Gurdain	Herb	<i>Girardinia diversifolia</i>	Urticaceae	Stem	Used for making ropes
Jangli tamaku	Herb	<i>Verbascum thapsus</i>	Scrophulariaceae	Leaves	Leaves used for fomentation
Jungli saunf	Herb	<i>Foeniculum vulgare</i>	Apiaceae	Seeds	Decoction
Kasrod	Herb	<i>Diplazium esculantum</i>	Arthyriaceae	Stem	Used to prepare pickle and vegetable
Khatta	Herb	<i>Rumex acetosa</i>	Polygonaceae	Leaves	As souring taste to food
Kokua	Herb	<i>Stellaria media</i>	Caryophyllaceae	Leaves	Leaves edible
Kuth	Herb	<i>Saussurea costus</i>	Asteraceae	Root	Medicinal
Nagchhatri	Herb	<i>Trillium govanianum</i>	Melanthaceae	Roots	Medicinal
Napalu	Herb	<i>Viola serpens</i>	Violaceae	Flower	Cold and cough
Neelkhanti	Herb	<i>Ajuga bracteosa</i>	Lamiaceae	-	-
Rasbhari	Herb	<i>Fragaria vesca</i>	Rosaceae	Leaf	Stomachache
Sadhu	Herb	<i>Dioscorea belophylla</i>	Dioscoreaceae	Leaves	Used for making Patroru, an ethnic food
Shapdotri	Herb	<i>Berginia ligulata</i>	Saxifragaceae	Root	Roots used for treating blood disorders
Shmak	Herb	<i>Valeriana jatamansi</i>	Caprifoliaceae	Root	Religious purpose
Sonchal	Herb	<i>Malva neglecta</i>	Malvaceae	Root	Washing of clothes, especially woolen clothes

SHRUBS					
Vernacular Name	Habitat	Botanical Name	Family	Part Used	Ethno-Botanical Use
Aakhe	Shrub	<i>Rubus ellipticus</i>	Rosaceae	Fruit	Fruit edible
Ban Ghia	Shrub	<i>Eleagnus pervifolia</i>	Eleagnaceae	Fruit	Wild edible fruit
Budhi ki cheer	Shrub	<i>Cotoneaster microphyllus</i>	Rosaceae	Leaves	Paste applied in case of headache
Dadun	Shrub	<i>Punicum granatum</i>	Punicaceae	Fruit	Fruit edible
Kale akhe	Shrub	<i>Rubus alvas</i>	Rosaceae	Fruit	Fruit edible
Kargongra	Shrub	<i>Prinsepia utilis</i>	Rosaceae	Whole plant	Religious function
Kemal	Shrub	<i>Berberis aristata</i>	Berberidaceae	Fruit	Fruit edible
Lalaakhe	Shrub	<i>Rubus niveus</i>	Rosaceae	Fruit	Fruit edible
Pree	Shrub	<i>Desmodium tiliacifolium</i>	Fabaceae	Leaves	Fodder
Tarndholu	Shrub	<i>Viburnum cotinifolium</i>	Adoxaceae	Fruit	Fruit edible
Timber	Shrub	<i>Xanthoxylum armatum</i>	Rutaceae	Stem	Twig used as toothbrush
TREES					
Vernacular Name	Habitat	Botanical Name	Family	Part Used	Ethno-Botanical Use
Aakhod	Tree	<i>Juglan regia</i>	Juglandaceae	Fruit	Fruits edible
Baidah	Tree	<i>Cedrela toona</i>	Meliaceae	Leaves and Stem	Fodder and farming tools
Ban	Tree	<i>Quercus leucotrichophora</i>	Fagaceae	Stem and leaves	For making farming tools, as fuel wood and fodder
Banni	Tree	<i>Quercus dilatata</i>	Fagaceae	Stem and leaves	For making farming tools, as fuel wood and fodder
Bathrole	Tree	<i>Machilus duthiei</i>	Lauraceae	Stem	For making farming tools
Chalun	Tree	<i>Populus ciliata</i>	Salicaceae	Stem	Fuel wood
Chihu	Tree	<i>Rhododendron arboreum</i>	Ericaceae	Flower	Flower used for preparing chutney
Chil	Tree	<i>Pinus roxburghii</i>	Pinaceae	Needles and stem	For making brooms, gates during ceremonial occasion. Wood used as timber and extraction of resin
Chindi	Tree	<i>Neolista pallens</i>	Laureaceae		Oil has therapeutic use
Chir	Tree	<i>Prunus armeniaca</i>	Rosaceae	Fruit	Fruit edible
Dhaman	Tree	<i>Grewia optiva</i>	Tiliaceae	Leaves	Fodder for animal; Leaves used for making dunna, leaf bowls at the time of performing death rituals
Diar	Tree	<i>Cedrus deodara</i>	Pineaceae	Stem and resin	For extracting kalun (Turpentine) and timber
Faguda	Tree	<i>Ficus palmate</i>	Moraceae	Latex	Latex has curative properties
Gaduni	Tree	<i>Achillea millefolium</i>	Asteraceae	Leaves	Fodder
Gun	Tree	<i>Aesculus indica</i>	Sapindaceae	Fruit	Fruit edible after drying
Jamun	Tree	<i>Syzygium cumini</i>	Myrtaceae	Fruit	Fruit edible
Kainth	Tree	<i>Pyrus pashia</i>	Rosaceae	Fruit	Fruit edible
Kakkadsingi	Tree	<i>Pistacia integerrima</i>	Anacardiaceae	Fruit	Curative properties
Khidak	Tree	<i>Celtis australis</i>	Cannabaceae	Stem	Fodder and fuel wood
Kow	Tree	<i>Olea cuspidata</i>	Oleaceae	Stem	Twig used as toothbrush
Krun	Tree	<i>Morus serrata</i>	Moraceae	Latex	Latex has healing properties

Pajja	Tree	<i>Prunus cerasoides</i>	Rosaceae	Stem	Used for making farming tools
Peepal	Tree	<i>Ficus religiosa</i>	Moraceae	Whole plant	Religious purpose
Piak	Tree	<i>Alnus nitida</i>	Betulaceae	Stem	Fuel wood
Raiin	Tree	<i>Abies Spectabilis</i>	Pineaceae	Stem	Used as Timber
Taur	Tree	<i>Bauhinia vahlii</i>	Caesalpiniaceae	Leaf	For making leaf plate
Thangi	Tree	<i>Corylus jacquemontii</i>	Betulaceae	Fruit	Fruit edible
Titri	Tree	<i>Rhus jaranica</i>	Anacardiceae	Fruit	As souring ingredient in food
Tosh	Tree	<i>Abies Pindrow</i>	Pineaceae	Stem	Timber

CLIMBERS AND GRASSES

Vernacular Name	Habitat	Botanical Name	Family	Part Used	Ethno-Botanical Use
Ban kakdu	Climber	<i>Melothria amplexicaulis</i>	Cucurbitaceae	Fruit	Wild edible
Druv	Grass	<i>Cynodon dactylon</i>	Poaceae	Grass	For religious purpose
Kusha	Grass	<i>Poa cynosuroides</i>	Poaceae	Grass	Religious purpose
Ngal	Grass	<i>Phragmites communis</i>	Poaceae	Stem	For making baskets and kalam (pen)

Source: Primary Survey

Table 7: Level of dependence of people on Forest Products

Main Forest Products	Guwad Panchayat		Sarahan Panchayat		Total	
	N	%	N	%	N	%
Fuel wood	22	73.33	18	60	40	66.66
Fodder	30	100	30	100	60	100
Timber	30	100	30	100	60	100
Medicinal plants	18	60	13	43.33	31	51.66

Source: Primary Survey

Table 8: Mechanism being followed for utilization of Forest Products

Main Forest Products	Guwad Panchayat		Sarahan Panchayat		Total	
	N	%	N	%	N	%
Traditional	11	36.67	12	40	23	38.4
Modern	19	63.33	18	60	37	61.6
Total	30	100	30	100	60	100

Source: Primary Survey