 J Biodiversity, 2(2): 127-140 (2011)

Biodiversity Register and Indigenous Knowledge: A Case Study of Baigachak Area, in Dindori District of Madhya Pradesh

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KEYWORDS Conservation. Forests. Biological diversity Act. Primitive Tribes. Central India. Resource Management. Documentation

ABSTRACT Conservation of biological diversity is extremely imperative as it is essential for efficient functioning of the ecosystem which actually accounts the innumerable life forms. Local initiatives have been taken to conserve biodiversity in landscape continuum in the form of sacred groves, home gardens and other indigenous practices. The wealth of NTFP and medicinal plant life useful to people is a strong justification for their conservation. Unfortunately, this indigenous knowledge on the properties, utilization and conservation aspects of plant resources available with tribal groups is on the verge of depletion due to developmental activities which are adversely affecting the cultural and traditional life of these groups. Tribal cultures are themselves disappearing and with them go their plant lore. Studies have shown that indigenous knowledge and biodiversity are complementary phenomena and are needed to conserve biodiversity. The study aimed to develop and document the process of a Biodiversity Register for two forest villages (Dhaba and Sherajhar) in Baigachak area, in Dindori district of Madhya Pradesh. The register identifies both wild and agro biodiversity elements and their indigenous knowledge. Development of management plan was a part of exercise to review local knowledge and conservation practices. Participatory Rural Appraisal tools along with conventional questionnaire methods were used to understand the biodiversity situation in their landscape covering 10 villages of Baigachak area, a comprised of Baiga, the primitive tribes of Madhya Pradesh. The study indicates that a rich biodiversity (109 floral species, 57 species of birds, 16 species of butterflies, 3 species of amphibian, 17 species of reptilian and 1 species of mammals) exists around the study area, local people's concern whereas there is a declining rate of availability for the last 15 years due to various reasons.

INTRODUCTION

Indigenous knowledge and biodiversity are complementary phenomena essential to human development. Global awareness of the crisis concerning the conservation of Biodiversity is assured following the United Nations Conference on Environment and Development held in June 1992 in Rio de Janerio. Biodiversity Act, 2002 emphasizes the participation of local communities in the conservation and use of biodiversity. Of equal concern to many world citizens is the uncertain status of the indigenous knowledge that reflects many generations of experiences and problem solving by thousands of ethnic groups across the globe. Very little of this knowledge has been documented, yet it presents an immensely valuable database that provides humankind with insights on how numerous communities have interacted with their changing environment including its floral and faunal resources. Such a system is especially needed to protect the interests of the ecosystem people of India, people who have played such a vital role in conserving the country's biodiversity, in augmenting it through evolving thousands of varieties of cultivated plants and domesticated animals, and in developing a vast body of knowledge about their sustainable use. The loss of biodiversity is an issue of profound concern for its own sake. Biodiversity also underpins the functioning of ecosystems which provide a wide range of services to human societies. Its continued loss, therefore, has major implications for current and future human well-being. The provision of food, fibre, medicines and fresh water, pollination of crops, filtration of pollutants, and protection from natural disasters are among those ecosystem services potentially threatened by declines and changes in biodiversity (Malhotra and Bhattacharya 2010).

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People's Biodiversity Registers (PBR)

People's Biodiversity Register, (PBR), seeks to document the knowledge of occurrence, practices of propagation, sustainable harvests and

conservation, as well as economic uses of biodiversity resources that reside with India's local communities. PBR inventories the biodiversity of a given locality and people's knowledge that is associated with bioresources. It is a document that is developed by the people, of their biodiversity and knowledge for biodiversity conservation (MoEF 2009). Thus, the PBR has information on availability, richness and status and knowledge of local biological resources, their medicinal or any other use or any other traditional knowledge associated with them.

PBR documentation could potentially serve as a basis for equitable sharing of benefits from commercial application of folk knowledge of uses (Dutfield 1999). Ethnobiology has a long tradition of recording folk uses of biological material to serve as a possible starting point for development of new commercial products (Martin 1995). PBR exercises focuses on people's perceptions of ecological processes, ecological changes, forces driving ecological changes, gainers and losers of uses of living resources and management options. These issues may be addressed, albeit to a limited extent in exercises such as participatory rural appraisals that are aimed at supporting decentralized participatory systems of resource management (Chambers 1983). PBR thus emphasizes documentation as a tool to empower people outside the scientific, administrative and political mainstream (Sharma 1997).

Formal conservation efforts in India have relied heavily on the recently declared official protected areas in various categories for biodiversity conservation. However, ancient and widespread human practice to set aside areas for the preservation of natural values in India can be seen in several examples of sacred groves, royal hunting forests, and sacred gardens (Gadgil 1982; Pandey 1991; Gadgil et al. 1993; Kanowski et al. 1999; Chandrashekara and Sankar 1998; Malhotra et al. 2007). Several of these areas became national parks and wildlife sanctuaries in India and elsewhere (Pandey 2001). It must be noted here that much of the India's biodiversity lies outside the officially declared protected areas. Indeed, biodiversity occurs in landscape continuum.

Though the PBR process helps to record and promote an assessment of possible value of a variety of conservation oriented traditional resource use practices (Gadgil and Berkes 1991; Gadgil et al. 1993) but it questions why this has not been adopted in most remote areas of India in last 20 years? In India, preparation of village-wise Community Biodiversity Registers (CBRs) for documenting all knowledge, innovations and practices has been undertaken in few States. The State Plan for Kerala has also actively promoted documentation of local knowledge regarding biodiversity in people's biodiversity registers. The state of Karnataka presents a unique example of NGO initiatives in the formulation of Peoples' Biodiversity Registers (PBRs). By mid 1998, 75 Plant Biodiversity Registers had been established in ten States with the help of Indian Institute of Sciences, Bangalore and others. Gene Campaign, New Delhi has undertaken work on documentation of biodiversity and knowledge relating three tribal populations: the Mundas in South Bihar (in the Chotanagpur region); the Bhils of Madhya Pradesh; and the Tharus of the Terai region. The Research Foundation of Science Technology and Ecology (RFSTE) initiated a movement called the Jaiv Panchayat which aimed to establish definitive sovereignty of local communities on their biodiversity resources.

Society for Research and Initiatives for Sustainable Technologies and Institutions based in Ahmedabad, has been involved in documenting innovation developed by individuals at the village level. The efforts of Kalpavriksh and the Beej Bachao Aandolan (Save the Seeds Campaign), Tehri-Garhwal, Uttar Pradesh; and Kalpavriksh, in collaboration with the villagers in Jardhar of the Teri Garhwal district of Uttar Pradesh, initiated efforts to document the various bio-resources used by the community and conservation practices.

Keeping in view, the study aimed at how broader issues of community based natural resource conservation practices, initiatives and development of practical and management strategies can be helpful by adopting the approach of biodiversity register. Baigachak area of Dindori district is rich in floral, cultural and as well as ethnic knowledge of Baiga community. Research has been done in various issues regarding the multifarious uses of plants by the local tribes inhabiting there. Under Biodiversity Act (2002) there is an importance to find out the living of local community and key drivers which they carry with the local indigenous knowledge to manage their resources for sustainance.

MATERIALS AND METHODS

Selection of Villages

By using cluster sampling the total villages (52 in number) present in Baiga chak area was divided. Cluster was based on the geographical distribution of Villages in east, west, north and southern direction from Baiga chak. From these clusters through proportionate sampling (20% of total villages in Baiga chak) 10 villages was selected. The criterion's taken for proportionate sampling was: (i) Villages situated within 5 km from forest area. (ii) At least 2 Landscape elements present in the villages (example - forest, agriculture). Field surveys were done in selected villages in Baigachak area in Dindori forest Division of Madhya Pradesh to document landscape elements, biodiversity components and other management aspects adopting Participatory Rural Appraisal (PRA) methods.

Preparation of Biodiversity Registers

Biodiversity Registers of 2 villages (Sherajhar and Dhaba) was made from the selected villages. Adopted complete documentation using data formats of "People's Biodiversity Register" methodology manual (Gadgil et al. 2003, Gadgil 2006) and data formats of Madhya Pradesh State Biodiversity Boards for Van gram Dhaba and Van gram Sherajhar respectively has been undertaken to understand the indigenous knowledge regarding local resources- flora, fauna, livelihood options, perceptions and motivations of different biodiversity user groups through Focus Group Discussions (FDP). Extensive interviews were conducted by using interview schedule consisted of both open and closed ended questionnaire. Group discussions and resource mapping were the other tools used to collect primary data. The secondary data were collected from the reports of Forest Department, census data and reports published by various agencies on Baigachak.

Identification of User Groups

The following criterion was adopted to identify the user groups (i) Identification and listing the various activities of local people (ii) Classification into major and minor user groups (3 months and more in the occupation regarded as a major user group and rest as minor).

Various key aspects with respect to biodiversity conservation were studied: (i) the linkages that exist within the indigenous knowledge and their existing practices available for biodiversity conservation in Baigachak? (ii) How traditional and indigenous practices have changed with time and cultural practices of the area? (iii) Is there any simple way through which such local wisdom can be further use in higher level planning and for future biodiversity conservation purpose ?

RESULTS

Baigachak area in Dindori Forest Division of Madhya Pradesh consists of 52 villages. The area is predominantly inhabited by one of the Primitive Tribal Groups (PTG's), i.e. Baiga, Gond, Dhoba and even Ahirs inhabit at the same place from last 70 to 80 years. Baiga's have been traditionally engaged in gathering minor forest products. Gond and Dhoba apart from agricuture also depend on forests for supplementing their income through collection of NTFP and wage labour earning.

In the actual scenario livelihood of the people living in Sherajhar and Dhaba denotes that a strong bond exists with agriculture, on their primary occupation (Fig. 1) rather than the forest. It has been found that 6 of the sampled respondent earned more than fifteen hundred rupees (Fig. 2). Off farm employment (Fig. 3) also plays a major role in their livelihood. 12 of the sampled respondents are found to earn greater than Rs 1500/- per year from secondary income, i.e. wage labour (work from panchayat and Forest Department).

Ecosystem Diversity

Forest Village Sherajhar

Forests: The village community of Sherajhar had identified 17 sub-type landscape elements in and around the forest area and prioritized 7 from them to which they are closely associated. The subtypes are mainly known by the local name as *Mochidadar, Dawahardadar, Dawarama, Badekhola, Bawaiama, and Bandarbetki.* Each part of the forest has unique significance. The villagers of Sherajhar is closely linked with the place *Badekhola* (Mixed forest) as they visit the site in festive seasons to harvest the species

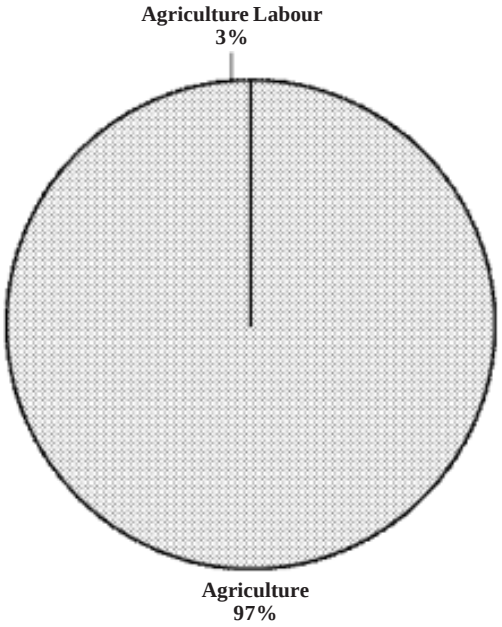

Fig. 1. Distribution of the households on the basis of Primary Occupation

found here, required in their respective festivals. They have a unique resource use pattern for the habitat in which the respective floral resource is found. For daily consumption and species required for *nistar*[1] they visit a specific subtype of forest called *Bandarbetki*. Leaves of *Mahul* are collected from a specific subtype of forest known as *Mochidadar, Dawahardadar and Dawarama*. The user group activities in different subtype of prioritized forest and the trends in last 10 years is shown in Table 1. The species in all the parts of forest shows a decreased rate in abundance due to biotic pressure. Productivity of crops shows an increased trend after land leveling and bunds made by OXFAM and NIWYCD, Nagpur (both are NGOs).

Agriculture: During Participatory Rural Appraisal the villager community at Sherajhar has indicated that the land subtypes *Dhuldhuli dadar and Daihan Dadar* are the most important area they are closely linked with rather than the forest, as their primary source of livelihood is agriculture. Productivity of crops have increased for the last few years due to natural resource management options intervened by OXFAM and NIWYCD. During PRA exercise the village community was impressed with the increase level of production of Ramtila in *Dahiandadar*.

Streams/Rivers: The villagers of Sherajhar mainly depend on rainfall for their crops. Among the prioritized waterscape elements Sitala nala (a stretch of 2 km) to which the people were associated and most them were identified. They use the water of this nala for

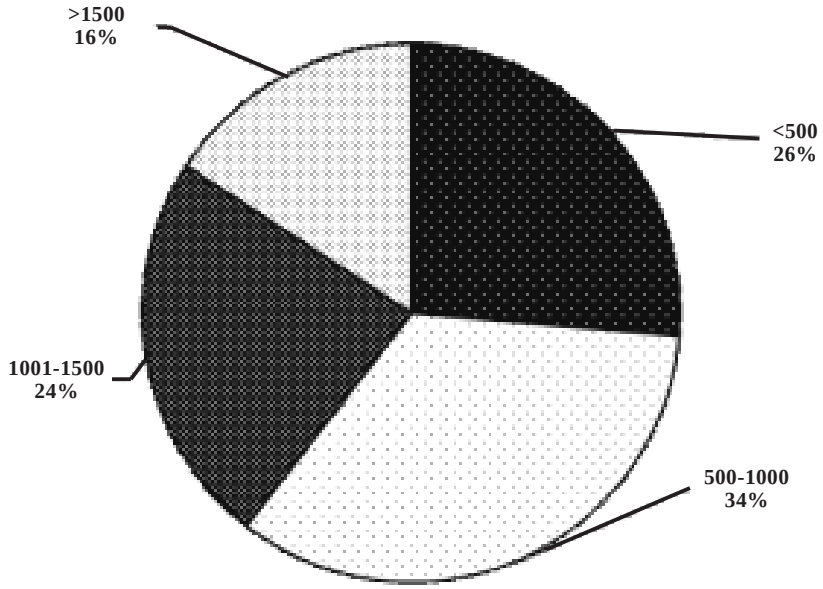

Fig. 2. Distribution of no. of Household on the basis of cash income from Primary Occupation

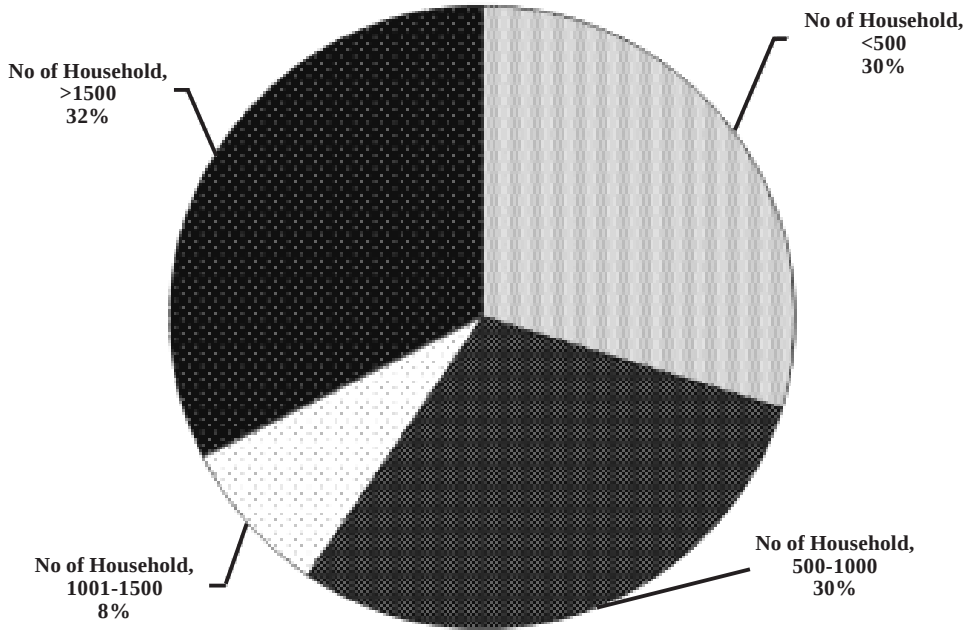

Fig. 3. Distribution of No. of Households on the basis of cash earnings from Wage labour

their household consumption and irrigate saplings they plants.

Species and Genetic Diversity

Agro biodiversity

The villagers of Sherajhar in Participatory Rural Appraisal exercise identified different types of crops and the indigenous varieties of the same. Among the 43 prioritized crops, 14 varieties of dhan /paddy, 8 varieties of kutki, 6 varieties of maize/mucca, 5 varieties of kodo, 4 varities of Jowar/wheat, 3 varities of Arhar and Urad, 2 varities of rye and ramtila, channa, masoor and 1 variety of mutter, buttri and tilli were found (Fig.4).

Table 1: Details of prioritized Ecosystem Diversity

S. No.	*Type/sub-type of Landscape/ Waterscape element prioritized*	*Name in local language (typology of land)*	*Approximate area*	*User Group activities*	*Associated species*	*Trends (Changes over last 10 years)*	*Reasons*
1	Forest	Mochidadar	-	(i)	(a)	(★)	(1)
		Dawahar dadar	-	(i)	(a)	(★)	(1)
		Dawarama	-	(i)	(a)	(★)	(1)
		Bade khola	-	(ii)	(b)	(★)	(1)
		Bawaiama	-	(iii)	(b)	(★)	(1)
		Bandarbetki	-	(iv)	(c)	(★)	(1)
2	Agriculture Land	Dhul dhuli dadar	100 acre	(v)	(d)	(★★)	(2)
		Daihan dadar	300 acre	(v)	(e)	(★★)	(2)
3	Streams	Sitala nala	2 km (approx)				(3)

Index:
Typology of land: (i) Mahul Patta (*Bauhinia vahlii*) collection (ii) Mixed variety of species -only during festive seasons (iii) Leaves of Sarai (iv) Nistar (v) Agriculture
Associated species: (a) Mixed forest dominated by Sal (*Shorea robusta*) (b) Mixed Forest (c) Mixed Forest (Tendu and Mahul) (d) Crops (e) Ramtila (*Guizotia abyssinica*)
Trends: (★) Decrease in species diversity (★★) Increase in productivity of crops
Reasons: (1) Biotic pressure (2) Mera bandi / bunding by OXFAM and Land leveling by NIWYCD (3) Household consumption and water for agricultural activities

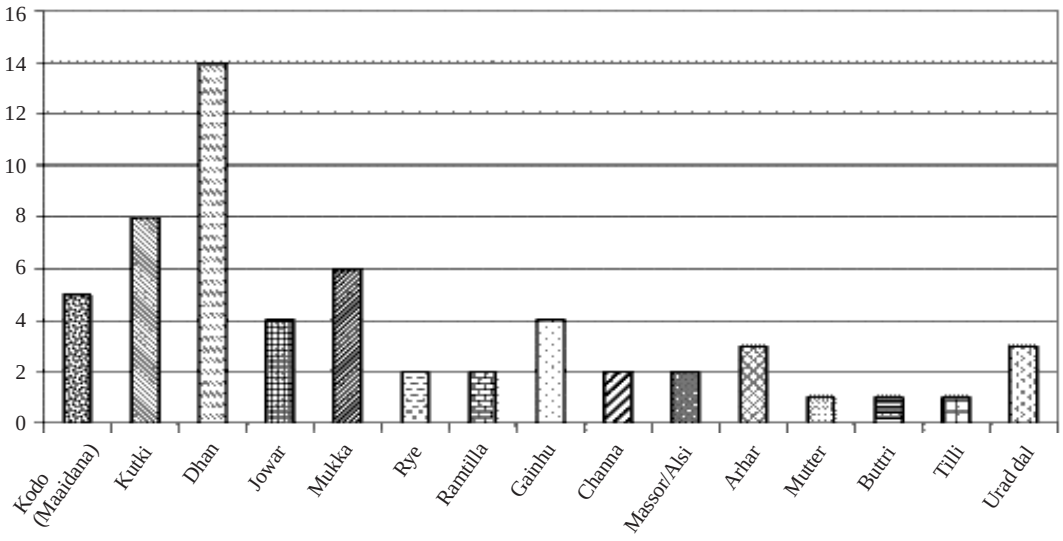

Fig. 4. No. of varieties for each crop in two villages

It was found that Baiga's have a indepth knowledge in each and every sphere of the agriculture diversity they possess. Among the crops, the villagers do not sale Kodo, Kutki, Sera dhan / paddy etc. but use the same for household consumption. The villagers prioritized the agricultural varieties available and gave options for alternative suitable area to be sown.

Unique knowledge came out in the PRA exercise, that local communities possess in depth knowledge of land suitability of the particular crop. Ex. *Dusreli*, a variety of Paddy grows best in Bharra and Plains. Some of the indigenous varieties possess the healing power to cure diseases and also treated to malnourished people. Productivity of some crops has reduced due to irregular rainfall. Local people also have the faith on micro organisms beneficial insect and earthwarm in the soil; which they give high priority for crop production. The village community was found to use only cow dung and cow urine to enrich the soils. Current management interventions like land leveling, mera bunds and other water harvesting structures by OXFAM and local NGO, NIWYCD has led to an increase in crop production.

Livestock Biodiversity

The village community of Sherajhar prioritized 5 varieties among the existing livestock which they found useful in their everyday life. *Bada Mudh and Lava Mudh* is among the *desi* (country) breeds of goat that are sacrificed and even consumed as meat. The population shows a decreased in trend due to frequent disease attack. Indigenous varieties of *Kukri* or hun are also consumed and sacrificed before their deities (Table 3). Live stocks is one biodiversity component which people appreciate for cash contribution in villages.

Forest Village Dhaba

Ecosystem Diversity

Forests: The villagers of Dhaba identified 32 sub-type landscape elements in and around the forest area and didn't prioritize any one of them to which they are closely associated. Mostly Sal (Shorea robusta) forest with various subtypes are mainly known by the local name as '*Bukar'*, *'Kede'*, *'Musri'*, *'Sili'* etc. based on local ecological succession pattern. Mainly the forest in the last few years has been protected by the community under Joint Forest Management System. For Nistar and NTFP collection they are closely associated with the landscape subtype *Bukar.* The area of landscape elements shows a moderate decrease in trend.

Agriculture: Agriculture is the primary occupation of the people living in Dhaba. During Participatory Rural Appraisal the villagers have indicated that the unirrigated agricultural lands

Table 2: Details of prioritized agricultural species

Species	*Variety*	*Character of variety including duration*	*Prefered Landscape type/ subtype and area sown*	*Productivity and volume of production*	*Use including medicinal use*	*Market rate*	*Trends over last 10 years*	*Reasons*
Kodo	Dusreli	Ripes even in less rainfall, 3 months	Grows in bharra and plains	20 times more than Bade kodo	Fever, given to women during delivery	-	Crop production has Reduced	Irregular rainfall
Mukka	Bhadeli	3 months	Grows in bharra soils	3-4 Quintals per acre	Soup or Pej filled with nutrients	Rs 7.5-8/kg	Less production	Absence of Gobarkhad
Kutki	Nagdawan	4 months Do not get spoil	Grows in bharra and plains	7-8 Quintals per acre	Soup or Pej filled with nutrients	Not Sold (Rs. 35/kg by one person	Production Increased	Mera bandi by Oxfam
	Sitahi	Fuzzes are bigger and more than Bade Kutki Black and shiny Production is more than Naagdawan	Lal mitti and bharra	9-10 Quintals per acre	Food	Not Sold	Production Increased	Land Levelling and Gatar bandh by NIWYCD and OXFAM
	Raali	Ripes even in less rainfall	Grows in every soil and even in hilly areas except in water logged areas	9-10 Quintals per acre	Food	Not Sold	Production Increased	Land Levelling and Gatar bandh by NIWYCD and OXFAM
Dhan	Sera		Grows in Doli budh	5 Quintals per acre	Nutritious and Longevity is more	Not Sold	Production Increased	Mera bandi by Oxfam
	Ratua	Production is more than others	Grows in Sehra and doli Bundh	4-5 Quintals per acre		Not Sold	Production Increased	Mera bandi by Oxfam
Jowar	Bhadeli		Grown in Homegarden and Agricultural land	1 Quintals per acre	Pej and Roti	Not Sold	Production decreased	Now importance is given to Kodo, Kutki and dhan
Raai	Choti Raai		Grown in Homegarden	2 Quintals per acre	Bhaji and given to sick and also to woman who has given birth to a baby (Chawariya)	Rs. 1800/ Quintal	Production decreased	Irregular rainfall
Ramtilla	Chot Ramtilla Bade Ramtilla		Grows in Bharra soils			Rs. 1800/ Quintal	Production decreased	Irregular rainfall
Gainhu	Sarvadi		Grows in Kali mitti and sehra also	4-5 Quintals per acre	Roti	Rs. 800-1000/ Quintal	Sowing has started for last 3 years	Mera bandi by Oxfam and NIWYCD

Table 2: Contd.....

Species	*Variety*	*Character of variety including duration*	*Prefered Landscape type/ subtype and area sown*	*Productivity and volume of production*	*Use including medicinal use*	*Market rate*	*Trends over last 10 years*	*Reasons*
Channa	Chote Channa		Grows in Sehra and Motto	1 Quintals per acre	Dal and Breakfast	Rs. 1600/ Quintal	Production Increased	Mera bandi by Oxfam and NIWYCD
Massor			Grows in Sehra and Motto	50-60 kg	Dal	Rs. 34/ kg	Production Increased	Mera bandi by Oxfam and NIWYCD
Arhar	Baigani			100 quintal	Dal	Rs. 50/kg		

Table 3: Details of livestock species accorded high priority.

Name of the species	*Breed*	*Products and services*	*Rate*	*Market Availability*	*Status in area*	*Trend over last 10 years*
Cow	Desi	Dudh, Dahi, Chaach, Makkhan, Ghee	Rs. 5000-6000	Yes	300 (Approx)	Number has decreased due to the cost and diseases
Bullock	Desi singh ke saath	Nagar Phadna, Jutai, Nisai, Gahai	Rs. 7000	Yes	120 (Approx)	Irregular trend due to diseases
Goat	1. Bada Mudh 2. Lava Mudhi	Sold and Babies are gifted to deities	Rs. 1000-2000 according to size	Yes	40 -50 (Approx)	Population have decreased due to diseases and attack of Bigwaa/leopard
Hen	1.Chirai Kukri 2. Sehi Kukri 3. Karia kukri	Sold and consumed as food. Chicks are gifted to deities (Black magic; treatment of fever)	Rs. 100-200 according to size	No	400-500 (Approx)	Population have decreased due to diseases
Pig	Desi (Chote)	Piglets are sold and gifted to deities, Meat is consumed	Small-Rs.800-1000/- Big-Rs. 3000/-	No	15	Population have decreased due to diseases

are the most important area they are closely linked with their day to day needs, like they collect several leafy vegetable from this land. Productivity of crops have increased for the last few years due to management options intervened by OXFAM and NIWYCD, just like the case of forest village Sherajhar. During PRA exercise the people were mainly impressed with the increase level of production of Ramtila. About 11 new crops are introduced from other area, not by Government always but they also do trial in their land to get some profit.

Streams/Rivers/Natural Springs: The villagers of Dhaba are mainly dependant on rainfall for their crops. Among the prioritized Waterscape elements, Jiria-jhori, a stream to which the people were associated most was identified. NIWYCD has given a hand in help to make a stop dam and canal at Jiria Jhori. They use the water of this water-scape element for their household consumption. Water born species like local fishes, tortoise, crab and other animal has vanished from the area for the last 15 -20 years which use to be a fun for capturing them for the young group.

Agro Biodiversity

The village community of Dhaba in Participatory Rural Appraisal exercise have identified different types of crops and the indigenous varieties of the same. They prioritized the species in terms of staple food, supplementary food, rituals, oil and cash crop. *Sathiya*, a variety of *Kodo*, *Bade Kutki*, *Dhan/ paddy* (indigenous are *Sera*, *Mohadonga*, *Bharra*, *Patthar*, *chatti*, *Dhaniadhan*, *Ramhegali*, *Lochai*, *Sumeri*), Jowar (*Chidri*), Mukka or Maize (*Shankar*, *Dudhmagri*, *Ghoda daat*), both varieties of Rai, etc were identified.

Local communities are more associated with food that could serve them in dual pur-

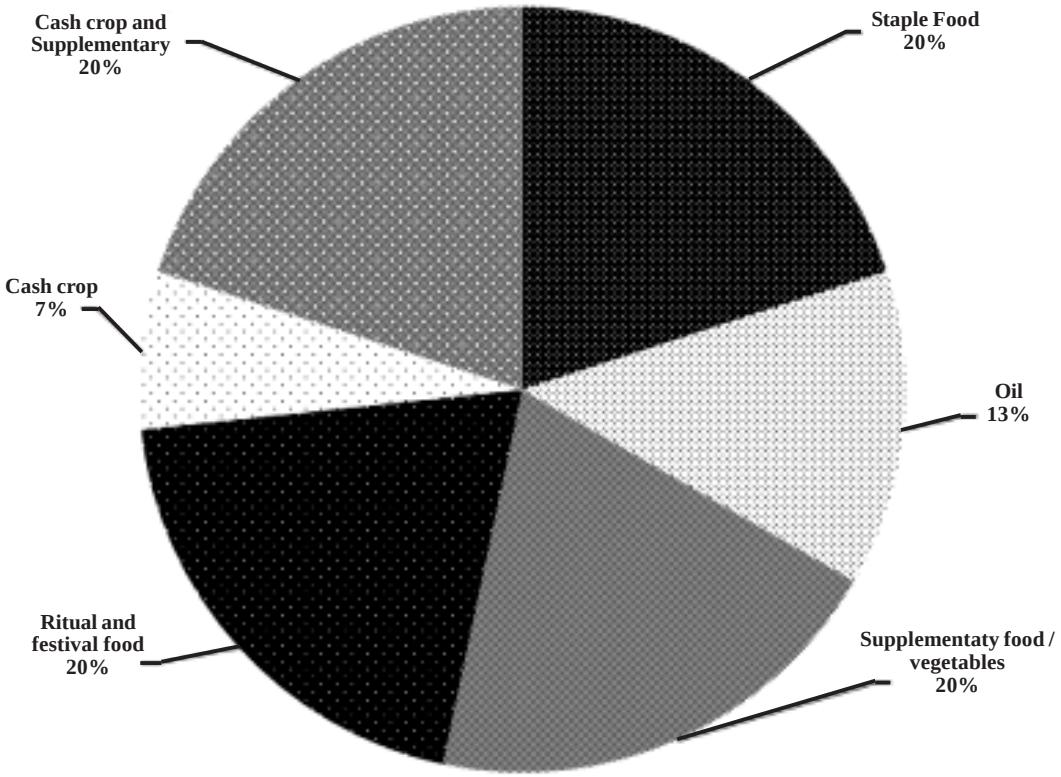

Fig. 5. Distribution of no. of species on basis of use

pose. Figure 5 denotes that 20% of the indigenous varieties serve them as cash crop or ritual, festival food and supplementary food or vegetables. Few years' intervention by OXFAM regarding land leveling and bunding activity has led to an increase in yield of 33% of the indigenous varieties.

Ethno-botanical Treatment: Indigenous knowledge of both the village communities were documented. Different local practices/ treatments for various diseases involving floral species were documented. *Pasaran, Dakarbela, Harsanghri grass, Banjeeth, Tinsaa, Baans, Hathajhori and Baranga* for the treatment of fractured bone, Nagphani, Bilwa, Doomar, Karonda, Boir, Dahimaan, Gurunjhar, Chench dana for the treatment of wound and worms, *Woodcutter and onion, Hassia depu, Kanda, Aamdin, Bhang, Ghutel , Kekti, Karon-da, Nirvis and Saapkanda* for treatment of Ghaat sarap(throat disease) and Kekti, Ghatel, Tinsaa, Nirvish, Arandi used for treatment of mouth ailments. In fact the communities used 6 floral species for the treatments of bone fracture, 8 floral species for the treatments of wounds, 11 floral species for the treatments of *Ghaatsarap/ throat ailments*, 6 floral species for the treatments of fever, 2 floral species for the treatments of Dysentry and 4 floral species for the treatments of mouth ailments (Fig. 6).

Wild Biodiversity

In PRA exercise a complete list of floral diversity was identified and prioritized by the villagers. Their uses and current level of abundance and trends over last 10 years have also been documented. Figure 7 shows the number of species consumed for different purpose. Local Baigas utilizes 30 % forest products for food and fruits, and 22 % for medicinal use and 11 % species is used as fodder and 9% is used for thatching, for making agricultural implements and brooms. This show mainly the tribals are dependent on forests for food and medicine. The villagers have also prioritized the floral diver-

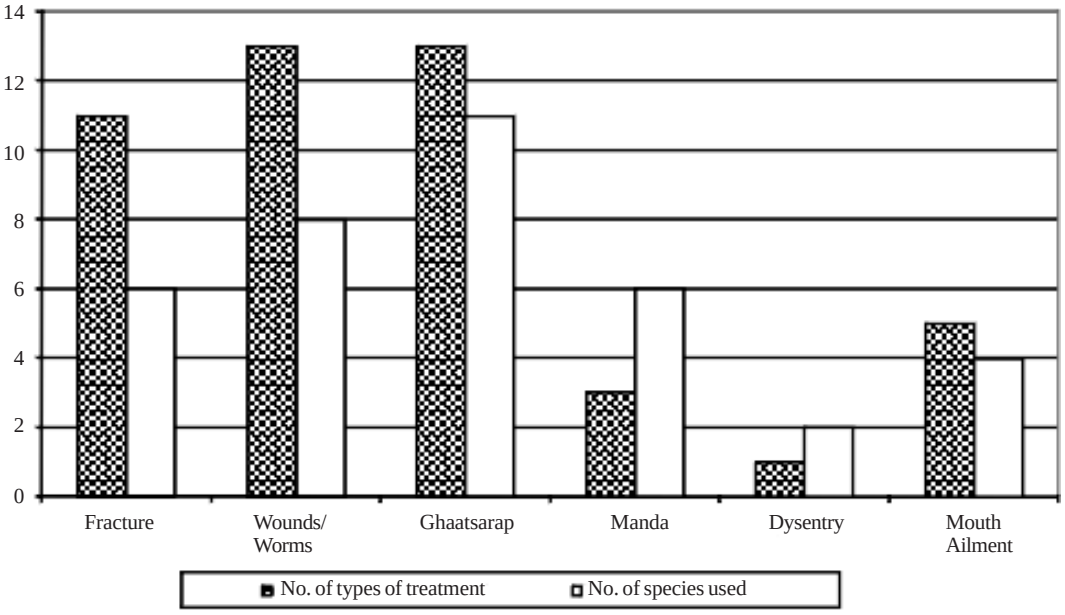

Fig. 6. Treatment and Number of species used for treatment of livestock

sity according to their needs and indicated that *Sal, Sajah, Tinsaa, Dhawan, Ghata, Korha, Laraiya, Bija* trees are in high uses and needs to protected. Undesired exploitation has been reported for *Aonla, Musli and Baans.* These species mentioned by them needs top priority for protection and conservation as their daily livelihood usage is dependent on them.

The village community of both the Vangram Sherajhar and Dhaba had prioritized 20 floral species. At Sherajhar, 9 species shows high abundance and 10 species shows less in abundance and 20 species show a decrease in availability. At Dhaba, 1 species shows a high in abundance, 16 species shows a medium in abundance and 14 species shows less in abundance

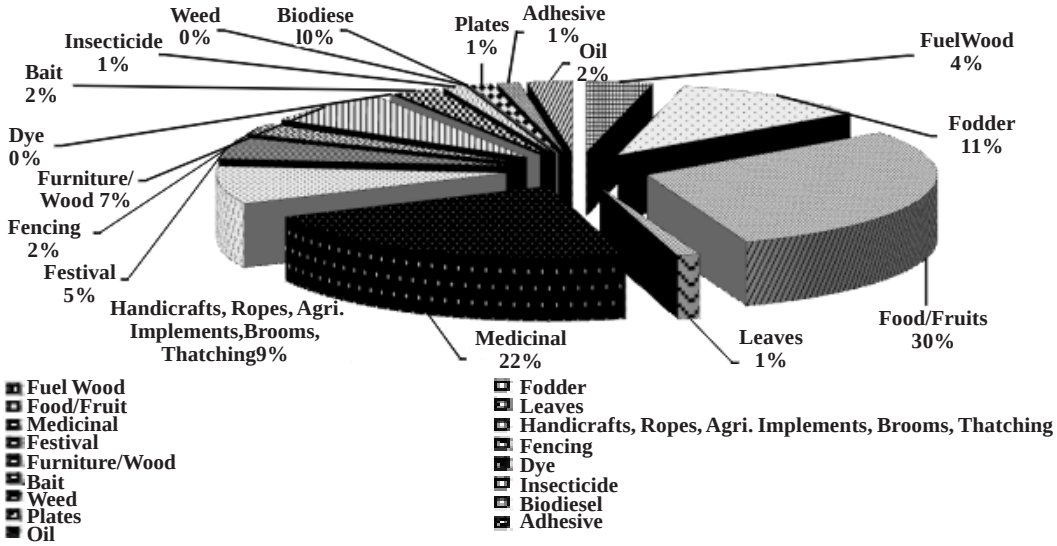

Fig. 7. No. of species of user category

Table 4: Details of Wild plant species accorded high priority in Sherajhar

S. No.	*Local name of species*	*Scientific name*	*Associated landscape type/ subtype*	*Use/Disuse (Symptoms treated in case of medicinal use)*	*User group associated*	*Current abundance*	*Trends over last 10 years*	*Reasons*
1	Bija	*Pterocarpus marsupium*	F	Cattle feed and Furniture	VC	+	D	BP
2	Ghata	*Schrebera swieternoides*	F	Feed for cattle and fruits are sold	VC	+	D	BP
3	Dhawa	*Anogeissus latifolia*	F	Agricultural Implements; Glue is sold in market	VC	+	D	BP
4	Saja	*Terminalia tormentosa*	F	Cattle feed	VC	+	D	BP
5	Safed Musli	*Chlorophytum tuberosum*	F		VC	+	D	BP
6	Korha	*Mallotus philippinensis*	F	Timber for agri. implements	VC	+	D	BP
7	Laraiya		F		VC	+	D	BP
8	Tinsaa	*Ougeinia dalbergioides*	F	Agricultural Implements; Bark is used as medicine for aaopila pachis	VC	+	D	BP
9	Sal	*Shorea robusta*	F	Furniture	VC	+	D	BP
10	Aamti		F		VC	+	D	BP
11	Pandri Rukhwa		F		VC	+++	D	BP
12	Achar	*Buchanania lanzan*	F	Treatment in Scorpion Venom	VC	++	D	BP
13	Aonla	*Emblica officinalis*	F	Fruits are eaten and used as medicine	VC	++	D	BP
14	Chindi	*Phoenix acaulis*	F	Thatching roofs, brooms, ropes and for fodder	VC	+	D	BP
15	Ban Munga		F		VC	++	D	BP
16	Ban Khirsari		F		VC	++	D	BP
17	Daichi Kanda		F		VC	++	D	BP
18	Rawaii Kanda		F		VC	++	D	BP
19	Pehri	*Agaricus bisporus*	F		VC	++	D	SE
20	Bodo Pehri	*Astraeus hygrometricus*	F		VC	++	D	SE
21	Bans Pehri	*Cantherallus sp.*	F		VC	++	D	SE
22	Puttu pehri	*Geastrum sp.*	F		VC	++	D	SE
23	Putpura Pehri	*Mycenastrum corium*	F		VC	++	D	SE
24	Bhat pehri	*Podabrella microcarpa*	F		VC	++	D	SE
25	Sarai Pehri	*Russula sp.*	F		VC	++	D	SE
26	Bhoraoh Pehri	*Termitomyces sp.*	F		VC	++	D	SE

Note: F: Forest, VC: Village community, +: Medium, ++: Low, +++: Very Low, D: Decrease, BP: Biotic pressure, SE: Soil Erosion

and 27 species shows a decrease in availability.

Festivals or Rituals significant bearing on Biodiversity Conservation

Integration of indigenous knowledge with formal forestry like sacred groves, temple forests, forest gardens and other community protected groves play an important role in providing important environmental services including biodiversity conservation, hydrological stabilization and microclimate moderation (Poffenberger and Pandey 2001; Patnaik and Pandey 1998). Biodiversity Groove Concept (Hobley 1996) illustrates the ability of local people to design management systems that fulfill a variety of forests users needs.

At van gram Dhaba, the village community living there has a unique indigenous belief about the number and laying pattern of Red Wattled Lapwings *(Vanellus indicus)* eggs at a particular habitat which predicts the rainfall of that very year.

This beliefs and customs shows that they follow some taboos before harvesting and future predictions about the climatic conditions, may be useful local information to predict climate vulnerability (Table 5).

Seasonality

The village community of both the villages is having rich knowledge about the months they need to perform any agricultural activities. They observe the seasonality of NTFP for fruiting and flowering, so that their livelihood sustains. Some of the agricultural and NTFP collection activities recorded during PRA exercise in both Van gram is listed in Table 6.

Table 5: Common Information on Knowledge

S. No.	*Attributes*	*Knowledge or Belief*
1	Rainfall	✓ If water oozes or drips from Sarai tree then time has come for rain ✓ Heavy rain occurs if a fruit named "Raila" is very ripe. ✓ Prediction of heavy rain depends on the amount of hail ✓ Eggs of Red Wattled lapwing denotes the amont of rain- ☞ Rain for three months if it lays 3 eggs ☞ Rain for 4 months if it lays 4 eggs ☞ Less rain will occur if it lays on the bank of river ☞ Heavy rain will occur if it lays on stone ☞ Normal rain will occur if it lays on any land ✓ More number of "jugnu"/ fire flys denotes the onset of Rain ✓ Water oozes out from land denoting the onset of rain ✓ Heavy rain is on the card If insects outbreak on the ripe fruits of Jamun and Achar ✓ Rain will come late if there is a late coming of new leaves of Sajah ✓ Adequate rain may happen if there is heavy sunshine for nine days and with a slight wind
	Hunting	✓ Sap of *Doomar, Peepal, Banyan, Thuaa* is wind around a stick to catch Birds ✓ Bark of *Tinsaa and Chali* is used to kill fish; fruits of *Reddi* and *Bher*i are also used
	Productivity of crops (Haryali)	✓ Branch of Baans, Bhilwa, Chital, Latti, Hasiya dapar, Bhawar maal are inserted into ground; increases in Production of Crops

Coping Mechanism: Homegardens

In India, local practices of vegetation management perhaps emanate from the basic ecological concepts of local communities reflected in "ecosystem-like concepts in traditional societies" (Berkes et al. 1998). Home gardens or *Badis* is used as reservoir of different species for household consumption a store house of nutrition and also it reduce pressure on forest. A typical home garden and kitchen garden of Baiga comprises of more than 55 floral species. The details about different species grown in Baiga home gardens, as well as kitchen gardens are provided and fodder is one of the important product, rich knowledge they posses regarding which are the best species for their cattle (Table 7). The concept of climate vulnerability and effect on the change in the local ecosystem is very much a topic of concern for the Baiga's which they refer in relation to summer temperature, agricultural yield, rainfall pattern and flowering and fruiting of trees.

CONCLUSION

Loss of biological diversity putting negative impacts in cultural, socio-political and sustainability of natural ecosystems including various products collect by the tribal on regular basis (Bhattacharya and Hyat 2003). In the recent past the economic function of diversity has played a vital role and that is being reflected in farmer's choice. Ecological functions operate towards maintenance of different ecosystems services utilizing the natural resource in a synchronized manner. The economic function that reduces the management costs include food, fuel, fodder, timber etc. contributing to local incomes both on farm and off farm. Among traditional communities like the communities at baigachak, when the economic service of the livelihood system is low, quite often such system are highly valued socially such as sacred groves or home garden species. The nature of biological resources and their relationship with the communities that depend on it lead to a different tenure systems (private or public property). Documentation through biodiversity register provide opportunity to understand such relationships, which have a major impact on the demography of the region, economy, political system and social customs, that gets reflected as cultural diversity. Sustainability of a species or diversity of species in a system depends upon the level of synergy between these three functions.

The synergy does exist in the traditional community of both the *Vangram* (Sherajhar and Dhaba) of Baigachak area, Dindori district of Madhya Pradesh. Although Agriculture is their primary occupation, forest is the natural capital, a highly valuable resource for the tribes living in the study area. Even though much of the forest has been degraded and a large number of species found in the area has been listed as endangered, it is obvious that it is the forest that has the extreme potential to provide sustainable livelihoods and food to the people of the area. The very existence of rich biodiversity and a

Table 6: Agricultural crops and their cropping season; and other forest livelihood activities

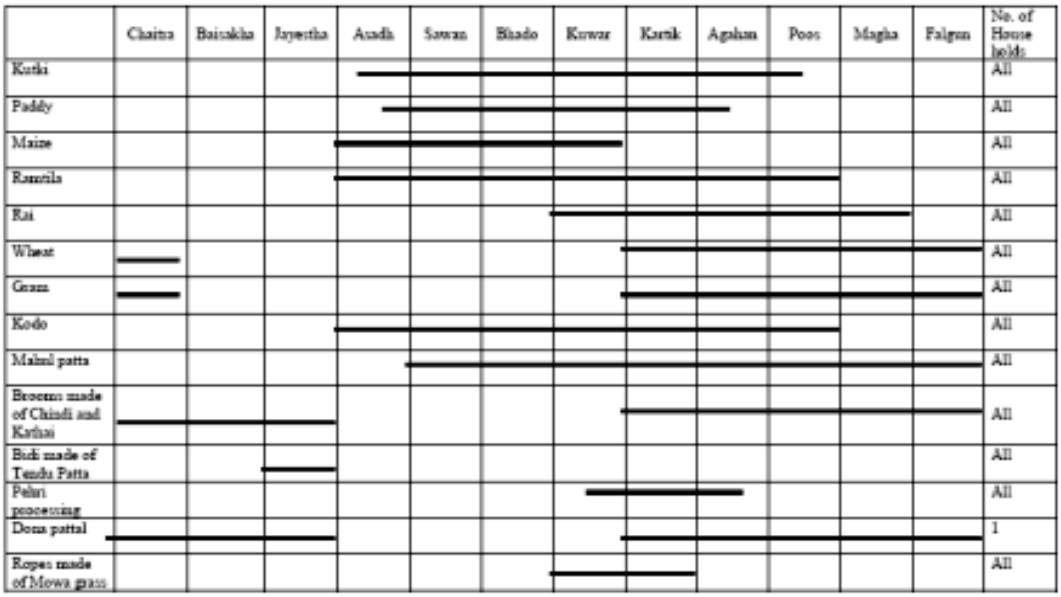

Table 7: Species of plants grown at different landscape elements

Elements	*Type*	*Species of Plants*
Home garden	Plants	Mucca, Raai, Bhagarenda, Nagphani, Mohua, Besharam, Munga, Atoot, Kurlu, Baans, Dhamin, Kassi, Munga, Jowar, Maria, Kangh, Tobacco, Nighori, Thua, Arandi
	Fruits	Aam, Nimboo, Bihi, Kathal, Papita, Kela
Kitchen garden	Vegetables	Tamatar, Lasan, Parwal, Dhania, Semi, Kumdha, Kalinder, Mirchi, Kaddu, Neem, Mahaneem, Semi, Patali, Tarrai, Bhadela, Pisti, Chech Bhjaji, Khira, Kochai, Gith Kanda, Ratal kanda, Tuma, Galinj, Purpuri, Koylar, Haldi

unique indigenous knowledge i.e. their resource use pattern and knowledge about multifarious use of floral diversity does exists in Baigachak area.

Indigenous or community knowledge, based on the cumulative experience is unique to a given community and is content, context and area specific. It is an iterative process practiced according to situational need and often tested over centuries. The main transmission channels of indigenous knowledge are through verbal communication, field observation and learning by doing (WWF International and CIEL, 2001). Community knowledge plays very important role in food security, resource management, environmental and biodiversity conservation and respects their local values.

RECOMMENDATIONS

The study recommends for organizing some event like a Biodiversity festival at baigachak area which would enable the communities at Baigachak area to showcase their rich resource available in their area and visualize the ecosystem by looking at the examples of Biodiversity around them, which have constant bearing on Biodiversity Conservation and the cultural heritage and values by displaying traditional equipments, handicrafts and skills, particularly dissemination of information for young people who had never been exposed to this concept.

The role of institutions should be brought forward to institutionalize mechanisms for forest protection and biodiversity conservation. Joint Forest management committees could help in providing much needed relief to the forest in the form of protection and prevention of illegal cutting. Detailed accounting of ecosystem services provided by local biodiversity may require further assessment in simple method, may help local community to understand the monitory value. Proactive planning for sensible forest

working plan development and also block level planning by incorporating such micro level information would be the need of the hour by honoring CBD and the Biodiversity Act (2002), policy planner should be sensitive enough to accommodate all such parameter of rich knowledge practice a Baiga women possess for sustainable village ecosystem.

NOTE

[1]Nistar means the concession granted for removal from forest coupes on payment at subsidised rate, for specified forest products for bonafide domestic use, but not for barter or sale.

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