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Traditional knowledge systems and conservation practices in tribal society of western Himalayas: a case study of district Kinnaur of Himachal Pradesh

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ABSTRACT

The tribal people of Kinnaur district of Himachal Pradesh constitute a special category of economically backward due to its inaccessibility and inhospitable geo-climatic set up of the region. Subsistence agriculture, livestock rearing and trading of the minor forest products are the only means of economic activities of the marginal people. These people have accumulated their own innovative traditional knowledge and have developed a congenial relationship with the locally available biological resources and diverse geo-climatic conditions thus establishing a perfect harmony with the nature. These people since time immemorial are practicing the indigenous means of conservation of cultural and biological diversity. The existence of an age old tradition of preserving forests on the ground of religious and mythological beliefs has become a key factor in the revival of degraded areas. A meaningful development of the area could only be achieved when cultural practices (based on indigenous knowledge) are supplemented with the adoption of modern techniques of agriculture at large by the locals to cope up with labour shortage and increasing the farm productivity. Most of marginal farmers of the region are still relying on subsistence agriculture and are not familiar with surplus production. This might be due to non-availability of markets in the vicinity although the local produce has great demand outside also.

Keywords: Tribal societies; indigenous knowledge; conservation practices; natural resource management; sustainable development

INTRODUCTION

Traditional knowledge is vital for sustainability of natural resources including forests, water and agro-ecosystems across landscape continuum spanning from households through farms, villages, commons and wilderness. Humanity faces exceptional challenge of eroding natural resources and declining ecosystem services due to a multitude of threats created by unprecedented growth and consumerism. Also imperiled is the biodiversity and sustainability of the essential ecological processes and life support systems in human dominated ecosystems across

scales. Indeed human domination of earth is evident in global change biodiversity extinctions and disruption of ecosystem functions (Singh 2002). Ecological problems coupled with unequal access to resources results in human ill-being and threat to the livelihood security of the world's poorest (Pandey 1996).

The western Himalayas cover approximately 11 per cent of the Himalayan landmass and about 90 per cent people in these areas live in villages. People in their traditional settings are well aware of the values of conserving social, cultural and biological resources. Since generations they have developed and accumulated knowledge, effective devices and methods for conservation, protection and preservation of such value systems. The tribal society of western Himalayas is highly traditional and has characteristic manifestation of man's cultural interactions with nature. These traditional societies have in turn evolved multitude of strategies to make effective and harmonious use of resources. During this process these ethnical societies have resorted to cultural adjustments for a harmonious articulation between community techniques and technologies. Indeed culture has played a vital role in the management of at least the biological resources tuned to the region. If natural reserves do not fulfill the basic needs of the individuals then society starts changing their habits resulting into a new phase of tribal culture. The society decides its own goals and methods ensuring sustained improvement in the quality of life without affecting the traditional values. Therefore culture plays a vital role in development and conservation of traditional society and biological resources (Pernetta and Hill 1984, Cohn 1988, Ramakrishnan 1992, Scott and Walter 1993, Davis and Wali 1994, Singh 2001). The interlinkages between culture and conservation in the Himalayan traditional society has not received any significant recognition (Singh et al 1996). Therefore this study mainly focuses on the cultural facets of traditional societies of western Himalayas where innovation of science and technology is not bringing significant change in their day to day life style but rejuvenation of the indigenous knowledge-based conservation practices and pertaining value addition could be a viable mechanism of sharpening and strengthening of overall socio-economic condition and livelihoods of the tribal communities.

Geography and climate of the study area: The study villages are located in the Kinnaur district of Himachal Pradesh in India. It is part of the Great Himalayas that lies between 31°05'55" N and 32°05' 20" N latitude and between 77°45'E and 79°00' 50"E latitude. The length of the valley is about 365 km which covers an area of nearly 6401 sq km accommodating about 84298 inhabitants (Anon 2011). The district comprises a number of small watersheds which find their way into the

Sutlej river. The hamlets are scattered over both sides of Sutlej river valley. The strips of cultivable lands in valley vary from a few hectares to a few kilometers. Vegetation cover is quite high in lower Kinnaur followed by middle and it is almost absent in upper Kinnaur. Tree species like *Pinus roxburghii, P wallichiana, P gerardiana, Cedrus deodara, Abies pindrow, Picea smithiana* etc are found in lower reaches whereas *Taxus baccata, Betula utilis* and *Rhododendron compenulatum* are predominantly found at higher elevation. North facing slope is relatively gentle and has adequate vegetation cover, farm fields, soil cover and sporadic settlements. Upper most part of the mountain peaks are usually covered with perpetual snow cover. A major part of the valley remains cut off from other parts of the state due to heavy snowfall during winter period. The rocks in the valley are varied in age from pre-cambrian to permo-carboniferous. Schists, gneisses, granites, quartzites, phyllites, conglongrates, quartzites slate, dolomite and limestone are the major rock types. Rocks have been highly exposed along almost all part of Kinnaur. Soil type is sandy to sandy loam and highly fragile. Thus the problems of landslide and erosion are rather very common in places where the land is not properly terraced.

There are four seasons; spring (middle of March to middle of May), summer (mid-May to mid-September), autumn (mid-September to November) and winter (December to March). The summer is mild and with the onset of monsoon there is a gradual decline in temperature. After receding of monsoon the mercury drops further thus winter sets in. The period from November to March is coldest. On the basis of rainfall the district can be divided into wet and dry zones. Usually rainfall occurs in monsoon and winter periods.

Villages and the people: There are 660 habitated and un-habitated villages in the Kinnaur district scattered over both sides of the river Sutlej. Multistory houses are common in the region which are built up of stones and wood and are either slated or roofed with iron sheets. The ground floor is used for cattle shed while the upper storey for living purpose. Now a days concrete houses are also coming fast. It is considered that people are from the Aryan stock but a significant trace of Mongoloid feature has also been noticed in the study area. The inhabitants are generally of dark complexion but good looking with a well-built muscular stature. They are frank, active, generous, hospitable and highly honorable in their dealings. Two principal castes, Kanets ie Rajput and scheduled castes are common. Apart from Hinduism people mostly follow Buddism. Sheep and goat rearing is very common profession. The villagers believe in swears of the local deity. There is also a sprinkling of polyandry practiced amongst the people. People are mostly dressed in woolen clothes. Their clothing is well suited to the climate and culture. Women wrap up a woolen shawl like garments locally known as Dhohru in a slightly different way

than the Saree and head covered with typical local cap called Kinnauri Topi.

METHODOLOGY

In an effort to document the indigenous traditional knowledge-based practices of the tribals in general the preliminary survey was conducted in the three developmental blocks viz Nichar, Kalpa and Pooh. After reconnaissance of the region nine Panchyats viz Bari, Katgaon, Yula, Kilba, Powari, Telangi, Moorang, Pooh and Nako at different elevations were finally selected for a thorough study. While selecting the villages it was ensured that these villages would represent all characteristics of the district. Equal representation was given to each village and approximately 5 per cent families from selected villages were interviewed randomly. In total 180 households 20 each from nine different Panchayats were interviewed through interactive discussions with individuals and groups of the people in the entire valley. The fields of farmers were visited and an inventory was made for crops and biological resource use and conservation practices. All the respondent farmers were categorized into five farm size classes viz marginal (<1 ha), small farm (1-2 ha), semi-medium (2-4 ha), medium (4-10 ha) and large farm (>10 ha). Women were given equal preference for the purpose of collection of data. All information pertaining to the use and conservation of endowed biological resources including plants used as medicines for traditional healthcare system were also recorded. Further farming practices such as factors favouring cultivation of indigenous landraces, crop diversity, cropping patterns and use of different tools and craftsmanship were extracted through a thorough and detailed discussion and filling up questionnaires over a period of entire year 2014. The role of deep-rooted culture in eco-development and management programmes was also enquired from respondents and was recorded into ecological, social and economic development framework.

RESULTS and DISCUSSION

Study area covered about 0.5 per cent of the state and nearly 5 per cent of the district area. Since there was no town/ city the total population lived in the rural areas and was engaged in agriculture and animal husbandry as their main economic activity. Literacy rate was relatively same as that of district and state. Sex ratio of the study area was relatively lower as compared to state level whereas sex ratio was higher in the other rural areas of Himachal Pradesh as well (Singh 1998). The salient features of the study villages are presented in Table 1.

All the study Panchayats were well connected with roads. There was few or no vegetation cover in Pooh and Nako panchayats except stunted growth of *Rosa webbiana* and *Ephedra* spp. The Pooh and Nako Panchayats remained under snow for

Table 1. General characteristic features of the study blocks of Kinnaur at a glance

Attribute	Nichar	Kalpa	Pooh
*Area (km^2)	1189	1779	3433
*Human population	33072	27765	23461
*Population density/km^2	27.81	15.60	6.82
*Literacy rate	80.18	82.28	79.36
*Sex ratio	790	815	860
#Inhabited villages	85	77	81
#Households	6681	7824	5471
**Approximate elevation (m amsl)	2200	2500	3000
**Total cultivated area (km^2)	29.10	34.56	32.81
**Area not available for cultivation (km^2)	22.24	986.95	1494.04
**Area under culturable waste (km^2)	9.15	7.96	15.65
**Permanent pastures and grazing land	882.10	559.56	1779.48
†Total livestock population	50563	34591	44486

Source: *Census India 2011 (Anon 2011), #District Panchayati Raj Office, **District Revenue Office, Kinnaur, †O/o Deputy Director Animal Health & Breeding, Kinnaur, HP

a period of about 2-3 months during winters. Inhospitable geo-climatic area of these Panchayats may be responsible for a lower population while higher population was noticed in the other study Panchayats. Similarly restricted geographical area of Pooh and Nako Panchayats had lesser area under cultivation. Per household cultivable land holdings of most of the study villages were less than 1 ha which was close to the estimate reported in other studies (Singh 1996, Singh et al 1997a, 1997b). The area not available for cultivation and under culturable waste (including common grazing lands and sacred area) was higher in Nako followed by Pooh and Moorang Panchayats. Rearing of livestock was an integral component of farming system. Distress selling of sheep and goat to earn money was common in study Panchayats. Better climate, geography and soil cover supported more varieties for crop cultivation in Bari, Katgaon, Yula and Kilba as compared to Powari, Telangi, Moorang, Pooh and Nako Panchayats. Livestock population in study Panchayats of Nichar block was higher than of Kalpa and Pooh blocks which revealed the dependence of the rural economy primarily on animal husbandry. Cultural diversity, environmental complexity and precariousness in the farming produce had forced people to practice a variety of ways and means of subsistence knowledge-based techniques of self-dependency (Table 2). In this process people had been utilising locally available resources in various forms. Preparation of organic manure by animal dung and urine with forest-based leaf litter, use of wild edibles and medicinal plants, trading off minor produce, cultivation of traditional crops and artisan activities were

Table 2. Existence of traditional knowledge-based practices in the study area

Parameter/practice	Response (%)
Existence of traditional houses	100
Resolution of social conflicts through informal village committees	100
Beliefs in local deity/Devta committees	100
Conservation of biodiversity through religious beliefs	100
Use of traditional implements/tools	100
Participation in fairs and festivals	100
Domestication of wild animals and their breeds	50
Existence of skilled persons (weavers)	75
Existence of skilled persons (wood workers, carpenters)	75
Existence of skilled persons (masons, blacksmiths)	75
Existence of skilled persons (basket makers)	30
# hydropower operated watermills	30
# hydropower operated sawmills	30
Use of wild edibles	100
Use of medicinal plants	100
Cultivation of traditional crops	100
Operation of organic farming practices	100
Operation of traditional breeding patterns	65
Preparation of handicrafts	90
Wearing of traditional dresses	90

amongst some of the common indigenous practices. Since ancient times people had developed a symbiotic relationship between endowed biological resources and cultural diversities. Traditional ways of practicing agroforestry had been evolved centuries ago through a series of trials and errors over a spatio-temporal scale. Indigenous methods of harvesting natural water for a variety of purposes were very common. People used water for drinking purpose, irrigation of crops, running watermills to grind grains etc. Incorporating the scientific inputs to modify these old systems for better hydropower use would be an asset to the tribal people. Diverting water through small canals would indeed be helpful for proper use of water rather than making big dams/ hydro-electric projects which may prove a threat to the otherwise fragile ecosystems of the Himalayan region. Use of similar traditional knowledge-based practices have also been reported from other regions of Himachal Pradesh (Singh et al 1996, Singh et al 1997a, 1997b) and Uttarakhand (Farooquee et al 2004). Protecting forest (sacred groves) areas on the ground of religious beliefs have also been noted in the area which is rich in biological and cultural diversity (Singh 1997a, 1997b, 2000). Such practices were regulated through informal committee consisting of head priest (Talrasa) and five other people. Similar practices were also noted from other parts

of the Himachal Himalaya (Singh et al 1996, Farooquee et al 2004). Approximately 20 crops were being cultivated by the subsistence farmers as staple food (Table 3). All crops were locally bred. Crops like wheat, barley and buckwheat were cultivated as major food crops. Knowledge regarding different crops and different fields was distinct. The people commonly practiced rotation of farm fields for the replenishment of nutrients. Majority of the crops were harvested during rainy season; heavy snowfall did not permit the cultivation of winter crops. Crop diversity in the study area was significantly higher as compared to northeast Himalayas (Mishra and Ramakrishnan 1982), central Himalayas (Pandey and Singh 1984) and other mountainous regions (Garcia-Ruiz and Lasanta-Martinez 1993, Sarmiento et al 1993, Dougherty 1994).

Landscape variability and environmental uncertainty had favoured the evolution of multiple ways of cultivation of varieties of local crops. Crop cultivation in Kinnaur with terraced lands varied and depended on field quality. However introduction of fruit bearing trees like apple was hardly 50 years old. Large scale plantation of apple in the area was required

Table 3. The diversity of crops grown in Kinnaur district

Botanical name	Common name/local name	Sowing period	Harvesting period
Amaranthus paniculatus	Amaranthus/Dankhar	Apr-May	Aug-Sept
Chenopodium album	Bathua/Bithoo	Apr-May	Sept
Eleusine coracana	Koda/Ragi/Kodro	Apr-May	Aug-Sept
Panicum miliaceum	Cheenee/Räd	Apr-May	Aug-Sept
Setaria italica	Koning	Apr-May	Aug-Sept
Hordeum vulgare	Jo/Täg/ Chag	Apr-May	Aug-Sept
Zea mays	Makki/Chhalia	Apr-May	Aug-Sept
Fagopyrum tataricum	Ogla/Olgo	May	Sept-Oct
F esculentum	Phapra/Bras	May	Oct
Triticum aestivum	Gehu/Zöd	Mar-Apr	Aug-Sept
Phaseolus vulgaris	Rajmah/Paithang	Apr-May	Aug-Sept
Vigna radiata	Urd/Rok Mash	Apr-May	Aug-Sept
Lens esculenta	Masur	Apr-May	Aug-Sept
Phaseolus mungo	Moong	Apr-May	Aug-Sept
Glysine max	Bhatt/Botang	Apr-May	Aug-Sept
Brassica spp	Sarson/Sheshong	May-June	Sept
Brassica spp	Salgam	Apr-May	Aug-Sept
Raphanus sativus	Muli	Apr-May	Aug-Sept
Solanum tuberosum	Aloo/Halgong	Apr-May	Sept
Pisum sativum	Matar	Apr-May	Sept
Brassica spp	Gobhi	Apr-May	Aug-Sept

thorough landscape study and planning (Singh and Ram 1997).

Approximately 15 plant species were found to be used by local people for medicinal purposes under their traditional healthcare system. Some of the commonly used species are presented in Table 4. The frequency of use varied depending upon the species and ailments. Technical knowhow to make ingredients and doses used for respective diseases were highly praiseworthy. Some of the medicinal plants were also used to cure animal diseases. Owing to high market demand for some of the medicinal plants like *Trillidium govanianum, Aconitum heterophyllum, Jurinea macrocephala, Dioscoria deltoids, Picrorrhiza kurrooa* and *Podophyllum hexandrum* were being harvested and collected regularly on large scale for commercial purpose.

Table 4. Local knowledge related to use of common medicinal plants

Botanical name	Common/local name	Usage	Percentage of families used
Aconitum heterophyllum	Patish	Root powder removes colic and indigestion	100
Bunium persicum	Kala Zeera	Seed powder cures jaundice, cough, cold	95
Berberis spp	Kashambal, Chava	Root powder used to cure joint pain	95
Viola odorata	Banafasha	Whole plant used during acute fever	75
Acorus calamus	Bach	Roots used during acute fever	50
Arnibia euchrom	Ratanjot	Roots used as dye	75
Dactylorhiza heterigera	Hathpanja	Paste of tuber applied on cuts, wounds	100
Dioscorea deltoides	Singli-Mingli	Tuber used as soap and for stomach problems	100
Hippophae spp	Chharma, Surch	Cures body pain	90
Jurinia macrocephala	Dhoop, Gugal, Shur	Roots used as stimulant during child birth, checks excessive bleeding and fever	100
Nardostachys grandiflora	Balchhar, Khome	Root extract cures hysteria, epilepsy and root powder cures gastric problems	95
Podophyllum hexandrum	Bankakroo	Root powder cures colic and vomiting	100
Saussurea lappa	Kuth,Dongor	Root extract cures cough and cold	100
Taxus baccata	Cha, Shing-Cha	Bark used in tea and cancer treatment	90
Picrorrhiza kurroo	Karoo, Kori	Root powder cures colic, body ache and diarrhoea	95
Trillidium govanianum	Nagchhatri	Roots are aphrodisiac	50
Morchella esculenta	Guchhi, Jhangmo	Fungus has high medicinal value	75

Elder people had full faith in the use of medicinal plants and also showed their enthusiasm to educate the younger generation. Imparting scientific knowledge for cultivation of agricultural fields and wastelands which were close to similar climatic regions of high altitudes could promote the economic benefit of the subsistence farmers and also accelerate regeneration of species in their natural environment. Thus establishing a harmonic symbiotic relationship between the locals and the natural resources seems to be important for preservation of social, cultural, economic and natural heritage. Indigenous knowledge pertaining to the use of various plants for different purposes has been noted among the people of the study villages (Table 5). Leaves of species of *Pinus, Abies, Picea* and *Cedrus* were collected for the purpose of cattle bedding which ultimately got converted into organic manure used for crop production whereas leaves of *Ficus, Morus, Pyrus, Pistacia, Quercus, Aesculus, Ulmus, Celtis, Eugenia* and *Salix* were used for fodder purposes during the lean period. The area was endowed with a rich variety of wild edible species of food value. Wild edibles are known for their high nutritive values which improve milk production of milch cattle, goats and sheep and also keep the body warm during the chilled winter season. Hard labour and low monetary value involved in the collection of wild edibles were not yet commensurate with the market demand. Therefore availability and growth of these plants were not limited. There was an urgent need to improve the utility value of these wild edible plants by innovating value added products so that better economic returns were ensured to the farmers.

Similarly people had been using a number of plant species for fuelwood, timber, tools and implements making on a routine basis (Table 6). Like leaf litter collection, collection of fuelwood was permissible throughout the year. Usually one or two family members were engaged in these activities. People were well aware regarding the artisan work and the usage of varieties of local tools and implements to carry out their day to day domestic needs and activities. Some of them were skilled in preparation of wooden and bamboo-based items while a few of them for making iron articles symbolizing their interdependence and self-sufficiency. Low landholding people comprising socio-economically weaker sections of the society were more dependent on such locally designed tools. However poor people largely depended on indigenous tools to save their economy. It was felt that there was a strong need to improve the capacity of the locally designed implements such as watermills, Raksh and Khadi so that small scale industry coupled with employment could be generated at the household level.

Most of the animals in the study villages were of local breed (Table 7). Cows, bullocks, goats, sheep, mules,

Table 5. Knowledge related to use of various plant resources

Botanical name	Common/local name	Litter	Fodder	Fuel/timber/ tools	Edibles	% response
Abies pindrow	Ri	+	-	+	-	100
Picea smithiana	Tosh	+	-	+	-	100
Betula utilis	Bhojpatra, Shrabra Botang	-	-	+	-	100
Cedrus deodara	Deyar, Kelmang	+	-	++	-	100
Eugenia spp	Jamun, Kron	-	+	-	Fruits	90
Hippophae spp	Surach	-	-	-	Fruits	90
Juglans regia	Akhrot, Ka	-	-	+	Fruits	90
Pinus roxburghii	Lim	++	-	+	-	100
Pinus gerardiana	Rhi/Chilgoza	+	-	+	Seeds	100
P wallichian	Chilam, Golda	++	-	+	-	100
Prunus armeniaca	Khurmani, Chuli	-	-	-	Fruits	100
P persica	Behmi	-	-	-	Fruits	100
Castenia sativa	Bailaiti	-	-	+	Fruits	50
Salix spp	Willow, Shon	-	+	+	-	90
Aesculus indica	Poo Bothang	-	+	+	Fruits	100
Arundinaria falcata	Bamboo/Nagali	-	+	+	-	50
Cotoneaster spp	Reuns	-	-	+	-	75

'++' major; '+' minor; '-' no use

Table 6. Local implements and tools used in the study village

Common/local name	Usage
Hal/Stal and Kol	Ploughing the farm fields
Gaiti and Kuti/Khot /Goling	Digging, weeding
Kulhari/Laasta	Cutting of wood, hedges
Basula/Basing	Wood finishing and plank making
Darat/Proshtong/Chatam	Cutting of bushes, hedges, lopping of trees etc
Sickle/Hasia/Jithrong/Thame	Cutting of crops, grasses etc
Kilta/Koting	Carrying of organic manure, food grains etc
Rassi/Bosh/Lat	Made up of sheep hair and used as rope
Patha/Kot/Köd	Made up of Akhrot tree or iron and used as scale for grain measurement
Gharat/Gotang/Gandhotar	Watermills to grind grains
Takli/Tawali	Spinning of wool
Raksh and Khadi/Phoshang and Khadi	Preparation of shawl, Pattu and Patti

Table 7. Usage of different local livestock in the study area

Zoological name	Common name	Local name	Usage
Bos indicus	Bail, bullocks	Herad, Dames, Zho, Gara, Gira, Buma	Ploughing and drought work
Bos indicus	Gai, cow	Lang, Zome, Gare, Gire, Kizme, Brume	Milk, milk products, wool and its products
Ovis aries	Bher, sheep	Hulas	Breeding, drought, wool, skin as baggage preparation
Ovis aries	Bher, sheep	Khas	Milk, wool and baggage preparation
Capra hirtus	Bakra, he-goat	Balu, Ach	Breeding purpose, wool, drought, baggage
Capra hirtus	Bakri, she-goat	Bhakhor	Milk, wool and its products and baggage
Equus spp	Ghora/mule	Rang	Carrying luggage, grains etc.
Equus spp	Gadha/ass, ponies	Phoch	Beast of burden
Bos grunniens	Yak	Yakcha	Domesticated wild animal act as Breeder

ponies and yaks constituted the major livestock. Wild yak was domesticated for the breeding and the offsprings of yak were used for various purposes. Bullocks were used for ploughing. Traditional knowledge related to preparation of milk products was very unique. Sheep and goats were domesticated in remote villages solely for meat, wool production and distress selling. Mules and ponies were used to fulfill their transportation need and were reared usually by small landholders whose livelihood was dependent on all these wild animals as these were geo-climatically suited to the area.

CONCLUSION

The tribal people of Kinnaur district of Himachal Pradesh have indigenously been conserving age old tradition, culture and natural resources and were well aware regarding environmental protection. Socio-cultural diversity and environmental complexity have favoured tribal people to develop symbiotic relationship with the locally available resources and precarious nature. Such conducive practices have helped the people for better pursuit of livelihood in particular and management of the entire watershed/landscape in general. Economy of the people could be improved by empowering the efficiency of the locally available resources, encouraging small scale industries, increasing market values of medicinal plants and food items, sensitizing the people for participation in development planning and awareness building in indigenous knowledge systems-based packages. However planning to improve their overall economy should be based on the cultural and social sentiments of the local people.

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