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Traditional Knowledge and Biodiversity Conservation: A Preliminary Study of the Sacred Natural Sites in Uttarakhand, Central Himalaya

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ABSTRACT Cultural diversity is closely linked to bio-diversity. The study of these interrelationships need to be studied mainly for the simple reason that culture is not only the ethical imperative for development, it is a condition of its sustainability; for there exists a symbiotic relationship between habitats and cultures, between ecosystems and cultural identity, and that this relationship constitutes a determining factor in ensuring sustainable human development. The association of religion with eco-system management is interwoven in the symbolic network of the Himalayan traditional communities. Infact, we cannot think of ecology in the Himalaya without religion. The present study deals with the study of sacred natural sites (forests/groves, pastures, water bodies), within the State of Uttarakhand, and the inherent traditional knowledge-based systems, the taboos, as regards the resource exploitation and other traditional beliefs and customs, in practice surrounding these sacred natural sites. Even though, dilution in norms and taboos restricting the resource use, has undoubtedly got diluted in many of the sacred forests, a significant number of very-well preserved sacred forests, with religiously guarded taboos, do exists, which warrants a detail study, for their floral and faunal diversity.

INTRODUCTION

Beginning several decades ago, the idea that indigenous people and other small-scale societies were exemplary conservationists gained widespread currency in popular media as well as in academic circles (Smith and Wishnie 2000). This indigenous conservationism has often been attributed to a spiritual respect for, and a practical understanding of the natural world (Vecsey 1980; Martinez 1996; Berkes 1999). Evidence offered in support of this characterization, includes the culturally expressed conservation ethics, animistic religious beliefs that conceptualizes other species as social beings, and relatively higher biodiversity richness found within the sacred forests in the homelands of these peoples (Nelson 1982; Duming 1992; Posey 1992; Gadgil et al. 1993; Callicott 1994; Alcorn 1996; Bodley 1996; Nabham 1997).

Even though, much progress has been made in exchanges; however awareness of the inter-relationship between culture and environment is still in its infancy. Yet cultures shape the environment. They determine the individuals and community use (and abuse) we make of the natural resources. They determine, who will manage those resources and how. Concomitantly, cultures are in turn shaped by the environment. Sustainable natural resource management is driven by the beliefs and behaviours of the human communities, and local cultures are strengthened by their intimate connections to the natural environment, which sustains them. Our modern world is often poorer for the scientific rationalism, which treats objective and sacred knowledge as separate entities. In contrast, the traditional cultures do not make such distinctions, where very often, ritual and religion are intrinsically bound with the daily chores of living (Vidyarthi 1963; Rappaport 1984; Malhotra and Mark 1989; Sinha 1995; Kumbhojkar and Kulkarni 1998; Negi 2003, 2005). In fact, in the Himalayan context, the association of religion with eco-system management is interwoven in the symbolic network of the Himalayan communities (Joshi 1992; Negi et al. 2001).

Ecology in the Himalayas is synonymous with the religion practiced. Sanctioning mechanisms are also religious in tradition-bound societies and deviation from established practices might be locally interpreted as the arousal of supernatural anger, and thus it becomes pertinent to take note of the fact that attempts to disregard religious factors in programs of change may be thwarted by the people, since religion gives meaning to various actions they carry out (Joshi 1992). However, these traditional knowledge-based systems (TKBS) in practice could qualify as being of conservation value, if these practices satisfy two

basic criteria: It should (a) prevent or mitigate resource depletion, species extirpation, or habitat degradation, and (b) be designed to do so (Smith 1995; Alvard 1998; Ruttan 1999; Smith and Wishnie 2000). With these two facts in view, the present paper attempts to bring forth the salient features of the traditional knowledge-based systems, surrounding the sacred natural sites in the State of Uttarakhand, Central Himalayas.

METHODOLOGY

The knowledge based-systems methodology for acquisition of local ecological knowledge suggested by Walker et al. (1997) and Sinclair and Walker (1999) was adapted. This involves knowledge collection from a small sample of deliberately chosen individuals, who are thought to be knowledgeable by other villagers about the domain of interest, and who are willing to co-operate. The knowledge was collected through repeated, focused interviews with the key informants. Since the domain of study, i.e. taboo system surrounding the sacred sites was governed by dominant castes, principally Brahmins and the Thakurs/Rajputs, with lower castes relegated to carrying out profunctionary functions/ tasks, it was inevitable that interviews be conducted across the different class of people, so that an overall picture of the taboo system could emerge, and hence, efforts were made to interview a minimum of 6-8 persons across the class/ caste divide per site/village, and thus, altogether 168 sacred natural sites (henceforth SNS), including 75 sacred forests, 74 sacred groves, 10 water bodies and 9 pastures, and extending across the nine hilly districts of the state were covered for the study of existent taboo system (Figs. 1 and 2), and a total of 1262 informants interviewed. In brief, the information was sought on the location of SNS, features related, local perception about the sacredness of the SNS, biodiversity, management (inclusive of caste dynamics), and lastly the taboo system in practice.

RESULTS

Traditional natural resources management system in practice in Uttarakhand, can be classified into the following broad categories: (i) protection of particular ecosystems or habitats (such as sacred groves and forests); (ii) protection of particular animals or plant species (as totem or tabooed species); and (iii) regulation of the exploitation of particular natural resource (such as a closed season for resource harvesting). Thus, keeping in view the above-mentioned facts, a total of 168 sacred natural sites (henceforth SNS), including 75 sacred forests, 74 sacred groves, 10 water bodies and 9 pastures, and extending across the nine districts within the State of Uttarakhand, were covered for the study of existent taboo system (Figs. 1, 2; Table 1). The intactness of the belief systems surrounding the SNS, showed a proportional relationship with the relative distance with the townships. This was more conspicuous in district Pithoragarh, as compared with the rest of the state. One of the causal factors remains the close ties of the populace of district Pithoragarh, with the neighbouring Nepal across the River Kali, where the institution of sacred is much stronger. This whole aspect of the traditional ties of the two people across the borders, along with the resident Gods, has manifested itself in the form of sacred groves and forests, conspicuously duplicated across the two banks of the River Kali.

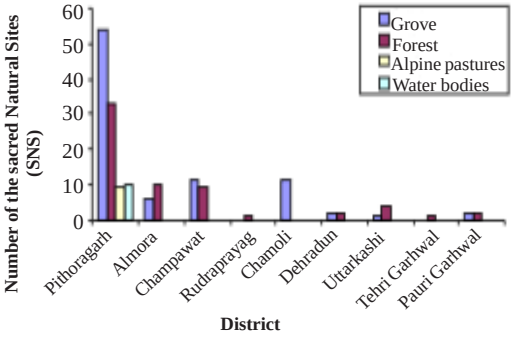

Fig. 1. Distribution of the sacred natural sites (SNS) across the State of Uttarakhand (N= 168)

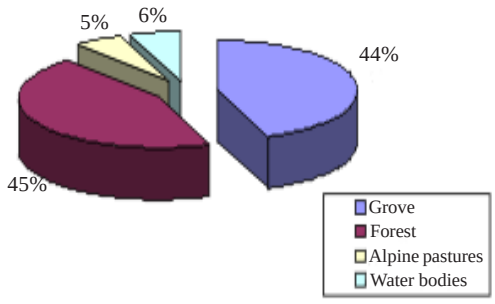

Fig. 2. Percentage distribution of the sacred natural sites (N= 168)

Table 1: Brief outline of the sacred natural sites across the state of Uttarakhand

S. No.	Sacred natural site	Management	Dominant caste	Festival	Influence	Restrictions or Taboo*	Floral diversity	Dominant species #	Status
				PITHORAGARH					
1.	Hurpudhar, Singalkhola	The representatives of the whole community, even though ladies are completely excluded	The society is not divided on caste	No specific festival, however, the local being a transhumant society worship the resident deities, immediately after their arrival in these summer homes, as well as before returning back to their winter homes around 3rd week of September.	Singalkhola village	12	Rich	*Rhododendron campanulatum, Juniperus communis.*	Well protected
2.	Waterfall, Ralam	-do-	-do-	-do-	Ralam village	9	-	*Berberis lycium*	-
3.	Brijgang-Top, Ralam	-do-	-do-	-do-	Ralam village (74)#	12	Rich	*Picrorhiza kurrooa, Juniperus communis*	Well protected
4.	Raghunath Mandir,Tola	-do-	-do-	-do-	Tola village	9, 10	Rich	*Abies* sp.	Well protected
5.	Syangchu Kund	-do-	-do-	-do-	Milam	9	-	*Juniperus* sp., *Danthonia sp.*	Well protected
6.	Suraj Kund, Milam	-do-	-do-	-do-	Milam	9	Rich (78)	*Rhododendron anthopogon, Danthonia sp.*	Well protected
7.	Supkasen, Ganghar	-do-	-do-	-do-	Ganghar and Pancchhu	Yes	Average	*Rhododendron campanulatum, Betula utilis*	Well protected
8.	Water fall, Maapa	-do-	-do-	-do-	Maapa, Ghanghar & Pancchhu	9	-	*Juniperus communis, Rosa* sp.	Well protected
9.	Bhujani, Martoli	-do-	-do-	Nanda Astami	Martoli village	6, 10	Rich	*Betula utilis, Rhododendron campanulatum*	Well protected
10.	Bhadelgwar, Martoli	-do-	-do-	Nanda Astami	Martoli & Lwa village	6	Rich	*Saussurea obvallata, Saussurea gossypiphora*	Well protected
11.	Bhagwati mandir, Lwa	-do-	-do-	Nanda Astami	Martoli & Lwa village	6	Average	*Juniperus* sp., *Rubus* sp., *Rosa* sp., *Betula utilis.*	Well protected
12.	Dharmbn Sem, Laspa	-do-	-do-	Nanda Astami	Laspa village	12	Rich (73)	*Dactylorhiza hatagirea, Carum carvi*	Well protected
13.	Rakas tall, Poting	-do-	-do-	No specific festival	Poting,	9	-	*Rhododendron campanulatum, Betula utilis*	Well protected
14.	Hya Roshey, Napalchu	-do-	-do-	-do-	Napalchhu village	6, 12	Rich (42)	*Euphrasia himalaica, Cicerbita violoides, Polygonum viviparum, Bupleurum sp., Potentilla cunifolia, P. atrosanguinea,*	Well protected
15.	Kee Pang, Gunji	-do-	-do-	-do-	Gunji village	6, 10, 13	Rich	*Pinus* sp., *Betula utilis, Abies* sp.	Well protected
16.	Tu Trang, Rong-Kong	-do-	-do-	-do-	Rong-Kong village	6, 10, 13	Rich	*Abies* sp., *Betula utilis, Juniperus communis*	Well protected

Table 1: Contd.....

S. No.	Sacred natural site	Management	Dominant caste	Festival	Influence	Restrictions or Taboo*	Floral diversity	Dominant species #	Status
17.	Neung Tangti, Rong-Kong	-do-	-do-	-do-	Rong-Kong village	6, 9, 10	Rich	*Abies* sp.	Well protected
18.	Khar Gumba/ Khar Kot, Kuti	-do-	-do-	-do-	Kuti village	10	Rich	*Aster stracheyi, Euphrasia himalaica, Agrostis pilosula, Carex setigera, Potentilla argyrophylla*	Well protected
19.	Parvati Sarovar, Jeolingkong	-do-	-do-	-do-	Kuti village	9, 13	Rich	*Euphrasia himalaica, Polygonum viviparum, Potentilla argyrophylla*	Well protected
20.	Dhan ki kheti, Jeolingkong	-do-	-do-	-do-	Kuti village	11, 12, 13	Rich (34)	*Euphrasia himalaica, Polygonum viviparum, Potentilla argyrophylla*	Well protected
21.	Gauri Kund, Jeolingkong	-do-	-do-	-do-	Kuti village	9, 13	-	-	Well protected
22.	Rangchim, Sipu	-do-	-do-	-do-	Sipu village	6, 10	Rich	*Betula utilis*	Well protected
23.	Nigalfu, Sipu	-do-	-do-	-do-	Sipu village	6, 10	Rich (37)	*Betula utilis* , *Juniperus* sp., *Aster stracheyi, Euphrasia himalaica, Potentilla cunifolia, P. argyrophylla, Geranium granilianum*	Well protected
24.	Muldi Bai, Sipu	-do-	-do-	-do-	Sipu village	9	Average	*Aster stracheyi, Euphrasia himalaica Polygonum amplexicaule, Potentilla cunifolia,*	Well protected
25.	Aanchari taal, Sipu	-do-	-do-	-do-	Sipu village	9	-	-	Well protected
26.	Bombasing, Tedang	-do-	-do-	-do-	Tedang, Dhakar	6, 10, 11	Rich	*Abies pindrow, Betula utilis, Pinus* sp.	Well protected
27.	Sangfa Fu, Baun	-do-	-do-	-do-	Baun and Baling village	6, 10,11	Rich (48)	*Juniperus* sp., *Rhododendron anthopogon*	Well protected
28.	Beecham, Naagling	-do-	-do-	-do-	Naagling village	6, 10, 11	Rich	*Pinus* sp., *Betula utilis, Abies* sp., *Juniperus communis, Rhododendron anthopogon*	Well protected
29.	Hokra Devi, Hokara	The representativesof the whole community	Thakur	Kartik purnmasi and Shivratri	Munsiari subdivision	1, 2	Very rich	*Q. leucotrichophora, Q. dilatata, Alnus nepalensis, Aesculus indica, Pinus wallichiana,*	Well protected
30.	Thal Ke dhar, Badabe	Badabe revenue village	Brahmins	Kartik purnmasi, Baisakhi and Shivratri.	Pithoragarh and the adjoining vmillages	1, 2, 3.	Rich	*Quercus leucotrichophora, Q. dilatata,*	Degraded
31.	Lateshwar, Badabe	-do-	-do-	Kartik purnmasi and Baisakh	Pithoragarh and the adjoining villages	1, 2	Rich	*Quercus floribunda*	Well protected
32.	Chamunda	The representativesof the	Thakur	-do-	Gangolihat sub-division	1, 3	Average	*Cedrus deodara*	Well protected

Table 1: Contd.....

S. No.	Sacred natural site	Management	Dominant caste	Festival	Influence	Restrictions or Taboo*	Floral diversity	Dominant species #	Status
		whole community							
33.	Panchmod	-do-	-do-	Baisakh	Peripheral villages (10)	1	Average	*Q. leucotrichophora, Pieris ovalifolia*	Well protected
34.	Madmahesh	The village community	Brahmins	Kartik purnmasi and Baisakh	Peripheral villages	1, 2	Rich	*Quercus floribunda*	Well protected
35.	Boorkasin	-do-	-do-	-do-	-do-	1, 2	Rich	*Quercus floribunda*	Well protected
36.	Khandelnath	-do-	-do-	-do-	-do-	1, 2	Rich	*Quercus floribunda*	Well protected
37.	Goril	-do-	-do-	-do-	-do-	1, 2	Rich	*Quercus floribunda*	Well protected
38.	Kashin	-do-	-do-	-do-	-do-	1, 2	Rich	*Quercus floribunda*	Well protected
39.	Churmal	-do-	-do-	-do-	-do-	1, 2	Rich	*Quercus floribunda*	Well protected
40.	Betal	-do-	-do-	-do-	-do-	1, 2	Rich	*Quercus floribunda*	Well protected
41.	Asur	-do-	-do-	-do-	-do-	1, 2	Rich	*Quercus floribunda*	Well protected
42.	Kamarnath	-do-	-do-	-do-	-do-	1, 2	Rich	*Quercus floribunda*	Well protected
43.	Latura	-do-	-do-	-do-	-do-	1, 2	Rich	*Quercus floribunda*	Well protected
44.	Dhawaj	-do-	-do-	Shiv-ratri	Very wide reverence throughout the region	1, 2, 3	Rich	*Q. leucotrichophora, Q. dilatata, Myrica esculenta, Rhododendron arboreum*	Well protected
45.	Budh Kedar	Village community	Thakur	Non existent.	-	-	Average	*Quercus floribunda*	Degraded
46.	Deochula	-do-	-do-	Kartik Purnmasi.	Didihat sub-division.	1, 2	Rich	*Q. leucotrichophora, Q. semecarpifolia, Pieris ovalifolia*	Well protected
47.	Ankot	-do-	-do-	-do-	Peripheral villages (8-10)	1, 2	Rich	*Q. leucotrichophora, Q. floribunda*	Well protected
48.	Ghandhura	-do-	-do-	Shiv-ratri.	Peripheral villages (15)	1, 2, 3	Very rich	*Q. leucotrichophora, Rhododendron arboreum, Q. semecarpifolia, Thamnocalamus sp. Syzygium sp.*	Well protected
49.	Syangse Gabla, Sosa	-do-	No caste	Kartik purnima	Throughout Chaudas valley	9, 10	Rich	*Q. semecarpifolia, Abies pindrow*	Well protected
50.	Chopakya	-do-	Brahmins	Shivratri	Peripheral villages	-	Average	*Quercus floribunda*	Degraded
51.	Navling	-do-	-do-	Kartik purnmasi.	Peripheral villages	2	Average	*Quercus leucotrichophora*	Well protected
52.	Nakuleshwar	-do-	Thakur	Kartik purnmasi & Shivratri.	Peripheral villages (8)	1, 2	Rich	*Quercus floribunda*	Well protected
53.	Ratashila Devi	-do-	Harijans	-do-	Shimpaani village	-	Poor	*Ficus glomerata*	Protected
54.	Taaleshwar	-do-	Thakur	Makar Sankranti	Wide influence, throughout the region	1, 2, 3	Poor	*Diploknema butyracea*	Well protected
55.	Ratashila	-do-	-do-	-do-	Wide influence, throughout the region	1, 2, 3	Rich	*Diploknema butyracea*	Well protected

Table 1: Contd.....

S. No.	Sacred natural site	Management	Dominant caste	Festival	Influence	Restrictions or Taboo*	Floral diversity	Dominant species #	Status
56.	Jagatnath rich	-do-	Brahmins	Shivratri, Janmastami and Basant Panchami	Wide influence, throughout the region	1, 2, 3, 5	Very	*Diploknema sp., Ficus sp, Aegle marmelos, Grewia optiva, Bombax ceiba, Ougeinia oojeinensis, Albizia lebbeck*	Well protected
57.	Bhetiya Devta	-do-	Thakur	Kartik poornima	Kaanadi village	1	A single tree	*Ficus religiosa*	Protected
58.	Nagarjuna/ Nang sara	-do-	-do-	Kartik purnmasi & Baisakh	Kaanadi village	1, 2, 3	Rich	*Acacia catechu, Diploknema butyracea, Grewia optiva*	Protected
59.	Bhaunaali	-do-	-do-	Kartik Purnmasi, Baisakh, Shiv ratri	Gaurihaat talla village	1, 2	Poor	*Ficus semicordata, Grewia optiva*	Protected
60.	Mani Mahesh	-do-	-do-	-do-	Gaurihaat talla village	1, 2	Poor	*Ficus semicordata*	Protected
61.	Churmal	-do-	-do-	-do-	Baltir village.	1, 2	Poor	*Ficus sp., Quercus leucotri-chophora*	Degraded
62.	Choragolu	-do-	-do-	-do-	Baltir village	1, 2	poor	*Ficus sp.*	Degraded
63.	Thamri Kund	-	-	-	Wide influence throughout the Munsiari sub-division.	1, 2, 3, 6	Very rich	*Quercus semecarpiflora, Rhododendron arboreum, R. campanulatum, Taxus baccata syn. wallichiana*	Well protected
64.	Malainath Swami	-do-	Thakur	Kartik Purnmasi, Baisakh, Shivratri	Wide influence throughout the Didihat sub-division.	1, 2	Rich	*Quercus leucotrichophora, Rhododendron arboreum, Myrica esculenta, Prunus ceresoides*	Well protected
65.	Jal Devi	-do-	-do-	-do-	Wide influence throughout the Didihat sub-division.	1, 2	Rich	*Quercus leucotrichophora, Rhododendron arboreum, Myrica esculenta*	Well protected
66.	Dhanlekh	The village community	Brahmins	Navratri	Bastari and adjoining villages (8)	1, 2	Poor	*Quercus leucotrichophora, Q. glauca, Myrica esculenta*	Degraded
67.	Kotgyari Devi	-do-	-do-	Chaitra and Aswin Navratri	Very wide influence throughout the district	1, 2, 3, 4	Poor	*Quercus leucotricophora*	Protected
68.	Asur Devta	-do-	-do-	Chaitol at the start of Chaitra month	Wide influence throughout the Majirkanda Gram Sabha	1, 2	Poor	*Pinus roxburghii, Ficus sp.*	Protected
69.	Jyastha Masaani Devi	-do-	Thakur	Nounagi##	Biskholi village	1, 2, 4	Poor	*Quercus leucotricophora, Ficus sp., Pyrus pashia, Grewia optiva*	Well protected
70.	Bhagwati Devi	-do-	-do-	-do-	Biskholi village	1, 2	Poor	*Quercus leucotricophora*	Protected
71.	Malainath	-do-	-do-	Navratri	Peripheral villages (7-8)	1, 2	Poor	*Quercus leucotricophora, Myrica esculenta*	Well protected

Table 1: Contd.....

S. No.	Sacred natural site	Management	Dominant caste	Festival	Influence	Restrictions or Taboo*	Floral diversity	Dominant species #	Status
72.	Malainath	-do-	-do-	-do-	Wide reverence throughout the Jourasi landscape	1, 2	Rich	*Quercus leucotricophora, Myrica esculenta, Rhododendron arboreum*	Protected
73.	Latenath	-do-	-do-	-do-	Lima village	1, 2	Very rich	*Quercus leucotricophora, Myrica esculenta, Rhododendron arboreum*	Well protected
74.	Malainath	-do-	-do-	-do-	Lima village	1, 2	Poor	*Quercus leucotricophora*	Protected
75.	Mahakali temple	The village community	-do-	Chaitra & Aswin Navratri	Askote and the peripheral villages (20)	1, 2, 3	Poor	*Sapium insigne, Quercus leucotrichophora, Bombax ceiba*	Partially degraded
76.	Suskar dev	-do-	-do-	Shivratri, Holi and Chaitra & Aswin Navratri	Askote and the peripheral villages (20)	1, 2, 3	Poor	*Quercus leucotrichophora*	Partially degraded
77.	Huskar	-do-	-do-	Chaitra & Aswin Navratri, Sakranti	Askote and the peripheral villages (20)	1, 2, 3	Poor	*Quercus leucotrichophora, Prunus sp., Osmanthus fragrans*	Partially degraded
78.	Churmul	-do-	-do-	Nounagi	Askote and the peripheral villages (20)	1, 2, 3	Poor	*Quercus leucotrichophora, Osmanthus fragrans*	Partially degraded
79.	Mallika arjun	-do-	-do-	Kartik chaturdasi, Shivratri, jaat	Askote and the peripheral villages (20)	1, 2, 3	Poor	*Pinus roxburghii Quercus leucotrichophora*	Well protected
80.	Naula Devta	The village community	-do-	Nounagi	Kusori village	1, 2, 3	Poor	*Quercus leucotrichophora,*	Partially degraded
81.	Kumeshwar	-do-	-do-	-do-	Kusori village	1, 2, 3	Poor	*Quercus leucotrichophora, Celtis australis*	Partially degraded
82.	Shivalya	-do-	-do-	-do-	Kusori village	1, 2, 3	Poor	*Quercus leucotrichophora, Aegle marmelos, Prunus ceresoides, Quercus glauca Aesculus indica*	Partially degraded
83.	Mahakali	-do-	-do-	Chaitra & Aswin Navratri, dola festival	Peripheral villages (6)	1, 2, 3	Poor	*Quercus leucotrichophora, Cedrus deodara, Myrica esculenta, Cupressus torulosa, Pyrus pashia*	Well protected
84.	Jaggannath	-do-	-do-	Sawan, Chaitra & Aswin Navratri	Mad & Manale villages	1, 2, 3	Poor	*Quercus leucotrichophora, Juglans regia, Cupressus torulosa*	Partially degraded
85.	Gorakhnath	-do-	-do-	Baishakh purnima	Mad & Manale villages	1, 2, 3	Poor	*Quercus leucotrichophora*	Partially degraded
86.	Brahmchari	-do-	-do-	As per the requirement of the villagers	Mad & Manale villages	1, 2, 3	Poor	*Quercus leucotrichophora, Osmanthus fragrans , Celtis australis*	Well protected
87.	Goril	-do-	-do-	-do-	Mad &	1, 2, 3	Poor	*Quercus leucotrichophora,*	Well protected

Table 1: Contd.....

S. No.	Sacred natural site	Management	Dominant caste	Festival	Influence	Restrictions or Taboo*	Floral diversity	Dominant species #	Status
					Manale villages			*Myrica esculenta, Rhododendron arboreum*	
88.	Jujarimal	-do-	-do-	Chaitra & Aswin Navratri,	The peripheral villages (7)	1, 2, 3	Poor	*Quercus leucotrichophora*	Well protected
89.	Alimal	-do-	-do-	-do-	The peripheral villages (9)	1, 2, 3, 7	Poor	*Sapium insigne, Ougeinia oojeinensis, Osmanthus fragrans, Toona ciliata, Syzygium jambolana*	Well protected
90.	Churmul	The village community	Brahmins	Aanthu, Gaura	Satgarh gram sabha	1, 2, 3	Poor	*Quercus leucotrichophora*	Partially degraded
91.	Asur Devta	-do-	-do-	As per the requirement of the villagers for rain	Satgarh gram sabha	1, 2, 3	Poor	*Quercus leucotrichophora*	Partially degraded
92.	Betal Devta	-do-	-do-	As per the requirement of the villagers for animal health	Satgarh gram sabha	1, 2, 3	Poor	*Quercus leucotrichophora*	Partially degraded
93.	Bud kasin	-do-	-do-	Aswin Navratri, Chaitol	Satgarh gram sabha	1, 2, 3	Poor	*Quercus leucotrichophora*	Partially degraded
94.	Latua	-do-	-do-	As per the requirement of the villagers	Satgarh gram sabha	1, 2, 3	Poor	*Quercus leucotrichophora*	Partially degraded
95.	Kasin	-do-	-do-	Aswin Navratri, Chaitol	Satgarh gram sabha	1, 2, 3	Poor	*Quercus leucotrichophora*	Partially degraded
96.	Manmahesh	-do-	-do-	-do-	Satgarh gram sabha	1, 2, 3	Poor	*Quercus leucotrichophora*	Well protected
97.	Khandenath	-do-	-do-	-do-	Satgarh gram sabha	1, 2, 3	Poor	*Quercus leucotrichophora, Q. glauca, Celtis australis*	Well protected
98.	Bhagwati temple	The village community	Thakur	Navratri	Falenti village	1, 2, 3	Poor	*Cupressus torulosa*	Partially degraded
99.	Nouling	-do-	-do-	-do-	Udiyari village	1, 2, 3	Poor	*Quercus leucotrichophora*	Well protected
100.	Pingalinag	The representatives of principal villages	-do-	Kartic Purnima, Navratri (shrdiya)	Peripheral villages (14)	1, 2, 3	Poor	*Quercus leucotrichophora*	Well protected
101.	Chandika mata	-do-	-do-	Navratri (Panchami & Saptami)	Peripheral villages (14)	1, 2, 3	Poor	*Quercus leucotrichophora*	Partially degraded
102.	Dhoulinag	-do-	-do-	Navratri Panchami	Peripheral villages (4)	1, 2, 3	Poor	*Pinus roxburghii*	Well protected
103.	Ajenti bubu	-do-	-do-	Holi	Peripheral villages (4)	1, 2, 3	Rich	*Pinus roxburghii*	Well protected
104.	Feninag	-do-	Brahmin	Makar Sankranti, Purnima, Navratri (Panchami & Saptami)	Peripheral villages (12)	2, 3	Rich	*Quercus leucotrichophora*	Well protected
105.	Haru Devta	The village community	Thakur	Navratri	Gara Paani village	2, 3	Poor	*Quercus leucotrichophora*	Partially degraded

Table 1: Contd.....

S. No.	Sacred natural site	Management	Dominant caste	Festival	Influence	Restrictions or Taboo*	Floral diversity	Dominant species #	Status
106.	Chamunda Devi	The representatives of principal villages	-do-	Navratri, Astami	Wide influence throughout the Gangolihat subdivision	2, 3	Poor	*Quercus leucotrichophora*	Well protected
					ALMORA				
107.	Haru Devta	The village community	Thakur	Navratri	Mugru and peripheral villages (8)	2, 3	Poor	*Quercus leucotrichophora*	Well protected
108.	Haru Sem Devta	-do-	-do-	-do-	Ladholi and peripheral villages (8)	2, 3	poor	*Quercus leucotrichophora*	Degraded
109.	Jageshwar	-do-	-do-	Sawan month (Monday) Shivratri	Restricted to Jageshwar	8	Poor	*Cedrus deodara*	Well protected
110.	Vishnu	-do-	-do-	Navratri (both Chaitra & Aswin), Dussehra and Shivratri	Dol and the peripheral villages (6)	3	Rich	*Cedrus deodara, Quercus semecarpifolia, Q. leucotrichophora, Aesculus indica, Ficus semicordata, Myrica esculenta, Rhododendron arboreum*	Well protected
111.	Gangnath	-do-	-do-	Chaitra & Aswin Navratri	Dol and the peripheral villages (6)	3	Poor	*Quercus leucotrichophora, Myrica esculenta, Pinus roxburghii*	Partially degraded
112.	Brinda/ Baanri Devi	-do-	-do-	Holi (Chaturdasi), Chaitra & Aswin Navratri, Shivratri	Wide influence throughout the region, extending to 30 odd villages	3	Average	*Quercus leucotrichophora, Myrica esculenta, Rhododendron arboreum, Pinus roxburghii*	Partially degraded
113.	Shivalaya	-do-	-do-	Shivratri, Holi and Chaitra & Aswin Navratri	Bhaisora village	9	Average	*Ficus spp., Aesculus indica, Prunus ceresoides, Alnus nepalensis*	Well protected
114.	Shihyayi/ Shyama Devi	The village community	Schedule tribe	-do-	Wide influence, throughout the lower Almora and Ranikhet region	2	Rich	*Quercus semecarpifolia, Q. leucotrichophora, Aesculus indica, Myrica esculenta, Rhododendron arboreum*	Well protected
115.	Golu Devata	The village community	Brahmins	Chaitra & Aswin Navratri	Dwarson village	-	Poor	*Quercus leucotrichophora*	Partially degraded
116.	Mahakaleswar	The representatives of	Thakur	Shivratri, Baisakhi and	Akhoriya and Mahalchora	-	Average	*Toona ciliata, Mangifera indica, Ficus semicordata*	Partially degraded

Table 1: Contd.....

S. No.	Sacred natural site	Management	Dominant caste	Festival	Influence	Restrictions or Taboo*	Floral diversity	Dominant species #	Status
		the principal villages		Holi	villages				
117.	Aeri Dhura	-do-	-do-	Chaitra & Aswin Navratri	Dol and Kandra villages	-	Rich	*Quercus leucotrichophora, Myrica esculenta, Rhododendron arboreum*	Well protected
118.	Anyar Bunga Aeri	The village community	-do-	Harela, Deepawali and Chaitra & Aswin Navratri	Restricted to Maitoli, Khupeti, Nai, Thali and Bhumka villages	-	Rich	*Quercus semecarpifolia, Q. leucotrichophora, Aesculus indica, Myrica esculenta, Rhododendron arboreum, Lyonia ovalifolia, Alnus nepalensis*	Well protected
119.	Sidh Baba	-do-	-do-	-do-	Nartoli village	2, 3	Rich	*Rhododendron arboreum, Myrica esculenta, Lyonia ovalifolia, Quercus leucotrichophora, Q. semecarpifolia, Aesculus indica*	Well protected
120.	Jwarnairi Aeri	The representatives of the principal villages	-do-	Navratri, Shivratri, and 22 days Jagar is held every 2nd year	Wide influence throughout the lower Almora region	2	Poor	*Cedrus deodara*	Partially degraded
121.	San	The village community	Brahmins	Navratri and 2 times a year post harvesting	Dunar Gram Sabha	2	Rich	*Cedrus deodara*	Partially degraded
122.	Sidhnath	The village community	Thakur	Shivratri, Holi and Chaitra and Aswin Navratri	Saharphatak	2	Rich	*Quercus semecarpifolia, Q. leucotrichophora, Aesculus indica, Myrica esculenta, Rhododendron arboreum, Lyonia ovalifolia, Alnus nepalensis*	Partially degraded
					CHAMPAWAT				
123.	Byandhura	-	Thakur	Chaitra and Aswin Navratri (Astami); Makar Sakranti, Magha purnmasi	Wide influence-throughout the district	1, 2, 8	Rich	*Quercus leucotrichophora*	Well protected
124.	Bhagwati	The village community	-do-	-	Kanda village	1, 2	Poor	*Quercus leucotrichophora, Q. glauca*	Protected
125.	Aeri	-do-	-do-	-	Kanda village	1, 2	Poor	*Quercus leucotrichophora, Q. glauca, Ficus glomerata, Prunus cerasoides*	Protected
126.	Gangnath	-do-	-do-	Aswin Navratri (Astami)	Bhimyala village	1, 2	Average	*Shorea robusta, Quercus leucotrichophora*	Protected
127.	Brahm Dev	-do-	Brahmins	Aswin Navratri (Astami), Makar Sankranti	Bhimyala village	1, 2	Average	*Cedrus deodara, Pinus roxburghii, Myrica esculenta, Rhododendron arboreum*	Protected

Table 1: Contd.....

S. No.	Sacred natural site	Management	Dominant caste	Festival	Influence	Restrictions or Taboo*	Floral diversity	Dominant species #	Status
128.	Mallareshwar	-do-	-do-	Shivratri	Wide influence throughout the district	1, 2	Rich	*Cedrus deodara*	Well protected
129.	Mosta	-do-	-do-	-	Phular village	2	Average	*Cedrus deodara*	Protected
130.	Ghatochkacha	-do-	-do-	-	Champawat township	2	Average	*Celtis australis., Mangifera indica, Ficus semicordata, Punica sp., Pyrus pashia*	Protected
131.	Bhagwati	-	-do-	Chaitra Navratri	Champawat township	10	Rich	*Quercus leucotrichophora, Q. semecarpifolia, q. glauca, Symplocus chinensis, Lyonia ovalifolia, Cedrus deodara, Myrica esculenta, Pyrus pashia, Rhododendron arboreum*	Protected
132.	Gorakhnath	The village community	-do-	Chaitra & Aswin Navratri	Wide influence throughout the district	1, 2	Rich	*Celtis australis, Osmanthus fragrans, Cedrus deodara, Sapium insigne*	Protected
133.	Chomu Devta	-do-	-do-	Chaitra Navratri	Wide influence throughout the region-Gumdesh	-	Poor	*Cedrus deodara*	Protected
134.	Kadhai Devi	-do-	Thakur	Chaitra & Aswin Navratri	Restricted to Devidhura, and the peripheral villages (6-7)	1	Poor	*Pinus roxburghii*	Well protected
135.	Bhumiya Devata	The village community	-do-	-do-	Bola village	1, 2	Poor	*Quercus leucotrichophora, Ficus spp., Pinus roxburghii*	Partially degraded
136.	Bhumiya Devata	-do-	-do-	-do-	Talla Kamlet and peripheral villages (5)	2	Poor	*Pinus roxburghii, Quercus leucotrichophora, Ficus spp.*	Degraded
137.	Fatakshila	The village community	Brahmins	Vijya Dasmi and Asoj Navratri	Wide influence throughout the district	2, 3	Poor	*Cedrus deodara, Quercus leucotrichophora*	Degraded
138.	Devi Dhura	The representatives of the principal villages	Thakur	The famous Bagwal on the occasion of Raksha bandhan in the month of August	Wide influence throughout the district		Average	*Cedrus deodara*	Well protected
139.	Kalsin	The village community	-do-	As per the requirement of the villagers	Dhakana village	2, 3, 6, 8	Poor	*Cedrus deodara, Quercus leucotrichophora*	Well protected

Table 1: Contd.....

S. No.	Sacred natural site	Management	Dominant caste	Festival	Influence	Restrictions or Taboo*	Floral diversity	Dominant species #	Status
140.	Tiundhar	-do-	-do-	Bali just prior to cropping	Dhakana village	2, 3, 6, 8	Poor	*Cedrus deodara, Quercus leucotrichophora*	Well protected
141.	Devidhar	-do-	-do-	Aswin Navratri, Nanda astami	Kaligaon/ Desali and peripheral villages (4)	2, 3	Poor	*Quercus leucotrichophora*	Degraded
142.	Bhagwati temple	-do-	-do-	Aswin Navratri, Krishna Janmasthami	Dhakana village	2, 3	Poor	*Quercus leucotrichophora*	Partially degraded
					RUDRAPRAYAG				
143.	Hariyali Devi	The representatives of the Jasholi Gram Sabha	Thakur	Raksha Bandhan (Baisakhi) in the month of August	Wide influence throughout the Rudraprayag district	1, 2, 3	Very rich	*Quercus semecarpifolia, Q. leucotrichophora, Aesculus indica, Myrica esculenta, Rhododendron arboreum, Lyonia ovalifolia*	Well protected
					CHAMOLI				
144.	Latu	The village community	Thakur	Nounagi	Wan village	1, 2	Poor	*Quercus leucotrichophora*	Well protected
145.	Bhumiyal	-do-	-do-	-do-	Mundoli village	1, 2	Poor	*Cupressus torulosa*	Well protected
146.	Golu Devta, Iccholi	-do-	-do-	Raj jat paraw	Iccholi village	1, 2	Poor	*Cupressus torulosa*	Partially degraded
147.	Shiv parwati mandir	-do-	-do-	Navratri, Nanda Devi Raj Jaat	Dewal and Nandkesari	1, 2	Poor	*Cupressus torulosa*	Partially degraded
148.	Renuka Devi	-do-	-do-	Hariyali, Navratri	Udalka village	1, 2	Poor	*Ficus religiosa*	Partially degraded
149.	Shrangey Rishi mahadev	-do-	-do-	Shivratri, Sankranti	Singori village	1, 2	Poor	*Ficus religiosa*	Partially degraded
150.	Purna Devi	-do-	-do-	Nanda Devi Raj Jaat	Dewal township	1, 2	Poor	*Ficus religiosa*	Partially degraded
151.	Vasisteshwar maharaj	-do-	-do-	Shivratri, Srawan month's 1st Monday	Lagansu village	1, 2	Poor	*Ficus religiosa*	Partially degraded
152.	Anusuia Devi	-do-	Brahmins	Navratri, Daat Jayanti	Anusuia village	1, 2	Poor	*Ficus religiosa*	Partially degraded
153.	Dhuyo Singh	-do-	Thakur	Nounagi	Sutol village	1, 2	Poor	*Cupressus torulosa*	Partially degraded
154.	Bhagwati	-do-	-do-	Navratri	Kunol village	1, 2	Poor	*Cupressus torulosa*	Partially degraded
					DEHRADUN				
155.	Routi Ki Beli	The village community	Thakur	Shivratri	Routi Ki Beli village	1, 2, 3	Poor	*Quercus leucotrichophora*	Partially degraded
156.	Rishikesh	-do-	-do-	Shivratri	Routi Ki	1, 2, 3	Average	*Pinus roxburghii, Cupres-*	Well protected

Table 1: Contd.....

S. No.	Sacred natural site	Management	Dominant caste	Festival	Influence	Restrictions or Taboo*	Floral diversity	Dominant species #	Status
					Beli village			*sus torulosa, Quercus leucotrichophora,*	
157.	Thatyur	-do-	-do-	Navratri (Bhadon)	Wide influence throughout the Mussouri sub-division	1, 2, 3	Rich	*Cedrus deodara, Myrica esculenta, Rhododendron arboreum, Quercus leucotrichophora, Q. floribunda, Q. semecarpifolia*	Well protected
158.	Maanthaat	The village community	Brahmins	-do-	Bhatar and the adjoining villages within Lakhamandal	1, 2, 3, 11	Poor	*Cedrus deodara*	Well protected
					UTTARKASHI				
159.	Danda Ka Deorana	-do-	Brahmins	Asad Purnima	Wide influence throughout the region, extending to the peripheral 65 odd villages	1, 2, 3	Average	*Cedrus deodara*	Well protected
160.	Mahasu	-do-	-do-	Navratri (Bhadon)	Pora village	2	Poor	*Cedrus deodara*	Partially degraded
161.	Kamleshwar Mahadev	-do-	-do-	Shivratri	Wide influence throughout the region Purola subdivsion	2	Rich	*Pinus roxburghii, Quercus leucotrichophora, Q. floribunda, Cedrus deodara, Pinus excelsa, Rhododendron arboreum, Myrica esculenta, Celtis australis*	Well protected
162.	Madhkeshwar	-do-	-do-	Srawan and during the celebration of Deolang festival	Wide influence throughout the Barkot subdivision	1, 2, 3, 11	Rich	*Cedrus deodara*	Well protected
163.	Bhadrakali	The representatives of each caste of the principal villages	Thakur	Srawan and Bhadon Navratri	Moulda village	1, 2, 3, 8	Rich	*Cedrus deodara, Pinus roxburghii, Ficus sp.*	Well protected

Table 1: Contd.....

S. No.	Sacred natural site	Management	Dominant caste	Festival	Influence	Restrictions or Taboo*	Floral diversity	Dominant species #	Status
					TEHRI GARHWAL				
164.	Sem Mukhim Naag	-do-	Thakur	26th November, every 3rd year	Wide influence throughout the region	1, 2, 3	Rich	*Quercus leucotrichophora, Q. floribunda, Q. semecarpifolia, Rhododendron arboreum*	Well protected
					PAURI GARHWAL				
165.	Ulkhagarhi	The village community	Brahmins	Chaitra and Asoj Navratri	Wide influence, extending to the township of Pauri and Srinagar	1, 2	Rich	*Quercus leucotrichophora, Q. floribunda, Rhododendron arboreum, Myrica esculenta*	Well protected
166.	Tarkeshwar	-do-	Thakur	Shivratri	Wide influence throughout the Lansdowne sub-division	1, 2, 3	Rich	*Cedrus deodara, Quercus leucotrichophora, Q. floribunda, Q. semecarpifolia, Myrica esculenta*	Well protected
167.	Dhontiyal Devta	-do-	-do-	Makar Sankranti and Shivratri	Andargaon and Sidpur villages	2	Poor	*Mangifera indica, Ficus religiosa*	Well protected
168.	Ladhu Kedar	-do-	-do-	-do-	Bajasi Gram Sabha	2	Poor	*Ficus benghalensis, F. religiosa, Mangifera indica*	Partially degraded

***** (1) Lower castes are strictly not allowed to enter the sacrosanct zone, (2) Menstruating ladies as well as those pregnant are completely banned to enter the sacred forest, (3) 7 days prohibitory period to enter the sacred forest after one has inadvertently taken the tabooed eatables, (4) 3 months prohibitory period extended to a family or a clan, when a death occurs in the family, (5) Construction work around the sacred forest is completely banned, (6) Hunting of the wild fauna is completely prohibited, (7) No sacrifice to the resident deity is allowed on the following days-Tuesday, Friday and Saturday, (8) Complete ban on the exploitation of resources from the forest, (9) Defilement of sacred water source is strictly prohibited, (10) Sacred tree species (viz., *Betula utilis* or *Celtis australis*) is strictly protected, and complete ban is extended to its fodder use, (11) Complete ban is extended to each member of the village (irrespective of caste or sex) to enter into the forest, except once during the celebration of the festival, (12) Grazing, apart from the sacred Yak and its hybrids-*Jhuppu* and *Jomos*, is completely prohibited, (13) hunting of the totem species-*Fiya* (Himalayan marmot) is completely banned.

Figures within parenthesis represents the results of the phytosociology carried out at these sites to ascertain the floral diversity.

Nounagi is celebrated at the start of each harvesting season (both Kharif and Rabi). The villagers offer the first culms of harvested lot to the resident deity, principally *Bhumiyal*-the land god, or the protector of the crops.

Sacred groves and forests, together represented 89 per cent of the total sacred natural sites (N= 168) covered (Fig. 2). Since the study was confined with the preliminary survey of the SNS, a simple questionnaire was prepared to elicit the presence of the SNS, as well as of the taboos, surrounding the same. Surprisingly, the awareness regarding the presence of sacred natural sites in the vicinity or at a distance of the village, significantly was lower (Fig. 3). However, the 50 per cent of the lot, who knew the existence of the SNS, were also acquainted with the taboo system surrounding the sacred sites (70 per cent, Fig. 4)! However, what is more significant, as regards the sustainability or the viability of the institution, is the fact that a significant percentage of the stakeholders were aware of the environmental or ecological role played by the sacred forests-*viz.*, the vegetation cover is important (expressed by 34 per cent of those interviewed), or that the forest cover represents the source of water (23 per cent). The above findings have important consequences for any developmental programmes, surrounding villages located in the precincts of these forests (Fig. 5), for the singular reason that this practical aspect of the existence and thus the benefits accrued from the sacred forests, and as perceived by the stakeholders, needs to be taken cognizance of by the policy makers, too.

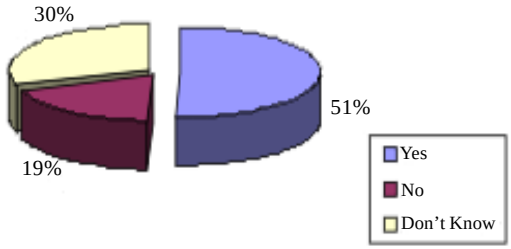

Fig. 3. Response to the question- Whether there are any sacred natural sites within or in close vicinity of thee village? (N= 1262)

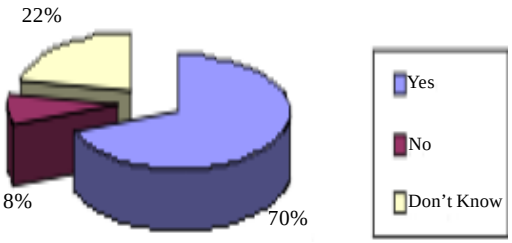

Fig. 4. Response to the question-Whether there are any norms or taboos in practice surrounding the sacred natural sites? (N= 1262)

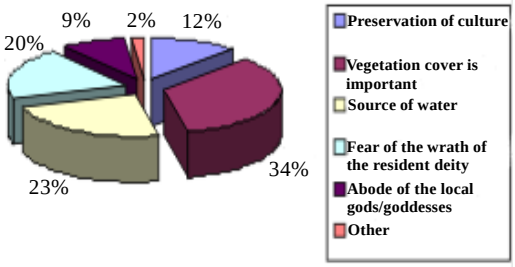

Fig. 5. Response to the question-What exactly is the role played by the sacred natural site? (N=1262)

One of the major causes of concern- the degradation the SNS, remains the dilution of the traditional norms, or the taboo systems surrounding the resource utilization from the sacred forests. Fortunately, the adherence to the age-old systems of taboos and norms surrounding the SNS remains vital in the view of an overwhelming percentage of stakeholders (77 per cent, Fig. 6). Also, a significant percentage of the stakeholders (29 per cent) strongly hold forth the belief that respect for the sacred sites is strong and is does practiced. It is only insignificant lot (3 per cent, principally represented by the youths), who do not adhere to the belief systems, surrounding the sacred sites (Fig. 7). This strong belief in the taboo systems needs to be translated into practical conservation efforts, and thus presents a challenge to the policy makers or conservationists. The traditional knowledge-based systems in practice in the landscape have been dealt with as per Smith and Wishnie (2000), and thus have been discussed as under;

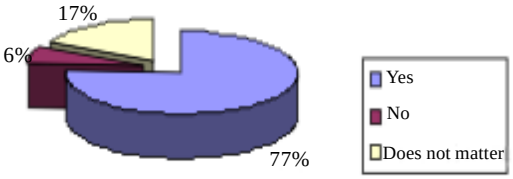

Fig. 6. Response to the question-Whether it is reasonable to adhere to or respect the sacred natural site? (N= 1262)

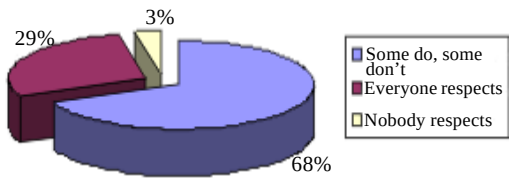

Fig. 7. Response to the question-Whether people respect the sacred natural site? (N= 1262)

(i) Harvesting Restraint

The type of resource utilization that most clearly meets the conservation design criterion is harvesting restraint that raises short-term production cost, in contrast to the harvesting of the wild in an unsustainable manner (which undoubtedly minimizes the time and space constraints) and thus minimizes the effort put in, but eventually raises the long term costs, i.e., the future availability of the resource. Examples from the landscape include the following-one comes across a number of sacred pastures and landscapes, principally in the Vyas valley, wherein grazing pressure is regulated through means of taboos, *viz.*, in *Hya-Roshe bugyal* (*bugyal*-alpine meadows/pastures) near the village Napalchhu, and Putuk-tu bugyal near the village Kuti, wherein only sacred Yak (*Bos mutus grunniens*) and its local hybrid *Jhuppu* and *Jomos*, are allowed to graze. Such is the fear factor that no shepherd dares to make use of these pastures! Similarly, the inhabitants of the Vyas valley religiously guard against killing of *Fiya* (Himalayan marmot- *Marmot bobak* Muller), which is regarded as a totem.

(ii) Protection or Propagation of Resource Species

Another form of conservation involves practices designed to protect or propagate the resource species. Examples include the institution of Kathburiya Devi and Nabu samo- (a) *Kathburiya Devi*-after traversing a tough climb, atop the ridges are sacred heaps or piles referred to as Kathburiya or wayside goddess. The locals pay homage to Kathburiya Devi usually by placing a small piece of branch- preferably of deodar or the cones of the same, and very often a fruiting branch of the native vegetation, referred to as *Chiyunli*, as a thanks giving for the successful climb to that point; (b) *Nabu samo*-'*Nabu*' stands for insects and '*Samo*' means to destroy, i.e., the festival symbolizes the victory over the harmful (crop destroying) insects. Each and every member of the village collectively gathers insects (in a cloth) from their fields; the collections then are tied to the horns of a goat, which is then sacrificed. Kathburiya and Nabu samo thus, represents an effective means of (i) regeneration of flora at the hilltop, and (ii) an effective way of getting rid of harmful insects, respectively.

(iii) Regulating Onset or Duration of Harvests

Controls governing the timings of resource harvest, as well as, who has the right to participate is widespread in small-scale societies. One prime example of the practice includes the *Nanda Astami* (celebrated in the praise of the local goddess-Nanda Devi, the highest peak in Western Himalaya) and associated with the harvesting of the sacred flower of Brahmkamal (*Saussurea obvallata*), invariably carried out towards the fag end of August or early half of September. The celebration of the festival brings forth the salient aspect of ethics of conservation inherent in the cultural ethos. On the festival day, only two souls (out of the hundreds of the Johaaris gathered together in the village Martoli, Johaar valley), are delegated to collect the Brahmkamal, from Salang Gwar (sacred alpine pasture, where the species abounds). These two souls, after taking the ritualistic bath, walking bare feet and dressed in all-white, and carrying with them the seasonally available cucumber (to propitiate the goddess), upon reaching the meadow, offer due prayers to the resident deity, after which the collection begins. Only fully opened and mature brahmkamal are selected for the offering. Nanda Astami brings out the inherent message of conservation by the traditional people- (i) It is celebrated only after the flowering and the shedding of the seeds by the species has taken place, and hence, collection of the same do the least damage, as concerns the regeneration; (ii) the restriction imposed on the number of harvesters, is an effective means to restricts the size of the pool harvested.

(iv) Avoidance of the Harmful Habitat Modification

Some types of habitats are more sensitive to the effects of modification than others, and hence avoidance or mitigation of such habitat change can be a form of conservation. For example, the taboo exercised on the collection of Aalam Sammo (described subsequently) from the sacred forests; the restricted grazing, allowing only the milch cows, or the sacred yaks to graze in some of the sacred pastures (Hya-roshe and Putuk-tu bugyals) in the Vyas valley; the regulated means of cyclical grazing practice, as prevalent in Chipla Kedar and Ralam valley, suffice to bring forth the conservation practices, inherent in the customary

lifestyle of the inhabitants. However, for the present, the taboo system surrounding the sacred natural sites (sacred forests/groves, pastures and water bodies) will be described here.

Sacred Natural Sites and the Taboo System

The sacred natural sites (SNS), are distributed through out the State of Uttarakhand (Table 1), the prime examples of sacred forests are offered within the Askote Conservation Landscape (ACL), being Bombasing (above the village Tedang) and Bhujani (above the village Martoli), where the same are referred to as *Se-Rong* (*Se*-god, *Rong*-forest). The villagers would not dare to enter these forests for the fear of angering the resident deity, or defy the norms to procure dead wood, fodder grasses or any produce from the forest, except on the singular occasion of annual festivals! One could easily envision the important role played by these sacred forests in the protection of the village, situated down below, from the impending avalanches during the winter months, or sliding mountain debris throughout the year, or as the only source of water. It is only during the festival of *Aalam Sammo* that the villagers venture into these restricted forests, to procure *Aalam*-an upright/straight stem of the Bhojpatra (*Betula utilis*), used as sacred pole staff.

Characteristic Features of the Sacred Forests

Some of the characteristic features associated with the sacred forests in the landscape, with minor variants, are the following;

1. Are mostly the Panchayat or civil soyam forests.
2. Usually dominated either by Banj (*Quercus leucotrichophora*, or *Q. semecarpifolia*), Raga (*Cupressus torulosa*), Deodar (*Cedrus deodara*), Bhoj patra (*Betula utilis*), or by Ratpa (*Rhododendron campanulatum*) or at greater altitudes, by bil (*Juniperus communis*, *J. indica*), which in turn are treated as sacred species.
3. Lopping, felling of trees is strictly prohibited; however regulated resource use, *viz.*, collection of the dead wood or twigs, or fodder grasses, may at times be allowed. In rare cases, no resource use is permitted, except for the purposes of the resident deity of the forest, during specific occasions of festivals surrounding the deity.
4. The most conspicuous taboo relates to segment taboo, which restricts the pregnant and menstruating ladies, as well as the lower castes from entering into these sacred forests.
5. Where the sacred forest remains the only source of water, more stringent is the taboo system in practice.

(v) Patch-switching to Maximize Overall Return Rates

The pastoralists often move their herds to better grazing areas before the current area is completely depleted, since the likelihood of obtaining higher foraging returns elsewhere, seem more economical (Polunin 1984; Winterhalder 1981). This foraging strategy (Smith 1983), practiced throughout the Askote Conservation Landscape (ACL, an enlarged version of Askote Wildlife Sanctuary, incorporating parts of adjoining Nanda Devi Biosphere Reserve, too), involves the regulation of the livestock grazing pressure, wherein the precise movement of the anwals (the shepherds), accompanied by their livestock population is strictly monitored, and duly excised by one of the villagers, who is delegated not just to ascertain the precise size of the livestock, but also to ascertain that the duration of grazing in one locality (the alpine pasture) is not extended beyond the permissible duration of stay.

(vi) Dedication of Forests to a Deity

The practice of dedicating forests to a deity is a very recent phenomenon (Gokhale et al. 1998), invariably born out of the need to impede the fast dilution of the traditional taboo system governing the resource utilization, and thus, to reinforce or strengthen the same. The deity in invariably all the villages remain the much feared goddess-Kotgyari, and the period for which the forests are dedicated varies from a minimum of 5 to 20 years. It is an effective example of an indigenous conservation practice, utilized by local communities to stop excessive exploitation of community forests and thus to regenerate the same to the extent, wherein a sustainable means of exploitation of fodder could be put into effect. Strict adherence to the norms surrounding the dedicated forests is adhered to, principally out of the inborn fear of the wrath of the presiding deity. Invariably, the communities do not tend to dedi-

cate the complete forest, but rather retain a small patch. There are specified norms governing the use or the extent of the use, to be permitted in the sanctified area, which are priorly 'defined to the deity' at the time of the dedication, and enumerated in the paper (a sort of socio-religious legal document). At times of dire need, the community decides to open up the forest, allowing restricted collection of the litter mass and even of fodder.

DISCUSSION

Social taboos surrounding sacred natural sites represent good examples of informal institutions (Charnov 1976). Such institutions are based on cultural norms that do not depend on government for either promulgation or enforcement (North 1994). Informal institutions, such as taboos, have largely been neglected in conservation designs in biodiversity rich, developing countries (Posner and Rasmusen 1999; Alcorn 1995), where park protection has been the major approach for protecting biodiversity (Robbins 1998; McNeely 1993). Since most of the world's biodiversity exist outside of protected areas (Gadgil 1998), informal institutions may play an active role in nature conservation. On a general level, anthropologists have ascribed various social functions to taboos- taboos function to distinguish between sacred and profane entities in a culture (Murphree 1994); taboos relate to animist and magical belief systems (Durkheim 1915); taboos serve psychological ends (Frazer 1922); and finally, taboos serve ecological adaptations (Harris 1971, 1979; Rappaport 1968). Infact, it may be difficult to distinguish among ecological, social, or religious origins and functions of taboos.

In fact, a great deal of social mechanisms, such as social taboos, may be highly adaptive from an ecological perspective and which contributes to biodiversity conservation (Colding and Folke 1997). Taboo often applies to certain sets of natural resources, which are particularly vulnerable to overexploitation; and among local resource users, the imposition of temporal taboos (defining restriction of resource use in time and space), regulates access to resource/s on either a sporadic, daily, weekly, or monthly basis (Colding and Folke 2001), as is conspicuous, principally in sacred forests. The institution of Nabu samo, the strong sense of faith and reverence for the local deities, whether its *Syang Se* during Chipla Jaat, or Nanda Devi, all bring forth, not just the significance of ethno-sociological concepts vis-a-vis environmental management, but importantly, the scope of their practical application. The institution of sacred groves/forests, pastures or even sacred water bodies, along with the strict norms and taboos that relates to resource utilization, invariably relates to the sustainable resource management concepts practiced by the traditional people; where very often the resource utilization never exceeds the regeneration potential of the sacred natural sites.

Ecological life support systems were preserved because sustainable forms of land use were very often governed by religious beliefs and customary rules that made it sustainable. Biodiversity was maintained as a result of the low pressure exercised over natural system, *viz.*, pastures and by the imposition of religious taboos or through the existence of sacred groves and forests (Basu 2000; Chandran and Hughes 2000; Sinha 1995). This aspect of conservation is brought forth in table 1, where the sacred pastures encompass within, relatively greater species richness, than the surrounding landscape. Typical examples of change, coupled with maintenance of sustainability in traditional management practices, have been demonstrated in sacred groves (Fargey 1991; Dorm et al. 1991; Ntiamoa-Baidu 1995; Ntiamoa-Baidu et al. 1992; Gyasi 1996; Hagan 1997). The breakdown of beliefs that protect these areas has been attributed to western type education and religion, to the immigration of people, who may have no respect for local traditions, and to a lack of modern legislation to reinforce traditional rules (Fargey 1991; Ntiamoa-Baidu 1995; Falconer 1992). Falconer (1992) has observed that, as a result of the uneven impact of these factors, 'sacredness', the prominence and protection of sacred groves varies considerably between and within communities. Many groves have been encroached upon because the fear which used to be associated with them, no longer operates.

CONCLUSION

Cultural and biological diversity are intimately and inextricably linked (McNeely 2003). Traditional knowledge systems are important for modern societies, not only because traditional knowledge itself is a valuable aspect of cultural heri-

tage and should be protected in its own right, but also because it is of great value in modern development, especially regarding sustainable use of forests, ecosystem management and poverty reduction. Certain guidelines should be put in place to safeguard the sacred areas and promote the traditional knowledge of conservation, namely: the revitalization and enforcement of traditional education; the delineation of boundaries; the improvement of relevant knowledge and their official recognition through a legal status (Decher 1997; Dorm-Adzobu and Ampadu-Agyei 1995; Lebbie and Guries 1995; McWilliam 2001; Swamy 2003).

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