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Lichens Resource Use Pattern and its Socio-economic Status in Temperate Region of Garhwal Himalaya, India

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ABSTRACT: The resource use pattern of some macrolichens and their socioeconomic status in temperate region of Garhwal Himalayas has been discussed. Out of five blocks, stakeholders of Narayanbagar and Dewal block are found highly dependent on lichen (macrolichens) based activity to conduct their livelihood. [Nature and Science. 2009;7(2):101-106]. (ISSN: 1545-0740).

Key Words- Macrolichen biomass, *Quercus semecarpifolia*, Garhwal Himalaya

INTRODUCTION

According to the concept of Upreti et al (2005) the lichens have been household items of Indians since ancient times. In India, lichens collected from the temperate regions of the Himalayas are used indigenously and are explored. The Uttarakhand hills and Himanchal Pradesh are the main areas of the lichen collection in India. The lichens are very slow growing plants. Because of their unique thallus composition, which is made of fungus and alga, they can not be cultivated in large scale like other plants. Thus, lichens growing in nature provide a basic raw material required for various uses of lichens. The lichens weigh very little when dry, thus a vast bulk of these plants is required.

Mountain and hillside areas hold a rich variety of ecological systems. Because of their vertical dimension, mountain creates gradient of temperature, precipitation, and insulation. In Uttarakhand nine of the thirteen districts comprise the expansion of lesser Himalaya. But with the pace of rapid modernization and increasing anthropogenic pressure on vegetation in general and on forest in particular coupled with natural disasters, the Himalayan vegetation is rapidly deteriorating in its richness as well as diversity. However, in recent past there has been a deep concern and realization for the conservation of the fragile Himalayan ecosystem.

Lichen exploitation is a common practice among the villagers and the rivals in moist temperate regions of the Garhwal Himalaya to collect the lichens together with tree twigs as oak and other trees bears luxuriant growth of lichens. Kumar (2008) reported Parmelioid lichens belonging to family Parmeliaceae are commercially trading lichens from Garhwal Himalaya i.e. *Everniastrum, Parmotrema, Cetrariopsis, Bulbothrix, Hypotrachyna and Rimelia* collected by rivals together with two fruticose genera, *Ramalina* and *Usne.*

Lichens in India are collected from the temperature regions of Himalayas and used indigenously for preparation of perfumes, dyes, and condiments (Kumar and Upreti, 2008). Approximately 750 metric tons of lichens are collected from Uttarakhand hills, 800 metric tons are imported from other regions of India, including Himachal Pradesh, Sikkim and Assam and out of which about 50-80 tons are exported (Shah, 1997).

Upreti (1995) assessed the different factors responsible for loss of lichen diversity in India. Important factors include the change in the ecological conditions, forest cover, and loss of habitat and increase of the urban and industrial areas. The various activities of man in hilly regions of India such as 'Jhoom' cultivation, agriculture, mineral extraction, tourism, hydroelectric and road building projects are other factors leading to the rapid deterioration of lichen rich habitats. Overexploitation and selective removal of economically important lichens by local people have now become the major threat to the lichen flora of India.

Lichens are sold at rates of approximately half a dollar/kg in the local markets (Upreti et al 2005). The price however doubles when these lichens reach the central market areas. A trained

collector can easily collect 6-8kg of lichens with twigs from the ground (collecting lichens from attached twigs slow down the collection as the entire branches are cut or the lichens are scraped off along with the bark and portion of sapwood). A collector for the major part of the year can earn a reasonable income by collecting the fallen lichens without being destructive with some knowledge of the fall and seasonal pattern.

A number of lichen patches in the forests 'hot spots' were identified together with the study viz. Bramtal, Jhaltal, Suptal, Bhekaltal, Didina forest, Kuling forest, Ghesh-Balan, Badeni forest, and Gairsain forest patches are in Chamoli district. Similarly Chopta-Tunganath, Khod-Bakseer, Badhanital, Devariyatal, Madhmaheshwar peak, and Tirjuginarayan forest patches were the major hot spots in Rudraprayag district. These all identified forest patches are similar in lichen diversity as well as for lichen biomass resource availability. These all forest patches (lichen hot spots) are purely dominated by the *Quercus semecarpifolia* (brown oak) trees and some time associated with *Rhododendron arboreum* (Burans) trees and associated shrubs *Barberis* spp and *Cotoneaster spp* occurs in these regions.

METERIALS AND METHODS

District Rudraprayag and Chamoli Garhwal of Uttarakhand state are the remotest areas in terms of lifestyle and also rich in botanical resources like lichen resource. A total of five blocks has been covered in two districts Rudraprayag and Chamoli. Ukhimath and Jakholi blocks in Rudraprayag and Dewal, Tharali and Narayanbagar in Chamoli district have been studied. From each selected block of Chamoli district, selected three village randomly villages on the basis of the temperate region, availability of lichen resource, lichen exploitation by local collectors and the areas were open for lichen collection. But the district Rudraprayag was totally band for lichen collection since ten years; from this district only two blocks (Ukhimath and Jakholi) were selected. The three selected blocks of district Chamoli were similar in lichen diversity and resource use pattern, but different in its collection and trading system.

A. Reconnaissance Survey: The reconnaissance survey was conducted for knowing the traditional method of lichen collection and involvement of lichen stakeholders of different rivals of the area. The traditional method of lichen collection is locally called 'Makku Tipan'. The method has been traditionally followed by lichen collectors of some lichen exploiting areas of Deval and Tharali block of Chamoli district of Uttrakhand state. In Chamoli district, lichens collected by the villagers or lichen collectors of Ratgawn, Bursol, Dungari, Man, Kolpuri, Mundoli, Vaan, Kuling and Ghes villages of the Tharali and Deval block. These areas come under the Badrinath forest division. These areas falls within the Garhwal Himalaya region and the forests are dominated with *Quercus semecarpifolia* (brown oak) and these areas lies between 2000m to 3000m altitudes in west Pinder range of Tharali Tehsil. Brown oak trees of the area harbors luxuriant growth of epiphytic lichens.

The traditional collectors of the villages are collects these plants and sale in local market at Tharali, Deval and Narayanbagar. Some small villagers sold it at Kerabagar and Vaan village of the area.

During the field visit author have interviewed with some lichen collectors and local contractors to asses the information on traditional method of lichen collection, extraction, resource use pattern and socioeconomic status of lichens (macrolichens) in the area.

B. Questionnaire Design: An ideal questionnaire was prepared after complete search of available literature on the lichen ecology and its economic role in our vital needs. The questionnaire was designed with keeping in mind of some tasks related to socio-economic and ecological impacts of lichens, which are always ignored by various workers.

C. Questionnaire Sampling and Selection of the Respondent: The survey was carried out during May-June 2007. The questionnaire was used to gather information on resource use pattern and assessment of earn money from lichen sector at different level of stakeholders. The respondents from the area were selected randomly on the basis of their involvement in the lichen sector as traditional collector, store keepers, packers loaders, horse trackers (transpiring lichens from forest to collection point/store house), local traders etc. were the respondents of the ideal questionnaire.

D. Process Questionnaire Filling: All questionnaires were filled throughout a long discussion along with the respondent.

E. DATA ANALYSIS: The data has been analyzed by using the SPSS software.

RESULTS

Households of Narayanbagar block depends highly on macrolichen based activity to conduct their livelihood represented by 93.65% followed of 63.32% households of Dewal and 18.38% of Tharali block of Chamoli district. Households of Rudraprayag district (Ukhimath & Jakholi block) was found less dependent on lichen sector (Table 1). In both the districts lichen sector found highest contribution to generate income as compare to other sources (Table 2). In both the districts lichen transporters and traders get maximum benefit from lichen sector as compared to other sources like agriculture, labor and shop etc. (Table 3). Earned money of the stakeholders from lichens sector was mostly used to provide foods like rice, wheat, pulses and vegetables etc. and it was less used in other daily needs (Table 4). The lichens collected/extracted from different substratum by the collectors maximum (51.53%) from tree bark followed by 43% and 4% from ground (fallen lichens) and rock substratum and only 1.37% extracted from soil (Table 5).

In the district Chamoli a lichen collector was collected average 254.5 kg lichens per year and its estimated income was Rupees 7668.08 per year @ 30.13 Rs. /kilogram. Similarly, it was in district Rudraprayag the average annual lichen collection was 78 kg and its estimated annual income was only Rupees 2393.82 @ Rupees 30.69/kilogram. Table 5 showed in Chamoli district, April-May (summer season) provided the maximum lichen material (313.4-267.15 kg/month/collector) followed of lowest (12.8kg/month/collector) in rainy season. In the district Rudraprayag, winter season (November to February) showed the maximum collection of lichens and throughout the year it was provided 414 kilogram /collector and provided Rupees 12705.66/ collector/year (Table 6).

Table1. Percentage of households engaged in lichen activity

District	Block	Number of households engaged in lichen activity (% of the total households)
Chamoli	Deval	62.32
	Tharali	18.38
	Narayanbagar	93.65
Rudraprayag	Jakholi	3.4375
	Ukhimath	14.375

Table 2. Contribution of lichens in income generation of lichen stakeholders

Sources of income	Contribution of lichens in income generation (%)	
	Chamoli	Rudraprayag
Service	1.08	0.90
Agriculture	33.82	31.59
Agriculture labor	1.56	1.30
Other labor	5.93	11.66
Lichen collection	56.31	53.02
Shopkeeping	1.29	1.53

Table 3. Shearing benefit from lichen sector at different level of stakeholders

Different level of Stockholders of lichens	Shearing benefit from lichens (%)	
	Chamoli	Rudraprayag
Collector	29.14	30.96
Tracker	15.36	0.00
Transporter & Traders	46.13	58.59
Storekeeper at village	0.00	0.03
Grader & shorter at village	0.84	2.17
Loader (Nepalis at local market)	8.54	8.16
Packer	0.00	0.09

Table 4. Percentage wise use of earned money (from lichens) in different needs of stakeholder

Needs of stakeholder	Percentage wise (%) use of earned money from lichens	
	Chamoli	Rudraprayag
Food	44.00	75.29
Medicines	10.93	6.47
House construction	6.86	4.71
Schooling of children's	1.00	1.18
Agriculture	1.40	0.00
Clothing	18.72	7.06
Assets creation	8.37	5.29
Marriage celebrations	7.21	0.00
Purchasing grams (feed) for horse	1.51	0.00

Table 5. Percentage wise extraction or collection of lichens from different substratum

Substratum	Lichen extraction or collection (%)
From trees	51.53
From rock	4
Fallen lichen collection	43
From soil	1.37

Table 6. Month wise collection of lichens by collectors in Chamoli and Rudraprayag districts

Months	Collection of lichen material kg/month/collector	
	Chamoli	**Rudraprayag**
Jan	190.4	97
Feb	78.36	51
March	62.53	34
April	313.4	23
May	267.15	0
June	74.41	8
July	15.82	0
Aug	12.8	5
Sep	33.54	24
Oct	66.96	52
Nov	75.6	74
Dec	42.1	47
Total	1233.07	414

DISCUSSION

Well resource use pattern of lichens was situated in diatrict Chamoli Garhwal and the collectors were mostly depends on lichen sector. It was the interesting feature of the study, the involvement of outsiders like Nepali's labours are completely restricted in lichen harvesting activity, which were involved only in few cases as loading of lichens and some time grading and sorting of the lichen species. But through the economic point of view, the outsiders are interfering in the income of lichen stockholders at the time of sorting and grading, loading-unloading and transporting from forest to collection point. The lichen traders (local traders) were the highest beneficiaries in lichen sector because they were well aware about this sector.

Lichens are house hold items of some local users and used for Garam Masala for providing flavoring taste through lichens etc. The earned money through lichens about 44% has been used in food by the stakeholders of district Chamoli, and in past the earned money of about 75.29% was used in food by the stakeholders of district Rudraprayag, therefore, at presently the activity is directly effects on food requirements of the stakeholders of district Rudraprayag due to the lichen harvesting activity was totally banned by the forest department. Some other needs like clothing, schooling of children's, medicinal treatments, house constructions, and assets creation of lichen stakeholders were directly effected by the process of opening and closing rules of forest department for lichen harvesting from the forests.

Kumar (2008) hypothesis showed only fallen lichen (fall from trees) collection can be allowed to provide livelihood for some stakeholders of high altitude or temperate regions of Uttarakhand, it can be possible about five kilograms per hectare per year from a pure Kharsu Oak forest.

If the grading and sorting process of the lichens would be conducted at villages so it can be increased the income of the collector (primary collector). The lichen sector in the state Uttarakhand has required a proper channel of its tender, collection and trading/marketing system from its collectors to traders (Village to Mandi).

If the lichen based livelihood activity would be started so the migration of some peoples of the area to the plains can be reduced, because they can get the job opportunity in lichens sector.

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