Prioritization of conservation sites in the timberline zone of West Himalaya

Uppeandra Dhar

G. B. Pant Institute of Himalayan Environment and Development

1998

gbpihed@nda.vsnl.net.in

The timberline zone in the Himalaya is a cradle of high temperate and low alpine biodiversity elements. It is a rich repository of highly sensitive elements which are of considerable biological and economic value. Among others, these include endemic, endangered, medicinal and edibles plant species. In view of the unique diversity of its biological components, representativeness, susceptibility to climatic changes, and heavy anthropogenic pressures, the study envisages:

- To develop an update inventory on biodiversity elements of timberline zone of west Himalaya.
- To select sites for prioritization on the basis of biodiversity and socio-economic value.
- To develop participatory methodology for prioritizing strategies.

1. Area

West Himalaya covers an area of about 53,000 sq km (Kumaun 21,000 and Garhwal 32,000) of which 4,107 sq. km (5.7%) is protected. Within West Himalaya, the study area (timberline zone of west Himalaya) stretches from Garhwal in the west to Kumaun in the east (78° 07' 27" E to $80^o53'20"$ E Longitude, 29° 53'5"N to 31° 00' 00"N latitude) covering an area of about 2,095 sq. km. Among the identified sub regions, Kumaun and Garhwal cover 642 and 1452 sq. km respectively.

2. Approach

Given the spatial scale of over 53,000 sq. km the preparation of inventory of biodiversity elements of timberline zone of west Himalaya based on secondary data involved collection and organization of available data.

2.1. Survey and Collection

Information on plant diversity of timberline zone of west Himalaya was obtained from various sources (floras, Ph.D. dissertations, research papers, reports, monographs, etc.). All the above information was recorded on location specific basis. The available information obtained from secondary sources covered the following attributes: richness, representativeness, naturalness, endemicity, uniqueness and use value. A database format in DBase 3 Plus was developed considering the objectives of the study.

Criteria used for analysing the identified attributes.

Attribute	Criteria
Richness	No. of species
Naturalness	No. of native species
Representativeness	Plant Communities (formations)
Uniqueness	Rarity status
Endemicity	No. of endemics
Use value	Medicinal, edibles and others

2.2 Mapping

At the outset, various maps were consulted from different agencies. Area falling within the identified contours (2800-3400m) was identified and separate maps were prepared for locations, settlements, land use and drainage network within the study area. The study area was further divided into uniform grid units (74.45 sq. km.) on the basis of intersection of longitudes and latitudes at 5 minute interval. The timberline area for each grid was calculated with the help of a planimeter.

2.3. Analysis

Initially, available information for west Himalaya was pooled for the identified attributes (richness, nativity, rarity, endemics, forest formations and value) to calculate the proportional representation of the timberline area (TLA). Later, the analysis was undertaken at two spatial scales (i) Timberline Area and (ii) Grids. Species richness, naturalness, representativeness, uniqueness, endemicity and use value was analyzed considering the total study area (TLA: Kumaun and Garhwal) followed by a similar analysis for each grid unit.

2.3.1. Identification of Clusters

Clusters were identified on the basis of Similarity Index (more than 60%). Delineation was further strengthened on the basis of drainage network.

2.3.2. Analysis of identified sites or clusters

Species richness, nativity, endemicity, rarity and use value was analyzed for each cluster.

3. Prioritization

The approach of prioritization developed in the present study considered the relative importance of biological and socio-economic features of the study area with respect to richness of total area of west Himalaya. The rationale of this process was to prevent observing and interpreting data in isolation. Serious efforts have been made to evolve prioritization by providing rationale at each step.

3.1 Sites

3.1.1. Identification of similar sites or clusters

Twenty clusters or sites (A to T) were identified throughout the timberline zone of west Himalaya on the basis of species commonalities and drainage network. Depending upon the Similarity Index, a cluster thus formed could consist of one or more grid units.

3.1.2. Identification and ranking of Representative clusters

Identification and ranking of priority clusters was finalized on the basis of the proportional representation of cumulative features of biodiversity attributes of clusters with respect to those of timberline area of west Himalaya. To start with, we gave equal weightage to all the identified attributes (richness, representativeness, naturalness, endemicity, uniqueness and value). The weightage of each identified attribute was kept uniform in view of the fact that there are overlaps and a very thin line of demarcation exists among the attributes. For example, endemicity of a unit area is dependent on richness or for that matter representativeness also reflects the richness.

3.1.3. Identification of unique clusters

Subsequently, unique clusters were identified on the basis of proportional representation of attributes with respect to an identified cluster. For example, each cluster was analysed for four attributes i.e., naturalness, endemicity, uniqueness and use value on the basis of assigned scores while ranking attributes. Thus the only difference from the earlier analysis was that top score was four (4) instead of six (6). The grids were accordingly ranked in descending order.

3.1.4. Prioritizing representative and unique clusters

The ranks thus assigned for both representative and unique clusters were summed up and the priority cluster was finalized. The identified clusters varied in percent area explored and did not show any relationship between area and richness, for example Cluster J was the smallest but had relatively high species richness compared to C which was relatively species poor but covered a larger area.

3.1.5. Identification of representative grid unit within prioritized clusters

The most representative grid with maximum species, natives, endemic and rarities was identified within each prioritized cluster of multiple grids. However, in some cases where a unit grid represented the cluster, the same was identified as the most representative grid unit.

The approach of prioritization has narrowed and sharpened our focus on representative grid unit of a prioritized site (cluster) for initiating appropriate conservation action. In the Himalayan context, secondary data has been, for the first time, effectively utilized for setting conservation priorities. This is the hallmark of the present study.

4. Recommendations

The following recommendations have been framed after critically examining and analysing the data. They also reflect the inputs obtained as a result of two meetings organized during the project tenure.

- The area to be recognized as a biodiversity 'hot-spot' of the region.
- The process of prioritization be based on both primary and secondary data in view of the gaps in knowledge.
- The studies on timberline zone must be extended all across the Himalaya.

- Initially the existing database on inventory should be further strengthened.
- The inventory should be carried out on location specific basis and use of GPS promoted for sampling.
- Remote sensing techniques must be utilized for delineating the timberline and broad habitat types within the zone.
- Sampling size of spatial area should be based on habitat type(s) which must reflect a biological entity.
- Quantification studies be focused on sensitive elements, their geographical range, habitat specificity, ecological amplitude and population size.
- Habitat specificity of several species be employed for biological regionalization of the timberline zone.
- Justification be given before assigning a particular rank to an attribute.
- While prioritizing sites, mobility of fauna and other linkages with the flora need to be considered.

In view of the aforementioned points, it is strongly recommended to embark on a major project on "Prioritization of Timberline zone of the Himalaya" in the right earnest.

_____

Notes to readers

The author may be reached at:

Conservation of Biological Diversity
G. B. Pant Institute of Himalayan Environment and Development
Kosi-Katarmal Almora 263643 (U.P.)
India
Tel: 05962 41041
Fax: 05962 31507