

## SOME ASPECTS OF THE VEGETATION OF NEPAL

PROF. B. D. PANDE

*Kathmandu, Nepal*

## A B S T R A C T

In this article the author simply catalogues the number of species of ferns collected by him after giving a short description of the geographical position and the climatic conditions of Nepal and the Kathmandu valley. The collections were made from the latter region only during class and private excursions. Some of these important places are Kakani, Sheopuri, Nagarkot, Sundarijal, Pharping, Godavari, Gokarna, Gauchar, Chapagaon, Balaju, Nagarjun, Thankot, Chandragiri etc. Although these collections are mainly from the Kathmandu valley alone yet on comparison with the previous collections made by the earlier workers from the various parts of the country reveal that out of the sixty species of ferns collected by the present author thirty six have not so far been recorded.

The vegetation of a country largely depends upon its physical features, climate and rain fall. Nepal is a mountainous country with rich vegetation. In its outline it is like an elongated rectangle with a length of 500 miles and a breadth of 50 miles approximately. It is situated north of the Ganges plain and south of the Tibetan plateaux between 80° and 88° E longitude and 27° to 30° N latitude with an area of 55000 square miles. If we take its latitude alone into consideration the country should have a tropical and subtropical climate. But the tremendous differences in its altitude and an alternating rainy season during the monsoon with a dry season are responsible for the extreme climatic contrasts. Within a small compass all the climatic Zones of the world are represented from tropical forests in the Terai to the arid zones of the Tibetan plateaux. If one crosses the country from the Indian plains northwards he comes across the following distinct natural regions.

- (1) The Terai
- (2) The Siwalik hills
- (3) The Mahabharat Lekh (Lekh=mountain)
- (4) The middle region with river valleys and mountain spurs of the Himalayas
- (5) The greater Himalayas
- (6) The inner Himalayas
- (7) The Tibetan Plateaux.

Terai is a narrow strip of alluvial terrain about 200 metres above sea level and about 45 Kilometers in width. Its climate is very unhealthy and malarious. The northern part is covered with its marshes and thick jungles whereas the southern part bordering the Indian plain is densely populated because of the good arable land which has been cleared of its natural vegetation for purposes of cultivation. The dominant forest tree in this region is the *Shorea robusta* (Sal) with many others like *Terminalis*, *Phyllanthus emblica*, *Dalbergia sissoo*, *Bombax malabaricum*, *Ficus religiosus*, *Acacia catechu* etc.

The Siwalik hills abruptly arise from the Indogangetic plains without any foot hills. On an average its ranges have a height of 1500 metres with the

highest summits rising upto 2000 metres. At places its ranges exhibit a series of isoclinal chains one behind the other. The Mahabharat range on its north at places directly merges into it but at other places the two ranges are separated by wide valleys called the "Duns". Some of the biggest 'Duns' of this region are those of Dang, Repati and Chitwan. It is sparsely populated as during the dry season all its streams run dry excepting the main rivers in the 'Duns' valleys. The primeval forests alone cover the wild rugged landscape.

Next comes the Mahabharat Lekh. Lekh in Nepali means mountain chain. Its ranges are extending from east to west, north of the Siwaliks and are rising upto a height of 3000 metres with a number of saddles (low passes) and intersected transverse river valleys. This is a steep region with rugged surface and deep gorges of the river valleys due to erosion. At lower altitudes we find some places inhabited but above 2000 metres there are dense forests of oaks and rhododendrons.

Between the greater Himalayas and the Mahabharat lekha is the region of broad river valleys and mountain spurs. It can be called the heart of Nepal as the broad valleys of the Chamliya, Seti, Karnali, Bheri, Kaligandaki, Trisuli, Sunkoshi, Arun and Tamur are thickly populated. In width this natural region is 60 to 100 kilometres with a height of 600 to 2000 metres. However, in the east and west the landscape is interrupted by zones of greater heights rising upto an altitude of 4000 metres. The tropical and subtropical climate of this region is very agreeable to the inhabitants which provides facilities for agriculture and farming. The valley of Kathmandu which is commonly known as the Nepal valley is situated in this zone.

After this comes the giant wall of the greater Himalayas with its highest peaks in the world. It is here that we find the deepest cuttings of the river valleys with their gorges. The summit of Annapurna rising to a height of 8078 metres and that of Dhaulagiri with a height of 8172 metres are scarcely 35 kilometres apart as the crow flies. Between them flows the Kaligandaki river whose floor is only 1200

metres above the sea level. Similarly between the summit of the Manaslu and Annapurna is the deep gorge of the Marsyandi river which is only 1400 metres above sea level. Above 2400 metres and upto a height of 4000 metres stretch a belt of dense primeval forests with a highly heterogenous composition, amongst which are found the famous Himalayan cedars. Beyond the belt of this primeval forest are found the alpine pastures extending upto the snow-line which ranges from 4500 metres to 6000 metres according to local variations.

Behind the mountain wall of the greater Himalayas lies the inner Himalayas with a number of valleys running east to west. Its altitude is ranging from 2400 to 5000 metres above sea level and is surrounded on all sides by ice clad giants some of whose glaciers extend right down into the valley floors. Regarding its climate this forms a transitional zone between the north Indian monsoon region and the arid plateaux of Tibet. The vegetation is, therefore, by no means uniform. It varies from humid rain sodden forests in the south to steppes and even mountain deserts in the north.

The Tibetan plateaux in the north has a height of 6000 to 7000 metres above sea level and is covered with scanty glaciers. The climate is dry and the vegetation is poor.

The vegetation of Nepal varies not only from the south to the north but also from east to west because of the difference in rainfall. As the monsoon starts from the east we find higher rains in this region. The more we proceed towards the west the rains get less and less. Consequently from plant collectors' point of view Nepal has been divided into three regions namely, eastern, central and western Nepal. The great Himalayas and the varied and luxuriant vegetation of this country has since long been a source of great inspiration and attraction to people all over the world. But as Nepal was a closed country to outsiders for a pretty long time its mountain peaks and rich vegetation have not yet been fully explored even though the country has now abandoned its old policy of isolation.

The early history of Nepal from plant collectors' point of view begins from the year 1802-3 when Hamilton spent a year or two in Nepal and collected plants among the forested hills near Kathmandu. His collections were supplemented by a few more plants brought by pilgrims from Gosainthan. In 1820 another Asian Botanist, Wallich came to Nepal and like Hamilton stayed here for a year or two. On the basis of the collections of these two persons D. Don compiled *Prodromus Florae Nepalensis* in the year 1825. This flora contains only 766 species of Phanerogams.

Later on in 1848 Hooker entered into Nepal through Sikkim to make his collections but he was not allowed to continue long. The descriptions of his travels and observations are recorded in the *Himalayan Journal* and in his famous book '*The Flora of British India*'.

Another person was I. H. Burkill who came to Nepal through Raxual and went upto Nawakot following Wallich's route. His collections are recorded in the *Botanical Survey of India* (1910).

For 100 years, after Wallich's visit, Hooker and Burkill were the only two visitors who collected plants from Nepal. However, another flora of Nepal was compiled under the authority of the Director of Royal Garden in Kew. This contains 1672 Phanerogamous plants, a list of which is appended to Percival Landon's *History of Nepal* Vol. I.

Plant collections were later on made by Lal Dhoj and Sharma also from east, west and central Nepal. Most of their collections are at the British museum and have not been worked out so far excepting a few genera of *Mecanopsis*, *Primulas* and *Gentiana*. Mrs. Proud, the wife of Col. Proud, who was for a pretty long time in the British Embassy at Kathmandu, had also been a regular collector for the British museum but the list of her collections is not yet available.

The first expedition party lead by H. W. Tilman was given permission to explore the Lamgtang Himal in the Year 1949. This party included Polunin who had made huge collections. But these also have not been worked out as yet except the few ones which have been listed in Tilman's *Nepal Himalayas* (1952). The Swiss expedition party (1952) of mountaineering for the Everest reconnaissance was another team that included scientists. The accounts of their collections have appeared in *Candollea*. The Japanese reconnaissance parties also visited Nepal three times in the year 1952 and 1953. The area covered by this party was round Manaslu and a number of districts north-west of Kathmandu. The accounts of their collections and observations have been published in Japan in two volumes edited by Kihara. The first volume deals with the Fauna and Flora of the Nepal Himalayas and the second with the Land and Crops of the Nepal Himalayas.

V. Puri, M. L. Banerjee, Williams etc are some others who have made collections from this country. Banerjee's list has come out in the journal of the *Bombay Natural History Society*.

In recent years teams of workers and individuals are coming every time to explore the mountain peaks, the flora and the fauna of Nepal. The author of this article also has been making his collections, mainly from the valley of Kathmandu with the aim that one day he might be able to bring out a consolidated flora of the valley which might be of some help to research workers and post graduate students of Nepal whose seat of learning is at Kathmandu. A short account of the valley is given below.

Kathmandu valley (Nepal valley) falls in the middle region of Nepal mentioned above in the description of its natural regions. Geological findings clearly indicate that it was once a glacial lake that has been deposited now with silt. The lignite

belts and the black soil rich in organic matter and impressions of vegetable leaves also go to prove this. The valley is drained by the river Bagmati alone through the narrow gorge of Chobar and is surrounded on all sides by mountain ranges of the Mahabharat Lekh and the Himalayas some of which reach to a height of 9000 feet e.g. Phulchowki near Godavari and Chandragiri with its bhanjyang (Pass). The altitude of the valley is 4500 ft. above sea level and the present collections have been made right from the floor of the valley upto a height of 8000 ft. generally.

Time and space do not allow to give a description and complete list of the collections made by the author. He would, therefore, like to mention only the names of the different species of Lycopodium and ferns collected by him from this area. On comparison with the lists of Landon, Burkill and Kihara it is noted that most of the species collected by the author are not recorded in them, although their lists are not confined to the valley alone, but cover far greater areas. Here is presented a list of these plants the type specimens of which are preserved in the herbarium of the Department of Botany Tri-Chandra College, Kathmandu. These specimens were identified at the British museum and at the Forest Research Institute (Dehra Dun) whenever any difficulty arose. The author is, therefore, thankful to Mr. A. H. G. AISTON of the British museum and to Sri M. B. Raizada, the forest botanist of Dehra Dun for help in this matter.

Table showing the total number of species of Lycopodium and Ferns in the list of Landon, Burkill, Kihara and the present author.

	Total number of Lycopodium species recorded	FERNS	
		Total number of genera	Total number of species
From P. Landon's List	4	40	121
From Burkill's List	1	9	13
From Kihara's List	1	28	33
From the present author's (B. D. Pande) List	6	24	60

Out of the six species of Lycopodiums reported by the author three of them have not been recorded in any of the three previous lists shown in the table. They are Lycopodium campanulatum, L. lucidulum and L. squarrosom. Similarly out of his sixty species of ferns thirty six have not been reported in any one of the previous lists. These unreported species are marked with a cross in the list given below:

## LYCOPODIUM

1. *Lycopodium clavatum* Linn.
- × 2. *L. campanulatum* Linn.

- × 3. *L. lucidulum* Michx.
- × 4. *L. squarrosom* Forest.
5. *L. serratum* Thumb
6. *L. sp.*

## FERNS

1. *Adiantum capillus-veneris* Linn.
2. × (i) *Asplenium ensiforme* Wall.  
× (ii) *A. normale* Don
3. × (i) *Athyrium macrocarpum* Bedd.  
× (ii) *A. pectinatum* Wall. Pr.
4. *Botrychium* sp.
5. × (i) *Cheilanthes albomarginata* Clarke  
× (ii) *C. rufo* Don
- × 6. *Coniogramme caudata* (Wall.) Ching.
7. *Cyrtia spinolosa* Wall.
8. *Davallia bullata* Wall.
9. *Dennstaedia appendiculata* (Wall.) Ism.
- × 10. *Drynaria propinqua* (Wall.) Ism.
11. × (i) *Dryopteris cochleata*  
× (ii) *D. odontolema* (Moore) C. Chr.  
× (iii) *D. papilio*  
× (iv) *D. parasitica*  
× (v) *D. sparsa* Moore.  
× (vi) *D. punctata* (Thumb) Chr.  
× (vii) *D. crenata* Forsk  
× (viii) *D. dentata* (Forsk) C. Chr.  
× (ix) *D. erubescence* (Wall.) C. Chr.  
× (x) *D. mollis* (Jack) Heinn.  
× (xi) *D. repens* C. Chr.
12. *Gleichenia linearis* (Burn) Clarke
- × 13. *Gymnogramme involuta*
14. *Hymenophyllum* sp.
15. × (i) *Leucostegia immersa*  
× (ii) *L. membranulosa* Wall.  
× (iii) *L. pulchra* Wall.  
× (iv) *L. pseudocystopteris* Bible.
- × 16. *Lygodium japonicum*
17. × (i) *Microlepia pilulosa* (Wall.) Prest.  
(ii) *M. strigosa* Swartz.  
× (iii) *M. urophylla* Hook.
18. *Nephrolepis cordifolia* (L.) Pr.
19. (i) *Onychium japonicum* Kunze.  
× (ii) *O. lucidum*  
(iii) *O. siliculosum* (Sec v.) C. Chr.
20. × (i) *Ophioglossum reticulatum*  
(ii) *O. vulgatum*
21. × (i) *Polypodium amoenum* Wall.  
× (ii) *P. argulium* Wall.  
× (iii) *P. clathratum* Clarke  
× (iv) *P. contartum* Christ.  
× (v) *P. lachnopus* Wall.  
(vi) *P. loriforme* Wall.  
Syn. *Pleopeltis linearis* Thunb.  
Syn. *Lepisorus* Wall.
- × (vii) *Polypodium malacodon* (Bedd.) C. Chr.  
(viii) *P. membranaceum* Don  
(ix) *P. simplex* Sw.
22. (i) *Polystichium lentum* (Don) Moore.  
× (ii) *P. squarrosom* Don
23. (i) *Pteris cretica* Linn.

- × (ii) *P. ensiformis* Burn
- (iii) *P. longifolia*
- × (iv) *P. quadrianriata* Petz.
- × (v) *P. sternophylla*
- 24. × (i) *Stenoloma chinensis* Bedd.
- (ii) *S. sp.*

## ACKNOWLEDGEMENTS

The author is thankful to all his colleagues and friends who had accompanied him during these excursions and joined hands with him in making the collections. He once again expresses his gratitude to those who had helped him in identifying his specimens whenever he could not do it himself.

## LITERATURE CITED

- BANERJEE, M. L. *Journal of the Bombay Natural History Society*. Different members.
- BURKILL, I. H. Notes from a Journey to Nepal (1910) (Records of the Botanical Survey of India) Vol. IV. No. 4, Page 97.
- DHOJ, L. AND SHARMA. 1927-37.
- DON, D. *Prodromus Florae Nepalensis* (1825).
- HOOKE, J. D. *Flora of British India* (1885).
- KARAN, P. P. *Nepal*.
- KIHARA, H. *Flora and Fauna of Nepal Himalaya*—Vol. I. 1952-53.
- LANDON, P. Vol. I appendix XIV, Page 334, Edition 1928.
- POLUNIN, O. Luncheon Lecture in the Royal Central Asian Society. October 14, 1953.
- An Expedition to Nepal—*Journal of the Royal Horticulture Society* Vol. LXXV. Part 8. August 1950.