ABSTRACT

In recent years much attention has been given to Mirik to establish it a beautiful hill resort in connection with the development of tourism in the region.

It is situated at an altitude of 1700m with its own special charm, located at 49 km from Darjeeling and 52 km from Siliguri. This hill resort has a special attraction for having a magnificent lake fed by perennial streams. It is under the Mirik P.S.of Darjeeling district in West Bengal and is located between 26°47'N. lat. and 26°55'N. lat., 88°8'E. long. and 88°15'E. long. It claims its special identity in respect of its strategic position in the Sub-Himalayan hilly tract in the northern region of West Bengal. Its flora is significant from the scientific, cultural and utilitarian view points. It has a wide range of habitats which provide ecological diversity. Phytogeographically also it occupies a key position. The economy of Mirik and its environs is primarily based on agriculture, forestry and plantation.

Like all other parts of the world, the ecosystem of the region has also been observed to be the most gravely threatened now-a-days. Due to large scale destruction without adequate replacement of forest trees, forest wealth has been diminished and due to lack of plant cover, soil is subjected to the combined influence of erosion, leaching, insolation and radiation. Thereby, much of the normal biogeochemical cycle is lost causing lack of regeneration of forest plants.

Recently, due to policy at the National level, large scale plantation is being encouraged in connection with Eco-Development Programme. But the proper management of the forest in a region is possible only with the utilization of the local plants in the area. It is, therefore, of primary importance to understand the present day plant resources of the region. As the development and distribution of floristic elements are very much dependent on the ecological condition of a particular region, emphasis has

been given to study the floristic composition, ecological condition of the region with special stress on the behaviour of different plant species from phytogeographical point of view.

During investigation some ecological observations on Mirik and its environs have been made after accumulation of information from various sources. In this connection collaboration has been made with the National Atlas and Thematic Mapping Organisation, Government of India. Information so far represented in connection with Mirik P.S. may be considered for the first time to report in this field of work. During the preparation of topographic section, it has been noted that less than 700m elevation shows the lower erosional surface, 700-1000m the middle erosional surface and above 1000m represents upper erosional surface of the mountains. Mirik itself lies in the highest part of the region in Mirik P.S. The height gradually slopes down towards south-east having average height of 300-600m above sea level. The surface configuration of this area undoubtedly presents a complex physical environment due to different Geomorphic processes.

The study on drainage and the river system of the region has specially been emphasized due to the fact that now-a-days catchment area has been noted to be a very important from ecological point of view. In connection with the study on this aspect, it has been noted that the Mechi and the Balason are the two main rivers with a large number of tributaries and branches, the courses of which have been taken into consideration during the preparation of map. The central part of the region acts as main water divide line. The water divide area is having a slope of less than 20% as calculated from the relief and the slope is maximum where the land is merging with the boundary rivers. Thus along both the rivers, the Mechi and the Balason, the slope increases to more than 50%.

Five different zones of soil have been prepared for Mirik P.S. These are Red Podosol, distributed in the northern part of the region, Brown Earth, representing the major part of the area, Ash Grey Soil with association of

Red Soil, representing a narrow strip towards the southern part, Whitish Grey Soil adjacent to the previous one in southern direction and Grey Soil with association of yellowish brown Soil representing the extreme southern part of the police station.

Out of the study on the earlier records on climatic factors, it has been noted that since 1850 the rainfall has been gradually declining from 3477.51 mm (1850-1855) to 2560.00 mm (1982-1987). Total rainfall in the year of 1988 has been observed to be 2039.4 mm. Thus the vegetation, now-a-days, is being subjected to stressed condition as compared to earlier days.

Due to rapid growth of urbanisation, the growth of human population has been observed to be at increased state and for this reason biotic influence on vegetation is inevitable. This increase in population coupled with the increased demand on natural forest areas for cultivation of cereals for food and for fuel, forest areas are being destroyed at a greater pace, year after year. Similarly, increased communication even with remote villages facilitates more movement of people from outside along with their domestic animals and consequently more interference with the vegetation. The major part of this area has been noted to have population density of 1-3 persons/ha. The small area of the central part has more than 9 persons/ha, and a small area in the north has been observed to cover less than 1 person/ha.

A very significant feature observed here in the study of landuse is the extensive existence of tea gardens. Crop land occupies a very little area which is distributed mostly in the northern part of the region. A map has been prepared to represent rural settlements, forests, scrubs and wastelands.

The primary or vergin forest has been noted to become restricted in the region. Majority of forest patches are secondary in nature. Vegetation of this area has been classified on the basis of physiognomy and structural features of the plant in relation to the altitude of the hill and

climatic conditions, specially the rainfall. Four vegetational zones i.e. Tropical Deciduous Sal Forests (Plantations; 100-500m), Tropical Evergreen (500-1200m), Subtropical Evergreen (1200-1800m) and Temperate Mixed Zone (1800-2630m) have been marked out and different plant species in various zones of the primary forests have been worked out. A change of vegetational structure for secondary forest formation due to the influence of various factors have been noted. Different species available in different zones of primary and secondary forests have been enumerated.

Water reservoirs in different zones of Tropical, Subtropical and Temperate regions have been observed though typical aquatic vegetation is poorly developed, the marshland vegetation has been studied in details.

Cultivated and other useful plants with special reference to food, medicinal and ornamental value available in the region have also been recorded. Special emphasis has been given on the survey of various plant materials used by the local tribes/hill people. Besides, common trees yielding timber, fibre and fruits have been identified.

In connection with the taxonomic study on the flora of Mirik and its environs in Darjeeling district, much emphasis has been laid upon the collection of plants, preparation of herbarium sheets and identification of them after consultation with different herbarium sections available. Nomenclature and citation, short description, flowering and fruiting periods, local name, if any, notes on the frequency of distribution, plant association, economic use, if any, of 1059 taxa including 71 cultigens of Angiosperms and Gymnosperms have been taken into consideration. Out of which again 987 and 67 species of Angiosperms are represented as wild and cultigens respectively. Gymnospermous taxa have been found to be represented by Cryptomeria japonica (L.f.) D. Don in wild state and 4 other cultigens.

The system of Bentham and Hooker (1862-1883) with some modifications based on recent knowledge has been followed during the representation of the sequence of families in the flora. Monocots include 300 species (excluding the cultivated 11 species) under 136 genera and

14 families. Similarly, Dicots cover 687 species (excluding the cultivated 56 species) under 350 genera and 95 families.

Based on total number of collection (excluding cultigens), percentage occurrence of family, genera and species of Dicots have been observed to be 86.36%, 71.87% and 69.53% respectively. Similarly, in Monocots, family, genera and species have been represented by 12.73%, 27.93% and 30.36% respectively.

The approximate ratios between the family, genus and species of the Angiosperms have been worked out. The Monocot-Dicot ratios in terms of family, genus and species have been calculated to be 1:6.8, 1:2.6 and 1:2.3 respectively. The genus-species ratio for the Angiosperms is 1:2 approximately.

Twenty different families in order of dominance have been worked out on the basis of the number of taxa incorporated in each family. Orchidaceae has been noted to include maximum of 131 taxa under 41 genera. On the other hand, each of Apiaceae and Acanthaceae includes minimum of 13 taxa under 8 genera.

The families in order of dominance have been worked out to represent Orchidaceae, Poaceae, Asteraceae, Rosaceae, Lamiaceae, Rubiaceae, Cyperaceae, Urticaceae, Fabaceae and Scrophulariaceae jointly and Ericaceae.

About 38 genera have been worked out in order of dominance on the basis of proportionate distribution of species in each of the genera studied. Each of the genus Bulbophyllum as well as the genus Impatiens have been observed to include maximum of 15 species. On the other hand, each of the genus Anaphalis and other 11 genera include minimum of 5 species.

A Solanaceous species has been collected from the area and noted to be a novel one. After detailed study of different literature and

herbarium sheets, Indian flora fails to recognise the plant and specially after receiving constructive criticisms through personal communication with Royal Botanic Gardens, Kew (London), the plant is tentatively named as Solanum mirikensis which is supposed to be a new addition to Indian flora.

After consulting different floras, monographs, journals and various other literature supported by different authentic herbarium specimens of India and abroad available in different herbarium sections, plant elements of Mirik and its environs have been studied from phytogeographical point of view.

Percentage occurrence of species common to different botanical regions in the world has been prepared, of which Chinese (42%), Japanese (13%), Malaysian (21%), South-East Asian (73%) and Central and West Asian (16%) elements are remarkable. European elements are represented by 1%. Enumeration of different species according to Neotropical and Palaeotropical in origin has been made and include 4.3% and 3.5% respectively of total number species available in the region. Pantropical elements are represented by 9%.

Percentage occurrence of various species common to different botanical regions in India has been worked out. Study reveals that the flora of the region under study is very much similar to that of Central Himalaya (Nepal) by 86.1% as against Western Himalaya (57%), Sikkim (63.3%), Bhutan (52.2%), NEFA including Upper Assam (41%), Gangetic Plain (11.5%) and South India (26.3%).

On the basis of much similarity of flora between Nepal and the region under study, Mirik and its environs that has so far been included within the Eastern Himalaya, is now being proposed to be included within the botanical region of Central Himalaya which was established previously by D.Chatterjee (1939, 1960) after considering Nepal only to represent as Central Himalaya.

The data presented in this part of work is an outcome of more than

5 years of study. Taxonomic approach towards the preparation of comprehensive flora of Mirik and its environs reflects some information and knowledge which are valuable not only from academic point of view but also from the point of view of their application. The comprehensive list of plant resources will be helpful during selection of species for manipulation of forest to encourage plant cover and to develop Agroforestry in connection with ecological and economical development of the region. Besides, it will contribute during preparation and revision of the "Flora of West Bengal" State and the "Flora of India" as a whole. Moreover, the ecological and phytogeographical study may help for better understanding of the trend of evolution of flora and the adaptation of various plant species under present day environmental situation of stressed condition. It is reflected from the observation that a gradual accumulation of Malaysian elements (21%) is operating under the influence of predominating tropical climate as against various European elements of 1%, prevailing at present as compared to Malaysian and European elements of 4% each observed during the last century.