

# Conclusion

Interest and concern about the environment have stimulated increased efforts to inventorying and document the plants of the world. The growing realization about conservation of rapidly dwindling resources and use those more wisely provides an added urgency to these efforts. Thus, the amount of time and money needed for floristic work is increasing, as are the diversity and importance of ways in which floristic information is being used and the number of people who have a direct interest in floristic data (Anonymous 2004).

Therefore, the PWS being one of the extremely inaccessible Protected Areas, the survey and the mapping of its floristic components has not been possible and remained unexplored for many years. Therefore, the data presented here is the 1<sup>st</sup> and pilot studies exclusively taken into consideration of this isolated and terrain during past seven years.

The PWS, with an area of 128 sq km is the biggest sanctuary of Sikkim holds tremendously rich floral component Lepcha *et al.* (2007, 2009). Significantly, the thick and compact forest of PWS has been recorded as the rare habitat of numerous rare and endangered species of plants including the *Podophyllum hexandrum*, *Rheum nobile*, *Aconitum bisma*, *Balanophora polyandra*, *Aristolochia griffithii*, *Clematis montana*, *Panax pseudo-ginseng* etc.

The floristic study of the PWS also reveals that there are numerous plants species are in the verge of threatened and gradually becoming rare. Their population is also gradually decreasing. However, there are still enough indications of migration of many species into the sanctuary particularly across the international boundaries of TAR region of China and Bhutan.

It is a matter of fact that the interference of the PWS through various undesirable means is identified as a major issue in regards to conservation in the sanctuary at present context. These factors were perceived to be the great threats to the existence of the park, its ecology and its bioresources as a whole.

The flora of Sikkim is largely subjected to ecological and climatic variations (Chauhan & Singh 1996). The varied climatic, physiographic and the edaphic factors have enabled the PWS area to evolve the rich diversity of its own in a small stretch of land mass. The different conditions of slopes, hill ridges, crests, furs, valleys, formations, and the diversity of habitat conditions, sharp altitudinal ranges of 6000 – 3100 m and the nature of diverse type of vegetation

formations have altogether contributed to Pnagolkha Wildlife Sanctuary to acquire its unique and diverse flora and vegetation.

PWS is surrounded by the TAR region of China in the north and Bhutan in the east, Darjeeling district of West Bengal in the south-east. The present floristic studies of the sanctuary had some advantages in enumerating the flora as some of the components of flora of adjoining parts of Bhutan and the areas of Neora Valley National Park are extended sharing their common international boundaries and the floras of both of these regions are in hand. This work of botanical explorations of PWS has enabled to amass over 3000 herbarium specimens, now stored in the NBU-Herbarium, Department of Botany, North Bengal University and at BSHC, Botanical Survey of India, Sikkim Himalayan Circle, Gangtok.

The present field study of *hitherto* unexplored forests of PWS recorded a total of 892 species of angiosperms belonging to 140 families which is remarkably a high figure in a small geographical land mass of only 128 sq km. In addition to angiosperms, 68 species of ferns and fern allies belonging to 20 families, and 6 species of gymnosperms were also recorded. However, a separate comprehensive study of the fern flora of the PWS is required to get the actual picture.

Out of eight natural reserves (6 Wildlife Sanctuaries, 1 National Park, and 1 Biosphere Reserve) in Sikkim, PWS is the one with very rich gene-pool of floristic elements. The forests of the PWS not only rich in the Himalayan floristic elements, but also represents the rich Sino-Himalayan, Japanese, South-East Asian and Malaysian elements. Apart from these, other floristic elements of the valley also include Indian subcontinent, Australian, Eurasian, Central Asiatic and American elements as well. Some species in the valley are found to be naturalized exotic elements.'

Above all, PWS holds huge store-house of species for medicinal values with tremendous scope for future use. Besides, it also holds extremely important resource species with economic values in the form of wild edibles, fodder, costly timber yielding, etc. The actual status of PWS as a source of NTFP needs further detailed inventorying.

Significantly, having being enormously rich in floristic diversity, the sanctuary could be considered as a *state-of-art* site for determination of taxonomic rank especially in the *species*, *varieties* level including *ecotypes* and *species novo* in the future. Therefore it is being assumed that more *taxa*, *varieties*, *ecotypes* and the *species novo* shall be certainly evolved in the future course. Most importantly, PWS is housing numerous endemic species of Himalayan, particularly of Eastern Himalayan region.

Considering all these facts, the floristic wealth of PWS needs to be conserved with topmost priority. It is the matter of fact, that the sanctuary with tremendous diversity in species level is a part of the *Himalaya Biodiversity Hotspot*. Hence, the safeguard of sanctuary through effective enforcement of the laws and implementation of advance and cost effective conservation methodology is a need of the hour for better and effective approach for the conservation and promotion of the rich "*Gene-pool*". The state Department of Forest and its personnel needs to play key roles in exercising their powers and duties with utmost sincerity, accountability and the credibility to ensure the sanctuary a safe and secure home for all its biodiversity. Also, the state Department of Science & Technology and other allied research based departments must take up intensive study in regards to the status of useful and RET species of plants for conserving and/ or improving their population structure as well as developing proper methods of their sustainable utilization through the cultivation of some such plants involving local people. The entire area can be declared as a **Transboundary International Park** for further and/or better conservation of the area's bioresources. This will ensure long term sustainability of natural resources not only in parts of Indian Territory but also develop a contiguous chain of protected areas for biological resources in the adjoining countries too.