

Who will save the plants from the botanist?

The Biodiversity Act 2005 makes it difficult for a botanist to collect plant material from inside of protected areas for research. However, one area of loss that has been overlooked is the collection of plant specimens by botany students for submission during the examination to fetch marks. The anachronistic exercise is still an integral part of curricula in most of the Indian universities.

Plant collection has become a matter of concern in the recent years on account of a few factors. Students are usually taken to biodiversity-rich areas which are mostly located around hill stations such as Pachmarhi, Darjeeling, Mahabaleshwar, Panchgani, Shillong, Kodaikanal, Munnar, Ooty, Mussoorie, Nainital and Shimla. Collections are often so ruthless that an entire population of a species that has stabilized over a large period of time is destroyed. This also affects the population's reproductive potential, gene diversity and ecological amplitude. The biodiversity-rich areas are inhabited by tribal and marginal rural communities. Destroying the diversity that they have conserved for centuries hurts their sentiments and prejudices their interests. The local communities resent the damage caused to the traditional plant resources by marauding visitors. With the loss of diversity outside, the students are now being taken to protected reserves for collection. Student collections selectively focus on certain rare and botanically interesting taxa that include liverworts, mosses, ferns, orchids and medicinal plants. Pteridophytes such as *Psilotum*, *Isoetes*, *Selaginella* and *Ophioglossum* species, and insectivorous plants such as *Drosera* and *Nepenthes* species are threatened. Plants of medicinal importance such as *Aconitum heterophyllum*, *Bacopa monerri*, *Coptis teeta*, *Gentiana kurroo*, *Podophyllum hexandrum*, *Rauwolfia serpentina* and *Saussurea lappa* have become threatened due to medicinal use but are now favourite for botanical collection on account of their rarity. What is the fate of these collected specimens? Most of the submitted collections are disposed off in waste bins after

award of marks! Lack of trained herbarium curators and dearth of taxonomic research facilities also leads to waste of the natural plant wealth in this manner.

Debates have been held at various botanical conferences to find a possible solution to save the plant diversity from this exercise. Clearly, a blanket ban on the botanical collections is neither feasible nor desirable. It would be difficult to implement and would meet opposition from the scientific community, as it can hinder taxonomic activity. The initiative must come from the academic community. Syllabi need to be modified to do away with collections in the wild. At the same time, suitable non-destructive field exercises should be developed, which would excite the students while retaining their interest in field botany. The substitute exercises can include: (i) study of plants in the field in relation to the abiotic factors; (ii) analyses of species and genetic diversity; (iii) preparation of taxonomic keys; and (iv) study of ecological adaptations. Pollination and seed dispersal ecology, though not a part of traditional taxonomy, would be of immense interest to the students. Collections can be restricted to the common plant species, cultivated plants and invasive species. Documented populations of rare, endangered and threatened (RET) plants should not be removed, unless the collection has a scientific purpose that cannot be accomplished using existing herbarium specimens. RET species should be collected only for research and for institutional herbaria. The Ministry of Environment and Forests has also issued a circular dated 20 October 2010 to all academic institutions to prohibit use of species listed in Section 12 of Wildlife Protection Act.

With the advancements in the fields of information and communication technology (ICT) and digital technology there is an immense scope of developing innovative field exercises. Students should be encouraged to take up field studies on plants in their natural habitats. Digital herbaria can be submitted by clicking the photographs in the field. Videography

has now become an integral part of field studies. Ethnobotany and plant-animal interaction can be absorbing areas of interest to budding nature photographers.

Excessive plant collections can have serious impact on both the target plant species and the surrounding habitat. Organized collection for established herbaria in a region is what taxonomists should emphasize on. Such specimens should be either for research or preservation for posterity. A few years ago the University Grants Commission (UGC) had taken some initiatives to discourage the use of rare plants in practical classes. These can also help in preparing some common guidelines and in developing alternative exercises to substitute for plant collections. There is need for a national debate among the plant scientists, teachers and conservationists on the utility (or lack of it!) of plant specimen collection from the wild. Botanical Survey of India, Indian Council of Forestry Research and Education, state forest research organizations and major universities should focus on developing infrastructural facilities at regional levels so that modern herbaria with the state-of-art facilities are available. This would help in building a huge repository of representative flora of the region. Vibrant herbaria and active taxonomic research complement each other. At the same time, a serious effort should be made to develop a consensus on developing alternative field exercises which can substitute for the present system of specimen collection without jeopardizing whatever interest students still have in taxonomy and field botany.

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