

Global biodiversity crisis and priorities in Indian plant systematics

The United Nations is celebrating the year 2010 as the International Year of Biodiversity. After a decade, the road from the first Earth Summit – Rio' 92 – has not lengthened any further even though alarming reports of biodiversity degradation and ecological hazard are being reported worldwide, especially from tropical countries. This human-altered global environment has stirred the 'sixth mass extinction' event, causing widespread changes in the distribution of living organisms. It is estimated that the present rate of extinction is 100–1000 times greater than earlier ones. Scientists believe that land-use change, which is experienced particularly in the Tropics, is the major global impact on biodiversity followed by climatic change, which is predominant in higher latitudes. They feel that a new economical thinking and environmental ethics are the need of the time. Clearly, poor implementation of policies and lack of political will are the crucial points behind this setback.

A recent report shows that ~1.75 million living species have been scientifically described so far and a working estimate of ~14 million species may remain undiscovered. Systematists believe that it will remain an 'unending synthesis'. A major challenge for the systematists of the coming decades is the assembly of the 'tree of life', to be reconstructed from phylogenetic knowledge¹.

The magnitude of the crisis in biodiversity is the central problem of systematics and the key dilemma of science as a whole. According to E. O. Wilson, systematics is linked to the future of the international conservation movement which is now focusing its attention on the threatened environments of the tropics². He also points out that there are few professional systematists in the world working with tropical organisms and their number may be declining with time. Heywood³ stressed the need for an effective use of the electronic taxonomic information system, better use and deployment of the existing data and resources, improvement of infrastructure and training in developing countries, and new models of inter-institutional cooperation to improve the state of inventory in the coming years. This would, in turn, fulfil Mission I of the Systematic Agenda 2000 – 'to discover, describe, and inven-

tory global species' diversity³. Many efforts are in progress to document the bio-wealth in different parts of the world under various programmes, projects and organizations such as the Global Taxonomic Initiative, Taxonomic Database Working Group, Expert Centre for Taxonomic Identification, Integrated Taxonomic Information System, Species 2000, DIVERSITAS and Global Biodiversity Information Facility.

It is obvious that many tropical countries including India are still in the 'explanatory phase' of the systematics study. India is ranked fourth in biodiversity and cultural diversity together and has vast indigenous knowledge systems⁴. Traditionally, biodiversity conservation is found profoundly intertwined with the Indian philosophy and Indians esteemed spiritual fulfillment through their external and internal environments. Unfortunately, the rate of eroding biodiversity is rising and it is estimated that nearly 10% of the recorded biological wealth is on the verge of extinction. In India, the state of inventory is now transcendent with various efforts being started to strengthen systematic biology research by many research and development institutions of government organizations, non-government organizations and some university departments. It is a matter of concern that the lack of co-ordination and reluctance to accept a collective vision, may render these attempts unsuccessful.

Taxonomy is among the key disciplines in the recognition and characterization of biodiversity. It provides the core reference system and tree of diversity for all organisms. The taxonomic monographs or revisionary studies help to inventorize biological diversity effectively – this includes in-depth studies dealing with the basic relationships among species. It is widely accepted that no one can do a careful floristic study of a particular geographic area that has not been investigated monographically. In India, plant systematists are still forced to depend on classic floristic works that were prepared before doing the taxonomic monographic works. These workers have scientifically documented only about one-fifth of the species. A thorough revision is a formidable task due to the lack of sufficient expert-taxonomists

for identification and classification. Fortunately, the Botanical Survey of India has started an ongoing 'Flora of India' project with the aim of publishing revisionary treatments periodically. However, the current rate of progress of this uphill mission is very slow.

The primary tool for biodiversity conservation is derived from the analysis of basic taxonomic and phylogeographic data which define the centres of endemism and species diversity. Taxonomy, ecology and plant geography or phyto-geography may go hand in hand in deciding the correct status of the taxon – they are considered as the 'backbones' of the taxonomic monographs. Morphology was again in the centre stage after molecular systematists tried to classify taxa according to their phylogenetic position; here, the units of classification are monophyletic. However, it became clear that many observations traced with molecular systematic studies were actually suggested by the morphological evidence earlier⁵. Even though in the near future, 'a portable DNA barcoding device' would be used by every systematist, even in developing countries, classical taxonomy shall remain useful in the determination of species. For a practical and inexpensive way of identifying a taxon, a simple morphological system shall continue to be of use⁶. The validity of DNA barcoding depends on establishing reference sequences from taxonomically confirmed specimens.

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