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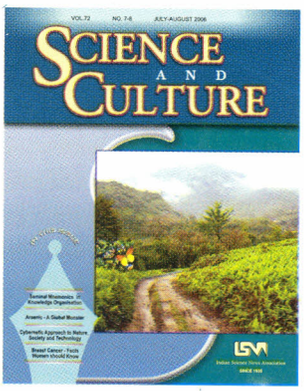
EDITORIAL

BIODIVERSITY: ITS PERSPECTIVES AND CONSTRAINTS



Biodiversity refers to the variety and variability among living organisms, the genetic diversity they contain, the assemblages they form, and the ecological complexes in which they occur. This is auto-sustainable and self-regulating, if there are no natural and/ or man-made perturbations. Biodiversity has been defined in various ways. In 1993, Jutro recorded 14 different definitions of biodiversity out of those most often used. Two of them – largely quoted, are of a more official nature, since they have been approved by most countries in the context of worldwide negotiations, agreements and strategies. The most extended one is that of the United Nations included in the Convention on Biological Diversity (UNEP, 1992). According to it, biodiversity means: "The variability among living organisms from all sources including inter-alia, terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems". The shortest definition of all is that of the Global Biodiversity strategy (WRI, IUCN and UNEP, 1992) which regards biodiversity as "the totality of genes, species and ecosystems in a region". Diversity within species is the *genetic diversity*; between species is the *species* or *taxonomic* or *organismal diversity*; and of ecosystems is the *ecological* or *habitat diversity*. *Genetic diversity* is needed by any species for maintaining reproductive vitality, resistance to disease, and the ability to adapt to changing conditions. *Species diversity* represents the range of evolutionary and ecological adaptations of species to particular environments. *Ecological diversity* or *Community level diversity* represents the collective response of species to different environmental conditions.

The natural world is a far different place now than it was about 10,000 years ago. Different natural ecosystems on the planet have been affected and modified by human populace. A large number of species have gone permanently extinct. Genetic diversity has been eroded. The climate has been disrupted.

In the year 1992, the Rio Summit brought some five documents (I. Rio Declaration; II. Convention of Climate change; III. Convention on Biodiversity; IV. Statement on Forest Principles; V. Agenda 21) to global prominence. For 12 days in June, world attention was focussed on a major conference in Rio de Janeiro, Brazil. Representatives from 178 countries including over 100 heads of state, plus leaders of the United Nations and major non-government and conservation organizations, met to discuss way of combining increased protection of the environment with more effective economic development in less wealthy countries. The most remarkable feature of the conference was the clear linkage established between the protection of the environment and the Third World poverty. The developed countries of the world have the resources to provide for their citizens and protect the environment. The third world countries see the immediate use of their natural resources as the key to raising the standard of living for their impoverished populations.

Of the five documents signed in the Rio Summit, most of the nations of the world endorsed the Convention on Biodiversity and since then it has become a guideline for conservation programmes. The Convention on Biodiversity has three objectives – protecting biological diversity, using it sustainably, and sharing the benefits of new products made with wild and domestic species. The countries providing the raw materials for medicine, new crops, biotechnology products; should receive fair compensation

for the use made of species found in the territories of a country. In the past, the developed countries have utterly deprived such compensations. The treaty on Biodiversity, signed by 153 nations, affirms that the countries have certain rights over the natural resources occurring within their borders and as such, they must be given rationale share of the use of their natural resources. But genetic resources, unlike all other natural resources have been declared to be the common heritage of mankind. This has led to the blatantly unfair situation in which use of these resources has never been paid for.

The distribution of biodiversity is uneven in the world. It is maximum in equatorial, tropical and subtropical regions and poor in the temperate as well as polar regions. As a matter of fact, the developing and the underdeveloped countries located in tropical and sub-tropical regions are endowed with vast natural resources than the developed countries located in temperate zones of the earth. It is noteworthy to mention that the Vavilovian Centres of Diversity of crops and domesticated animals are also located in some of the developing countries. Vavilov has shown that plant species are unevenly distributed over our planet in the modern geologic epoch. Some parts of the world are characterized by an astounding diversity of species. These include South-Eastern China, Indo-China, India, the Malay Archipelago, South-East Asia, Tropical Africa, Ethiopia, Central and South America, the Mediterranean basin, the Near East, and some others. Northern countries and regions, such as Siberia, all of Central and Northern Europe, and North America are poor in species composition.

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The importance of genetic variability in crop improvement, breeding programmes and an understanding regarding the consequences of genetic erosion has stimulated initiative world-wide for conservation of germplasm and establishment of gene banks. In the Rio Convention, it was internationally agreed upon by the participating leaders of the different countries to safeguard the common concern of humanity by conserving nature and utilizing genetic resources in sustainable manner. In view of the same, conservation programmes are accordingly implemented at three levels, namely, genetic, species and ecosystems through *in-situ* and *ex-situ* conservation methods.

In *in-situ* conservation, plants are protected in their natural habitats. In case of crop gene pools, the wild relatives are conserved. To conserve both genetic diversity and potential for continuing evolution, wild relatives should be able to co-evolve with their pests and pathogens. Through the interplay of evolutionary processes in natural habitats, *in-situ* conservation maintains genetic diversity at a dynamic state. The *ex-situ* method of conservation of flora and fauna are done at off-site, i.e. away from the original place of occurrence. As such, the seed banks and field gene banks are vulnerable to human beings, natural disasters and technical problems such as power cuts, fires, earth quakes, and floods. Consequently, *in-situ* conservation of wild flora through protection of species habitats and ecosystems is chiefly being implemented by the Ministry of Environment and Forests. *Ex-situ* conservation of genetic resources of cultivated plants and their wild relatives is managed and maintained largely by the National Bureau of Plant Genetic Resources (NBPGR) under the Indian Council of Agricultural Research (ICAR). Moreover, the non-governmental organisations (NGOs) play a pivotal role to make people's participation possible to protect and conserve biological diversity. At the international level, six major organisations have been involved in conservation and utilization of biodiversity. These are United Nations Educational, Scientific and Cultural Organisation (UNESCO), Food and Agricultural Organisation (FAO), United Nations Environment Programme (UNEP), United Nations Development Programme (UNDP), International Board of Plant Genetic Resources (IBPGR) and other institutes under the Consultative Group on International Agricultural Research (CGIAR), World Resources Institute (WRI), International Union for Conservation of Nature and Natural Resources (IUCN), now renamed as World Conservation Union (WCU) and Worldwide Fund for Nature (WWF), earlier known as World Wildlife Fund. Out

of these, UNESCO has contributed substantially in building up a conceptual and philosophical framework through its Man and Biosphere (MAB) and other programmes, such as the network of *in-situ* conservation areas like Biosphere Reserves, National Parks and Sanctuaries.

Biological diversity and its risk are high in the developing countries primarily due to global climate change, destruction and degradation of natural habitats and ecosystems (especially in the tropics), pollution, population growth and extensive farming, increased stress on forests, etc. The biodiversity is a basic determinant of the structure and function of all ecosystems and provides the foundations on which the future well-being of human society rests. Its conservation has become a national obligation for each country worldwide through various attempts. Such attempts for protection and conservation of biodiversity primarily involve identification and long-term conservation of ecosystems, domestication of wild economic biota, managements of protected areas and habitat restoration, rehabilitation of endangered and threatened species, linkage between *in-situ* and *ex-situ* conservation, domestic legislation and adherence to international conventions, etc.

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Increase in demands of food, fuel, fibres and shelter by the ever-increasing human population has considerably eroded the natural resources. The single most affected resource is biodiversity. Since biodiversity represents the gene pool in various living beings, and it provides the raw materials for plant breeding, its devastation would have catastrophic effects on the survival of the human race. Keeping this in mind, the conservation of biodiversity is a must for the posterity of mankind.

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