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Research Article

Extinction of Species in Relation to Environmental Degradation

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INFO

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ABSTRACT

So far as the improvement in the existing life forms on the earth is a concern, it is a well-known fact that the chances of improvement are directly proportional to the available genetic base and vice-versa. Loss of habitat, changes in climate patterns, entry of new alien species, etc. are the prime cause of loss in biodiversity and species extinction as well. The introduction of new crop species (*Bt*. based crops) is also a challenge to our natural flora and fauna as the alien gene has the potentiality to get reshuffle with indigenous genetic base. The extinction of species and the destruction of ecosystems has been a major concern of policymakers. To realize the importance of the matter, the Government has established crop-wise National Gene Banks that are provided with the facility of Seed Repository, Cryo-Bank, and tissue culture repository. Pre-breeding is also a useful approach to enhance the genetic base in crop plants. National parks and sanctuaries have been established in many countries to conserve life forms in its natural way.

Keywords: Species, Extinction, Environmental Degradation, Habitat, Cry-Bank, National Gene Bank, Tissue Culture

Introduction

Biodiversity includes the diversity of species, life forms, ecosystems, and genes that exist on earth. The extinction of species and the destruction of ecosystems has been a major concern of policymakers. One of the major efforts has been to conduct a survey and conserve the country's biodiversity, to save wild plants and animals from extinction. National parks and sanctuaries have been established in many countries to meet this objective. At present we have genetically modified plants too that have some alien gene (introduced through soil bacteria) and these genes have the potentiality to produce some toxic proteins in the host plant. So the feeder on these crops may die because of the toxic protein. Now see India is a developing country and 7 out of 10 people are dependent on agriculture. The landholding is marginal. As a botanist, we know that surrounding crops may inter-breed and thus may affect the neighboring crops too. The pollen of *Bt* based crops can be blown and pollinate the surrounding non-*Bt* crops thus transferring the toxic gene to the non-host crop too. Another aspect of these genetically modified crops is that they may have herbicide tolerance. So when herbicide spray on the field except for the crop in question remain to withstand and rest vegetation (including weeds, some other flora, and fauna) get destroyed.[1,4,5] Now in such a situation evolution of new weed species (Super weed) may be a reality as seen in Georgia province of South America where a new weed species popularly known as Pigweed evolved that cannot be controlled by any herbicide. So this is a burning question before the policymakers that how and how much they can allow the new crop species in our environment so that they can remain feasibly fit.[7,8] One of the major efforts, has been to conduct a survey and conserve the country's biodiversity, to save wild plants and animals from extinction. In continuation, a comprehensive

study laid down by Inter Governmental Science Policy Platform on Biodiversity and Ecosystem Services (IPBES), a UNEP & FAO sponsored independent body with a total 134 member country including India reveals alarming states on both Biodiversity and Environment in its recent reports submitted in May 2019[10,11] are as follows:

- Nature is declining seriously globally as 1 million species out of total estimated 8 million species present on the earth are seriously on the floor of extinction
- Land-based habitat declined by 20% (mostly since 1990 onwards)
- > 1/3rd of marine animals are threatened
- 300-400MT of heavy metals, toxic sludge, other waste, etc., dumps annually into the water
- A 10 times increase in plastic pollution since 1980
- The 16-21 cm rise in global average sea level since 1900
- 100% increase since 1980 in greenhouse gases emission that results in 0.7-degree increase in global temperature
- 300% increase in food production since 1970
- 23% of land areas have seen a reduction in productivity

Reasons to Extinction of Species and Loss of Biodiversity

Here are some point that leads to loss ofBiodiversity andextinction of species:

Extinction **-** In many groups of plants and animals, there is a group of species, which are prone to extinction due to environmental change so that the group is reduced to one or a few threatened or endangered species. These threatened or endangered species have a high probability of extinction during the next few years or decades.[9] Red Data books are prepared which contain the lists of these endangered species of plants and animals. The extinction of these rare species may be natural or manmade or both.

Natural extinction **-** It is primarily due to the small size of the breeding population (thus promoting inbreeding and inbreeding depression) associated with a high coefficient of variation. When the size of the breeding population drops to a hundred or less, the likelihood of extinction is enhanced still further due to the inbreeding depression.

Human caused extinction **-** Due to destruction of natural habitat s by human interference, biodiversity is being lost at a fast rate, particularly in the tropical regions(e.g. tropical rain forest and coral reefs).

Food Chain Alteration**-** The feeding activity of exotics can alter the availability of food resources for native species.

Loss of endemic species**-** Competition for food and/or space may result in the elimination of related species occupying the same niche. Predation on a native species by exotics is also a problem.

Cross Breeding**-**Exotic species may be reproduced with native populations, resulting in hybrids and the ultimate loss of the native species.[2,3]

Despite these there are other several reasons like urbanization, industrialization, disturbances with the ecosystem (climate change), narrowing genetic base due to continuous inbreeding and more and more use of chemical pesticides, herbicides, fertilizers, etc. that play a vital role in depleting our biodiversity.

Steps to Conserve Biodiversity

- No undisturbed land is used for development or urbanization
- To protect threatened and endangered species from extinction, a catalogue should be prepared that comprises of inventories of resources from genetics and national biological
- In poor nations, birth rate should be lowered and sustainable, high yielding agricultural systems be developed, so that preservation and sustainable exploitation of biodiversity go hand in hand
- Measures should be taken to reduce the emission of greenhouse gases and ozone-destroying compounds
- To promote "Conservation Biology" this technique includes in-situ and ex-situ conservation

Efforts to Conserve Biodiversity

In-situ Conservation

This type of conservation applies only to wild flora and fauna and to the domesticated animals and plants, e.g. National Parks Sanctuaries, Nature Reserves, and Natural Monuments, etc. Plants and animals are conserved in their native ecosystem. They can also be conserved in the manmade ecosystem as per their habitat.

Ex-situ Conservation Efforts in India

Conservation of samples of genetic diversity away from their field habitats. This is achieved through the establishment of "Gene Banks" which includes Genetic Resources Centers, Zoo, Botanical Gardens, Culture collections, etc. India has signed a joint project with the United States on plant genetic resources in 1988 with an aim to established national gene banks for various crops throughout the country. A gene bank must have the following facility to conserve the germplasm for a longer duration.

Seed Repository **-** Where the seeds are stored at -20ºC

Cryo Bank **-** Where the seeds are stored at -196ºF

Tissue Culture Repository (10–25ºC)

Conclusion

In vitro conservation techniques including tissue culture and cryo-preservation offer distinct advantages. Given this, in 1986 a National Policy for Plant Tissue Culture

repository was established at National banks for Plant Genetic Resources (NBPGR), New Delhi. At the national level, crop-wise gene banks established throughout the country, and they all are well supported by NBPGR, New Delhi. A few renowned national level gene banks are:

Central Rice Research Institute, Cuttack, Directorate of Wheat Research, Karnal, Indian Grassland and Fodder Research Institute, Jhansi, etc.

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