

BIO-DIVERSITY IN TURKEY

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Bio-diversity is decreasing throughout the world at an alarming rate. Biological diversity can be compared to an enormous organic library, an enormous store of information. This information, the experience gained and the solutions found to the problems faced by living things throughout the course of millions of years of evolution, is encoded as messages called genes. Biological diversity can be considered in two main categories: first, the genetic diversity consisting of hereditary differences between the individuals that form a species, and, second, the ecological diversity created by the differences among the species, which is the evolutionary extension of the first.

Genetic diversity can be defined as the diversity or wealth of hereditary information of a species in its gene pool. The differences in genetic composition observed between local varieties of the plant and animal species of economic importance are especially significant from the point of view of improvement efforts and conservation of the evolutionary potentials of these species, because they reflect adaptations to different local conditions. In order to be able to adapt to changing environmental conditions, every living species must possess genetic diversity. At the same time, in the field of biotechnology, which has advanced so rapidly in recent years, genetic diversity constitutes the raw material necessary for the development of numerous high-quality plants and animals.

Ecological diversity, on the other hand, is defined as the different ecosystems and communities of species in a given region together with the numbers of species within these communities. As the number of species within a community increases, the community's information content and diversity of species also increases. Of two communities containing the same number of species, the community in which every species is represented by an equal number of individuals is regarded as richer from the standpoint of information content and diversity of species than the community in which only one or a few species are represented by a large number of individuals while the others are represented by small numbers.

Ecological diversity varies from region to region on earth depending in particular on differences of latitude. As one travels from the poles to the equator, diversity of species increases significantly. One of the most important and interesting questions of ecology and evolutionary biology today is how these regional differences in ecological diversity came about. Another interesting question is the causal relationship between the ecological balance and the diversity of species, for which nature conservationists have succeeded in arousing public awareness. The answers to these questions are of enormous importance from the point of view of preserving ecological diversity and the ecological balance. In theoretical ecology, despite the extremely fascinating and significant developments in recent years especially in research concerning mathematical models of ecosystems, these questions cannot yet be said to have been answered fully.

Even by the most optimistic estimates, it is reported that almost one-fifth of the living species on the earth face the danger of extinction within the next 20-30 years. Under the circumstances, even if the number of living species on the earth is regarded as five million minimum, at least one million species, which have come into being as the result of millions of years of evolution, face the threat of extinction within a very short time.

The massive disappearance of living species has been witnessed many times in the biological history of the earth. According to scientific estimates, the species living on the earth today constitute less than even 1% of the species that have existed since the beginning of life. On this basis, a living species has a more than 99% chance of facing extinction as part of the evolutionary dynamics, but can it be said that concern about the declining number of living species is unfounded? The massacre of species caused by modern man is 400 times greater than the losses of species observed in recent geological eras, and a loss of diversity of species of such dimension has perhaps not been seen for at least the last 65 million years. It is expected that a decrease of this magnitude and rapidity in the diversity of species on the earth will also have negative effects on the future of mankind.

Although the mass loss of species was encountered frequently in past paleontological periods, such losses were spread over a much longer time- perhaps a few million yearsöthan now. The destruction of diversity of species over a long span of time may allow ecosystems to adapt themselves to such losses and new species to evolve to take the place of those lost. But losses of species en masse that take place over a period of 20-30 years, which is very short from the standpoint of evolution, may cause the complete collapse of ecosystems. Another interesting and distressing aspect of matter is that, although losses of species have reached such large dimensions, mankind still has absolutely no knowledge about a large fraction of the species that are disappearing. This is tantamount to tossing a major part of a vast store of knowledge or an enormous library into the street without even cataloguing it.

The communities of species in nature have not come together haphazardly. The species in every community have formed a complex network

of relations by evolving together over millions of years. For this reason, which may appear insignificant and of whose existence no one is even aware, the ecosystem may suddenly be brought to the point of collapse. Nevertheless, since ecological science is not yet sufficiently developed to make precise estimates concerning when, how and under what conditions an ecosystem may collapse, and no phenomenon of comparable proportions has been previously experienced in the history of mankind, this keeps the public from taking seriously predictions and warnings on the subject of decreasing biological diversity.

Biological diversity is also decreasing in Turkey. Turkey has a unique position among temperate countries in terms of its biological diversity. Anatolia is the genetic center, or diversity center for a large number of plants. The number of local varieties of apple, pear, walnut, and fig found in Turkey is 172, 253, 91 and 286 respectively. The number of plant species is also very rich. There are approximately 9,000 plant species in Anatolia, 3,000 of which are endemic.

As for animals diversity estimates are rather rough when we deal with invertebrates. It is estimated that, number of insects living in Turkey is between 60.000-80.000. 192 Species of fish belonging to 26 families live in the inland waters of Turkey. Whereas 276 species of fish are known to live in the seas of Turkey. Amphibians are represented only with 18 species. Reptiles on the other hand have 93 species, 36 of them are snake species. Birds enjoy rather high diversity. There are 415 species, 387 of which are breeding, wintering or regular migrant, 26 species are vagrant.

Turkey is among few temperate countries with the highest diversity in its fauna and flora. Because of its special position between Asia and Europe, and Africa, her fauna and flora comprises elements from these continents. There are 120 species of mammals living in Turkey. Lynx, wolves, brown bears, otters, red deer, chamois, wild boar, squirrel, wild sheep represent European elements. Asian and African elements are represented by hyenas, porcupines, gerbils, antelopes, caracals, leopards.

As one can see biological diversity is very high in Turkey. Yet it is under serious threat. Habitats of various mammals and bird species is seriously reduced. Leopard is becoming extinct and few individuals of this species is struggling to survive. Bald ibis *Geronticus eremita* is also in the process of extinction. A darter species *Anhinga rufa* already became extinct.

What can be done to protect bio-diversity in Turkey or in the world? Biological diversity increases steadily as one goes from the poles to the equator. For this reason, living natural resources, which are so vital for the future of man, are largely concentrated in the developing countries. In all of these countries, however, which are engaged in a struggle to develop as rapidly as possible so as to bring their fast-growing populations up to the desired level of prosperity, the concern to protect biological diversity, a subject of interest to the future of all mankind, is relegated to secondary importance. In Turkey, which is also engaged in a struggle for rapid development, biological diversity cannot be said to be receiving enough importance.

The first condition to protect the biological diversity is that developed nations will help developing nations in their development. Developing nations must reach a level of prosperity so that they can focus their attention to the biological diversity.

The attitude of people towards their environment must change. In order to change the attitudes of students towards environment, biology should be taught to students in engineering, and art and science, and administration for at least one semester. Students should gain an appreciation of life and understand that they are part of nature. Human beings are subject to laws of nature just as the fish, birds and plants and should understand that their population cannot grow to infinity. Population of humans must be in balance with its resources just as animal population, or plant population has to be in balance with its resources.

Biology has dimensions beyond chemistry and physics. When synthetic insecticides were first introduced after the World War II, the success of these synthetic poisons in controlling pest populations was considered as the victory of chemistry over the insect pests. As a matter of fact Paul Muller received the Nobel Prize in 1948 for his discovery of the properties of DDT as a pesticide. But the victory was soon overshadowed by the evolution of the resistance problem. The belief that synthetic pesticides were the final solution to pest problems had overlooked a fundamental law of biology, namely natural selection. Evolution of insecticide resistance is the result of natural selection favoring the resistance genes in environments where insecticides are applied. Persistent applications of an insecticide, initially killing the major portion of a population results in continuously increasing percentages of surviving insects in the successive generations as the frequency of resistance (R) genes spreads in the population, which in turn, necessitates application of larger doses of the chemical to achieve an effective control. Thus, synthetic insecticides poison the environment and cause the extinction of many species of mammals, birds and insects.

In the face of growing human populations all the living resources may eventually face the fate of the "Tragedy of Commons". In order to prevent the "Tragedy of the Commons", cooperation among people should develop over the management of resources, the evolution of which, however, takes too long to be effective.

Turkey's fauna and flora is the heritage of all humankind, and therefore concerns not only Turkey, but all of humanity. International cooperation is necessary to protect this rich bio-diversity.

We are living in a world where military spending amounts to US\$ 900 billion per year for the security of nations. In order to find solutions to

environmental problems we should learn to live in peace and direct our resources to save the environment. The International University for the Bio-Environment(I.U.B.E.) may help accelerate the development of cooperation among nations.

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