

CHAPTER 1

Our Environment

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INTRODUCTION

The earth and its moon are part of the solar system. The earth is one of the planets moving around the sun, which is a central star. This constitutes the solar system. The solar system is an orderly, harmonious system of matter. However, it is also part of countless star systems with their satellite planets which compose our galaxy. It is estimated that there are one hundred thousand million (10^{11}) galaxies within the maximum radius of the observable universe! In this context therefore, the earth is an insignificant speck!

Within our solar system however, the earth is not insignificant, it occupies a position which enabled the appropriate conditions for life to exist. The existence of life on earth in turn transformed the surface of the planet. The behaviour of the earth in relation to the sun imposes rhythmical changes in exposure to light and dark, day and night, summer and winter. Other characteristics of the earth, such as its rotation on its axis, create the characteristic atmospheric and oceanic circulations. Furthermore, the earth receives a constant and major output of energy from the sun. It is this energy that is the source of life for most organisms.

OUR PLACE IN NATURE

Life consists of a thin film over the surface of the earth. This film is the biosphere. Other major elements of the earth's surface are the lithosphere, hydrosphere and atmosphere. The global veneer of life is significant in that despite its relatively small mass it has profound impacts on the nature of the lithosphere, hydrosphere and atmosphere (Fig. 1).

In terms of age, the human race is a very recent arrival on earth, having been preceded by most other organisms. Arthropods, for example have existed for more than 400 million years and have survived several major mass extinctions. The oldest known organism, from the fossil record, is a bacterial organism about 3 billion years old. The oldest hominid is less than 4. million years old, whereas the human race is only 0.1 million years old!

---- *Introducing our Environment* ----

Today's biodiversity is the manifestation of a long evolutionary process through which many species have become extinct and new species have arisen. The structure of biodiversity has changed through time as species have continually evolved. During this evolutionary process, species have built a variety of inter-relationships and relationships with their surroundings that have enabled them to survive. These relationships have evolved into balanced but dynamic equilibria which enable ecosystems to function. In terms of numbers, the human species is negligible. There are other species that numerically dominate the earth. For example, of the described species, arthropods constitute 85 per cent of the total global fauna and 65 per cent of the total known biodiversity (based on 1.7 million species). When diversity is calculated on the basis of the estimated global total (12.5 million species) arthropods alone make up 91 per cent of all the living animals and 79 per cent of the global biodiversity (Groombridge, 1992) (Figures 2 and 3). Mammals and the human species in particular constitute only a small proportion of the vertebrate fauna.

Despite that, humans have been able to evolve the intelligence and numerical abundance that has enabled them to dominate the earth. The only problem is that no single species possesses all the necessary ecological attributes to sustain ecosystem dynamics. All species individually have definite roles to play and it is the multiplicity of these roles that sustain the system. Humans are a species and part of nature. We humans draw our own human spirit from nature (biodiversity and its natural settings), as Wilson (1984) ably described this point in his book "Biophilia". The natural settings for biodiversity are made up by the atmosphere, hydrosphere and lithosphere (Fig. 4). It is from here that the resources that enable the existence of life are drawn.

The atmosphere has a specific composition. It is 78.09 per cent nitrogen, 20.95 per cent oxygen, 0.93 per cent argon and 0.03 per cent carbon dioxide by volume. Other gases constitute less than 0.003 per cent by volume. Through natural or human-induced activities, minor constituents of the atmosphere may also include dust, pollen, bacteria, spores, smoke particles, sulphur dioxide, hydrogen sulphide, hydrocarbons, and larger amounts of CO₂ and ozone depending on weather, volcanic activity, local industrial activity, and concentration of human, animal and motor-vehicle population. This does not include water vapour which is an important constituent in all normal atmospheres.

The hydrosphere has water as the major constituent. It is difficult to estimate the amount of water in the hydrosphere but Table 1 gives the estimated quantity of water in the world. The water varies in composition depending on where it is found but wherever it occurs, its natural composition varies within set limits beyond which it would be considered to be polluted.

---- *Gender and Biodiversity Conservation in Africa* ----

The lithosphere is merely the rigid crustal plates of the earth from which the earth's terrestrial surface, soil, is made. Soil has both biotic and abiotic components which are essential for sustaining plant growth. The productivity of a soil will depend on its composition. This composition is susceptible to alteration by human activities.

The survival of any living organism necessitates the use of certain materials both living and non-living for sustenance. These are called resources. As far as human beings are concerned, resources may be renewable or non-renewable. The former can be used almost indefinitely because they have the capacity to regenerate. The latter are in finite quantities and are liable to be exhausted. Our environment supplies these resources and we have the choice to use them rationally or irrationally. The rational and equitable use of the earth's resources is the key to the long-term survival of the human species.

PROPOSED FURTHER READING

Miller G. T., 1992. Chapter 1: *Population, Resources, Environmental Degradation, and Pollution in "Living in the Environment"*

Ferguson-Bisson D., 1992. *Rational Land Management in the Face of Demographic Pressure: Obstacles and Opportunities for Rural Men and Women* (Ambio Vol. 21(1))

Stahl M. 1993. *Land Degradation in East Africa* (Ambio Vol. 22(8))