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Ecology and Environment

In contemporary times, growing industrialization with explosive population growth in several countries has highlighted the problem of protecting the natural environs such as plants, animals, water resources, soils, and metals on a world scale. The interaction between natural environments and the human population is considered an important issue, and is described as the problem of ecology and environment.

Ecology

Ecology as a term was coined in 1869, and is a relatively new science. Till recent times it was treated as a branch of biology but is now considered an independent subject. However, it is closely connected with biology. This subject deals with interaction between various living organisms such as plants, animals, and human beings. With the emergence of humans, the need for food, shelter, and transport came to the forefront. In ancient times, humans lived on wild produce and hunting birds and animals. However, in the industrial age, the relation of humans with plants and animals has undergone a fundamental change, and now many living organisms are preserved through human efforts.

Environment and Human Advance

Environment means surroundings, both natural and man-made. Natural elements comprise soil, air, and water on which animals, plants, and people live. A man-made environment signifies food, shelter, and transport facilities such as roads,

bridges, dams, and various types of structures used as dwellings. This environment also includes rural, urban, socio-economic, cultural, and political conditions.

The environment has a direct bearing on human efforts. But it would be wrong to think of environmental determinism, for human efforts substantially affect the natural surroundings. Thus, deforestation followed by the production of cereals led to large settlements. On the other hand, changes in climate and river courses led to the desertion of some settlements and migration of populations. Though there have been no major climatic changes since 9000 BC on a world scale, there have been some important regional variations. Thus, many scholars of ancient climate hold that extreme aridity and freezing temperature prevailed in Central Asia in the third and the second millennia BC. Towards the turn of the second millennium BC it was bitterly cold. This compelled many people of south Central Asia to move towards the Indian subcontinent in search of a less cold area. This migration is attributed to the speakers of the Indo-Aryan language and the Rig Vedic people.

We cannot think of human advance in ancient times without the exploitation of natural resources. The earliest settlements in India were generally founded near lakes or rivers in hilly, plateau, or wooded areas where people could make stone and bone tools to earn a livelihood. These tools were used for hunting birds and animals, tilling the soil to grow plants and cereals, and also to prepare the sites for setting up dwellings.

Surroundings and Settlements

It was almost impossible to found large agricultural settlements in the Gangetic plains without deforestation and cultivation of the hard alluvial soil. This could be effectively done only with the use of the iron axe and iron ploughshare from about 500 BC. For this, iron mines had to be discovered and the technology for the extraction and the manufacture of iron artefacts had to be developed in various parts of the country. The hard alluvial soil of the mid-Gangetic plains, the red soil of the Vindhyan zone, and the black cotton soil of the Deccan and western India needed iron shares for effective ploughing. Today, safeguarding the natural environment is emphasized. However, despite deforestation, the doab forests continued until the sixteenth to seventeenth centuries when wild animals were hunted in this area. This ecological change was completed only in modern times. In any case, human society progressed at the cost of plants and animals.

Once human beings started growing plants and rearing animals, they multiplied both of them.

The location and size of settlements were conditioned by environmental factors, with soil and climatic conditions which determine the selection of sites. Favourable rainy zones with river, lakes, forests, hills, minerals, and fertile soils attracted many settlers. On the other hand, arid, desert areas without water resources discouraged people from settling there. The Gangetic plains formed an attractive environmental zone. Numerous settlements were established there in the post-500 BC period and quite a number in the earlier period. Many towns were established in the doab and the mid-Gangetic plains. Rivers served as transport routes like the roads and railways of today. When they flooded, they washed away forested banks and prevented the forests from re-growing there. Moreover they irrigated the land thus made available to farmers.

Changes in river courses affected the fortunes of settlements around 2500 BC. The Sarasvati, coterminous with the Ghagar–Hakara, was joined by the Yamuna and the Sutlej, and the three together contributed to the growth of the Harappan culture. However, in 1700 BC, the Sutlej, and possibly the Yamuna, moved eastward, adversely affecting post-urban Harappan settlements.

The river junctions served as sites for the early settlements. The junctions effectively cleared forests and helped human habitation. This can be said of Pataliputra, the first great city of India. This place lay on the junction of the Ganges and the Son. Not far from the town, the Gandak and the Ghagara too joined the Ganges on the north and the Punpun joined it on the south. The presence of the rivers on three sides made Pataliputra virtually a water port and helped it to become the first great state capital. Though Pataliputra was located at the junction of the Ganges and Son, later the Son shifted westward. In prehistoric times, Chirand became important because it was located on the junction of the Ganges and the Ghaghara, and sites around it seem to have been forested. This is indicated by the excavation of Neolithic tools in Chirand. Many of them are made of antler bones which suggest that deer were hunted in the nearby forest.

Although rivers were preferred sites for settlement, people also settled near lakes and tanks. We find such sites in eastern UP and northern Bihar in the second millennium BC. The practice of settling near water reservoirs continues to this day.

The Rain and Human Effort

We may recall the relevance of rainfall indicated in [Chapter 4](#), and examine the relation between rains and human efforts. Though the Harappan culture is found in an arid, semi-desert zone, this is attributed to good rainfall. Scientists speak of adequate rainfall in the Harappan area in the third millennium BC. Once the rainfall reverted to its usual level, this adversely affected the Harappan settlements. Plant and animal remains from Inamgaon in Maharashtra suggest the onset of an extremely arid phase around 1000 BC that forced the farmers to desert their homes and take to pastoral nomadism.

Rainfall certainly helped human society in pursuing agriculture and founding settlements, but heavy rains during the tropical monsoon deterred people from regular work. Gautama Buddha used to suspend his mission of teaching Buddhism annually for four months during the rainy season and stay at such places as Rajagriha, Vaishali, and Shravasti for *varsha-vasa*. He is said to have spent twenty-six rainy seasons in Shravasti. This idea still influences some people, and no marriages are performed in the rainy season, but today, unless the institutions are closed or their workers granted leave, people have to continue work despite heavy showers.

Some other natural hazards are far more catastrophic than heavy rainfall. They include floods, hurricanes, and earthquakes. We hear of a famine leading to the migration of some Jainas, in pre-Mauryan times from Magadh to south India. However, the researchers have yet to discover the sources that mention the natural hazards causing famines and other calamities.

Ancient Attitudes Towards the Environment

In ancient India, rivers came to be regarded as divine. The *Rig Veda* depicts the Sarasvati as a goddess. However, in post-Vedic times, the Ganga emerges as the mother goddess, and the tradition persists to this day. As both earth and water sustained plants and animals, they came to be considered mothers, though there is nothing to show that plans were devised to protect either of them.

Many trees and plants, including *neem*, *pipal*, *vat*, *shami*, and *tulsi* are considered sacred. That is also the case with herbs, including grass. All these are valued because of their medicinal properties, and therefore they are preserved and worshipped. The desire to protect large and small trees is expressed in various ancient texts, and it continues to this day. At the conclusion of large sacrifices and even ordinary rituals, priests and the common worshippers wish peace and prosperity (*shanti*) to forest trees and plants in general.

More importantly, many ancient texts condemn the slaughter of animals. Gautama Buddha was the first person to stress the need to protect cows in a Pali canonical text called the *Suttanipata*. He stressed the virtue of rearing cows because in his view cattle help to grow plants and provide people with food, vitality, health and happiness. Hence his injunction that people should not kill cows. In the early Christian centuries, brahmanical texts lent religious colour to the Buddhist teaching, speaking of dire consequences in the next world for those who killed cows. Later, even the elephant came to be worshipped.

A background of ecology and environment may help the study of ancient India, and may be especially useful in the study of our prehistory. However, human society cannot advance by halting man's struggle against nature. In ancient times, this struggle was principally directed against plants and animals. Once these were brought under control, efforts were made to multiply both of them. History deals primarily with interaction between humans in terms of time and place, but it cannot be correctly constructed unless historians bear in mind the ongoing interaction between human efforts, on the one hand, and the functioning of natural forces, on the other.

Chronology

(BC)

3rd–2nd M	Extreme aridity and freezing temperature in Central Asia.
9000 onwards	No major climatic change on a world scale.
500 onwards	Wide use of iron tools in the Gangetic plains and spurt in settlements.
300	Famine and Jain migration from Magadha to south India.

(AD)

16th–17th C	Forests in the doab despite deforestation.
1869	The term 'ecology' coined.