

## Ecological (Biological) Indicators

[Organisms are affected by their environmental factors like climatic topographic, edaphic and biotic.] It is natural to recall that the characteristics of organisms are determined by their genetic constitution (hereditary traits), but heredity is not able to work in the vacuum. Heredity in fact works only with the help of the environment. Thus environment plays important role in organism's life. Accordingly organisms chiefly plants are the measurement (indicator) of the environment.

[Thus, organisms, species or even communities which serve as a measure or index of environment conditions are known as 'biological or ecological' indicators. It is thus evident that every plant is a product of the conditions under which it grows and is, therefore, a measurement of environment.]

Some of the obvious cases where plants and animals serve as indicators of some characteristics of environmental conditions are as given below—

✓(1) **Indicators of potential productivity of Land**—Forests serve as good indicators of land productivity. For example, vegetative growth of trees like sps *Quercus* is comparatively poor on low land or sterile sandy soil than the normal soil in which they grow under natural conditions.

✓(2) **Indicators of agricultural possibilities**—Native vegetation of a particular region is the safe criterion of agricultural possibilities thus, plants growing under natural conditions provide informations on capabilities of land for crop growth than those obtained through meteorological data or soil analysis.

✓(3) **Indicators of climate**—Plant communities characteristics of a particular region provide information on the climate of that area. For example, evergreen forest indicate high rainfall in winter as well as in summer; sclerophyllous vegetation indicates heavy rainfall in winter and low during summer;] grassland indicates heavy

rain during summer and low during winter; Xerophytic vegetation indicates a very low or no rainfall in the year.

✓(4) **Indicators of fire**—Some plants as *Agrostis hemalis*, *Epilobium spicatum*, *Pinus contorta*, *Pteris aquilina* etc. dominate in areas destructed by fires. *Pteridium* sps in particular indicate burnt and highly disturbed coniferous forests.

✓(5) **Indicators of soil type and other soil characteristics**—Luxuriant growth of some taller and deeply rooted grasses like *Psoralea* indicates a sandy loam type of soil, whereas the presence of grasses *Andropogon* indicates sandy soil. *Rumex acetosella* indicates an acid grassland soil; whereas *Spermacoce stricta* the iron rich soil in the area. Plants like *Chrozophora rottleri*, *Heliotropium supinum* and *Polygonum plebejum* grow better in low lying lands. *Shorea robusta*, *Cassia obtusifolia*, *Geranium* sps and *gmpatiens* sps indicate proper aeration of soil. Grasses like *Succharum spontaneum* prefer to grow in poorly drained soils.] Plants as *Artemisia tridentata*, *Kochia vestita*, *Salicornia utahensis* and *Salicornia rubra* indicate Saline soils. *Capparis spinosa* and *Carissa spinarum* indicate intense soil erosion.

(6) **Indicators of petroleum deposites**—Some protozoans as *Fusilinds* indicate petroleum deposites in the area.

✓(7) **Indicators of adequate oxygen in water**—Plants like *Utricularia*, *Chara*, *Wolffia* prefer to grow in polluted water. Bacteria like *Escherichia coli* also indicates water pollution. Presence of diatoms in water indicates its pollution by sewage. Movement of fish like *Catla*, *Labeo gonius*, *Labeo bata*, *L. rohita* and *Natopterus natopterus* away from the water indicates industrial pollution of water.]

(8) **Indicators of overgrazing**— Annual weeds and short lived (ephemeral) perennials like *Amaranthus*, *Chenopodium* and *Polygonum* etc. grow better in over grazed areas. Frequent visits of the areas by animals as Cattle, Horses, Sheep, Goat etc. also indicate that the area is under intense grazing.

From the above discussion, it is clear that biological (ecological) indicators, thus, enhance the usefulness of ecology to mankind.] Their knowledge is useful in protection and reclamation along coasts, water purification, military purposes, nature conservation, biotic control, utilization of waste lands, management of grasslands and in medical sciences.