Introduction to Ecology:

Ecology is the study of how organisms interact with one another and with their physical environment.  The distribution and abundance of organisms on Earth is shaped by both biotic, living-organismrelated, and abiotic, nonliving or physical, factors.  Ecology is studied at many levels, including organism, population, community, ecosystem, and biosphere. Ecology at many scales  Within the discipline of ecology, researchers work at five broad levels, sometimes discretely and sometimes with overlap: organism, population, community, ecosystem, and biosphere.  Organism: Organismal ecologists study adaptations, beneficial features arising by natural selection, that allow organisms to live in specific habitats. These adaptations can be morphological, physiological, or behavioral.  Population: A population is a group of organisms of the same species that live in the same area at the same time. Population ecologists study the size, density, and structure of populations and how they change over time.  Community: A biological community consists of all the populations of different species that live in a given area. Community ecologists focus on interactions between populations and how these interactions shape the community.  Ecosystem: An ecosystem consists of all the organisms in an area, the community, and the abiotic factors that influence that community. Ecosystem ecologists often focus on flow of energy and recycling of nutrients.

 Biosphere: The biosphere is planet Earth, viewed as an ecological system. Ecologists working at the biosphere level may study global patterns—for example, climate or species distribution— interactions among ecosystems, and phenomena that affect the entire globe, such as climate change. The five levels of ecology are listed above from small to large. They build progressively— populations are made up of individuals; communities are made up of populations; ecosystems are made up of a community plus its environment; and so forth. Each level of organization has emergent properties, new properties that are not present in the level's component parts but emerge from from these parts' interactions and relationships. Types of Ecology

Aims of Ecology: The larger objective of ecology is to understand the nature of environmental influences on individual organisms, their populations, and communities, on ecoscapes and ultimately at the level of the biosphere. If ecologists can achieve an understanding of these relationships, they will be well placed to contribute to the development of systems by which humans could sustainably use ecological resources, such as forests, agricultural soil, and hunted animals such as deer and fish. This is an extremely important goal because humans are, after all, completely reliant on ecologically goods and services as their only source of sustenance. Ecology can be studied at several levels, from proteins and nucleic acids (in biochemistry and molecular biology), cells (in cellular biology), organisms (in botany, zoology, and other similar disciplines), and finally at the level of populations, communities, and ecosystems — which are the subjects of ecology. Because of its focus on the broadest level of life and on the interrelations between living beings and their environment, ecology draws heavily on other branches of science,

such as geology and geography, meteorology, pedology, chemistry, and physics. The behavioral relationship between individuals of a species — e.g. The study of the queen bee, and how it relates to the worker bees and the drones. The organized activity of a species e.g. the activity of the bee assures the pollination of flowering plants. A bee hive additionally produces honey which is consumed by other species, such as bears & The consequences of the environmental change on the bee activity. Bees may die out due to environmental changes (see pollinat or decline). The environment at the same time both affects and is a consequence of this activity and is thus intertwined with the survival of the species. APPLICATIONS OF ECOLOGY 1. Agriculture Ecology has great applications in agriculture. Agriculture provides us food and fibers. Agriculture depends on ecological principles. These principles are limiting factors, irrigation requirement, pest control and productivity. Ecology helps to conserve the land. It helps to reclaim the. alkaline and water logging soil.. 2. Forestry The study of forest is called forestry. The developing countries like Pakistan are facing problem of population explosion. This rapid increase in population growth increase requirements for food and shelter. Therefore man is cutting trees for agriculture and for wood used in houses. If the forests are continuously cut down at that rate, there will be no leaf canopy left. This leaf canopy protects the soil from driving rain.. Consequently, some of the soil will run away with water and reach into the stream and river. This soil will he wasted. Thus the fertility of the soil will be reduced. There are three aspects of forestry: (a) Deforestations: Clearance of vast areas of forest for lumber, planting subsistence crops or grazing cattle is called as deforestation. (b) Reforestation: The replantation of trees in a forest is called reforestation. It is necessary that deforestation should be replaced with reforestation. Reforestation is especially important for many of the conifers species. (c) Aforestation: The establishment of new forests where no forests existed previously is called aforestation. Ecology helps in reforestation and aforestation. Ecologists are devising ways to stop deforestation. desertification and over grazing. 3. Wild life management All non-cultivated plants and non-domesticated animals are included in wild life. Wild life plays very important role in food chain. The food chain is disturbed without wild life. So. it becomes very difficult to maintain the balance in ecosystem w idiom wild life. Man is trying to change the environment. The effects of these changes in environment are becoming more and more apparent with the passage of time. The imbalance in wild life can jeopardize the existence of man. All living organisms are interdependent, A balance is present between living organisms and environment. Man is disturbing this balance since very long. A species that is near to extinction is called endangered species. Today there are thousands of endangered plants and animals. Wild life is a non-renewable resource. Ecologists are trying to save the endangered species. 4. Fishery and Aquaculture The breeding and rearing of fishes is called fishery. The culturing of aquatic animals is called aquaculture. There is almost over fishing in rivers, lakes and seas. Therefore. population of fishes is decreasing in these water bodies. Ecological principles help to maintain population of fishes in rivers, ponds and lakes. The feeding habits, breeding physiology and habitat of fishes are studies. The fishes are cultured in ponds. They are given suitable nutrition and other ecological factors necessary for their growth. Oxygen is limiting factor in ponds. Therefore, oxygen is supplied artificially. Fishes are hatched in special hatcheries. These steps have increased the population of fishes. 5