



# UGC-NET

Environmental Science

NATIONAL TESTING AGENCY (NTA)

PAPER – 2 || VOLUME – 1

**FUNDAMENTAL OF ENVIRONMENTAL  
SCIENCE**



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## DEFINITION , PRINCIPLE AND SCOPE OF SCIENCE OF ENVIRONMENTAL SCIENCE

- The word Environment is derived from the french word "Environner" which means to encircle around or surround.
- The biologist ~~Trab~~ Jacob van Uerkal (1864-1944) introduced the term environment in ecology.
- As given by environment protection Act 1986, Environment is the sum total of land, water, air, interrelationships among themselves and also with the human beings and other living organisms.
- Environmental science is the interdisciplinary field and requires the study of the interactions among the physical, chemical & biological components of the environment with a focus on environmental pollution and degradation.
- Environmental science deals with the study of processes in soil, water, air and organisms which lead to pollution or environmental damages and the scientific basis for the establishment of a standard which can be considered acceptable clean, safe and healthy for human beings and natural ecosystems.

## ① Environment =

→ The term environment refers to the surrounding of an organism which includes both living & non-living components.

→ Environment is the aggregate of all those things and set of conditions which directly or indirectly influence not only life of organisms but also the communities at a particular place.

↳ Some imp. definitions of environment have been given below :-

①a) According to Anastasi :-

The environment is everything that affects the individual except his genes.

①b) Acc to Boring :-

A person's environment consists of the sum total of the stimulation which he receives from his conception until his death.

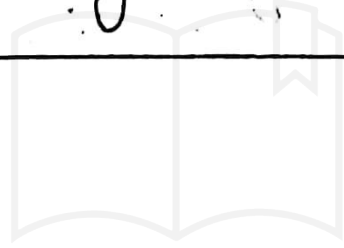
①c) Acc to Holland :- (Also acc to Douglas).

The term environment is used to describe, in

the aggregate of the external forces, influences and conditions, which affect the life, nature behaviour, growth, development and maturity of living organism

(d) Alc Jo Downs :-

Public interest in environment changes through time and the whole sequence of change is completed in 5 stages termed as Issue Attention Cycle.



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## CHRONOLOGY OF THE DEVELOPMENT OF ENVIRONMENTAL SCIENCE

- As early as 4th Century BC the Greek Philosophers like Hippocrates, Aristotle, Theophrastus, attempted to describe the relationship between living and environment. Aristotle in his book *Historia Animalium* pointed out on such a relationship.
- Graunt in 1662 described human population in quantitative terms. He established the importance of measuring in a quantitative way the birth rate, death rate, sex ratio & Age Structure of human population.
- ⇒ Buffon in 1756 described in his book *Natural History* that population of man & other animals & plants are subjected to the same process.
- ⇒ Malthus in 1798 mentioned that the no. of organisms increased geometrically and ~~foods~~ food supply increased arithmetically.

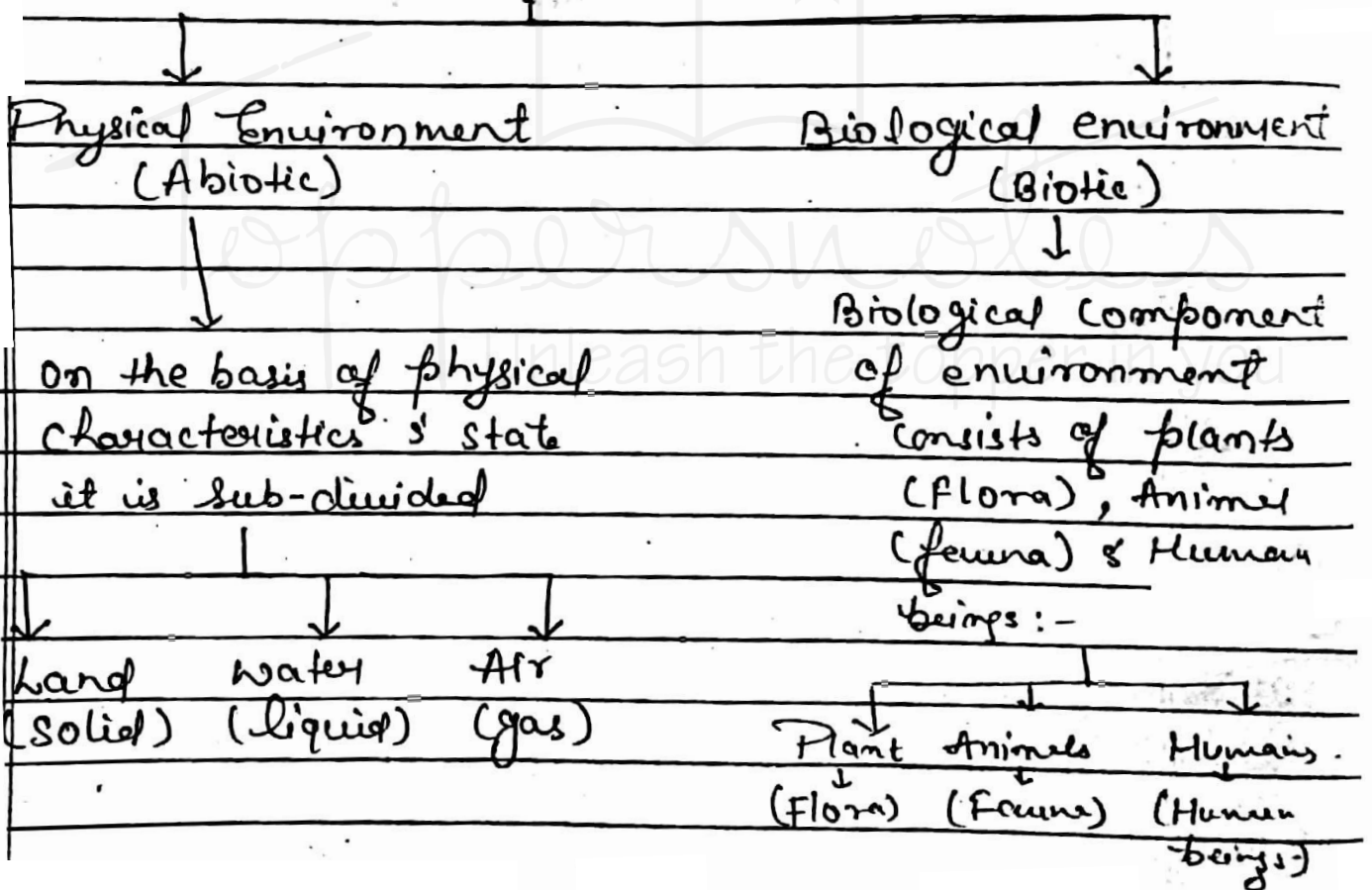
- 1) Quetelet in 1835 suggested that potential ability of a population to grow geometrically was balanced by a resistance to population growth.
- ⇒ Faour in 1843, discovered that there was a relation b/w the density of the population and the death rate.
- ⇒ Geoffroy Saint Hilaire, in 1859 for the first time used the term Ethology to refer to the study of relationships between organisms and environment.
- ⇒ Reiter in 1868 introduced the term Oekologie to define the relationship b/w living and Environment.
- ⇒ Ernest Haeckel in 1869 first of all defined ecology as the total relation of the animal to both its organic and inorganic environments.
- ⇒ A.G. Tansley, in 1935 introduced the term ecosystem.
- ⇒ Odum in 1969, defined ecology as the study of the structure and function of nature.

## CLASSIFICATION OF ENVIRONMENT

→ (Composed of Physical & Biological Components)

Includes both Biotic (living) & Abiotic (non-living) components

Environment



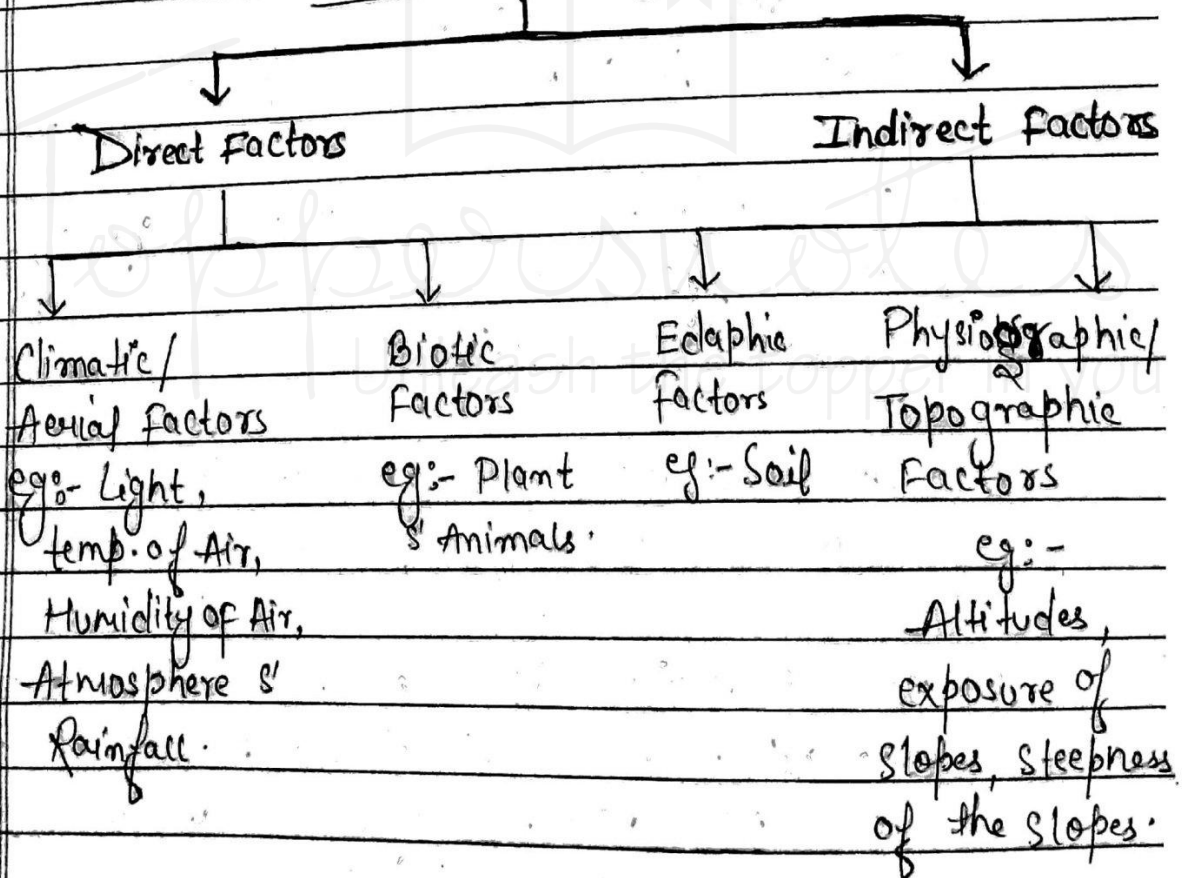


## ENVIRONMENTAL FACTORS

→ Any external force or influence which surrounds and affects the life of a plant or any organism in any way becomes a factor of its environment. These factors are called Environmental Factors.

→ It may be Biotic or Abiotic.

### Environmental factors :-





## Characteristics of Environment :-

(i) It consists of physical, social, moral, economic & political forces which affect the life nature, behaviour of an organism.

(ii) It is the sum-total of conditions which surround an organism at a given point in space and time.

(iii) Sum total of stimulation from an organism's birth to until his death.

(iv) It includes all the external forces, which affect the growth and development of living organism.

(v) Increase economic productivity through improved health of people.

(vi) It generates attitudes and values towards understanding the interdependence of nature man and work for sustainable development.

## ENVIRONMENTAL PRINCIPLE

→ They offer protection to our natural world and also act as guidance for judges and decision-makers, giving meaning & shape to laws.

→ They are used in government & public Authority decisions, including Planning Applications, Management of marine protected areas and dealing with contaminated land.

### ① The Precautionary principle :-

When there is an uncertainty about the risk of environment harm, the precautionary principle allows protective measure to be taken without having to wait until the harm materialises.

This principle is valuable in managing risk where there is an uncertainty about the environmental impact of an issue.

### ② The prevention principle :-

This principle includes preventive measures that should be taken to anticipate and

Avoid environment damage before it occurs. It is central to the government planning policy and underlies lots of environmental legislation.

③ Environmental Damage should be Rectified at source :-

Working alongside the prevention principle this principle ensures that damage or pollution is dealt with at the source of pollution.

It operates in many areas of environmental policy to prioritise the way environmental damage is addressed.

④ The polluter pay principle :-

This principle holds that the person who cause pollution should bear the cost of the damage caused. It plays a significant role in environmental management acting as a deterrent and ensuring accountability for harm.



⑤ The integration principle:-

This principle requires that environmental protection is integrated into all other policy areas, in line with promoting sustainable development. That is to say that all government departments have responsibilities to protect our environment.



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## SCOPE OF ENVIRONMENT

The environment consists of 4-segments.

### (1) Atmosphere :-

The atmosphere implies the protective blanket of gases, surrounding the earth.

(a) It sustains life on the earth.

(b) It saves it from the hostile environment of outer space.

(c) It absorbs most of the cosmic rays from outer space and a major portion of the electromagnetic radiation from the sun.

(d) It transmits only here ultraviolet, visible, near infrared radiation (300 to 2500 nm) and radio waves (0.14 to 40 m) while filtering out tissue-damaging ultra-violet waves below about 300 nm.

The atmosphere is composed of Nitrogen and Oxygen. Besides Argon, Carbon dioxide and trace gases.

## HYDROSPHERE

- ⇒ The Hydrosphere comprises all type of water resources oceans, seas, lakes, rivers, streams, Reservoirs, polar icecaps, glaciers and ground water.
- ⇒ Oceans represent 97% of the earth's water's about 2% of the water resources is locked in the polar icecaps and glaciers.
- ⇒ Only about 1% is available as fresh water as surface water in rivers, lakes, streams, and as ground water for human use.

## LITHOSPHERE & BIOSPHERE

⇒ Lithosphere is the outer mantle of the solid earth. It consists of minerals occurring in the earth's crusts and the soil  
e.g. Minerals, organic matter, Air and water

### Biosphere

⇒ Biosphere indicates the realm of living organisms and their interactions with environment viz atmosphere, hydrosphere and lithosphere



## Scope of Environmental

### Science :

\* Environmental science has a vast scope since it covers a wide range of subjects, matters or issues related to our complex life supporting system. Scope of the subject can be described in terms of major area of applicability as well as career opportunities related to the subject.

\* Three major areas of applicability of the subject are

(i) Management of Natural Resources

(ii) Conservation of ecosystem and Biodiversity

(iii) Prevention and control of pollution.

In Addition, environmental science plays a key role in solving complex environmental issues of varying scale including climate change, ozone layer depletion, energy crisis, Desertification, urbanization, population explosion, and so on.