

Environmental Components

Girdhari Lal Meena
Lecturer in Chemistry
Govt. PG College Rajgarh (Alwar)

Generally, the term '**Environment**' means surroundings, influences, conditions and circumstances in which living bodies such as human beings, animals, microorganisms and plants lives effortlessly on the Earth. Life is only survived on the Earth because of the environment which support or protect the living organisms and supplies all the necessary materials, i.e., food, air, and water that needed by living organisms to lives or survives effortlessly on planet (Soskolneet *al.*, 2008; Freedman, 2018; Marchetti and Moyle, 2010).

The term '**Environment**' is originated from French word '*environ*' which means '*surrounding*' (Narayanan, 2017; Singh, 2006; Jafarinejad, 2016; Kumari et al., 2016; Environment and Environs definitions). The surrounding comprises two elements, i.e., biotic and abiotic. The biotic elements include living bodies such as human beings, animals, microorganisms, plants, etc., and abiotic elements include non-living components such as water, soil, air (Atmospheric gases and wind), temperature (Heat flow), light (Sunlight) etc. (Singh, 2006; Klanderud et al., 2015; Lewis et al., 2017). Thus, the environment comprises everything around us whether it is living or non-living elements. In modern Sanskrit, the word '*Paryavaran*' is used for the term 'environment' which made from conjunction of two different words, i.e., '*Pari*' means a '*round circle*' and '*Avaran*' means a '*cover*'. Therefore, the word '*Paryavaran*' or '*environment*' means '*cover everything around us*' (Wikipedia Report: Prayavaran). It can also be well-identified as the combination of physicochemical and biological circumstances, which covers or environs everything and act upon an organism or an ecological system.^[12] The living or non-living elements have a specific circumstance with which they frequently interacted and affect the activity of natural organisms. Thus, "*Environment is the sum total of all conditions and influences that affect the development and life of all organisms on earth*" (Das, 1998; Singh, 2006). The **Hutchinson Dictionary of Ideas** stated that "*Environment in ecology, the sum of conditions affecting a particular organism, including physical surrounding, climate, and influences of other living organism. In common usage, 'the environment' often means the total global environment, without reference to any particular organism*" (Hutchinson Dictionary of Ideas). Apart from the above descriptions, the term environment has also been broadly introduced by numerous authors and researchers (Singh, 2006; Budd and Young, 1999; Prasad et al., 2015).

Fundamentally, earth's environment categorized into four major and naturally interlinked components, i.e., (a) lithosphere, (b) hydrosphere, (c) atmosphere and (d) biosphere (Singh, 2006; Prasad et al., 2015; Singh and Chandel, 2006). These components are repetitively changeable and interlinked to each other (**Fig. 1**). The environment and its major components are largely affected by human being activities (Abdallah, 2017; Human Impacts on the Environment). The features of these major environmental components are specified below:

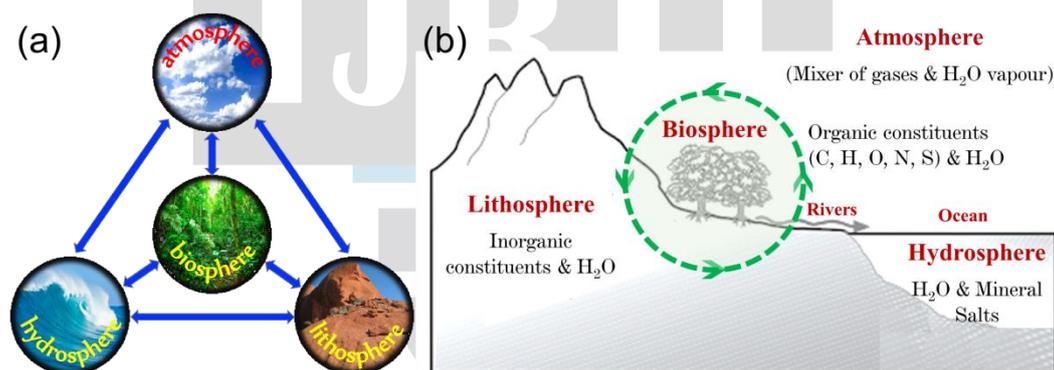


Figure 1: (a) Major environmental components and their interactions, and (b) Photographic demonstration of environmental components with their interactions and distribution of elements.

A. Lithosphere: The lithosphere is an extremely significant and important component of the environment. It is made up of outer mantle of the solid rocks that cover up uppermost part of the earth's crust. The term 'Lithosphere' originated from two ancient Greek words, i.e., '*Lithos*' means rocky and '*Sphaira*' means sphere (Abdallah, 2017).

Lithosphere is rigid and inorganic upper layer of earth's crust, and consists of rocks, soils, mountains, continents and ocean. Soil is less dense and relatively loose material which prepared from rocks through the weathering processes such as rainfall, temperature change and humidity. Soil, the most important portion of lithosphere, mainly composed of inorganic mineral

matters, soil organic matters (Humus), soil water, soil atmosphere (air), biological systems (Plants, human, animals, microorganisms), micronutrients, macronutrients, etc.

The frontier part of lithosphere prepared a multifaceted interface with the other components of environment, i.e., the biosphere, atmosphere, and hydrosphere (**Fig. 1**). They all are principally interconvertible and interacted to each other. The interaction between the lithosphere, atmosphere and biosphere generally takes place at continental region where land-air interface exists and involves the precipitation, atmospheric gases and solar energy transformation. These interfaces are frequently controlled and customized by biospheres.

B. Hydrosphere: The hydrosphere is another significant component of environment where water bodies present in the form of liquid, solid or gas. It is composed of all water bodies and found in its three phases such as liquid water, ice and water vapour on and around the earth's surface. It consists of all kinds of water reserves on the earth, i.e., oceans, rivers, lakes, ponds, streams, reservoirs, groundwater, ice-caps, glaciers, etc.

Nearly ~96.53% of the earth's water stored in oceans which covers ~71% of the earth's surface (Skinner and Porter, 1987; Barbara, 2005; Gleick, 1993 & 2011). Ocean water is saline and account as non-drinkable water for human beings and animals. Remaining ~3.477% of the total volume of earth's water stored in various resources such as rivers, lakes, reservoirs, streams, ponds, groundwater reserves, ice-caps, glaciers, etc., which is fresh and fit for human and animal drinking.

The scattering of water on and around the globe is virtually fixed and circulated all around the earth environment from one component to other component due to *hydrological cycle* (**Fig. 2**) (Narsimhan, 2009; Wikipedia Report: Water Distribution on Earth). The water of the earth's ecosystem circulates between the ocean, atmosphere and land by the environmental and ecological activities, i.e., evaporation, transpiration, condensation, precipitation, percolation, run-off, ground water mobility, etc. Therefore, the hydrosphere prepared a complicated interface with the atmosphere, lithosphere and biosphere (**Fig. 1**). These interactions and interfaces are repeatedly organized by environment.

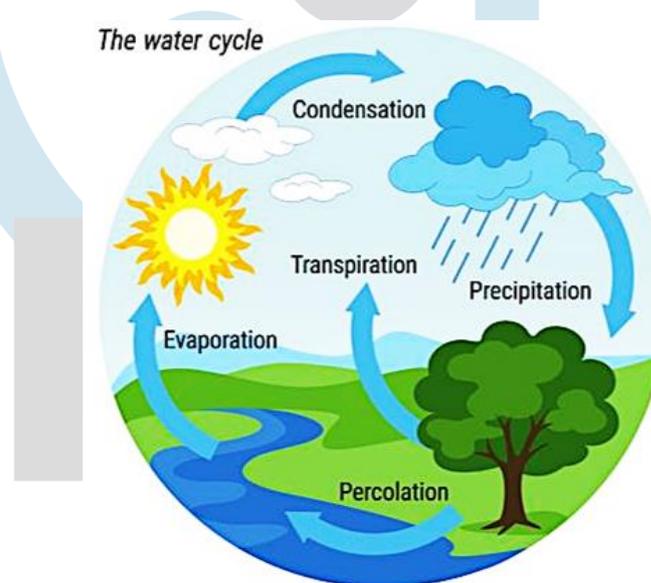


Figure 2: Schematic diagram of Hydrological cycle of water that sustain the life on Earth (Hydrological Cycle).

C. Atmosphere: The earth's atmosphere is a multifaceted and multilayered system of gases and suspended particles that forms a shelter around the earth up to a height of several kilometers. The atmospheric shelter vertically divided into five zones, i.e., troposphere, stratosphere, mesosphere, thermosphere (Ionosphere) and exosphere. It consists of number of natural gases such as nitrogen, oxygen, argon, carbon dioxide, hydrogen, helium, other noble gases, water vapour, ozone etc.

The percentages of major atmospheric constituents are 78.08% N₂, 20.95% O₂, 0.93% Ar, and 0.035% CO₂. The atmospheric water vapour content ranges from more than 5% (Above tropic region) to 0.001% (Above polar region). Atmosphere is the most important components of environment that sustain the life on Earth. Its constituents, i.e., oxygen and carbon dioxide, affect the activity of all forms of life on the earth through respiration and photosynthesis.

D. Biosphere: The biosphere is the fourth most precious component of earth's environment and biological ecosystem where natural living beings, i.e., human, animals, plants, microbes, etc., live effortlessly. The environmental system completes the

essential requirement of all living beings, i.e., water, food, air, energy, minerals, macro and micronutrients etc., to survive naturally on earth. Biosphere is composed of all-natural living beings such as human, animals, plants, flora, fauna, microorganisms etc., that live effortlessly above, over, and below the surface of earth. Most of the living beings extend over surface of the earth, and some of them extend below three meters and above thirty meters of the earth's surface. Somewhere, it is extended above 200 meters above the ocean and seas. Therefore, the biosphere is a miscellaneous kind of life, which survives at the top of the lithosphere, throughout the hydrosphere and into the lower atmosphere. Thus, the biosphere is the biogeographical system of earth's surface which gradually interacts with the lithosphere, hydrosphere and atmosphere.

References

1. Singh, V., and Chandel, C. P. S., Analytical Study of Heavy Metals of Industrial Effluents at Jaipur, Rajasthan (India). *Journal of Environmental Science and Engineering*, **2006**
2. Singh, Y. K., Environmental Science. New Age International Publishers, New Delhi, India, **2006**, ISBN: 9788122423303.
3. Skinner, B. J., and Porter, S. C., Chapter: The Earth: Inside and Out. In: Physical Geology, *John Wiley & Sons, New York*, **1987**.
4. Slooff, W., (Editor), Basisdocumentfluoriden. Bilthoven, Netherlands, National Institute of Public Health and Environmental Protection (Report No. 758474005), **1988**.
5. Soskolne, C. L., Westra, L., and Kotzé, L. J. (Ed.), Sustaining Life on Earth: Environmental and Human Health through Global Governance. Lexington Books, Maryland, **2008**, ISBN: 9780739117309.
6. Srinivas, R., Bhakar, P., and Singh, A. P., Groundwater Quality Assessment in some selected area of Rajasthan, India Using Fuzzy Multi-Criteria Decision Making Tool. *Aquatic Procedia*, **2015**
7. Suthar, S., Bishnoi, P., Singh, S., Mutiyar, P. K., Nema, A. K., and Patil, N. S., Nitrate contamination in groundwater of some rural areas of Rajasthan, India. *Journal of Hazardous Materials*, **2009**
8. Suthar, S., Garg, V. K., Jangir, S., Kaur, S., Goswami, N., and Singh, S., Fluoride contamination in drinking water in rural habitations of northern Rajasthan, India. *Environmental Monitoring and Assessment*, **2008**
9. Tailor, G. S., and C. P. S. Chandel. To Assess the Quality of Ground water in Malpura Tehsil (Tonk, Rajasthan, India) with emphasis to Fluoride Concentration. *Nature and ScienceUSA*, **2010**
10. Tank, A., and Vyas, A., Groundwater Potential and Quality in Makrana Block of Nagaur District, Rajasthan. *Hydrology: Current Research*, **2019**
11. Tank, D. K., and Chandel, C. P. S., A Hydro chemical elucidation of groundwater quality under domestic and irrigation land in Jaipur city. *Environ. Monitor. Assess.*, **2010**
12. Tölgyessy, J., (Ed.), In: Chemistry and Biology of Water, Air and Soil, Environmental Aspects (1st Edition). *Elsevier Science*, **1993**, vol. 53.
13. Valsami-Jones, E. (Editor), Phosphorus in environmental technologies: principles and applications. IWA Publishing, UK, **2004**.
14. Vogel, A. I., A Textbook of Quantitative Inorganic Analysis Including Elementary Instrumental Analysis, 3rd Edition, Green & Co. Ltd., London, **1964**.
15. Yadav, A. K., Khan, P., and Sharma, S. K., Water Quality Index Assessment of Groundwater in Todaraisingh Tehsil of Rajasthan State, India-A Greener Approach. *E-Journal of Chemistry*, **2010**, 7(S1), S428-S432.
16. Yadav, J. P., Lata, S., Kataria, S. K., and S. Kumar. Fluoride distribution in ground water and survey of dental fluorosis among school children in the village of Jhajjar district of Haryana, India. *Environ. Geochem. Health*, **2009**
17. Yadav, R. K., and Monika. Influence of carcinogenic industrial pollutants on groundwater quality of RIICO industrial area of Bhiwadi (Alwar), Rajasthan, India. *Ecology, Environment and Conservation*, **2021**, 27, S407-S414.
18. Yadav, R. K., and Monika. Quality Assessment and Impact of Industrial Pollutants on Groundwater of RIICO Industrial Area of Bhiwadi Town of Alwar, Rajasthan. *Pollution Research*, **2021**, 40(4)
19. Yadav, R. N., Dagar, N. K., Yadav, R., and Gupta, P., Assessment of ground water quality of adjoining area of the Bhiwari industrial area (Alwar), Rajasthan. *Res. J. Pharm. Biol. Chem. Sci.*, **2011**
20. Yadav, R. N., Dagar, N. K., Yadav, R., and Gupta, P., Variability in physico- chemical parameters of ground water of north-east zone of the Bhiwadi industrial area (Alwar). *J. Curr. Chem. Pharmacol. Sci.*, **2012**