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Impact of Environmental Changes on Ecosystem

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Abstract – Environment plays crucial role in sustenance of ecosystems on earth. Changes in environment are impacting the ecosystem. Biotic and abiotic components of ecosystem are getting severally affected by undesirable changes in environment. Ecology, diversity and sustainability of ecosystem are getting affected by changes in environment. Degradation in various environmental components/ factors including air, water, soil and changes in various climatic factors including rainfall pattern, temperature has resulted in air pollution, water pollution, soil pollution and global warming, eventually leading to imbalances in ecosystems. Aquatic ecosystems are prone to water pollution while many fragile ecosystems are prone to climate change. Ecological consequences of degradation in environment are affecting the relationship between living organism and environment.

Keywords- Environment, Ecosystem, Changes, Degradation, Affected

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INTRODUCTION

Multiple controlling factors are involved in stability and sustenance of ecosystem. Environmental factors have a profound effect on structure and function of ecosystem. A change in an ecosystem necessarily affects the species which are part of it, and changes in species in turn affect ecosystem processes (1). An intricate relationship exists between biotic and abiotic components of ecosystem and interaction among these components determine the different aspects of ecosystem including structure and function. Over the years undesirable and anthropogenic changes in various environmental constituents including air, water and soil have led to the degradation of ecosystems. Climate change is impacting ecosystems through changes in mean conditions and in climate variability, coupled with other associated changes such as increased ocean acidification and atmospheric carbon dioxide concentrations (*Malhi et al 2020*).

IMPACT OF CLIMATE CHANGE ON ECOSYSTEM

Climate is a significant factor in determining the structure, functions and services of ecosystem. Ecosystem patterns and processes, such as rates of primary productivity or input–output balance of chemical elements, respond in complex ways to climate change because of multiple controlling factors (*Grimm et al* 2013). Anthropogenic actions have led to increased concentration of green house gases in atmosphere that eventually resulting in climate change with increase in average global temperature, increase in sea level and increase in frequency of extreme events like droughts and floods. Ecosystem response to climate change is species and ecosystem specific, depending upon complex interaction among biotic and abiotic factors. Impact of climate change is resulting in inevitable ecosystem degradations. Ecosystem structure and functions are severely affected by climate change as sustenance, diversity, productivity and viability of ecosystems are threatened by climate change. Major consequences of climate change associated with ecosystem includes change in species composition due to biodiversity loss, change in characteristics of vegetation, habitat degradation and fragmentation, disturbances in food chain, changes in nutrient cycling, reduction in ecosystem productivity and occurrence of physiological stress. Forest ecosystems have become more prone to wild fire. Degradation in coral ecosystem in the form of coral bleaching is considered to be the consequence of climate change. Polar ecosystems are facing the threat of habitat change and migration due to rise in temperature. Marine ecosystem may face change in species distribution pattern and change in nutrient cycling. Various stages of life cycle such as reproduction, hatching of eggs and migration are influenced by climate change in some species.

IMPACT OF AIR POLLUTION ON ECOSYSTEMS

Many studies have shown that plant and animal species differ in their sensitivity to air pollution and its biogeochemical consequences, such as soil and

water acidification (*Lovett et al* 2009). Many air pollutants like hydrocarbon, oxides of nitrogen and sulphur, heavy metal like zinc, mercury, cadmium and lead and ground level ozone have severe impact on many plant and animal species. Sensitivity to air pollutant is species and pollutant specific. Different pollutants have different ecological and physiological impacts on specific plants and animal species. Apart from causing injuries to the leaves of sensitive plants, oxides of nitrogen and sulphur form nitric and sulphuric acid in the air that comes to the earth in the form of acid rain. Acidification of aquatic bodies affects the flora and fauna and fish population is greatly reduced. Due to acidification, soil acidity is increased thereby affecting the flora and fauna of soil including soil microbes. Ground level Ozone causes the reduction in rate of photosynthesis and damages to the leaves. The accumulation of mercury in the form of methyl mercury at various level of food chain can cause physiological impairments in animal species.

IMPACT OF WATER POLLUTION ON AQUATIC ECOSYSTEMS

Anthropogenic activities are causing chemical changes in aquatic ecosystem. Changes in water chemistry have a significant impact on composition and distribution of flora and fauna in aquatic ecosystem. Increase in concentration of nitrates and phosphates etc lead to eutrophication of lakes and ponds thereby causing emergence of algal bloom. Polluted aquatic ecosystems have many potential hazardous substances and some of them are highly poisonous. Heavy metals like mercury, lead, cadmium etc. cause damage to various internal organs including brain, liver and kidney, with impairments in physiological processes. These metals accumulate in food chains and fish are severally affected. In polluted water bodies, due to excessive growth of aerobic microorganism, oxygen level begins to deplete thereby affecting the biotic components of such water bodies. Productivity and biogeochemical cycling are affected in polluted aquatic ecosystem. With pollutants pathogenic microbes may enter the polluted ecosystem that may cause the spread of disease among flora and fauna.

IMPACT OF SOIL POLLUTION ON ECOSYSTEMS

Soil is getting contaminated with many toxic substances and presence of these substances in abnormally high concentration can have an adverse effect on biotic components of terrestrial and aquatic ecosystems. Through soil and ground water, pollutants enter the plant through root plant translocation system and bioaccumulate at higher trophic levels. Accumulation of toxic pollutants results in mortality of species, eventually leads to alteration in biodiversity. Due to soil pollution, reduction in soil organic matter is caused, natural microbial activity in soil is decreased and soil fertility is reduced. Soil pollution contributes to water and air pollution as many contaminants are released into water and air from soil.

CONCLUSION

Changes in environment and its impact on ecosystem are two correlated processes. Many terrestrial and aquatic ecosystems are getting severally affected due to anthropogenic changes in environmental factors. Climate change along with air, water and soil pollution are changing the physical, chemical and biological properties of water, air and soil respectively thereby changing the natural ecological conditions of various ecosystems. The shift in ecological conditions is eventually leading to severe ecological consequences in the form of changes in structure and disruptions in functions of terrestrial and aquatic ecosystems.

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