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CLIMATE CHANGE AND BIODIVERSITY IN NARAYANI RIVER ECOSYSTEM AND ECOSYSTEM SERVICES

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ABSTRACT

The global climate change results from the rise in greenhouse emission within the atmosphere through anthropogenic activities. The dissolution of carbon dioxide is much more compared to the other gases within the river water change affects changes with warming. The climate change and temperature increase have shared to indicate negative impacts on all aquatic organisms. Thus, it is needful to manage greenhouse discharge in atmosphere for safe ecosystem with biodiversity.

Key Words: Climate change, atmospheric concept, Carbon dioxide, Biodiversity, Aquatic ecosystem.

INTRODUCTION

The intense increase in greenhouse gases within the atmosphere occurs due to anthropogenic activities causing warming within which rise of temperature held with alteration in climate. The global warming has been affecting temperature of water resources, and, also hydrological events that cause a change in physical and chemical characteristics of water. The temperature rise in water-body affects the life cycle, physiology and behaviors of aquatic living beings.

Climate change impacts on inland aquatic ecosystems will range from the direct effects of the increase in temperature and carbon dioxide concentration to indirect effects through alterations within the hydrology resulting from the changes in the regional or global precipitation regimes and also the melting of ice cover.

There have been several researches on the consequences of climate change on terrestrial, marine and freshwater ecosystem within the last two decades. Despite this increase of research on the subject, we still lack a comprehensive understanding of climate change and predictive capability of its effects on biodiversity in various organism groups and ecosystems. The current review was aimed to enhance the existing information within species variance and combine this to major anthropogenic stressors on aquatic biodiversity.

Mechanism of Climate change on Physical environment: Global climate change directly affects the water parameters by changing run-off patterns, increasing the frequency and intensity of utmost activities, and changing groundwater recharge rates. The India has a high-risk climate with a low conversion of rainfall to run-off and really high year-wise variability.

The rivers with main-flow because of surface run-off are more liable to changes in climate compared to rivers with high base-flow indices because of groundwater support. Also, a rise flooding frequency is probably alters many river ecosystems, although the extent to which this happens will depend on deviation from background conditions and through non-structural flood management. The groundwaters recharge certainly suffering from changes in the amplitude, frequency and timing of extreme events. Projected changes in recharge into groundwater stores are different for median, dry and wet years.

The combined effect of high temperature and low flow is deleterious to aquatic organisms with reduction in the dissolved oxygen quantity. The predicted change in air temperature causes increase in water temperature is a complex process depends upon insulators and buffers such as solar radiation, groundwater input and shading. Other water quality variables likely to increase in response to more intense rainfall events include turbidity and nutrients, with sediment washed in from the catchment or in the case of nutrients from the riverbed.

Mechanism of Climate change on Physical Habitat: Any changes in amount**,** seasonal distribution and intensity of rainfall may affect channel geomorphology, longitudinal and lateral connectivity, and aquatic habitat. Bunn et al (2002) reported that loss of spatial and temporal linkage can give rise to community isolation, species barrier and endemism.

There connectivity is typically reduced through flow disturbances by dams and is often combined in respect of other morphological modifications such as channel formation (Ward et al., 1995). Flow is also a major determinant of biotic composition.

Climate change and Biotic composition: Thermal and hydrological regimes are key variables during river ecosystems (Poff et *al*, 2009). The climate change will affect aquatic assemblage at species to community level. Susceptibility of aquatic organisms to climate change varies between species and will in part depend on their biological traits.

Biodiversity in freshwater ecosystems shows substantial impacts from land use, biotic exchange and climate (Sala et *al*, 2000). Threats to global freshwater biodiversity can be grouped as overexploitation, water pollution, flow modification, degradation of habitats and invasion by exotic species (Dudgeon et *al*, 2006). These threats are likely to be further exacerbated by predicted climate change, leading to greater loss of aquatic biodiversity.

The reduced individual flow within meta-population and increased homogenization of communities favored generalist or opportunist species (Eady et *al*, 2013). The spawning behavior of fishes may triggered by high temperature and water level or flooding in rivers. A combination of temperature and the flow regime was shown to influence the seasonal pattern of changes in community assemblage of insects (Rectliffe, 2011). Certain species may act as winners or losers with climate change will result in a shift in community structure and possibly lea to change in trophic status.

The key climate changers -temperature and flow-are likely to determine the invasion and success of exotic and induced species in rivers (Bunn et *al*, 2002). There, shift of community balance makes more vulnerable to invasion by alien species. Changes in species pattern could also lead to development of indigenous pest species of particular among dipterans.

The Impact of Climate change on Aquatic Organisms: The change in precipitation regime causes nourishing load in the river and excess accumulation of organic material in river catchment identified by living beings. Also, plankton drift is possible on the bottom with decreasing fish consuming organic materials in the system and rise in hydrogen sulphide layer.

Water temperature plays an important role for the reproduction of fish species and provide ideal living environment. The fishes are quite susceptible to changes in temperature in larva and juvenile stage of their life cycle. If the population members are unable to adjust in the response of sudden and strong change in temperature, disturbances in partial or complete metabolism may cause mass mortality. The horizontal local and northern migration is result of climate change to ensure reproduction and survival. Also, a decrease in pH level may effects hatching and emergence of normal juveniles.

Approaches for maintenance of appropriate Climate: The guiding principles includes focus on water quantity with maintenance of appropriate environmental flows, integration of climate change into water quality management, conservation planning for freshwater biodiversity, the promotion of ecosystem resilience, and extending climate change science into policy and public discourse.

It is recognized that a naturally variable flow regime is required to sustain freshwater ecosystem rather than a static low flow in rivers. The flowing rivers without any disturbances may respond to changes in soil use and climate through dynamic movements and are thus more resilient (Palmer et *al*, 2008). The retrofit dams with outlet valves to allow release of environmental flow and installing fish-ways to facilitate fish passage is more resilient. In addition, an evaluation should be undertaken of the appropriateness of inter-basin water transfers and vulnerability of donor and recipient riverside biota to climate change.

The conservation planning has key points for selecting ecosystems as high integrity, connectivity, incorporation with important areas for population persistence and identification of additional processes that can be mapped. A conservation target is minimum area needed to ensure representation and persistence. Connectivity must be planned in spatial and temporal dimensions, to counter disrupted hydrological and thermal time-series events resulting from dam construction, water abstractions and land-use changes (Richter et al, 1996).

Resilience is the capacity of reduced or impacted populations or communities to recover after a disturbance (Hildrew et *al*, 1994). It reflects the capacity of natural systems to resist from environmental change and thus persist into the future. The resilience of freshwater ecosystem may be enhanced through restoration practices for small rivers and wetlands. The vulnerability of freshwater rivers to climate change depends on water management ultimately and this options have the potential to lessen its consequences. Engagement at a local scale is the scale at which climate change is going to be felt, it is as important as institutional support.

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