

# Impact of Climate Change on Aquatic Plants Found in Major Lentic Water Bodies Located at Eastern Rajasthan

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## ABSTRACT

Climate change is one of the major challenges of the environment which is caused by the burning of fossil fuel, deforestation, increasing anthropogenic activities, release of greenhouse gases and global warming. The biggest factor of concern is increase in greenhouse gases mainly CO<sub>2</sub> level which change the climate and weather pattern. In Rajasthan situation is as critical as continuous rain failure create the conditions of draught in Rajasthan. Some of the immediate effects of recent climate change are becoming apparent through effects on aquatic flora. Vicissitudes of climate have a considerable impact on aquatic flora. The wetland ecosystems, which are most productive but most fragile, are great threat of extinction today, partly on account of their use for human activities and partly due to natural threats; such as frequent droughts, scanty rainfall, erosion and biotic effects caused by biotic intervention in maintaining them. The current review mainly focuses on how flora of eastern Rajasthan are likely responding to direct and indirect effects of anthropogenic climate change. We aim to awareness rather than to be comprehensive. Rajasthan is the largest state of India area-wise constituting 10.4% of country's geographical area. East Rajasthan got one of the two Ramsar sites of Rajasthan, two national parks, and 7 wildlife sanctuaries and comprises about 9% geographical area of the state. Most of the lakes in east Rajasthan get fully dried up at least once in four to five years. All aquatic ecosystems of this region suffer from periodic desiccation. We include extinction in aquatic plants, endangered species, and invasive species. However, all are important in providing insights into future state of aquatic ecosystems. We also highlight some of the management issues relevant to conserving aquatic communities and ecosystem in the face of anthropogenic climate change.

**Key words:** *Climate change, East Rajasthan, Anthropogenic activities, Aquatic plants.*

## Introduction

Climate change is change in various climate parameters such as temperature, precipitation, relative humidity and atmospheric gases composition over a long period of time. It can likewise be alluded as any adjustment of environment over the long haul whether because of regular fluctuation or because of human action.

The eastern part of Rajasthan reflects semi-dry

climatic conditions (Jhurawat *et al.*, 2020). Eastern Rajasthan is an important physiographic unit of the state, laying in the west part of the Aravalli ranges, characterized by rolling plateau with rounded hills and forest. Administratively, six districts namely Bharatpur, Dhaulpur, Karauli, Sawai Madhopur, Dausa and Alwar are a part Eastern. This paper is an attempt to study the cause and impact of climate change on aquatic plants of eastern Rajasthan. The inland vast water happens in type of streams,

lakes also, lakes. This asset is principally utilized and overseen for water system, giving consumable water and for catch fishery. The expanding interest for water, diminishing measure of usable surface water, issue of siltation and contamination have constrained concerned offices to focus on issues of effective utilization of lakes (Devarshi, 2007).

**Location of study area**

The region lies in eastern part of Rajasthan. The study area comprises six eastern districts of the Bharatpur, Dhaulpur, Karauli, Sawai Madhopur, Dausa and Alwar, occupying an area of 23,200

square miles (6000 square kilometer). The upland range in elevation from 820 feet (250 meters) in northeast to 1620 feet (495 meters) in southwest and constitute the northern part of central highlands. The east Rajasthan uplands, formed by past fluvial erosion and by geologically recent desert erosion, are bounded by Indo-Gangetic plain to the north, the Madhya Bharat plateau to east, the Malwa region to the south, and Aravalli central region. The valley between the hill ranges is wide and stretch for many miles; flattened hilltops form small plateau.

**Major Lentic water bodies of eastern Rajasthan**

In eastern Rajasthan total 102 large water bodies were identified. Nature reserves in these Eastern Districts of Rajasthan are Keoladeo National Park, Bandh Bareth Wildlife Sanctuary, Sariska Wildlife Sanctuary, Ranthambhore National Park, Keladevi Wildlife Sanctuary, National Chambal Sanctuary, Van Vihar WLS, Ramsagar Wildlife Sanctuary, Kesar Bagh Wildlife Sanctuary (Devarshi, 2007).

**Aquatic plants found in these water bodies**

*Aponogeton natans, Cyperus rotundus, Eleocharis acutangula, Eleocharis dulcis, Eleocharis palustris, Limnophyton obtusifolium, Najas minor, Nymphaeanouchali, Nymphaea pubescens, Nymphoides indica, Polygonum glabrum, Paspalum distichum, Potamogeton crispus, Potamogeton pectinatus, Potamogeton nodosus, Sagittaria guayanensis, Scirpus littoralis, Scirpus tuberosus, Vallisneria spiralis* are found in these water bodies.

**Impacts of climate change on these aquatic plants**

Due to anthropogenic activities and hydrological effects number of aquatic plants decrease some of them are *Scirpus littoralis, Scirpus tuberosus, Nymphaeanouchali, Nymphaea pubescens, Nymphoides indica, Aponogeton natans, Cyperus rotundus* (Middleton 2009). Water Hyacinth (*Eichhornia sp.*) also poses a threat to the aquatic eco-



Fig. 1. Districts of Eastern Rajasthan (Devarshi 2008)

Table 1. District-wise Area, Location

S.No.	District	Latitude	Longitude	Area (in km <sup>2</sup> )
1	Bharatpur	26°30'-27°50'	76°53'-77°45'	5066
2	Dholpur	26°22'-26°57'	77°14'-78°16'	3034
3	Karauli	24°49'-26°03'	76°55'-77°26'	5070
4	Sawai Madhopur	25°45'-26°42'	75°59'-76°59'	4980
5	Jhalawar	24° 35' 50.4564'	76° 9' 39.5280'	115
6	Alwar	27°04'-28°04'	76°07'-77°17'	8720

system as dense mats of the hyacinth increase siltation in the wetland and Invasive grass species like *Paspalum distichum* react to changing water supply in the site and in this manner spreading in the wetland region supplanting other significant aquatic vegetation. It may occur and spread if not controlled, with the restoration of water supplies. The broad development and spread of grass species *Paspalum distichum* exhaust the degree of oxygen in the vast water bodies influencing seriously the other great biomass (Shackleton *et al.*, 2020).

**Table 3.** Number of Lakes in Eastern Rajasthan

S.No.	District	Number of water bodies identified
1	Alwar	17
2	Bharatpur	14
3	Dhaulpur	18
4,5	Karauli and SawaiMadhopur	50
6	Dausa	03

#### Remedies / Possible solution

A single strategy cannot be adopted due to different climatic conditions in different part of the state, it is essential that problem has to be tackled by identifying key climate zones in which climate change is likely to be severe. Invasive species like *Eichhornia crassipes*, *Paspalum distichum* should be removed.

#### Conclusion

It concluded that growing anthropogenic activities around these water reservoirs are likely degrading

water quality which directly affect the aquatic ecosystem. Expansions in water temperature will cause a change in the warm reasonableness of sea-going living spaces for inhabitant species. This study reports it can be concluded that climate has a very important influence on water resource and life in the state of Rajasthan.

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