Climate Change: Biodiversity Conservation with Reference to Thar Desert

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Abstract:

Purpose: The purpose of this paper is to analyse impact of climate change on biodiversity; study the conservation of biodiversity, and implications of government policies in the study area. The pattern of current rainfall and temperature in the study area is unexpectedly changed. Focusing in this paper to be protected the species that reached the verge of extinction in the Thar Desert.

Methodology: The author uses information in this paper as climate change, degradation of biodiversity and conservation of Biodiversity was collected from state weather department and state biodiversity board, Government of Rajasthan, Jaipur. The information of rain rainfall and air temperature was collected from state irrigation department, Government of Rajasthan, Jaipur and the Research stations of Central Arid Zone, Research Institute of Bikaner, Jaisalmer, Jodhpur and Pali and analyzed for long term changes using simple regression analysis.

Findings: As according to weather department of Rajasthan government the pattern of rainfall and temperature has been changed since 100 years. Many of the protected species of fauna and flora are on the verge of extinction; forests are also decreasing in the area. The conservation of water has become the vehicle for the conservation of the biodiversity in the Thar Desert. The arrival of water in the Indira Gandhi canal command area, if used judiciously, may encourage biodiversity.

Social implications: Awareness is very important for environmental protection among people

Practical implications: It will be helpful for understanding the affect fauna and flora due to climate change impact.

Originality/value: The maintenance and conservation of biodiversity is needed for human survival. People in Thar Desert have survived for ages with the application of their collective intelligence by conserving biodiversity.

Keywords: Thar Desert, climate change, biodiversity, variability

Introduction

By the end of 21st century the impact of climate change as projected by Inter Governmental panel on climate change (IPCC, 2007) is more likely on arid ecosystem than in semi-arid or sub-humid regions of India. Thar Desert in Rajasthan spreads in twelve western districts of the state covering 19.61 million ha is very fragile and subjected to excessive stresses due to frequent drought and low rainfall. Climate change results in shifting rainfall pattern, increase temperature, more demand for water and will be significant driver of biodiversity with changing life cycles, migration, loss and invasion of new habitat in Thar region. Biological diversity and climate are closely interconnected and each impacts the other. Biodiversity always builds natural resilience to climate extremes like as forests are natures social security check in times of disaster and crisis, additionally forests also act as a sink for greenhouse gas emission.
Rajasthan state is the largest state of India area–wise falls within the areas of massive climate change sensitivity.

In the recent times the state has experienced severe and frequent spells of drought than any other region in India. At the present time according to a study recently undertaken by the state control board is suffer from increased water shortage due to substantially reduction in rainfall, as well as increased evapo-transpiration due to global warming. These types of changes are directly responsible for the loss of biodiversity.

The desertification process may continue due to increased biological activity as a result of over-grazing and loss of vegetation cover with consequent more radiant energy loss and reduction in convective activity (Sikka.1997). Soil degradation and loss of vegetation impact the thermo dynamic balance in the north western India and expansion of Thar Desert can lead to a pronounced and large scale impact on summer monsoon hydro climate of the north western region of India. (Bollasina and Nigam, 2011)

Western part of India is rich in biological diversity with arid climate conditions of the region suitable for adaptation of different species in the Thar Desert. There is extreme weather conditions like as low rainfall, high temperatures, strong winds as well as low humidity make in inhospitable to different habitat leaving to migration and loss of habitats in the Thar region (Rao, 1992, 2005 and 2009). In this research paper, i am presenting an analysis of climate change scenarios influencing the Thar Desert region focusing on biodiversity conservation of the region.

**Purpose**

- To analysis impact of climate change on biodiversity in the Thar Desert.
- To study conservation of biodiversity.
- To study implication of government policies in Thar Desert to conservation of biodiversity.
- To study environmental awareness among the people
Study Area

The study area located in Western Rajasthan covering around 2% of the land of Jaisalmer, Barmer, Bikaner and Jodhpur district it is a part of the Thar desert spread over 446,000 sq. km on both sides of Indo-Pak border covering the southern part of Haryana, Punjab and province of Pakistan. Bounded by River Sindh in the West, River Sutlej in the northwest. The Aravalli range in the east, and the salty marshes of the Rann of Kutch in the South, it extents over 208, 110 sq. km. climatically, it is hot and dry; rainfall is scanty. Its physical build is however not so uniform. There are sand dunes, plains, hills, salty marshes, and a few oasis here and there. Luni is the only river that meanders through the desert and reaches the Arabian Sea through the Rann of Kutch; it is said to be the remnant of river Saraswati along which Vedas, the first written books of the world were composed. Apparently, what is scrubland today was full of lush vegetation once upon a time. 300 million years ago roamed in this part of India the dinosaurs and their ascendants.

Methodology

In this research paper climate change, degradation of biodiversity and conservation of Biodiversity data was collected from state weather department and state biodiversity board, Government of Rajasthan, Jaipur Biodiversity Board, Government of Rajasthan, Jaipur. The rain rainfall and air temperature data was collected from state irrigation department, Government of Rajasthan, Jaipur and the Research stations of Central Arid Zone, Research Institute of Bikaner, Jaisalmer, Jodhpur and Pali and analyzed for long term changes using simple regression analysis.
Variation in rainfall

Thar Desert covered twelve arid districts western part of Rajasthan. This region constitutes 61% area of India hot arid zone, were the annual rainfall varies from 100mm in the extreme. West to 400mm towards eastern part of the study area. The coefficient of annual rainfall varies from 40 in the eastern 70% in western part of the Thar region, causing larger inter-annual variability in rainfall influencing crop production. Thus drought affecting crop as well as fodder production. Bikaner district experienced severe agricultural drought in 24% years and moderate in 26% years, whereas, Jodhpur district experienced serve drought in 18% years and moderate drought in 29% years. Its variation in rainfall pattern due to climate change.

In this research paper in the present study, the overall regional annual rainfall (1911-2011) for Thar showed no significant rise (0.56 mm/year) in the rainfall. The rainfall trend at different location showed that the annual rainfall is likely to increase by +100 mm at Bikaner, 124mm at Jaisalmer, -40mm at Jodhpur and +21 mm at Pali. Long duration crop like pearl millet, Sorghum are likely to be replaced with short duration and traditional as crop like cluster bean. Moth bean, gram where rainfall is expected to decrease by 21th century (Rao and Purohit, 2009). To cope up with the delayed monsoon conditions, crop contingency plans (Joshi and Amalkar, 2009) should be adopted.

Biodiversity of Thar Desert:

Thar Desert is not all sand; there are hillocks and sandy as well as grow plains too. This diversity in habitat has given rise to more diversity in vegetation, animal life and human culture in comparison to the other desert regions of the world, trees are few; but thorny pushes and shrubs in small patches are scattered all over the region. The main tree species found here are: Acacia, milotica, tamrix aphylla, prosopis cineraria (Khejri). The dominant scrubs are calligonum polygon aides, crotalaria Sapp, and Haloxy recurvum. Among the xerophilious grasses of the region are Aristidesascensions, concurs biflorus, and leisure’sscandium.

The desert of Rajasthan contains 25 species of serpents and 23 species of lizards. The endangered Great Indian Bustard, the Black buck. Indian wild ass and the Indian Gazelle are found here.

In the all above species, some species like the great Indian bustard are being affected by the climate change as well as human cause also.

Findings

- Northern part of India is expected to be warmer than the southern part of country.
- Summer monsoon rainfall in India will increase extreme rainfall events would rise sharply.
- The rainfall trend during the last 100 years revealed that the summer monsoon rainfall, which contributes more than 85% of the total annual rainfall in the region, has increased marginally (<10%) in the South and East part of the Thar Desert, but has already declined by 10-15% in its north-western part of India.
- Earlier studies on changes in rainfall and air temperatures of north-west part of India showed that the rainfall increased marginally by 141 mm in the past 100 years (Pant and Hingane, 1988), especially in the irrigated belt of Ganganagar region particularly during the part 3 decades (Rao, 1996)

Conservation of Biodiversity

Biodiversity can be conserved in two ways: ex-situ (i.e. out of the natural habitat) and in-situ within the natural habitat).
In-situ conservation

In-situ conservation of maintains the genetic diversity of the species, while at the same time helps the species adapt to the changing environment caused by nature or anthropogenic activities. It also helps in preservation of other related species of the habitat. For this type of conservation technique certain area are designated as protected sites. It is being promoted by the man and Biosphere (MAB) program of the United Nations educational, scientific and cultural organization (UNESCO)

Ex-situ conservation

The ex-situ methods biodiversity conservation include creation of zoos where captive breeding programs are carried out; development of aquaria for research, public information and education; and plant collections through seed storage and breeding. Zoos are not just public display facilities and for educating people about wild animals, but also for captive breeding specially of the vertebrates such as panda and dormouse that are facing extinction.

There are a number of biodiversity conservation sites in Indian desert. The most important and by for the largest among them is Desert National Park, Jaisalmer. Spread over 3162 km², it is an excellent example of the ecosystem of the Thar Desert, and its diverse fauna. Among the measures being adopted to conserve and preserve the plans life in Indian desert is the greening of the desert.

The scientist of CAZRI, have successfully developed and improved dozens of traditional and non-traditional crop/fruits that produce much larger fruits than before and can thrive with minimal rainfall. Arid Forest Research Institute (AFRI) situated at Jodhpur, the objective of the institute is to carry out scientific research in forestry in order to provide technologies to increase the vegetative cover and to conserve the biodiversity in the hot arid and semi-arid region of Rajasthan.

In the Thar Desert agriculture is not a dependable proposition because after the rainy season, at least one third of crops fail. Animal husbandry trees and grasses, intercropped with vegetables or fruit trees, is the most viable model for arid, droughts-prone regions. The region faces frequent droughts. Overgrazing due to high animal populations, wind and water erosion, mining and other industries have resulted in serious land degradation. In this desert region of Rajasthan is a major opium production and consumption.

The Thar Desert is one of the most heavily populated desert areas in the world with the main occupations of its inhabitant’s agriculture and animal husbandry. Animal husbandry is the major livelihood in the Thar Desert. Livestock depends for grazing on common lands in villages. During famine years in the Desert the nomadic rebari people move with large heard of sheep and camel to the forested areas of south Rajasthan.

Concluding Remarks

The Thar Desert region is more sensitive to changing global climate than other climate regions. Development of strategies, adaptation of traditional knowledge and practices related to biodiversity conservation and sustainable use along with modern scientific interventions will lead to mitigation of adverse effects of anticipated climate change on biodiversity in Thar Desert region.

The present government policies on biodiversity conservation are not working well. Many of the protected species of wild life are on the verge of extinction forests are decreasing in area as the pressure of variability of rainfall and temperature pattern as well as population on land increases. The stage has come, when each village and city should be asked to reserve at least 20 percent of its land for forests. It may be that several villages can join hands and have joint forests reserves along the rivers on the hills and other areas not used for agriculture. Some of the less productive areas can be devoted to forestry. This may not be a very feasible proportion in states like Rajasthan when climatic restrictions come in the way of forestry.
References


Sco.wikipedia.org/wiki/Thar_Desert
www.indiaweather.gov.in
www.rajasthan.gov.in
www.environment.gov.in