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Geography

A STUDY OF CLIMATE CHANGE IN RAJASTHAN AND ITS IMPACT ON FLORA AND FAUNA

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ABSTRACT Climate change, the greatest global challenge, is already a reality for the farmers of Rajasthan. It is increasing the pressure on already scarce resources and if proper measures are not taken, migration towards the cities will soon reach new heights. According to the Rajasthan State Action Plan on Climate Change (RAPCC) report by the Rajasthan State Pollution Control Board prepared with the help of a multi-disciplinary team of experts from TERI with support from GIZ says, 'enough is already known to start action'. And more than the factual situation the action plan that the report suggests is a writing on the wall for farmers.

KEYWORDS : Climate, Rainfall, Flora, Fauna

INTRODUCTION

The State of Rajasthan is situated in the western part of India, faces severe water scarcity, has poor rainfall, and is classified as arid/semi-arid region. Administratively, the State comprises of 33 districts, 39,753 inhabited villages, 249 Panchayat Samities and 9168 Gram Panchayats. Geographically, deserts in the State constitute a large share of landmass. The forest cover of the State contributes 4.19% to the national forest cover (Table 3.1). There are three major rivers flowing through Rajasthan, the Chambal, Tapi and Luni. The State is severely deficient in the most important resource, that is, water. With 10.4% of the country's area and 5.5% of its population, Rajasthan has only about 1% of the country's water resources. On the basis of climatic conditions and agricultural practices, Rajasthan is divided into 10 agro-climatic zones ranging from arid western to flood prone eastern. Rajasthan is the largest state of India, comprising 10.4% of the country's total area. Nearly 76% of the state's population resides in rural regions. Rajasthan produces 5.49% of the nation's total food grains production and 21.31% of its oil seeds.

Any change in climatic determinants could not only adversely impact food security and nutrition but also affect the well-being of the population that derives its income from the sector. Agriculture and allied sectors, therefore, exhibit high sensitivity to climate fluctuations. The way ahead is, “Breeding of climate-hardy livestock and development of nutritional strategies to prevent heat stress and productivity loss; Dairying of goats and other small ruminants should be promoted; indigenous varieties with heat resistance capacities could be identified and promoted to minimize related losses in milk production.”

“We have left no stone unturned to prepare the RAPCC report. The data is based on 20,000 research papers published since 1850. Given the rising temperature and shifting monsoon trend, malaria window in Rajasthan can certainly increase. Enough is already known to start action. The RAPCC is based on current state of knowledge and warrants action,” said D N Pandey, member secretary, Rajasthan State Pollution Control Board.

“Given the fragility of the resource base in much of Rajasthan, agriculture is a high risk activity. Climate change poses formidable challenges to the animal husbandry sector as well. Rajasthan is the second highest producer of milk in the country (amounting to nearly 17 lakh kg per day). But the current annual loss in milk production due to heat stress in Rajasthan is 98.65, 40.55 and 29.74 litres per animal per year in crossbred cows, local cows and buffaloes respectively,” states the report.

It is projected in a range of studies that climate change will lead to a decrease in crop and animal produce especially in tropical countries like India, aggravating the risk of hunger, malnutrition and poverty, as the availability of food and opportunities for livelihood across sectors will get affected. On the flip side, it would affect the demand and corresponding changes in crop prices. “The harvest prices of food grains, pulses, vegetables and spices have constantly been on the rise. Yield-temperature response curves show that there is a decrease in grain yield of wheat in Rajasthan at the rate of 2.49 quintals per hectare per degree rise in seasonal temperature, 0.92 quintals per hectare decrease in yield of mustard,” reads the report.

Shifting cropping patterns to more heat adapted and less water consuming varieties is a strategy already practiced by farmers. Reports indicate a shift in cropping patterns to local varieties of pulses, green gram, millets and mustard, which need less water.

Besides, Rajasthan has a livestock population of about 49.1 million and ranks among the top three states for having the highest livestock population. Though contribution of animal husbandry to the state GDP is about 9.16%, it is also one of the biggest methane emitters contributing almost 9.1% to the total methane emissions in the country.

Studies show an increase in the population of buffaloes 1998 onwards. Also, the number of goats and sheep has grown significantly in the past 50 years. And steep rise in goat and sheep numbers may be attributed to the poor availability of fodder to sustain buffalo/cattle.

“And although they significantly contribute to the improvement of dairy farmer's economy, unsatisfactory nutritional status and lack of knowledge of balanced feeding and lack of proper marketing facilities for animal products like goat and camel milk, meat and wool in addition to scarcity of fodder are aspects that may lead to an unsustainable future,” reads the report.

Apart from that livestock is a major source of methane emission. Rajasthan has the second largest population of livestock, nearly 49.136 million. Rajasthan contributed 9.1% of India's total livestock emissions. The spatial analysis in GIS has identified a few districts like Udaipur and Jaipur, with total methane emissions above 0.05 Tg. With a livestock population of 49.14 million in Rajasthan, emissions from enteric fermentation account for .98 (Tg) and manure management account for .09 (Tg).

Though the vulnerability of farm animals to climate change varies with their genetic composition, type and breed, life stage and nutritional status, studies indicate that the performance of farm animals is affected by climate. Heat stress in dairy animals is likely to impact their productive and reproductive functions, cautions the report.

REVIEW OF LITERATURE

Dhorde et al., 2009 it has been found out that some of the metropolitan cities in India have recorded significant increase in minimum temperature during winter.

Kothawale et al., 2005 for India as whole and in particular homogenous regions of east coast, west coast and Indian peninsula show a significant increasing trend in frequency of hot days as well as decreasing trends in frequency of cold days during the pre monsoon season over the period 1970–2005.

Partha Sarthy, 1984b it has been showed that during the last four decades the monsoon rainfall has been trend less.

Kumar et al., 1994 particularly on all India Scale but trends in regional monsoon rainfall in the past century have been brought out.

Partha Sarthy, 1984a an overall increase in extreme rainfall events and their intensities during the period 1901–2000 have also been observed.

Rathore, 2004 the annual spatially averaged rainfall is highly variable and it is most erratic in the western region with frequent dry spells, punctuated occasionally by heavy downpour in some years associated with the passing low pressure systems over the region (SAARC, 2008).

Goel and Singh, 2006 the maximum average rainfall of 726 mm was recorded in 1996 and minimum 291.6 mm was recorded in 1987, prior to 2002.

Khan, 1988 the quantum of rain and number of rainfall days during the rest of the year in different parts of Rajasthan range from 2.1 cm at Jaisalmer to 7.2 cm at Jaipur, distributed over 2.5 to 6 rainy days.

De et al. 2005 an assessment on extreme weather events over India for the last 100 years has been carried out.

CLIMATE VARIABILITY OVER RAJASTHAN

Rainfall

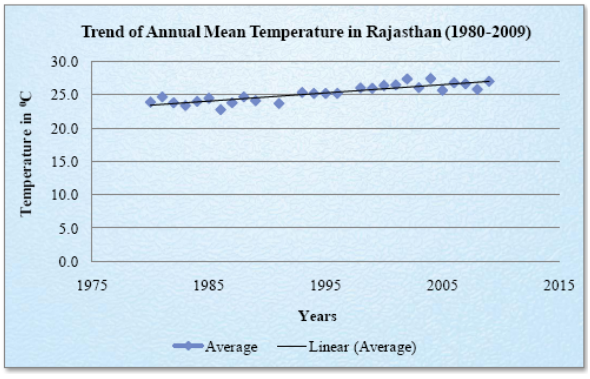
The average rainfall of Rajasthan is 574 mm compared to the all-India average of 1,100mm and a significant variation is seen across different regions. In the western Rajasthan, the average annual rainfall ranges from less than 100 mm in north-western part of Jaisalmer (lowest in the state) to over 400 mm in Sikar, Jhunjhunu, Pali region and along the western periphery of the Aravali range. In the eastern region, the rainfall ranges from 550 mm in Ajmer to 1020 mm in Jhalawar. In plains, Banswara (920 mm) and Jhalawar (950 mm) districts receive the maximum annual rain. The highest rainfall (1638 mm) is received at Mount Abu (Sirohi district) in the southwest region of the State.

The number of rainy days during the south west monsoon period from June end to mid-September over Rajasthan varies from 10 in Jaisalmer to 40 in Jhalawar and to 48 in Mount Abu. During the rainfall deficit year of 2002, the state received just 220.4 mm rainfall up to September, against the normal of 518.6 mm in the overall monsoon. During this year, the monsoon was worst for Rajasthan in past 17 years as the state recorded a minimum of 220.4 mm rainfall against the normal 533 mm.

Temperature

A gradual decreasing trend in the mean annual temperature for the region of northwest India has been observed (Pant and Hingane, 1988). The maximum contribution to this decrease is during the southwest monsoon (–0.52°C/100 years). The frequencies of the occurrence of cold waves and hot waves in Rajasthan for different time periods. After Jammu and Kashmir, Rajasthan is the second state where maximum number of cold waves has occurred (De et al., 2005). On the other side, Alwar in Rajasthan (East) holds the record for the highest maximum temperature of 50.6°C (123°F) on 10 May 1956.

The state witnesses great peculiarities in temperature. Winters are very severe and temperature falls below freezing point at places like Ganganagar; summers are intense and quite severe in region like the western Rajasthan. High resolution regional model projections for 2071-2100 have predicted an increase in annual mean surface temperature for all parts of India with an increase of 2-40C for the state of Rajasthan (Government of Rajasthan, 2010). May is generally the hottest month and generally January records the lowest daily maximum and minimum temperature. Changes in the climate variables like temperature increase can affect the hydrologic cycle and agriculture and allied sectors which exhibit high sensitivity to climate stresses.



Source: (GoI) Temperature in Rajasthan (1980-2009)

FLORA AND FAUNA

Forests of Rajasthan are dominated by dry deciduous type and are concentrated in the Aravalli and Vindhyan hill systems in the east and grasslands in the west (GoR 2007). The forest cover in the State is 16,036 km2, which is 4.69% of the State's geographic (FSI 2009).

Historically, forests in the state have been used by the erstwhile Maharajas as their hunting reserves and for meeting subsistence needs of communities living within or neighbouring forests.

The forests, deserts and wetlands of the State house a wide array of flora and fauna, some of which are specific to the region. It is home to about 3000 known species of flora and fauna and, a large number of undocumented insects, butterflies and micro-organisms. A majority of the native plants in the state are known for their economic importance and are being used by local communities. Many of these species have evolved over the years to survive in the harsh climatic condition specific to the region.

Many species of flora and fauna are rare and endangered in the State. Many plant and animal species are endemic to the Thar Desert and the Aravallis which are one of the world's oldest hill ranges. It is estimated that 100 species of plants (including 61 of desert region) are threatened in view of their conservation status. All the 19 endemic species are threatened, and so are all the 35 wild relatives of cultivated plants. There are 23 species of plants that are endemic to the state.

REFERENCES

1. Akermann, K., L. Herberg and A. Kalisch, 2009. How do small farmers respond to climate change in Rajasthan? Rural 21 4: 30–32.
2. Attri, S. D. and L. S. Rathore, 2003. Simulation of impact of projected climate change on wheat in India. International Journal of Climatology 23(6): 693-705.
3. Bhattacharya, S., C. Sharma, R.C. Dhiman and A.P. Mitra, 2006. Climate change and malaria in India. Current Science, 90, 369–375.
4. Garg, A., R. C. Dhiman, S. Bhattacharya and P. R. Shukla, 2009. Development, malaria and adaptation to climate change: A case study from India. Environmental Management 43(5): 779-789.
5. Goel A and Singh R B, 2006. Climate Variability and Drought in Rajasthan. Advances in Geosciences, Vol. 4: Hydrological Science, pp. 57-67
6. Gopalakrishnan, R., Jayaraman, M. and Ravindranath, N. H. 2011. Regional Climate Modeling results for Rajasthan state. Presented at the workshop, Science-based policy options for climate change adaptation in Rajasthan. 24-25 February 2011. Organized by Rajasthan state pollution control Board, Jaipur, Rajasthan.
7. Mall, R., R. Singh, A. Gupta, G. Srinivasan and L. Rathore, 2006b. Impact of climate change on Indian agriculture: A review. Climatic Change 78(2): 445-478.
8. Panda, A., 2009. Assessing vulnerability to climate change in India. Economic & Political Weekly 44(16): 105-107
9. Pant G B and Hingane L. S., 1988. Climatic Changes in and around the Rajasthan desert during the 20th century. Journal of Climatology, Vol. 8, pp. 291 – 401