

## Studying local climate variability and its implications: experiences in Rajasthan

**Viren Lobo<sup>1</sup> and Dr. Jagdish K. Purohit<sup>2</sup>**

Society for Promotion of Wastelands Development (SPWD)  
New Delhi, INDIA

**SPWD, an Indian NGO that focuses on wasteland development, land management, water governance and livelihoods, reports some field observations on climate from the state of Rajasthan. Detailed studies are needed to differentiate short-term variability from long-term climate change, and NGOs could play a vital role in this.**

It is highly unlikely that the spiraling awareness and concern about global Climate Change has left any country unaffected. In India too, concern has been expressed in various fora about temperature rise and its likely impacts like snow melt of glaciers, temperature rise in winter and impact on wheat grain production, reduction in rainfall and number of rainy days and increased run off, impact on recharge of ground water, inundation of the sea coast and shifting of the vegetation to higher altitudes, all of which ultimately have an impact on food security and the country's economy.

Although "climate change" per se may not be the term used by local communities to describe environmental changes, they too have the knowledge and ability to recognize changes in weather and climate and describe it in their own terminologies and jargon. Any grassroots level organization working with these local communities would also recognize the inherent changes in a region over a period of time, whether due to the

aforementioned "climate change" or other factors, and definitely be concerned about impacts at the local, regional and national level.

The origins of Society for Promotion of Wastelands Development (SPWD) in 1982 can be traced to the need to do something about land degradation which was assuming alarming proportions by the late 1970s and early 1980s. The understanding was that degraded lands could be reclaimed and put to more productive use. With a livelihood focus to natural resource management, SPWD focused on identification of needs of the local communities on one hand, documentation of technologies in the field and development of appropriate institutional mechanisms to deal with the concrete issues emerging on the ground. Resources like water, land, forests, pastureland and animal husbandry have been the starting point for developing an understanding of different types of ecological systems and their relationship with livelihoods.

The diversity of initiatives spawned has led SPWD to develop its understanding on issues relating to ecology and livelihoods on the one hand and a concrete study of governance structures appropriate for multi-layered, multi nested natural resources on the other. The series of interactive regional and national workshops held during SPWD Silver jubilee year, unfolded a number of these dimensions. The challenge before SPWD now is how to give concrete shape to this understanding on the ground in the context of its mandate "to prevent, arrest and reverse degradation of life support systems, particularly land and water, so as to expand livelihood opportunities in a sustainable and equitable manner through people's participation". It was a natural progression to include a perspective on "climate change" in its mandate, and

---

**1. Executive Director, SPWD, New Delhi**  
**2. Sr. Programme Officer, SPWD Western Region Office, Udaipur**

undertake activities to investigate the impacts more closely.

The specific programme initiatives undertaken by SPWD are as below:

-Water Governance - at the sub basin level (6 sub basins in three states). The technical social, institutional dimensions to this and related laws, policies etc.

-Water Quality studies: Technical appraisal for surveillance, geological studies and use of GIS techniques.

-Wastelands Characterisation: 9 river basins in 7 states. Use of GIS tools for appraisal, socio economic and field survey for appraisal of degradation parameters and its implications for livelihoods.

-SAPPLPP (South Asia Pro Poor Livestock Policy Programme) study to understand pro poor implications of common lands on livestock management in three locations South Rajasthan, Chandrabadni watershed in Uttrakhand and Bahuda (Pennar) basin in Chitoor.

At the outset, it must be stated that in discussions with the local communities in SPWD's working areas the understanding

on Climate Change is manifested more through empirical observations on the availability of water (surface and ground water), number of rainy days, intensity of the storm and impact on trees (water in the root zone) and in some cases the vegetation changes. These observations when cross-checked with other data to have a more scientific observation reveal the following:

1. Rapid depletion of natural resources as a result of industrialisation, mining and also intensification of agriculture, animal husbandry and exploitation of the forests and natural resources. 2. Due to point 1 above, rainfall which can refill the lakes and recharge ground water has to be higher in quantity. For instance if the ponds were filling up with rainfall of 600 mm happening in two years, now they fill up after a 700mm rainfall which happens once in 5 years perhaps.

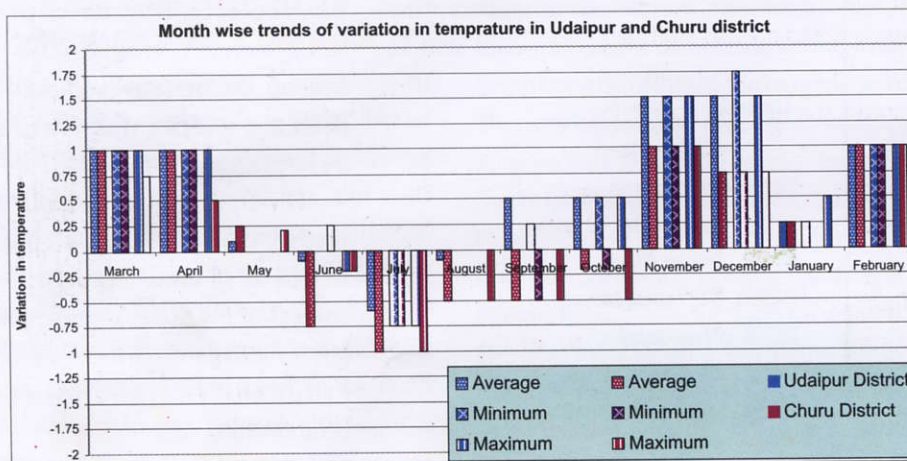
3. The depletion of trees and vegetative cover, pitting due to mining and the recourse to mono cropping

systems result in less moisture trapped upstream and greater run off. Also the ability to tap lesser rainfall spells is reduced. The result is that the ambient temperature is higher and hence higher rates of evaporation results as against evapo-transpiration.

The above factors make it difficult for the local community to examine Climate change scientifically (separate out the variability from the long-term trends). Nevertheless since all this creates local climate change factors which are very concrete, they need to be examined. Case Study of Jaisamand Catchment area

Considering the above, SPWD undertook a study of Udaipur District in Rajasthan State of India in the 2006 - 2008 since a large information base was available for the Jaisamand catchment area which could be used for further systematic observations. It was observed that there was a slight increase in the temperature over a period of hundred years (after accounting for the yearly variability). There has also been a slight drop in the rainfall over the last hundred years. Both these are not conclusive evidence as a much larger time frame with thirty year moving average data is needed to understand long-term trends, nevertheless it is indicative. The monthly data indicate that there is a temperature rise from September to May and a temperature reduction from June to August (see Table 1). While the rise in winter temperature can potentially affect the wheat crop, the reduction in the number of rainy days will impact the rainfall pattern. These observations will be the basis to make more minute observations at the basin level. (For more details about the area, geography and climate please see Climate Change in the Jaisamand Catchment Area:

Table 1



Source: Extracted data from the published global CRU 2.1 dataset consisting of interpolated climate grids from the Tyndall Centre for Climate Change Research, Norwich, UK.

Landuse/ cover Map of 1997-98



Landuse/ cover Map of 2000-01



Landuse/ cover Map of 2005-06



Vulnerability and Adaptation by Elco Bakker and Heid Jerstad at [www.spwdindia.org/references](http://www.spwdindia.org/references).

A comparative analysis of climatic factors was done for Churu (part of Thar desert) to get a preliminary understanding whether this impacts India, west and east of the Aravalli mountain range. The observations for Churu however showed that the temperature is rising slightly but the rainfall has slightly increased. In Churu, temperature rise is observed from November to April and decline from June to October (Table 1). The cooling down is observed in Punjab, Haryana and North West India primarily due to irrigation facilities and due to wind breaks which control the impact of the hot winds from the North West on the crops.

Considering the issue of glacier melt, it would be necessary to study a mountainous state like Uttarakhand as well. Preliminary observations shared with us by scientists in Uttarakhand reveal that the melting of Himalayan glaciers are affecting some of the traditional livestock drinking spots of the transhumants as well as the shift in

vegetation upwards is affecting the kind and nature of fodder availability. These aspects need further study to understand the nature of adaptation possible. The study on Jaisamand Catchment area by Elco Bakker and Heid Jerstad indicates that even though there is a possibility that the average rainfall might increase, the increase in the intensity of rainfall and the reduction in the number of rainy days, could mean that the groundwater availability might go down due to less recharge potential. This in turn will affect irrigated agriculture and the fodder availability from agriculture as well. The change in intensity of rainfall can also have implications for the upstream vegetation which will have a bearing on the availability of fodder for goats. Programmes that are aimed at improving the water storage capacity from rainfall, need to keep some of these elements in mind. Temperature variations, particularly higher winter temperatures would have a bearing on the environment for pests and diseases which need to be carefully studied as well.

SPWD is in the process of preparing an integrated proposal to look at all these aspects in the context of the States of Rajasthan, MP, Chattisgarh, Orissa, Andhra Pradesh, Jharkhand and Uttarakhand. ●

#### Legend

-  Built-up land
-  Fallow land
-  Barren/ rocky area
-  Dense forest
-  Degraded forest
-  River sand
-  Land with scrub
-  Land without scrub
-  Mining area
-  Waterbody
-  Rabi crop only
-  Kharif crop only
-  Double crop