
Climate Change and Increasing Water Demand in Manipur

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ABSTRACT

Climate change refers to an average increase or decrease in earth's temperature which in turn causes warmer or colder. It is caused by both anthropogenic activities and natural phenomenon. Due to climate change, rainfall fluctuates every year causing water scarcity. This increases water demand. Large scale deforestation and lack of rain water harvesting enhances the water problem. We cannot prevent the natural phenomenon but we should try to minimize its effects. We should also reduce anthropogenic activities that cause serious harm to our environment. With growing population and rainfall fluctuation, Imphal valley's water supply is under great pressure as the demand continues to rise. Water conservation has become a critical element of water management strategy in the state. Minimizing water-use, waste, and loss overtime is heavily dependent on continually evaluating and adopting new technologies and practices. The scientific way of searching of groundwater as well as harvesting of rainwater in a planned manner should be the main sources of water for potable, domestic and industrial in Manipur.

KEYWORDS: *Climate change, water harvesting, rainfall fluctuation, deforestation, groundwater*

INTRODUCTION

Manipur is a small state located in a hilly terrain with a small portion of valley. It has a complex geology, terrain, geomorphology, and lithology. Imphal valley is a palaeo-lake basin. Most of the lakes in the basin had now vanished in the course of time. Many natural groundwater recharging structures like ponds, tanks and swampy areas are greatly reduced due to urbanization and change in land-use pattern (Sherjit and Mohon, 2014). Rivers are greatly polluted in many parts of the state. But demand of water is increasing day by day due to rapid increase in population. So Manipur is facing water problem. Urbanization and changing climate change enhances the problem.

Impacts of climate change on aquatic ecosystem

Warmer air temperatures are expected to have several impacts on water resources including diminishing snow pack and increasing evaporation, which affects the seasonal availability of water (Field et al. 2007, p. 619). A key impact of warmer air temperatures is warmer water temperatures. Some impacts of warmer water temperatures are:

- a shift in aquatic species distribution and population (Field et al. 2007, p. 631);
- higher temperatures reduce dissolved oxygen levels, which can have an effect on aquatic life and warming is likely to extend and intensify summer thermal stratification, contributing to oxygen depletion” in lakes and reservoirs (Field et al. 2007, p. 629);
- higher surface water temperatures will promote algal blooms and increase the bacteria and fungi content which may lead to a bad odour and taste in chlorinated drinking water and the occurrence of toxins”
- drinking water and wetlands managers will need to account for water losses due to increased evapotranspiration rates resulting from temperature increases.

Some aquatic organisms are particularly sensitive to temperature. For example, the breeding cycle of many amphibians is closely related to temperature and moisture, and reproductive failure can occur when breeding phenology—periodic biological phenomena correlated with climate—and pond-drying conditions are misaligned (Field et al. 2007, p. 630).

SCARCITY OF WATER AND WATER DEMAND

Scarcity of water is prevalent in Imphal Valley during dry season. The average annual rainfall is about 1500mm. The annual water deficiency in the state is due to the monsoonal fluctuation. In general, evapotranspiration accounts for more than 78 percent of the total precipitation. While the surface run-off and percolation accounts for about 10 percent and 12 percent, respectively. The actual annual water balance of the state cannot be clearly traced out due to the lack of hydro-geological data in the state. In a hilly state like Manipur, it has less ground water and more surface water, due to lithology, topography and rock structures. The surface water is the main source of water in the state.

The present water demand is calculated to be 118.689 MLD and the requirement by the year 2031 will be 152.141 MLD. But the actual water supply is hardly about 80 MLD only. There is a gap of about 40 MLD for Imphal (PHED, Manipur 2016). The water demand for other towns are estimated to be about 40MLD and for rural areas are estimated to be about 80 MLD. The total water demand for the stste is estimated to be about 238 MLD.

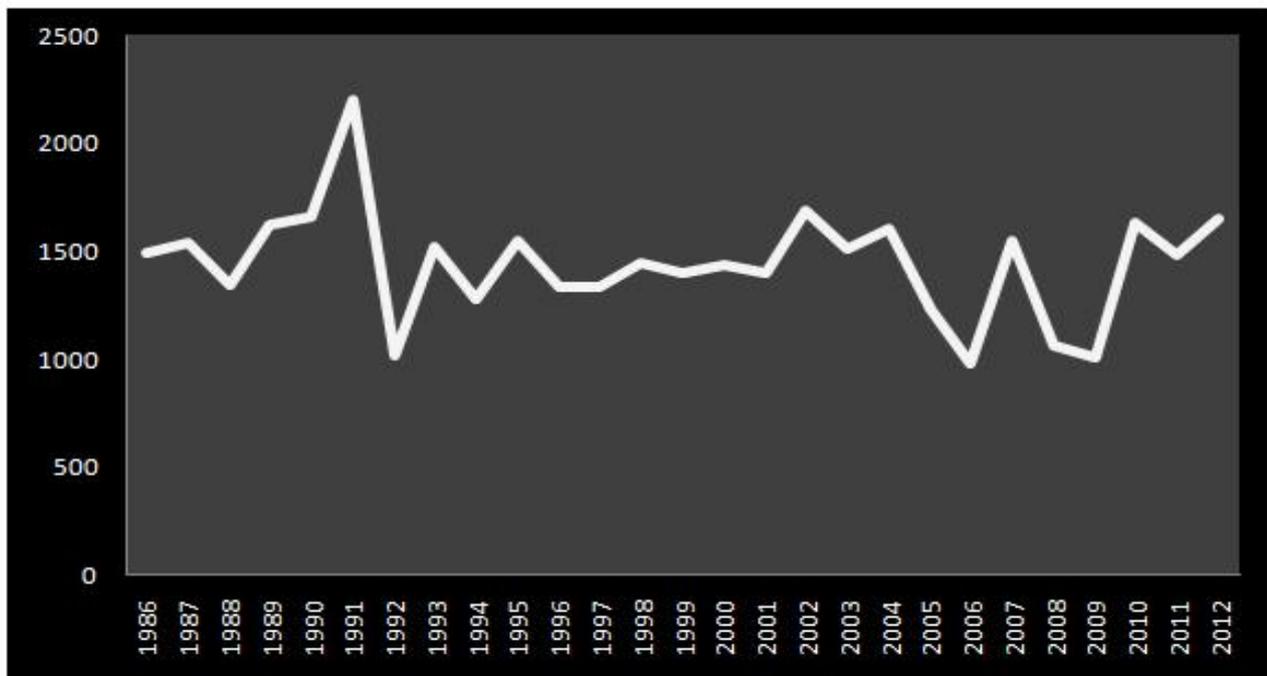


Fig.1 Graph showing fluctuating annual rainfall in mm of Manipur (based on IMD)

Climate change and deforestation leads to vanishing of many spring in the state. It creates serious problems in hilly areas mainly in Ukhrul district of Manipur where spring is the main source of water. Warmer climate leads to uncontrolled growth of weeds in the lakes that pollutes water. Increasing phoomdis in Loktak Lake may relate to climate change. Further, detailed investigation is necessary for this purpose. Utilization of groundwater, aforestation and rainwater harvesting can solve the problem to a greater extent.

Table no.1 Ground water resource of Manipur in Million cubic meters (Source: CGWB-NER)

AVAILABILITY OF TOTAL FRESH GROUND WATER RESOURCES IN MANIPUR				
(DISTRICT-WISE, as on March, 2009)				
(in ham)				
Sl. No.	Assessment Unit/ District	Annual Replenishable Ground Water Resources	Fresh In-Storage Ground Water Resources	Total Availability of Fresh Ground Water Resources [(3)+(4)]
1	2	3	4	5
1	Imphal West	8655	157033.52	165688.52
2	Imphal East	12870	113666.88	126536.88
3	Thoubal	11278	254080.4	265358.4
4	Bishnupur	7999	172696.32	180695.32
5	Churachandpur	3548	56000	59548

CONCLUSION

Climate change is natural phenomenon. An increase in the average global temperature is very likely to lead to changes in precipitation and atmospheric moisture because of changes in atmospheric circulation and increases in evaporation and water vapour. The effects of increases in temperature and radiative forcing, a measure of irradiation in the tropopause, alter the hydrological cycle, especially characteristics of precipitation (amount, frequency, intensity, duration, type) and extremes". Climate change may cause severe problems leading to water scarcity in the state. It also affects the aquatic ecosystem of the state including Loktak Lake. Rainfall in Manipur is based on orographic precipitation caused by monsoon. It affects agricultural activities and proper irrigation in the state. Due to rainfall fluctuation water scarcity increases for domestic and agricultural purposes.

Large scale deforestation in catchment area enhances the problem. Artificial recharge with proper planning of water resource management of surface water and groundwater and long-term underground storage is preferred wherever possible. Rooftop rainwater harvesting for groundwater recharge and for other uses is important. Large scale plantation in catchment area may solve the problem to a greater extent by regulating the flow of water.

REFERENCES

-) Field et al, Climate Change Impacts on Water Resources,2007, p. 629
-) Investigation and Planning Division, Public Health Engineering Department, Government of Manipur, 2011.
-) Kh Mohon and L Sherjit, "Ground water recharge estimation and Conservation at Awang Sekmai, Manipur" CGWB Workshop (NER) on "Water Conservation in Northeast India",2014,p.14-21.
-) Kh Mohon and L Sherjit; "Water conservation in Imphal valley" CGWB Workshop (NER) on "Water Conservation in Northeast India",2014, p.38-43.
-) Tier II Training Course, Central Ground Water Board (NER), 2014

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