



A Study on Present Scenario of Water Scarcity in Purulia District of West Bengal, India

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Abstract

As per the 2011 Census, Purulia is one of the most backward districts of West Bengal and highly dependent on the rural economy. However water scarcity is a regular phenomenon of Purulia. It is argued that 1800 million people will be living in different parts of the world with absolute water scarcity, and two-thirds of the world population could be under stress conditions by 2025. The situation will be affected rapidly to the growing urban areas and create heavy pressure on neighbouring water resources. This paper is nothing but an useful effort to identify the nature and causes of water scarcity of Purulia district of West Bengal in particular and India in general.

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I. Background:

Economic analysis found that demand for water has been growing at more than twice the rate of population increase in the last century and this will create an increasing number of regions are chronically short of water. Researchers estimated that the situation will be in alarming position as rapidly growing urban areas put heavy pressure on neighbouring water resources of rural areas all over the world. Today hydrologists typically assess water scarcity by looking at the population-water equation. By comparing the amount of total available water resources per year to the population of an area this can be calculated.

To measure water scarcity, it is one of the easiest way to rank countries according to the amount of annual water resources available per person for a locality. If we look into the Falkenmark Water Stress Indicator, a country or region is said to experience 'water stress' when annual water supplies drop below 1,700 cubic metres per person per year. At levels between 1,700 and 1,000 cubic metres per person per year, periodic or limited water shortages can be expected which is popularly known as water scarcity (*Falkenmark and Lindh, 1976*). When water supplies drop below 1,000 cubic metres per person per year, the country faces 'water scarcity' and when water supply is below 500 cubic metres per person per year, there is 'absolute water scarcity' (*Larsen, 2009*). The United Nations' FAO states that 1.9 billion people will be living with water scarcity by 2025.

II. Nature and Causes of Water Scarcity:

In general, 70% of the earth surface is covered with water, which amounts to 1400 million cubic kilometres (m km^3). However, 97.5% of this water being seawater and by taste it is salty. Out of this surface water, freshwater availability is only 35 m km^3 and out of the total freshwater, 68.7% is frozen in ice caps. It is also calculated that 30% is stored underground and only 0.3% water is available on the surface of the earth. Now out of this surface water, 87% is stored in lakes, 11% in ponds and swamp and 2% in rivers. It is believed that as all the sweet water is not separable from extracts, only 1% of the total water can be used by human beings.

From the economic definition it is known that water scarcity means lack of sufficient available water resources to meet the demands of water usage within an area. This phenomena of water scarcity already affects almost every continents and around 2.8 billion people worldwide at least one month out of every year. As we have celebrated International Decade for Action Water for Life for the period 2005-2015, it is observed that more than 1.2 billion people is facing from access to clean drinking water. From the economic angle of our analysis we can say that water scarcity is a relative concept and can occur at any level of supply and demand. But scarcity may also be a social construct (a product of affluence, expectations and habitual behaviour) or the consequence of already supply patterns stemming from climate change. Thus scarcity has various causes most of which are capable of being remedied or alleviated (*Pan, 2010*).

Table 1: Per Capita Water Availability in India

Year	Population (in Million)	Per Capita Water Availability (m^3 per year)
1951	361	5177
1961	439	4863
1971	548	3900
1981	683	3270
1991	846	2209
2001	1027	1820
2011	1210	1545
2021	1326	1486
2025*	1394	1341
2050*	1640	1140

(* = estimated)

Source: *Economic Survey*, Government of India, 2021

As we know that water is the most important natural resource and is vital for all life on earth, from geographical concept scarcity of it often has roots in water shortage

and it is in the arid and semi-arid regions affected by droughts and wide climate variability, combined with population growth and economic development, that the problems of water scarcity are most acute (*UN-Water*, 2006). So on the availability of water, well-being and the development of any society is dependent. From the consideration of space and time, it is the most precious resource which is sometimes scarce, sometimes abundant and is always very unevenly distributed. The root causes of water scarcity are climate change accompanied with high temperature, low precipitation and loss of vegetation cover but every geographical area should have some inborn causes related to its origin, structure, and location.

From Table 1 it is found that per capita availability of water in India was about 5177 m³ in 1951. This has now reduced to about 1545 m³ in 2011 (*Government of India*, 2021). From the economic side of our analysis it is found that the demand for water in India is steeply increasing because of the following reasons:

- a) The main reason of water scarcity in India is its population growth which was 361 million in 1961 and is expected to rise to increase to 1640 million in 2050.
- b) Urbanization is another cause of huge water scarcity. In 2001, 26.1% of the Indian population was living in urban areas and the urban population is expected to rise to 55.2% by 2050.
- c) The third important cause of water scarcity is that per capita income of Indians will increase from US\$ 468 in 2001 to US\$ 6735 in 2050 and water has been misused.
- d) Rapid industrialization in reform period will demand more water as its contribution to GDP will increase from 29.1% in 2001 to 40% by 2050.
- e) It is expected that the demand for water will increase from 30 billion m³ in 2001 to 161 billion m³ in 2050.

II.I. Causes of Water Scarcity of Purulia:

From the Census data of 2011 it is found that Purulia is one of the most backward district of West Bengal and highly dependent on the rural economy. As we know that water development is linked closely with poverty reduction especially in low income countries that are highly dependent on the rural economy still water scarcity is a regular phenomena of this district of West Bengal. So it is very important to identify the nature and causes of water scarcity of this district which is totally dependent on rural economy for the socio-economic development of the district as water plays a significant role in economic and human development here.

Due to typical dry climate and rocky soil, Purulia has a long history of water scarcity. During summer in Purulia, village women begin to walk along the village streets with earthen pots and pitchers looking for water. There are several factors which are mainly responsible for the water scarcity of Purulia. This problem is increasing due to the gap between demand and supply of water. Rapid growth of population is another causes of water scarcity observed in Purulia district. In this district, both physical and economic water scarcity have been found. Inadequate water resources to meet a country's or regional demand, including the water needed to fulfil the demand of ecosystems to function effectively is called physical water scarcity. This arid regions of Purulia frequently suffer from physical water scarcity. Economic water scarcity arises here due to unplanned water uses and lack of storage facilities of rain water (*UNDP*, 2006).

Table 2: Major Factors of Surface and Ground Water Scarcity of Purulia

Sl	Types	Factors	Government's Initiative
1.	Economic Factors	Urbanization	Jal Dharo-Jal Varo Scheme; Afforestation Program; Rationing; MGNREGA
		Poverty	
		Population Growth	
		Deforestation	
		Primitive Technique in Agriculture	
		Lack of Budget	
		Proper Monitoring	
2.	Geological Factors	Hydro-meteorological	Kangsabati Water Project; Thurga Check Dam, Yogamaya Sarobar, Loharsol Dam
		Topographical Factors	
		Anthropogenic Factors	
3.	Social Factors	Unscientific water use	CSR, Community Development; Mati Utsav; Handicraft Fair
		Ignorance of people	
		Lack of Reservoir	
		Grazing	
		Inadequate Knowledge	
		Inadequate Institutions	
		Legal Authority	
4.	Geographical Factors	Composition of Rocks	Reservoirs by Irrigation Department of the Government of West Bengal (Panchet; Maithan; Murguma; Upper & Lower Dam; Futiyari, Baranti)
		Rocks Temperature	
		Porosity Soil Moisture	
		Evaporation	
		Surface Depression	

Source: *District Statistical Handbook*, Government of West Bengal, Kolkata.

From Table 2 it is found that economic water scarcity is caused by a lack of investment in infrastructure or technology to draw water from rivers, aquifers or other water sources, or insufficient human capacity to satisfy the demand for water. There are four major types of factors (economic, geological, social and geographical) which affect the water scarcity of the said district. To mitigate with each factors state and central governments are trying to build up some initiatives to face the challenging factors.

III. Suggestions:

From practical behaviour of our daily life it can be said that water is the most abundant substance on earth, the principal constituent of all living things, and a significant force constantly shaping the earth's surface. It is known that water scarcity affects all social and economic sectors and threatens the sustainability of the natural resources base,

discussion on water scarcity is an inter-sectoral and multidisciplinary approach to water resources management. This is related to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. It can not be denied the importance of integration where integration needs to take into account development, supply, use and demand, and to place the emphasis on people and the ecosystems that sustain.

Enhancing the productivity of water use in all sectors is paramount to successful programmes of this problem from the demand side analysis of water scarcity. Protecting and restoring the ecosystems that naturally capture, filter, store and release water, such as rivers, wetlands, forests and soils, is crucial to increasing the availability of water of good quality. Equitable and effective management practices requires knowledge, expertise and investment at political, institutional and technical levels which is useful to keep these in mind as we develop our thinking on foreseeable responses and the types of economic analysis that will be useful to overcome the problem of water scarcity.

It can be argued that the complexity of water management encompasses the varied uses and reuses of water, including human, productive, agricultural and environmental factors. Climate change and more extreme hydro-meteorological events will have consequences for dry lands and they will result in changes to agricultural demand and to productive processes. For the analysis of water-saving systems and the higher efficiency of drop-by-drop irrigation in food production require adequate technologies such as mulching, micro-irrigation tunnels, bio-fertilizers, reuse of agricultural by-products, sensors to measure soil humidity, and the development of efficient irrigation plans according to specific crop needs. So for sustainable supply of water each and every person should have to work accordingly.

There are many reasons of water scarcity in Purulia. Waste of water in agriculture, the lack of trust in government activities, the corruption and the attitudes of traditional producers limit the use and promotion of technologies are impacting adversely on the quality of life of producers. To address these challenges, wastewater collection system managers must be exceptionally proficient in a multitude of technical and non-technical skills needed to efficiently and effectively operate and maintain a collection system.

At the end by considering the above all facts related to nature and importance of water, impacts of scarcity of water and sustainable water use, it is essential to work hand to hand for all the stakeholders of Purulia district, governmental institution, non-governmental organizations and social workers in a holistic manner to secure the water for future generation and to protect the natural ecosystem of world in general and Purulia in particular.

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