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MAJOR FACTORS OF WATER SHORTAGE AND ITS IMPACT ON BUNDELKHAND REGION, WITH SPECIAL REFERENCE TO MAHOBA DISTRICT (UTTAR PRADESH)

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Abstract: Water is a crucial natural resource that serves as the backbone for every living thing to survive. About 96.5 percent of the water in the ocean and 1 percent of the water in some lakes on Earth, which is completely alkaline water, is not fit for daily life. Just 0.32 percent of the water on Earth is liquid, and only 2.5 percent of that pure water has been established. According to the Water Resources Information System, India accounts for 4 percent of fresh water, but varies with the distribution of water. Water resources are abundant in many areas but most of the plateau area is suffering from water scarcity problem, in which Mahoba district of our study area Bundelkhand is also facing the problem of water shortage. The supply of water in any region depends on rainfall. Indian water management is monsoon dependent. The average rainfall in the study area ranges between 500-1000 mm, due to hard land seepage is very slow. Mahoba is located near the Tropic of Cancer, most of the rainfall occurs in mid-June to mid-September and during these days the region receives abundant sunlight and the rate of evaporation is high during these days. These are the main and common factors of water shortage in that area due to over-exploitation of ground water and slow pace of water recharge, hence many areas are facing the problem of water scarcity. Several negative impacts can be observed in the study area due to scarcity of water such as local people have to go home from water sources to fetch water or forcefully use impure water due to non-availability of pure water. It is very important to solve these problems quickly. We should make people aware and suggest some methods and techniques for water conservation. This research article also makes an effort to understand the causes, consequences, and explore resources available to address the issue of water shortages in the Mahoba district.

Keywords **- Resource, Abundant, Shortage, Sunlight, Seepage.**

I.INTRODUCTION

Water is an important resource for life. The percentage of water that we can use in our daily life is very less. Water shortages are a problem in the Bundelkhand region's Mahoba district. There are many factors that affect the depletion of ground water level and exacerbate the drought conditions such as deforestation, erratic climate, urbanization, over exploitation of existing water resources, high rate of evaporation, mismanagement of water resources etc. Many negative effects can be seen due to this water scarcity like irrigation management, soil weakness, social conflict, agriculture, water quality etc. Few rich people who are financially strong are able to afford borewells and water tankers in their daily routine. But the middle class and lower-class people who are financially unstable are not able to afford borewells and water tankers regularly.

Water is an essential resource and very useful for everyone's daily life like; Bathing, washing, drinking, cooking, cleaning and other uses like hydropower generation, tourism, entertainment, transportation, industry etc. But the study area has to face so many difficulties during these whole processes. People have different views about the reasons for water shortage like low rainfall, deforestation, tube wells, wells etc. in all the blocks of people in the study area and also people think that the main reason for water shortage in the study area. The reason is less rainfall and deforestation.

This mismanagement of water resource and awareness of people is also the main reason for water shortage, so it is very important to organize awareness programs for water conservation. By the end of this decade, more than two-thirds of the world's population would

experience a water crisis, according to the United Nations and several assessments. Therefore, it is necessary to examine the factors of water shortage and its impact in the study area so that the problems or the water scarcity situation can be mitigated and how we can easily survive in these conditions.

II.OBJECTIVES

• To look into the causes of the water shortage in the research area and how the public perceives these causes.

• To look into the effects of the water deficit in the research area.

• To offer strategies and tactics for resolving the water shortage issue.

III.DATABASE AND RESEARCH METHODOLOGY

In this study, primary and secondary data are also utilised. A village-level household survey was used to gather primary data. Respondents used a well-organized programme to discover how people felt about the main causes of the water crisis and how it affected the rural area. The town and village directories as well as the district census handbook will be used to collect secondary data.

Sample villages and households were chosen to reflect the entire study region using a multi-stage random selection procedure. The district's governmental divisions are based on block size. Using a multi-stage random sampling technique, sample villages and households were chosen to represent the entire study region. Governmental divisions of the district are based on block size. Many kinds of statistical tools, such as average, percentage, maxima, and minima, will be utilised for the analysis of the data tabulation method, and the data will be represented using cartographic tools like maps, tables, and diagrams, among others.

IV.STUDY REGION

The Study region (Mahoba district) spans the latitude range of 25°01'30 to 25°39'40 north and the longitude range of 79°15'00 to 80°10'30 east. It has a 3144 square kilometers area and 8,75,858 people live there, according to the 2011 census. The study area is located in the state of Uttar Pradesh's southwest region. Its northernmost district is Hamirpur, its southernmost district is Madhya Pradesh, and its eastern and westernmost districts are Banda and Jhansi. Mahoba, Charkhari, and Kulpahar are the three tahsils that make up the district's administrative division. The district has been divided into four development blocks: Kabrai (Mahoba), Charkhari, Jaitpur, and Panwari. These blocks are used for the implementation and oversight of various development initiatives. The urban area is 27.9 sq km, whereas the rural area is 3116.1 sq km. Throughout the overall study region, there are 86 deserted villages and 435 inhabited villages divided among 247 Gram Panchayats and 521 Revenue villages.

Since the rocks are huge and compact in nature, rainwater doesn't penetrate to the deep bottom section of the soil and typically stores underwater. The Jaitpur block's Aznar range hill has the distinction of having the study area's 500-foot-highest peak. The main rivers in the region are the Dhasan, Urmil, Birma, Chandrawal, and Arjun. The total area covered by forests is 162 square kilometers.

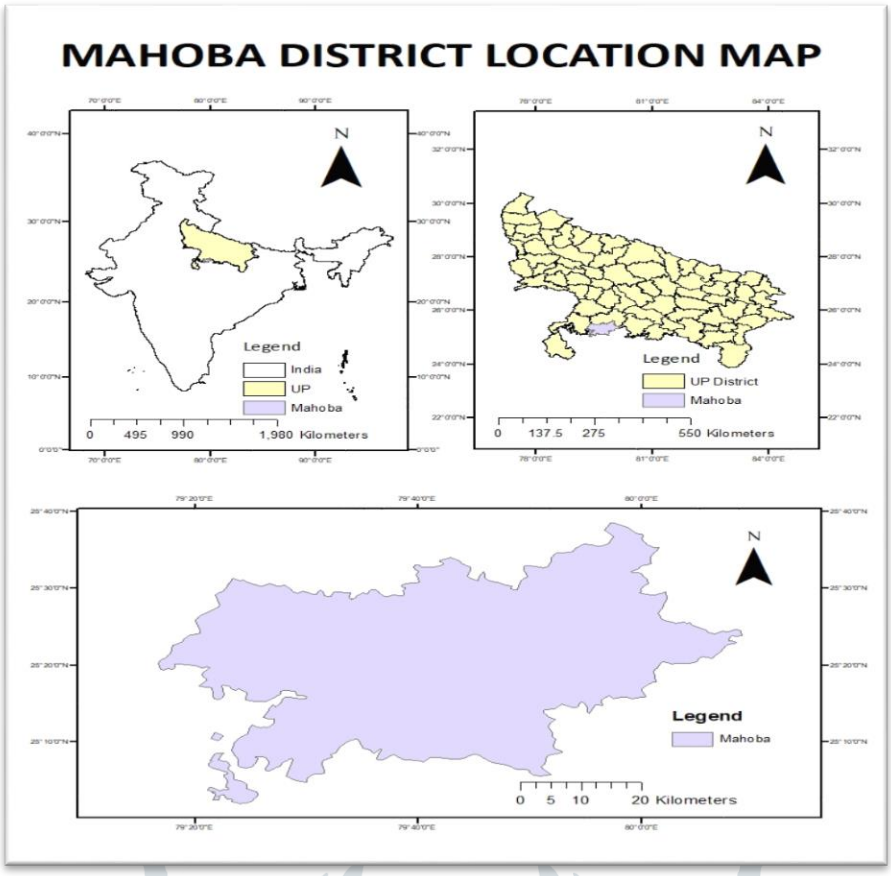

Figure 4.1: Map of Study area

V.MAJOR CAUSES OF WATER SHORTAGE

The problem of water shortage is faced by people of all four blocks of Mahoba district of Bundelkhand region. There are seven dams in the study region thereafter the thirst of Earth could not be quenched. The surface and underground water level is depleted day by day. According to the field survey, according to people's perception the major factors of water depletion in surface and underground water level in all four blocks are shown below table.

Table 5.1: Major factors of surface and ground water shortage (in percent)

District	Less Rainfall	Deforestation	Tube wells	Wells	Don't know	Total
Charkari	42	21	20	14	3	100
Jaitpur	41	22	20	12	5	100
Kabrai	44	25	22	7	2	100
Panwari	48	26	21	4	1	100
Study Region	43.75	23.50	20.75	9.25	2.75	100
Source: Personal field survey, 2023						

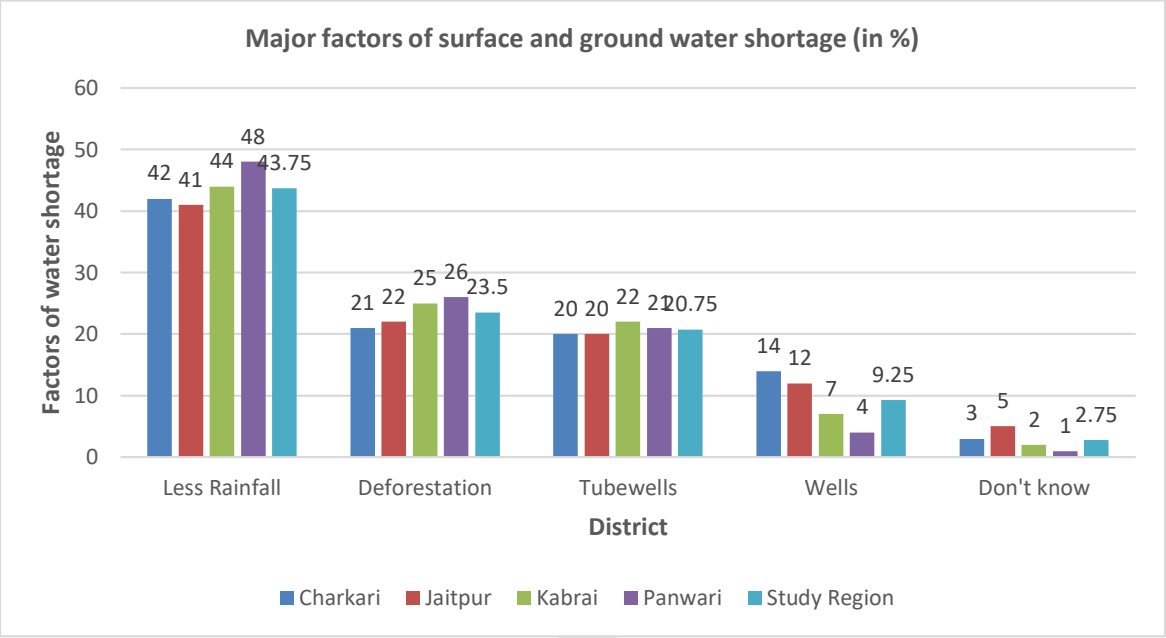

Figure 5.1: Major factors of surface and ground water shortage (in %)

According to people perceptions in charkari block of study region about surface and grond water depletion is less rainfall according to 43.75 percent, the second domain perception factor is deforestation according to 23.50 percent people, third domain perception factor is tube wells according to 20.75 percent people and the fourth domain perception factor is wells according to 9.25 percent people.

If we look at the case of Charkari Block, according to people's perception, 42 percent of people believe that less rainfall is the primary cause of surface and ground water depletion, 21 percent believe that deforestation is the primary cause, 20 percent believe that tube wells are the primary cause, and 14 percent believe that wells are the primary cause.

The major factor is less rainfall of water depletion according to all blocks people opinion, minimum 41 percent people of Jaitpur, 44 percent of Kabrai and maximum 48 percent people in Panwari block. According to 21% of individuals in Jaitpur block, 25% in Kabrai block, and up to 26% in Panwari block, deforestation is the second domain important issue. According to 20% of individuals in Jaitpur block, up to 22% in Kabrai block, and 21% in Panwari block, tube wells are the third domain's important factor. According to maximum 12 percent of residents in Jaitpur block, 7 percent in Kabrai block, and a minimum of 4 percent in Panwari block, wells is the fourth domain key factor.

If we look at the actual causes of water scarcity in the study area, we can see that there is less rainfall, poor geology, a high rate of evaporation, excessive use of water resources, mining, ignorance, urbanisation, pipelines in poor condition, poor water management in agriculture, and other factors that are discussed below:

Less rainfall: In north-central India, the Mahoba district of the Bundelkhand region is situated in a dry area. Its location is distant from the sea, and as a result, when the monsoon hits this area, it is weaker. In the research area, there is an average rainfall of 750 to 1000 mm.

Geology: Mahoba district is a plateau region and hard rocky region. Due to this feature of the land, the process of water seepage is so difficult, hence groundwater recharge is not done properly. This is also a major factor of water shortage in the study area.

High rate of evaporation: The location of Mahoba district is near the Tropic of Cancer toward north, so about half the year from April to September, the amount of sun's heat is abundant and high temperature air blows at that time. The high rate of evaporation due to these harsh weather conditions puts the region's watersheds in a state of drought.

Excess use of water: This is the main reason for the scarcity of water. Ground water, followed by canal water, is our principal supply of drinking water and agricultural water. People use borewells, tube wells, wells to use below groundwater and they have no limit and management to install borewells and tube wells. The density of tube wells increases day by day and fails within a short span of 5 to 10

years as the aquifers are emptied due to excessive use of ground water and about 8 to 10 percentage people started the use of tube wells in last two decades.

Mining: This is also the main reason for the lack of water. Stone mining is done in the study area. Large quantities of explosives are used to tear apart the earth's chest to extract the stones. Due to these large explosives, underground water aquifers are destroyed, then the area around mining activities is not suitable as usable water. Some major mining companies in district are Kumar granite, SS granite, Central stone Udyog, SG mines etc.

Lack of awareness: Ignorance of the people is one of the major factors of water shortage. Local people do not know how to manage and use water in the event of low availability of water and about 2.75 per cent do not know about the reasons for water shortage in their area. Due to the ignorance of the people, they do not use water harvesting and other traditional techniques and methods, instead they use more water for cleaning, bathing, brushing, cooking etc. These conditions create water shortage conditions.

Urbanization: Expansion of urbanization means expansion of concrete surface cover which helps in increasing surface runoff. Due to this increased surface runoff, the rainwater completely drains into the sewage and mixes with the dirty water. The seepage of rainwater stops and the groundwater recharge process stops. This is the reason that the ground water in urban areas is decreasing day by day and in summer these areas are also facing the serious problem of shortage of drinking water.

Worst conditions of pipelines: Poor planning of pipeline distribution is the biggest factor in water shortage. Water leakage is a common problem in these pipelines. In many areas, due to pipe leakage, soil mixes with the water supply or creates blockage in the water supply, reducing the quality and quantity of water supply in the study area.

Agriculture and irrigation: Mismanagement in agricultural cropping patterns and irrigation techniques is a major factor in water scarcity. According to the individual field survey of the study area, about 37 percent people of the study area cultivate mint crop and 28 percent of the people in the study area cultivate wheat, these crops require more water than other crops according to the water availability area consumes. Also, people have not sufficient knowledge that how much water is required for any special crop that's why so much water is wasted in excess irrigation.

These are major factors of water scarcity in the study area and other minor factors like improper watershed management, climate change, deforestation, changing land use patterns, watershed treatment, lack of cleanliness of canals, rivers and ponds etc. Due to these reasons the study area creates this dreadful situation.

VI.EFFECTS OF WATER DEFICIT

Water is the basic requirement to survive any civilization. According to recent studies, by 2030 there will be no enough water available to fulfill the demands of every people. Several effects of the water deficit in the research area are largely covered below:

Increased conflicts: fresh water is often shared by two or more block, district, villages, states which lead to more conflicts between local peoples of the country for fresh water. As this type of regular overuse of water may increase the potentially threaten for our security.

Lack of access to clean drinking water: Water scarcity in the study area has a direct negative impact on the availability of drinking water, with the ground water level depleting day by day, making it beyond the reach of the local people after some time. Multinational companies will start setting up drinking water factories and then start selling packaged drinking water after which they will take over the major drinking water sources. Then it becomes difficult for common people to access clean drinking water sources. To get drinking water from the source to the residence in rural areas, 64% of individuals must walk roughly 400 meters, and 36% must walk farther.

Agriculture: the impact of water shortage is directly on agriculture; the irrigation requirement of crops cannot be fulfilled in the situation of water scarcity. Then crop like paddy, sugarcane, wheat, cotton, soyabean etc. will be not cultivated in the study region and the situation of lack of diversity in the crops are exist many more agricultural lands converted into barren land.

Food shortage: food production struggles to meet increased demand due to declining water supplies and the rate of population growth. Due to shortage of water, food crops like paddy and wheat which consume high water to irritate are difficult to cultivate then shortage of food is common in that situation.

Diseases: water is very important resource which is used in daily life but due to lack of water availability without proper sanitation, various issues are rises which causes mental health issues including depression, anxiety; and physical issues due to consumption of dirty water like cholera, diarrhea etc.

Migration: due to shortage of water it may also lead to migration because in further time this region is not suitable for agricultural and manufacturing sites. Then thousands of people lose their jobs and income sources because mostly population involves in primary activities and depends on secondary activities. So, they have to forcefully migrate from this area to another suitable place.

Cash-strapped: people who are facing with the problem of water shortage are also dealing with problem of cash-strapped because without water they have limited resources in agriculture, fisheries and secondary activities and they facing the situation of poverty and they also find it difficult to eat a full stomach for two times.

Energy production: in India, about 5132 MV energy is produced by small and big hydropower plants which contributes to 13 percent energy production by water. There are many small hydropower electric plants on rivers in the study region but due to scarcity of water its negative impact on energy production will be seen.

Loss in biodiversity: Due to lack of water some plants may become extinct due to unavailability of water or their thirst. Many animals may also die of thirst or may migrate from this area to another suitable location in search of water as overuse of water destroys their natural habitats and leads to loss of biodiversity.

VII.SUGGESTIONS

For water conservation some following methods and techniques can be used which are helpful to easily survival in situation of water shortage:

Rainwater harvesting system is a technology that has been going on since ancient times. This is the technology in which rainwater is directly stored on roofed and underground tanks for further use in dry days. Rainwater is an essential resource which doesn't spoil for a long time.

Government and NGOs should organize awareness program for water conservation. They should discuss the value of and access to water in the research area, advocate water conservation through dramatic water-saving displays, and impart water-saving methods and techniques to all age groups of both educated and illiterate people.

Mining work should be done under the supervision of government agency to stop the limitless of mining. Ban on the big explosives used to break stones which also destroyed the underground water aquifers, instead they can use small explosive and machineries to break rock to escape the distribution of ground water aquifers.

Due to expansion of urbanization and concreted surface perception of rainwater is totally stopped. Keeping in view the water conservation, we should focus on vertical development instead of horizontal development and should create kutcha watershed at micro level in large colonies so that rain water will not flow completely into sewerage. This stored water can be used again and again by recycling process and it also helps to recharge the underground water.

Government should take quick action to repair the leakage of pipelines and spread the pipelines to facilities of water to each house and some special preference should be provided to old people whose children are migrate to other places for education and jobs, they are alone at home and not able to bring water from source to house.

People should have to pay attention towards the irrigation methods and crops farming. Mostly farmers used furrow method of irrigation instead they should use sprinkle, drip and center-pivot irrigation techniques and government should give subsidy to install these projects for latest technology. Also, farmers used crop cycle and cultivate those crops which consume less water.

By using the techniques in modified water tape without losing functionality of water. Normal tap excludes approx. 10 liters water per minute instead we can use spray mode tape which exclude 2 liters water minute and mist mode tape which exclude 0.3-liter water per

minute. Normally we use water that touches skin. By this technique we can use every drop of water by increasing the surface area of the tap water.

VIII.CONCLUSION

Water is an important resource for life as it is the basis of life for drinking and for secondary uses such as bathing, cleaning, power generation, food, agricultural cooking, etc. In India, many areas suffer from the problem of water shortage and they have many negative effects. According to field survey in our study area, in Mahoba district of Bundelkhand, 43.75 percent of the people felt that the major domain factor of water shortage is low rainfall, 23.50 percent people believed that deforestation is the major domain factor of water shortage, 20.75 percent people felt that tube wells is the major domain factor of water shortage, 9.25 per cent people believe that wells are the major domain factor of water shortage and 2.75 per cent people are unaware of the factors of water shortage.

Other actual causes are less rainfall, geology of the study region, high rate of evaporation, excess use of water, mining, lack of awareness, urbanization, conditions of pipelines, agriculture, improper watershed management, climate change, etc. are discussed in this research paper. There are many negative impacts such as increasing conflicts between local people, lack of access to clean drinking water, decreasing quality and quantity of agriculture sector, food shortage, many mentally and physically diseases, migration, poverty, decrease energy production, losses in biodiversity etc.

Should take quick action to solve this problem, an attempt been made by suggesting some methods and techniques such as traditional methods of water harvesting, awareness programs, modification in techniques of mining, urban planning, selection of crops and irrigation techniques etc. By these techniques we can use every drop of water and the facilities which we are taking today can be made available for future generations.

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