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ASSESSMENT OF IMPACT OF AGRICULTURE ON WATER RESOURCE THROUGH WATER BUDGETING

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Abstract: *In this research work, socio-economic parameters were included which are impacting agriculture sector directly and surveyed various households of the selected villages. The purpose of this survey was to increase awareness amongst the villagers for water conservation and water budgeting enabling them to carry out water budgeting on their own for sustainable future development.*

1. INTRODUCTION:

Around 71% of the Earth's surface is covered by water. It is vital for all known forms of life. On Earth, 96.5% of the planet's crust water is found in seas and oceans, 1.7% in groundwater, 1.7% in glaciers and the ice caps of Antarctica and Greenland, a small fraction in other large water bodies, 0.001% in the air as vapor, clouds (formed of ice and liquid water suspended in air), and precipitation. Only 2.5% of this water is fresh water, and 98.8% of that water is in the form of ice (excepting ice in clouds) and groundwater. Less than 0.3% of all freshwater is in rivers, lakes, and the atmosphere, and an even smaller amount of the Earth's freshwater (0.001%) is contained within biological bodies and manufactured products. A greater quantity of water is found in the earth's interior.

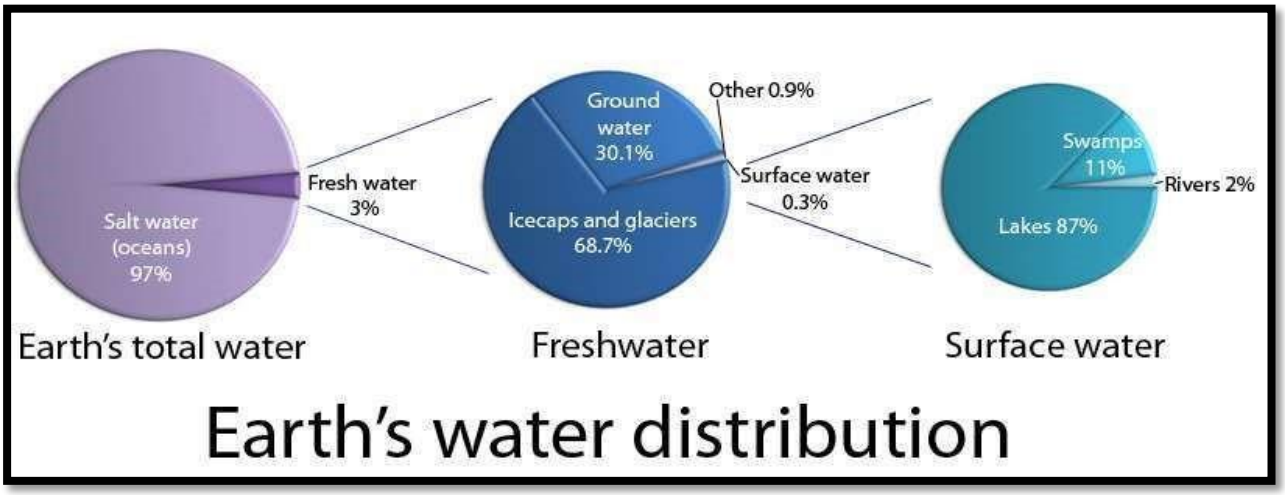

Figure 1: Water resources in India and impact of climate change:

1.1 Water resources in India and impact of climate change:

The surface water and groundwater resources in India play vital roles in agriculture, fisheries, livestock production, forestry and industrial activity. Water and agriculture sectors in India are largely dependent on monsoon rainfall. The demands on the water resources in the country by the several sectors are, not surprisingly, dominated by the agriculture sector. In 1999, agriculture consumed 85.3 per cent of the water, industry 1.2 per cent, energy sector 0.3 per cent, and other sectors 6.4 per cent, whereas domestic consumption was 6.6 per cent

1.2. Water budget:

Water budget for a given area can be looked as water inputs, outputs and changes in storage. The inputs into the area of investigation (precipitation, groundwater or surface water inflows, anthropogenic inputs such as waste effluent) must be equal to the outputs (evapotranspiration, water supply, removals or abstractions, surface or ground water outflows), as well as any changes in storage within the area of interest.

1.3. Water Footprint:

The water footprint measures the amount of water used to produce each of the goods and services we use. It can be measured for a single process, such as growing rice, for a product, such as a pair of jeans, for the fuel we put in

our car, or for an entire multinational company. The water footprint can also tell us how much water is being consumed by a country – or globally – in a specific river basin or from an aquifer.

1.4. Global Water footprint:

Founded on a decade of research and application, the Global Water Footprint Assessment Standard lays out the internationally accepted methodology for conducting a Water Footprint Assessment. The standard has been applied and tested worldwide across many sectors and includes detailed instruction and guidance on the following:

- How to calculate the green, blue and grey water footprint to understand the geographic and temporal allocation of water resources for industry, agriculture and domestic water supply
- How to conduct a water footprint sustainability assessment which includes criteria for understanding the environmental sustainability, resource efficiency and social equity of water use, for both consumption and pollution
- How to use the results of the water footprint accounting and sustainability assessment to identify and priorities the most strategic actions to be taken in local, regional, national and global scales, individually and collectively

The Global Water Footprint Assessment Standard will help us achieve fair and smart use of the world's fresh water.

1.5. Water footprint of India:

The Internal And External Water Footprints Of The Indian States In High Chhattisgarh population and low population Delhi population.

1.6. India's Agriculture Sector:

India is 2nd worldwide in farm output. Agriculture and allied sectors like forestry and fisheries accounted 13.7% of the GDP (Gross Domestic Production) in 2013, and employed 50% of the workforce. The irrigation infrastructure includes a network of canals from rivers, ground water, well based systems, tanks and other rain water harvesting products for agriculture activities. Today ground system is the largest, covering – 160 million ha of cultivated land in India with 39 million ha irrigated by ground water, 22 million ha by irrigated canals and about two third of cultivation in India is still depending on monsoon.

"The earth, the land and the water are not an inheritance from our forefathers but on loan from our children. So, we have to handover to them at least as it was handed over to us." - Mahatma Gandhi

2. Types of Irrigation Systems:

There are many different types of irrigation systems, depending on how the water is distributed throughout the field. Some common types of irrigation systems include:

- **Surface irrigation:** Water is distributed over and across land by gravity, no mechanical pump involved.
- **Drip irrigation:** A type of localized irrigation in which drops of water are delivered at or near the root of plants. In this type of irrigation, evaporation and runoff are minimized.
- **Sprinkler irrigation**: Water is distributed by overhead high-pressure sprinklers or guns from a central location in the field or from sprinklers on moving platforms.

3. METHODOLOGY:

From the secondary data collected through remote sensing and govt reports we selected reports of Gujarat we performed water budgeting and agricultural resource mapping for carbon emissions and sustainable water consumption. For the research we designed a socio-economic Questionaire and on the basis of questionnaire we designed this research.

4. RESULT AND DISCUSSION:

From the data, it is inferred that all three villages are in over-exploited category. Annual water usage in the three villages of this cluster varies from 278 to 334%.

4.1 Requirement:

Village	Area Hectares	Annual Average	Population		Requirement of water for		
			Human	Livestock	Drinking & Cattle Total		

		Rainfall (mm)			Domestic Purposes		
					Tanks (1 Tank=50000 litres)		
Dabhalaa	1318	798	6000	20210	3449	3673	7122
Mahadevpura	220	798	1500	1581	646	697	1343
Manekpura	180	798	950	819	395	417	812
Total	1718	798	8450	22610	4490	4787	9277

4.2 Consumption

Village	Water Availability (in Tanks)	Water Consumed (in Tanks)			% Consumption	Status
		Irrigation	Drinking and cattle	Total		
Dabhalaa	98171	280500	9034	289534	295	Over-Exploited
Mahadevpura	19840	64091	2109	66200	334	Over-Exploited
Manekpura	17718	48510	730	49240	278	Over-Exploited
Total	135729	393101	11873	404974	298	Over-Exploited

From the above data it was clear that the cluster of these three villages in Vijapur block were over-exploited, meaning that the resource utilization was in excess of availability i.e. more than 100%. This has resulted in deterioration of water quality and depletion of water levels. It was observed that water levels were depleting and there has been a sharp decline in last two decades. In village Dabhala groundwater reserve has reached to an alarmingly low level. The below given data set gives a grim picture of the available resource left for future generations:

Village	Area Hectares	Annual Average Rainfall (mm)	Pumping Levels	Aquifer limit
			(in Meters)	
Dabhala	1318	798	285	300
Mahadevpura	220	798	185	270
Manekpura	180	798	185	260

5. CONCLUSION:

After deliberations with the community and analysis of the data it is observed that community lacks awareness regarding water availability and usage. Large amounts of water are being wasted in both agricultural activity and domestic usage. Water levels are fast dwindling in the area and it is affecting the quality of the water. Traditional irrigation practices and excessive use of chemical fertilizers is also affecting the quality, quantity and agricultural production of the area.

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