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Towards Rethinking the Water Conservation Techniques in Order to Deal for Drought Area, A Case of Jhansi for Designing Rural Development Training Institute

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Abstract: India has 16% of the world's population and only 4%of the world's water resources, which are depleting rapidly. The demand for water is expected to grow from 40 billion cubic meters currently to around 220 in 2025. Water is one of the most important inputs essential for crops. Both its shortage and excess affect the growth and development of the plants, yields and quality of produce. There are numerous methods to reduce such losses and to improve soil moisture. The most important step in the direction of finding solutions to issues of water and environmental conservation is to change people's attitudes and habits; this includes each one of us. Droughts are considered natural hazards which also have the significant impact on the sustainable management of water and sanitation for all. Droughts can lead to water scarcity and reduce access to clean drinking water. Drought is a natural hazard, known primarily in terms of scarcity or supply deficit of water due to failure of rainfall, deficiency of reservoirs and water resources, resultant failure of crops, and consequently a level of serious socio-economic distress. The study will reduce the climatic risk of drought in the region and will also reduce the risks of lives. Climatic resilience will encourage people towards environmental consciousness.
Keywords: Water, conservation, technology, Rainwater-harvesting.

I. INTRODUCTION

Water needs no introduction, the importance of this is known to one and all. However, despite water being the basic human need, this precious resource is being wasted, polluted and getting depleted. Every drop of water is precious but we continue to waste it like it is a free natural commodity. 98% of water on this planet is salty and is not fit for human consumption. Out of the 2% of fresh water reserves, 1% is locked up in form of ice in various regions around the world. Hence; only1%oftotal water reserves are available for our domestic & industrial use. Many cities in India and around the world are already facing sever water shortages due to reduced rainfall, man-made climatic changes, reduction in ground water levels, population explosion, industrialization and staggering amount of water wastage because of negligence by users & dilapidated water supply systems. The importance of water in a country's economic growth should not be undermined.

Water pollution, unavailability of drinking water, inadequate sanitation, open dumping of wastes, loss of forest cover is some of the problems faced by many parts of India. The daily struggle for procuring water, mismanagement of waste water, improper sanitation are common features and are leading to serious consequences on human health and the economy of the country. The situation demands immediate intervention in the management of these rapidly growing problems, especially through an integrated approach for water, sanitation and related issues.

II. WATER CONSERVATION

Water conservation can be defined as:

1) Any beneficial deduction in water loss, use, or waste.
2) A reduction in water use accomplished by implementation of water conservation or water efficiency measures; or,
3) Improvedwatermanagementpracticesthatreduceorenhancethebeneficialuseofwatera water conservation measure is an action, behavioral change, device, technology, or improved design or process implemented to reduce water loss, waste, or use. Water efficiency is a tool of water conservation. That results in more efficient water use and thus reduces water demand.

III. PARAMETERS

The parameters of water conservation efforts include:

1) Sustainability- To ensure availability for future generations, the withdrawal of fresh water from an ecosystem should not exceed its natural replacement rate
2) Energy conservation- Water pumping, delivery, and wastewater treatment facilities consume a significant amount of energy. In some regions of the world over 15% of total electricity consumption is devoted to water management
3) Habitat conservation- Minimizing human water use helps to preserve fresh water habitats for local wildlife and as well as reducing the need to build new dams and other water diversion infrastructure.

IV. CONSERVATION TECHNOLOGIES

Process of conservation may be synonymous of preservation against loss or waste. Briefly stated it means putting the water resources of the country for the best beneficial use with all the technologies at our command. Water conservation basically aims at matching demand and supply. The strategies for water conservation may be demand oriented or supply oriented and/or management oriented. The strategies may vary depending upon the field of water use, domestic, irrigation or industrial use.

A. Rainwater Harvesting

Rainwater harvesting essentially means collecting rainwater on the roofs of building and storing it underground for later use. Not only does this recharging arrest groundwater depletion, it also raises the declining water table and can help in water supply. Rainwater harvesting and artificial recharging are becoming very important issues. It is essential to stop the decline in groundwater levels, i.e. prevent sea water from moving landward, and conserve surface water run-off during the rainy season

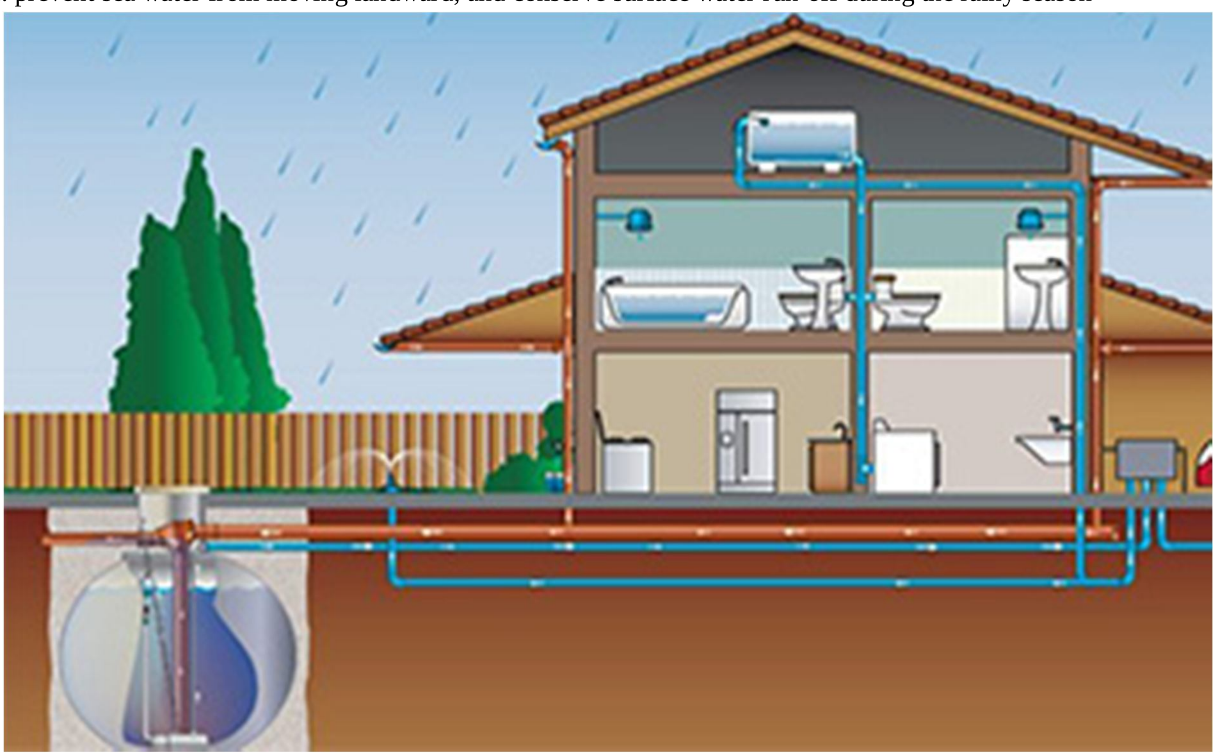

Fig. 1 Rain water harvesting

B. Advantages

1) Provides self-sufficiency to water supply.
2) Reduces the cost for pumping of groundwater.
3) Provides high quality water, soft and low in minerals.
4) Improves the quality of ground water through dilution when recharged.
5) Reduces soil erosion &flooding in urban areas.
6) The roof top rainwater harvesting is less expensive & easy to construct, operate and maintain.

C. *Water Efficient Tap*

These taps is a simple device which dispenses a limited amount of water slowly and facilitates a thorough hand wash. In case of piped water supply, every time the tap is opened for a hand wash, an average of 300 - 500 ml of water is utilized. Using these Tap it is possible to have a good hand wash with only 60 to 80 ml of water.

Fig. 2 Water efficient tap

D. *Propagation of Dry Garden / Eco Lawn*

As a step towards water conservation and propagation of native plant species, drought resistant plantation (plants requiring less water) should be carried out.

E. *Soak pit Construction*

Water runoff sand water logging are combated by constructing soak pits near water points like hand pumps. This is a sanitation measure and also helps in recharge of ground water.

V. INTRODUCTION TO THE CITY

Jhansi is a prominent city of Bundelkhand region of Uttar Pradesh state. Jhansi grew in popularity during the reign of the Marathas because of the heroics of its valiant queen, Rani Lakshmi Bai. She had valiantly fought against the Britishers during the 1857 revolt. Jhansi fort was built in 1613 and today has a wonderful collection of sculptures that depicts the history of Bundelkhand. There are many sculptures of the 9th to 12th centuries found in the Rani Mahal too. The museum of Jhansi houses regional antiques like sculptures, manuscripts, paintings, arms and silver, gold and copper coins. Jhansi has a major and Key Road and Rail junction. The National Highway Development Project, initiated by the government of Atal Behari Vajpayee, has sparked Jhansi's development. The North-South Corridor connecting Kashmir to Kanyakumari passes through Jhansi. The East-West corridor also goes through this city, so there has been a sudden rush to infrastructure and real estate development in the city.

Jhansi city is situated between the rivers Pahunj and Betwa between North longitudes 24°11´ and 25°57´and East latitudes 78°10´and 79°25´.It has an average elevation of 284 meters (935 feet)In addition, the city is well connected to all other major towns in Uttar Pradesh by road and railway networks. It is about 415 km from Delhi and 292 km from Lucknow, and the gateway to Bundelkhand. Three national highways NH-3, NH-25 and NH-76 pass through the city. As Jhansi is on a rocky plateau, the temperatures here are extreme. Temperatures reach as low as 1 degree Celsius in winter; it also reaches a maximum of 48 degrees Celsius in summer. Jhansi has lots of monsoon rains that are used for irrigation purposes. The average temperature in the rainy season lies around 36 degrees Celsius while the average rainfall is about 35 inches a year.

A. *Demography*

As per the 2011 Census, the total population of Jhansi was estimated at 507293.

B. *Present Scenario*

Industrialization has been sporadic and this in turn has led to low levels of urbanization. Living conditions are harsh especially for the rural poor who depend mainly on agricultural incomes for sustenance, and are therefore highly vulnerable to drought and failure in cropping systems and loss of employment and incomes. The level of poverty in rural areas has increased since a large number of farmers depend on rain fed agriculture (Planning Commission, 2009 & CSO, 2010). According to the inter-ministerial central team report (Samra, 2008), the water supply is not adequate.

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The failure of the monsoon has severely affected the available water in river systems. The resulting diminishing water available in surface water sources as well as depletion of groundwater tables has not only decreased the availability of drinking water for people and domestic animals, but also impacted the natural vegetation and growing grasses (crucial as fodder). Most tribal population inhabiting forests areas adjacent to rivers have no choice but to continue to exploit forests for survival and cause further over exploitation of resources. The repetitive crop failures and depletion of natural resources has led to widespread and increasing trends of migration to urban areas. With the collapse of monsoons and arrival of successive dry years, the inhabitants of city are now facing scarcity of water in almost every season. Urban areas are no better off than rural areas. The expense of securing water has been raised and the resource is treated as a commodity.

Drought is the combined effect of meteorological (reduced rainfall) and hydrological (reduced available water supply) factors. In the UP part of Bundelkhand, drought became evident in 2004-05 with a 25% short fall in monsoon rains. The rainfall deficit increased further to 43% in 2006-07 and 56% in 2007-08, leading to severe (metrological) drought conditions in Mahoba, Jhansi and Chitrakut districts. Except Tikamgarh and Datia districts, drought in the Bundelkhand region of MP commenced from 2006- 07.

Fig. 3 Water scarcity

Fig. 4 Dry well

C. Sources of Water in the City

Almost 66% of the city population gets the piped water supply. The main sources of water are river Betwa and local underground water. Jal Sansthan Jhansi is responsible for water supply and Water Production.

D. Transmission, Distribution and Storage Capacities

Most of the pipelines network is in satisfactory condition but pipelines leakage /wastages occur because of illegal tapings and connections

Strengths	Weaknesses
Satisfactory coverage	Lack of metered connections
Betwa river flowing nearby the city	Leakages
Opportunities	Using private electric pumps to suck water
Improving water quality and reducing water borne diseases	Illegal connections
Rehabilitation of the existing lines	Unwillingness to use water at the consumer end due to contamination in the supply line
Constant vigilance to control illegal connections	Water borne diseases due to poor quality of water supplied
IEC campaign to overcome illegal connections from rising main and usage of untreated water leading to contamination	Threats
Encouraging individual metered connection to increase revenue	Poor service in some areas
IEC to bring for the change in them for Individual metered connections	Contamination due to household &commercial waste directly lead to open drains and nallas

SWOT analysis of Water Supply system in the city

VI. CASE STUDY

Traditional methods of water resource management of Bundi city the water crisis that stares us in the face today is our creation. India's climate is not dry, nor down Lack Rivers and groundwater. But what we do lack is management. With unclear laws, government corruption, and industrial and human waste rendering our vast supply almost useless, the water supply crunch is real and rising. Historically water was viewed as an unlimited resource. Thus, no conventions were laid down to provide it as a basic human right. The existence of life is mainly dependent on water. The availability of ground water in Rajasthan is decreasing steadily. The main reason being decrease in average annual rainfall, excessive exploitation of groundwater and overuse of water in almost every sphere of life. Changing consumer habits increasing demand of water for agriculture and industries, increasingnumberofnuclearfamilieshaveallcontributedtothedeterioratingwateravailability.SinceIndependence, India's primary goals have been economic growth and food security, with a complete disregard towards water conservation. As Indian law has virtually no legislation on groundwater so anyone can freely extract water as long as the water lies beneath his patch of land. Relentless rapid pumping of ground water and subsequent depletion of aquifers is inevitable. The owners of wells do not have to pay for extracting water, so there is no incentive to conserve or recycle it. Modern industrialization is responsible for the crises as washing machines, flushed toilets, automobile washing, and home gardens need much water.

A. Objectives

1) To study the importance of ancient methods of water harvesting in Bundi for sustainable development of water resources of the city.
2) To study the present situation arising due top population grows than industrialization.
3) To provide concrete steps to meet future water supply.

B. Methodology

Use of primary and secondary data, field survey, use of topographical sheets and various statistical methods.

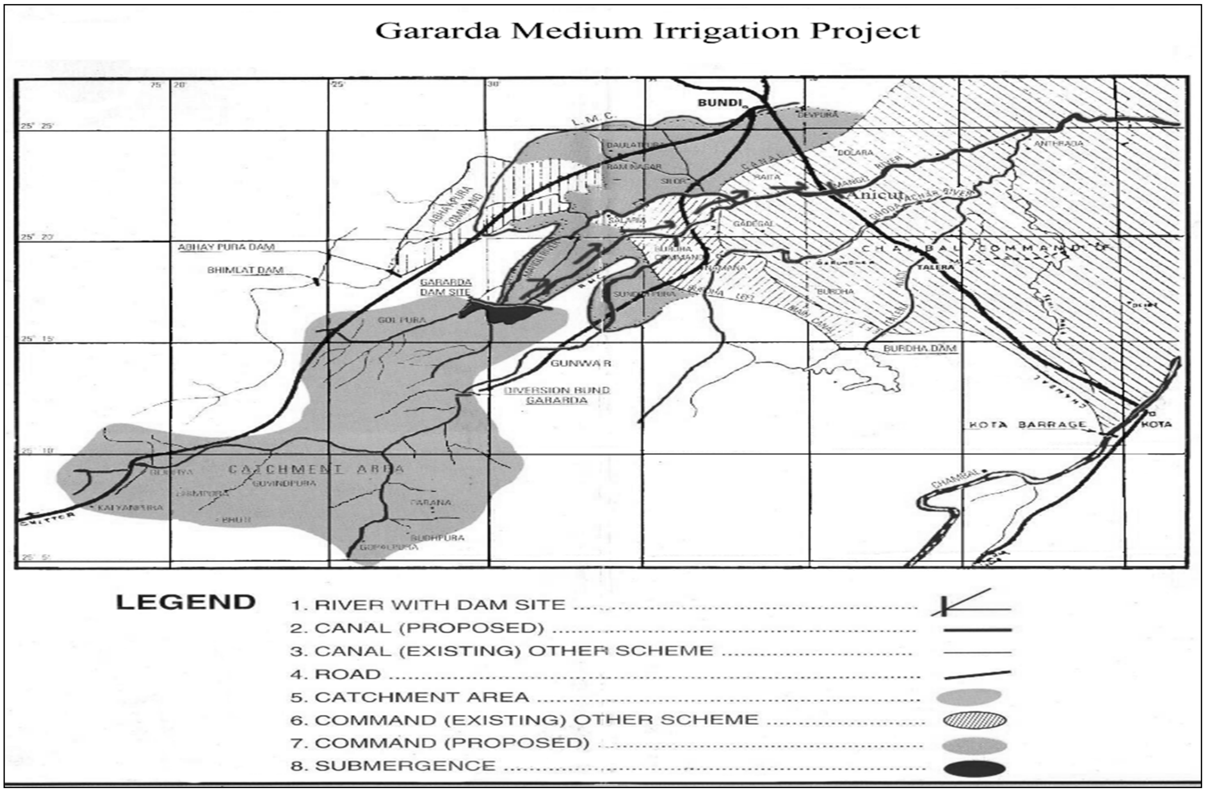
Hadauti region of Rajasthan, which experiences high rainfall, is also not untouched by water shortage. Bundi- an old city of Hadauti is also facing this problem. The geological structure of Bundi is typical as it stands on the confluence of Aravallis and Vindhyans. Aravallis Here consist of marbles chists while Vindhyans have ferulligenous limestone. The underground layers are a mixed combination of porous and non-porous rocky layers which restricts the recharging process. With steep sloppy and plateau ground having black clay soil and hard underground strata; Bundi since its formation has seen stepwells as a source of water availability. In the princely state of Bundi, stepwells were mainly constructed by the royal family or by the rich 'seths'. Water recharging in these stepwells occurred in two ways-Firstly, the rain water collected in these stepwells directly as surface runoff and secondly, the walled city had a 40feet wide and 30 feet deep trench surrounding its walled section. The trench had a 10 feet high safety wall on its one side to stop the waste from being dumped inside. This water in the trencher charged the stepwells of Bundi city. Till 1956, step wells were the only source of water in the city. There were 33 stepwells and 9 tanks to fulfill the needs of a population of 25,000. In 1959, waterworks department introduced tap connections in the city from stepwells at a cost of rupees seven lacs. Thus started the neglecting of the stepwells. After independence, rapid urbanization, break up of joint family system and too much dependence on the waterworks department led to the neglection of the stepwells thus putting them on the verge of destruction. Till 1975, 2000 gallons of water per hour was pumped out of these stepwells .Fast increase in population saw the emergence of tubewells in Bundi but due to filling of the trench by the erstwhile district administration, these tubewells soon turned dry, resulting in water supply to the city from river Mangli. 24 hour water supply in Bundi till 1982 was restricted to 4 hours per day and from 1998 onwards this came down to an hour per day. 2004 saw water supply in three days. At present, there is water supply for 30 minutes per day and in some parts of the city it is of 30 minutes per 48 hours. Today, many stepwells of Bundi have become waste disposal pits. 12 stepwells have being filled up with garbage. At present, of the 21 remaining, 4 have gone dry and of the17 only 6 have potable water.

C. Causes for the bad Condition of Stepwells

1) Increasing population saw unplanned expansion of the town and thus the natural channels of water recharge to the stepwells were blocked.
2) The roads were made by cement concrete which also stopped or minimized the groundwater seepage.
3) In1982, the district administration got the trench filled up to create a market, which led to the extinction of the distinctive recharging technique of stepwells.

4) Decrease in average annual rainfall also saw the decrease of water in the stepwells.
5) The princely town of Bundi was surrounded by dense vegetative cover over the hills which have now changed into rocky barren hills leading to decline in annual rainfall and also more surface runoff.

Due to decreasing water supply, voices are raised for connecting Bundi with Chambal. Though the demand seems to be viable but it is going to be an expensive affair as the height of Kota barrage is 250meters above sea level while that of Bundi is 266meters.



By the national parameters of 100 liters of water per person per day (PHED takes only70 liters of water per person per day), Bundi requires 10 mcft. Water per month. Just 18 kms. Away from Bundi, Gararda a misunder construction (almost complete) whichhasaprovisionof170 mcft. Of water reserved for drinking purposes. Looking at this it has enough water to meet Bundi's demands. The dam is 280 meters above sea level and is built on river Mangli (It is the present source of meeting Bundi's demands. 8 kms. away from Bundi, there is a anicut which receives rainwater from July to September and seepage from Chambal canals fromNovembertoFebruary).Theanicutis260metresabovesealevel,thusthereisaslopegradientof .009. Releasing water from the dam into the river will raise the water in the anicut and will also help in ground water recharge. Rising water pipe line and treatment plant is already functional from Mangli. Small storages are much more appropriate and effective for groundwater recharge. This is particularly important when such large proportion of agricultural production comes from the groundwater irrigated areas.

VII. WHAT WE CAN DO TO CONSERVE WATER?

1) Use only as much water as you require. Close the taps well after use. While brushing or other use, do not leave the tap running, and open it only when you require it. See that there are no leaking taps.
2) Use a washing machine that does not consume too much water. Do not leave the taps running while washing dishes and clothes.
3) Install small showerheads to reduce the flow of the water. Water in which the vegetables & fruits have been washed - use to water the flowers & plants.
4) At the end of the day if you have water left in your water bottle do not throw it away, pour it over some plants.
5) Re-use water as much as possible
6) Change in attitude & habits for water conservation
7) Every drop counts!

VIII. IMPROVE WATER MANAGEMENT

1) The close link between forests and water, and the traditional relationship between agriculture and water, need to be recognized and protected to ensure sustained productivity.
2) National water management policies should take account of the impact of trade in water-intensive goods on water availability and ecosystems integrity. For example, in water scarce regions, people should grow crops with low water requirements, or of high value compared to the water used. Options for improving the water balance by importing water intensive goods from water-rich regions should be explored, where appropriate and cost-effective.
3) The potential of rainwater harvesting for augmenting rural and urban water supply is increasingly becoming recognized. This alternative should be further explored and utilized.
4) Proper water pricing must be an integral part of water policies. However, care must be taken to ensure that the poor and socially disadvantaged are not denied access. Moreover, there must be adequate monitoring and control of market mechanisms.
5) It is necessary to study and analyze the impacts of subsidies (on water, energy, and other relevant inputs) on water use. Subsidies that inhibit water use efficiency or cause negative effects on the environment should be reduced.
6) Our traditional water management approaches and systems were both sustainable and accountable. These need to revived and invigorated. Policies must recognize and build on these.
7) Principles of reuse and recycling of water resources must be incorporated into water management plans and strategies. There must be incentives for water conservation.

IX. PUBLIC EDUCATION AND AWARENESS

1) Public awareness and education on the importance of protection of the coastal and ocean environment helps to meet social and economic needs and aspirations of the country in the long run.
2) Awareness campaigns on existing regulations for management of coastal areas need to be conducted. Education and communication material on the need for conservation and protection of rare and endangered species need to be developed.
3) Research findings on marine resources, their development and management have to be demystified. The educational and communication material targeted at the public has to be developed in local languages.
4) Opportunities for interactions between communities, policy makers, regulating agencies, NGOs, scientists, etc. need to be increased.
5) Appropriate strategies and decision-making tools that would enhance the capabilities of professionals, Government, and non-government organizations to take up local and community level action programmes need to be developed.

X. DESIGNS

SITE ANALYSIS

INTRODUCTION OF JHANSI

Jhansi is a prominent city of Bundelkhand region of Uttar Pradesh state. Jhansi grew in popularity during the reign of the Marathas because of the heroics of its valiant queen, Rani Lakshmi Bai. Jhansi City is situated between the rivers Pahunjand Betwa between North longitudes 24°11′ and 25°57′and East latitudes 78°10′and 79°25′

LOCATION OF SITE:-

INDIA

JHANSI

SITE

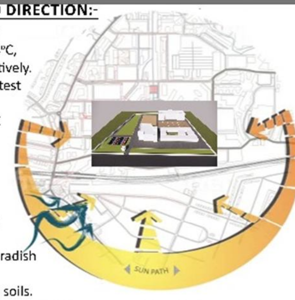
CLIMATE:-

IN THE COMPOSITE CLIMATE, PLACE LIKE JHANSI THE MAIN CONSIDERATION IS TO CUT OFF SUMMER SUN BY ALL THE MEANS AND WELCOME OF WINTER SUN WHICH CAN BE OBTAINED BY ADOPTING GOOD FORM AND PLANNING IN THE DESIGN, BY PROPER ORIENTATION, USE OF THERMAL INSULATING MATERIALS IN ROOF AND WALLS, GROUND SURFACE TREATMENT BY PROPER LANDSCAPING.

LATITUDE-25°31'N
LONGITUDE-78°33'E
ALTITUDE-838 FT.

SUN DIRECTION & WIND DIRECTION:-

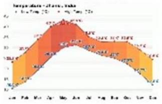
The summer, rainy and winter temperatures vary from 30-44°C, 20-24.°C and 14-21.°C, respectively. The May and June are the hottest months and some time temperature goes upto 48.0°C and minimum temperature falls to 2.0°C during December-January.



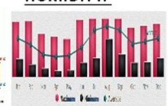
SOIL CONDITION:-

1. Bundelkhand coarse grained radish brown soils.
2. Bundelkhand coarse grained radish brown soiLand,
3. Bundelkhand clay loam black soils.

TEMPERATURE:-

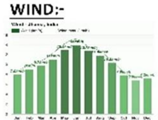


HUMIDITY:-

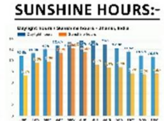


RAINFALL:-

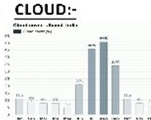
WIND:-



SUNSHINE HOURS:-



CLOUD:-



FORM AND PLANNING:-

1. Courtyard type buildings are very suitable. It is the most pleasant space for most of the year, because it allows wind and traps the sun.
2. A moderately dense, low rise development is suitable for this climate.
3. Shading of external walls through provision of louvers, fins and recessed window reduces the surface exposed to solar radiation.
4. Building blocks should be broadly spaced for breeze penetration. As a rough guide: space between two long rows of buildings should not be less than five times the height. But provision must be made for protection from cold and dusty hot winds.

CLIMATIC INFERENCES:-

1. Minimization of glare and reduction of eye strain.
2. Maximization of solar heat entering room in winter.
3. Protection again wind and rain.
4. Provision of adequate ventilation at all times.
5. Control of insect, dirt and dust.
6. Adequate exterior vision.
7. Maintenance cost vs. External cost of sun control device.
8. Exterior appearance.

ORIENTATION:-

1. Orientation on east-west axis, long elevations facing north and south to reduce exposure to sun.
2. Depending on the wind flow, the orientation of the building will be on northeast- southwest axis.
3. The building should be oriented such that a maximum no. Of opening should get the natural north light, max. Number of opening should be on north side.

SITE IMAGES AND VIEW:-

WATER CONSSERVATION (RAIN WATER HARVESTING)

METHOD TO CALCULATE DIFFERENT VALUES

The total amount of water i.e. received in the form of rainfall over an area is called the **rainwater endowment** of that area. Out of this the amount that can be effectively harvested is called the **rainwater harvesting potential**.

Rain water harvesting potential= Rain fall (mm) x collection efficiency
Annual rain fall of any city / place = X mm
Area of Roof Catchment = Y sq.m.
Height of rain fall = 0.X m
Volume Of rain fall over the plot = Area of plot x Height of rainfall
Rain water endowment of that area = (Y x 0.X) cum = A litres. (say)

Sample calculation for effectively harvested water from total rainfall
(i) Considering roof catchment is having tile finish so coefficient for roof surface can be adopted as 0.85 (say)
(ii) Another constant coefficient for evaporation, spillage and first flush wastage can be considered as 0.80 (for all situations)
Statistically and approximately only effectively harvested water quantity may be considered as = Rain Water endowment of that area ('A') x 0.80 x Surface co-efficient

Total rwh potential as per the site is :
Average rainfall = 832.6mm
Roof catchment area = 3405sq.m
Height of rainfall = 0.83m
Volume of rainfall over plot = Plot area x Ht. of rainfall = 2826 cum
Coef. of roof surface = 0.85 (tile)
Wastage = 0.80
RWH potential = (2826000 x 0.85 x 0.80) **= 19,21,680 Litres**

RAIN WATER HARVESTING TANK

LOCATION OF WATER UNDERGROUND

RWH TANK DETAILS:

The rainwater harvesting underground water tank is located at the south - west direction of the site.
The main catchment areas are the roof tops of the three building blocks connecting to the recharge pits which are connected to the underground water tank.

RWH potential = 1921680 litres, out of which 80% of the water quantity is taken into consideration excluding the water wastage and taken count on for the duration water is to be stored i.e. 12,00,000 litres.

Size of the tank = (14x28.57x3) =1200 cum.
Capacity of the tank = 12,00,000 Litres

SOME KEY FEATURES OF THE BUILDING

Energy efficient and eco-friendly phyto-remediation STP plant

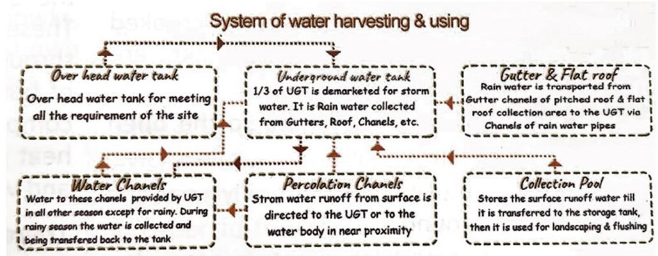
Rainwater Harvesting

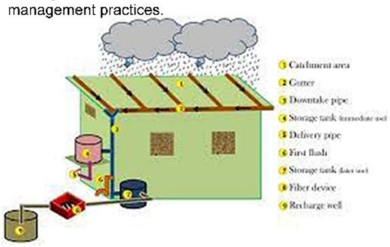
Interlocking paver blocks, allows rain water infiltrate into the ground

WATER CONSSERVATION (RAIN WATER HARVESTING)

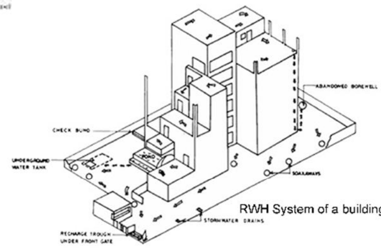
RAIN WATER HARVESTING RWH)

Rainwater harvesting (RWH) is indeed a valuable practice that involves collecting and storing rainwater for various uses, such as irrigation, watering gardens, flushing toilets, and even drinking water in some cases. It's an ancient technique that has gained renewed interest due to water scarcity issues and the need for sustainable water management practices.





TYPICAL EXAMPLE OF RAIN WATER HARVESTING SYSTEM



RWH System of a building

ADVANTAGES OF RWH

Rainwater harvesting offers several benefits, both for individuals and communities:
Water Conservation: Reduces the demand on traditional water sources like rivers, lakes, and groundwater.
Cost Savings: Depending on location and water usage, rwh can significantly reduce water bills, especially if used for non-potable purposes like gardening or flushing toilets.
Flood Mitigation: Reduces risk of flooding in urban areas by capturing/diverting excess rainwater away from drainage systems.
Improved Water Quality: Rainwater is typically free from many of the contaminants found in other water sources, making it ideal for certain uses like irrigation or laundry.
Sustainable Agriculture: Harvested rainwater can be used for irrigation in agriculture, reducing the reliance on groundwater and surface water sources and promoting more sustainable farming practices.

TECHNIQUES:

Rainwater harvesting involves collecting, storing, and using rainwater for various purposes. There are several techniques for rainwater harvesting, each suited to different contexts and needs.
Here are some common rainwater harvesting techniques:

Rain Barrels
Gutters and Downspouts
Rainwater Tanks
Ponds and Reservoirs
Green Roofs
Permeable Paving
Check Dams and Swales
Fog Harvesting

Each of these techniques has its advantages and limitations, and the suitability of a particular method depends on factors such as climate, available space, water requirements, and budget.

GREY WATER TREATMENT

GREY WATER

Greywater (or grey water, sullage, also spelled gray water in the United States) refers to domestic wastewater generated in households or office buildings from streams without fecal contamination, i.e., all streams except for the wastewater from toilets. Sources of greywater include sinks, showers, baths, washing machines or dishwashers.

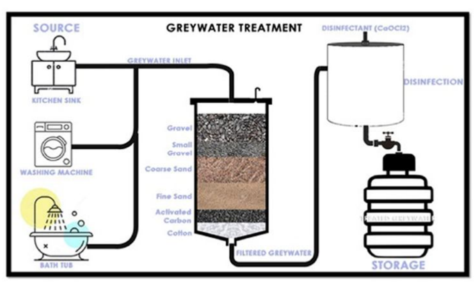
TYPICAL EXAMPLE OF CLEAN, GREY, AND BLACK WATER

BENEFITS OF GREY WATER TREATMENT

A primary benefit of using a greywater system is lowered water usage. Because it makes use of recycled water, it can significantly reduce overall water consumption and water bill.

The various benefits are as follows:
Greywater is really useful for Irrigation
Greywater is Beneficial and Safe for Plants
Helps Turn a building into an Eco-Friendly one
Greywater Systems Help Manage Dry Soil Problems
Greywater Systems in Watering Plants

GREY WATER TREATMENT - METHODOLOGY



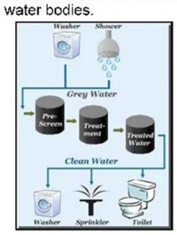
A SCHEMATIC DIAGRAM OF THE PROPOSED GREYWATER TREATMENT PROCEDURE.

A **gravity-governed method** has been applied, where natural strata were used to treat the greywater. Also, applied **bleaching powder** to the **disinfection process**.
Filtration media was prepared by using a column packed with filtration media (i.e., cotton, activated carbon, sand (fine (<0.5 mm) and coarse (1.0 mm/0.5 mm)), and gravel (small—(4.0 mm/2.0 mm) and big (4.0 mm/12.0 mm)).
Where activated carbon (<1.0 mm) captures color, odor, and organic pollutants, sand, and gravel capture suspended solids and microorganisms.

Treatment of greywater may include:
Pre-filtration
Sedimentation
Flotation
Post-filtration or UV disinfection

TREATED GREY WATER USES

It is a safe and even beneficial source of irrigation water in a yard. Aside from the obvious benefits of saving water (and money on water bill), reusing greywater keeps it out of the sewer or septic system, thereby reducing the chance that it will pollute local water bodies.



CHALLENGES

If one choose to store grey water then it must be utilized in a few days otherwise the organic matter in the water will cause it to decompose.
This type of recycled grey water is **not recommended to consume**, but can be used for cleaning or toilet flushing after going through a series of treatment stages.

The usage of greywater is controlled due to the risk of disease spreading within your domestically and overseas.

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SEWAGE TREATMENT PLANT (STP)

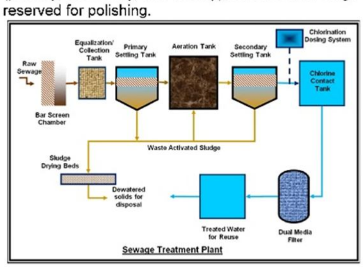
SEWAGE TREATMENT PLANT

The water we flush down the toilet is turned into potable water, and it is the job of sewage treatment plants to make this water fit for human consumption or release into rivers and oceans.
Sewage treatment plants collect, treat, and discharge wastewater, providing a service essential to environmental and public health.

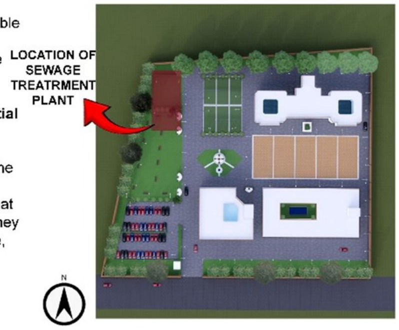
Without adequate treatment, sewage will leach into the environment and contaminate ecosystems. For example, sewage contains bacteria and chemicals that break down using oxygen in the water. In doing so, they use oxygen that fish and aquatic life needs to survive, so it needs treatment to preserve the ecosystem.

HOW STP WORKS

Sewage treatment plants run wastewater through multiple treatment stages. After preliminary filtration, there are three main stages of wastewater treatment (primary, secondary, and tertiary), with the third stage reserved for polishing.



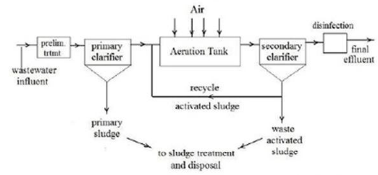
SEWAGE TREATMENT PLANT - LOCATION



STP TANK DETAILS:

The (STP) sewage treatment plant is **located at the north - west** corner of the site.
Total water consumption of the institution is considered to be = **1,10,000 Litres.**
Therefore the estimated capacity of the stp will be 90% of the total water consumption = **99,000 Litres.**
The stp tank capacity **= 100 KLD.**
Size of th tank = **11.10M X 6.35M.**
Depth of the tank = **3M.**

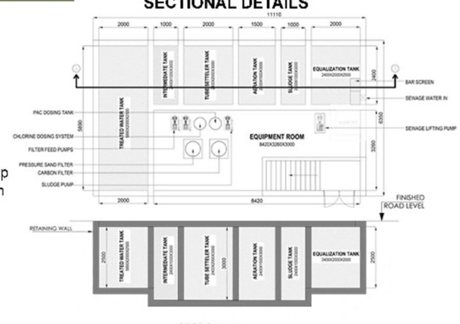
SEWAGE TREATMENT



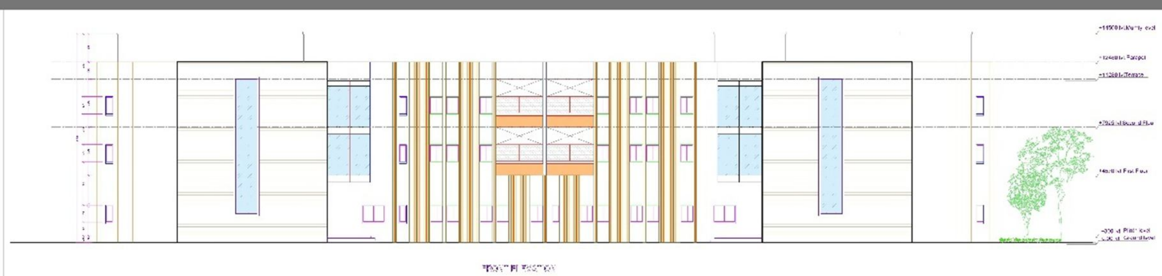
TANKS IN ORDER OF THEIR PLACEMENT

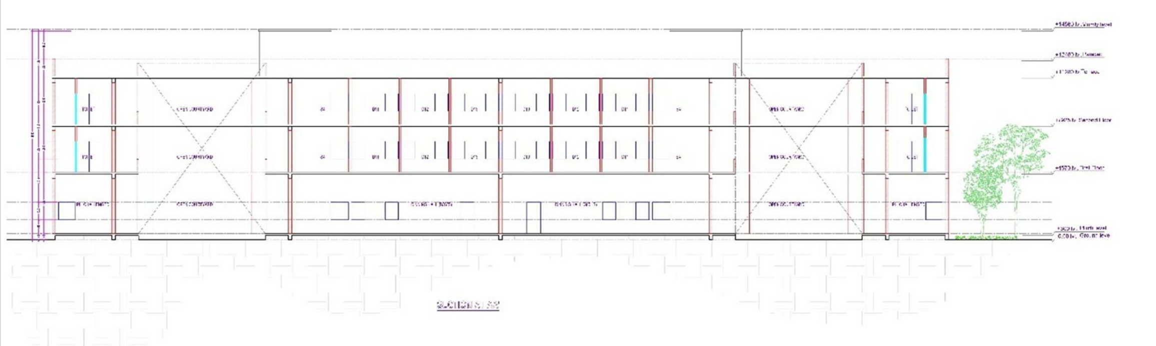
EQUALIZATION TANK
SLUDGE TANK
AERATION TANK
TUBE SETTLER TANK
INTERMEDIATE TANK
TREATED WATER TANK

SECTIONAL DETAILS



HOSTEL BLOCK





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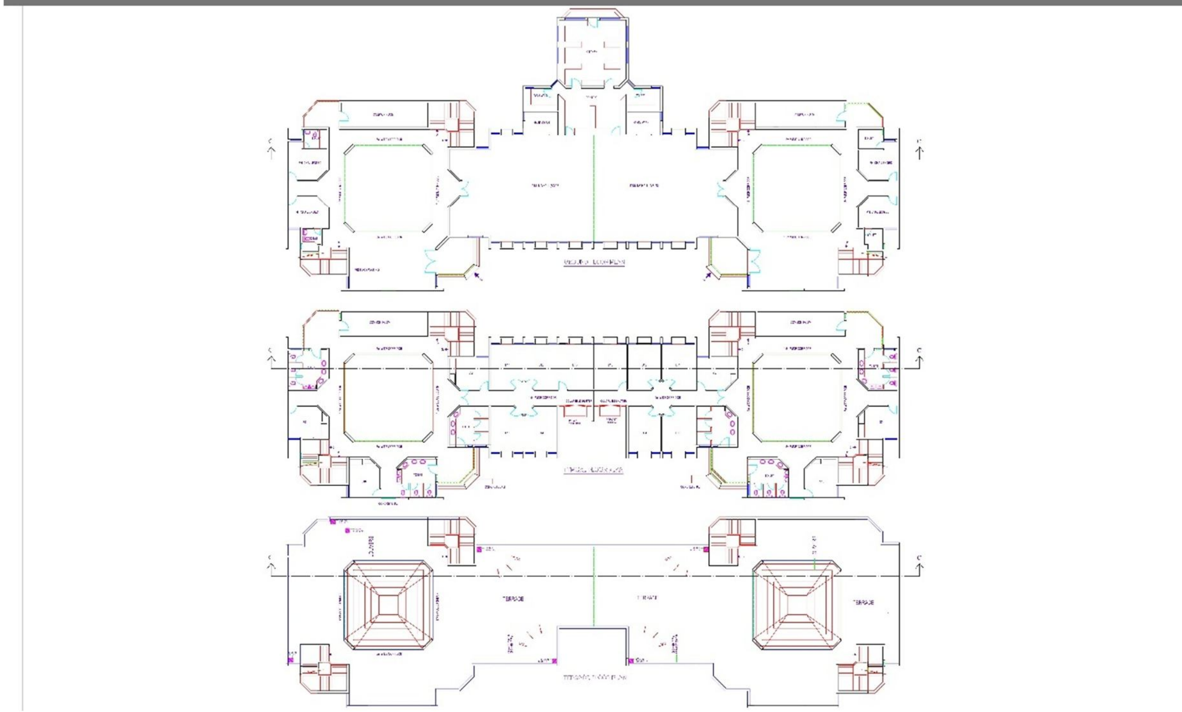

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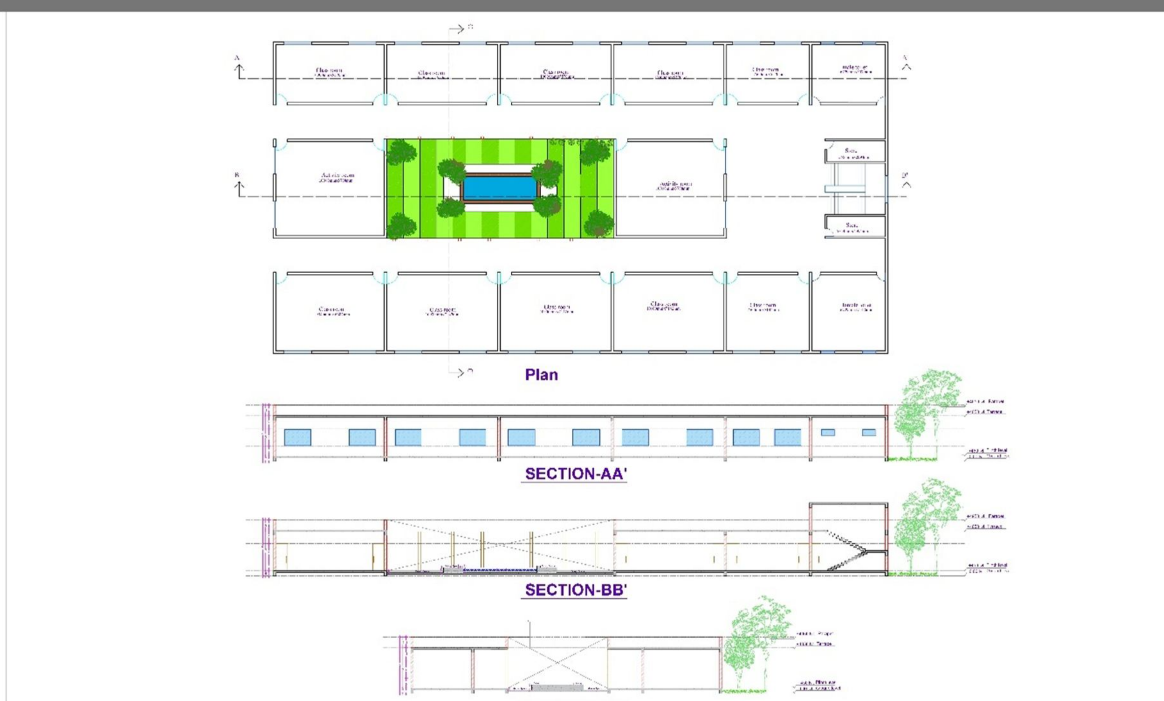

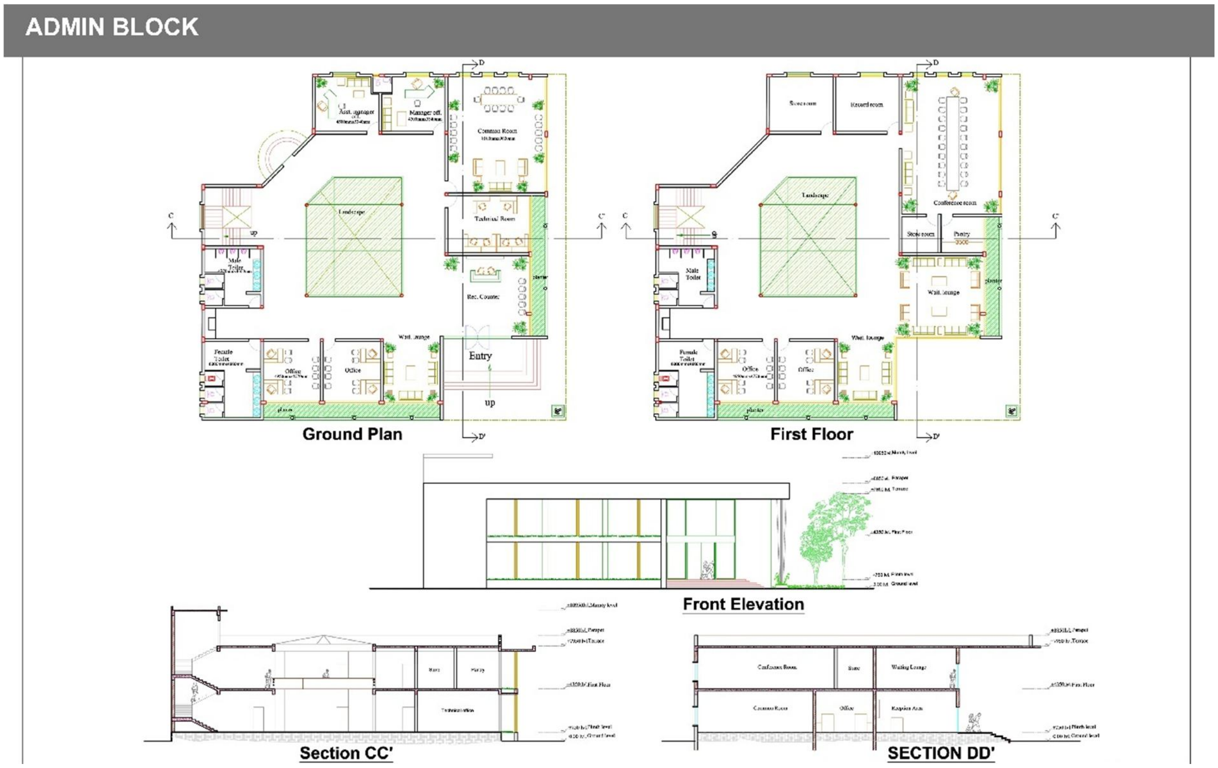
ADMIN BLOCK
Ground Plan
First Floor
Front Elevation
Section CC'
SECTION DD'


admin block
admin block

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XI. CONCLUSION

Water problems will not go away by themselves. On the contrary, they will worsen unless we, as a global community, respond and use water responsibly. So, before it is too late, let us all, as individuals, families, communities, companies & institutions, pledge towards using water wisely. Intelligence is not in lavishness but in conservation, so that our future generations can continue to enjoy the blissful feeling and touch of water. The presented study has a more unified scientific way for water resilience strategy. The given methods of gathering data sets will have an impact on understanding the issues and sources of chemical and biological pollutants issues which are posing a threat to water quality. The article stresses the spatial evaluation of water with trans-boundary policy approach for its better quality and quantity management. In developing countries, the issues are mostly among the governing body.

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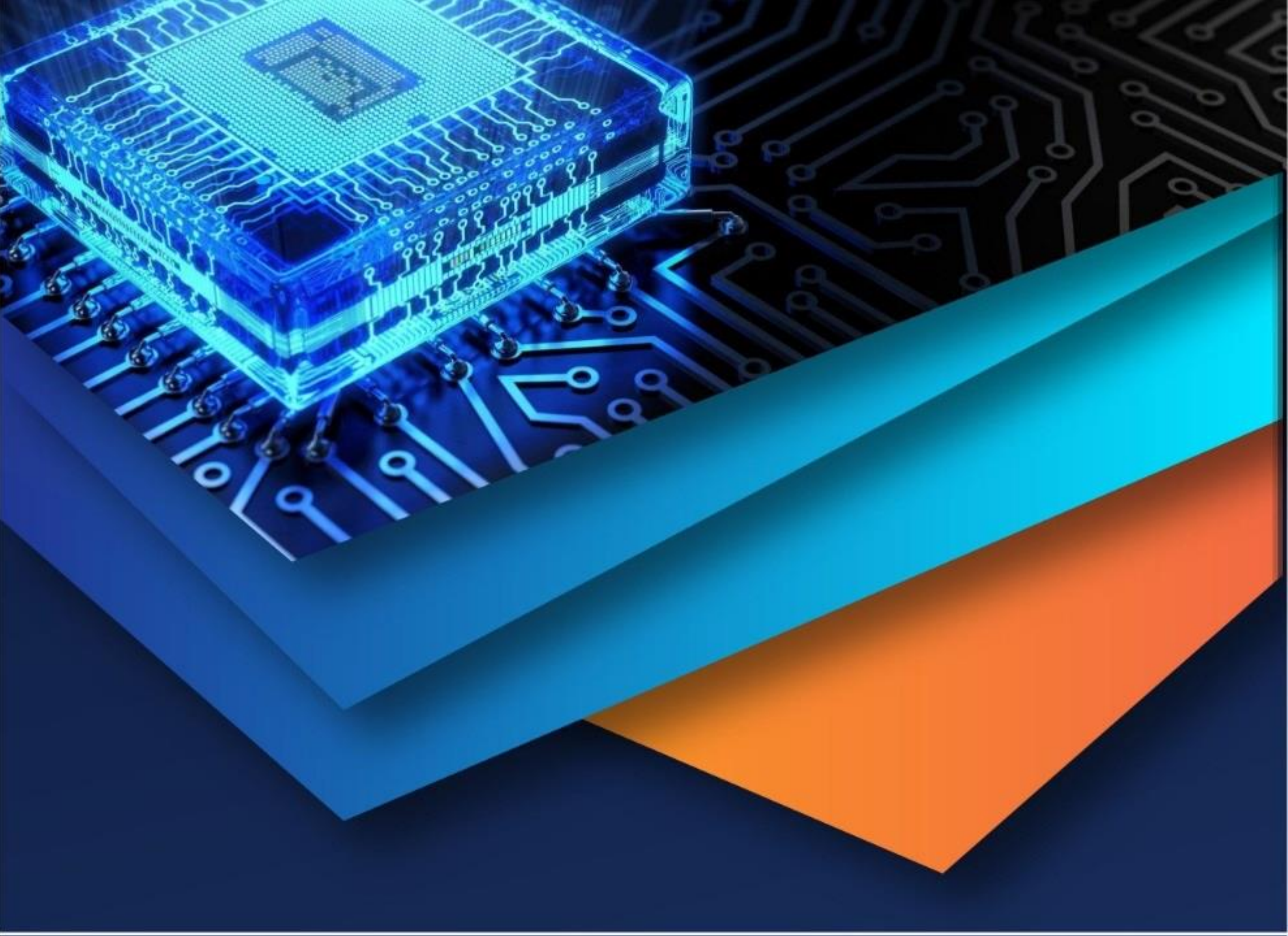

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