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RAINWATER HARVESTING AND ITS ANALYSIS AT IIMT COLLEGE OF ENGINEERING GREATER NOIDA (UP)

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ABSTRACT

Our earth is called a blue planet and 4/5 part of earth surface is covered by water, around 97 % World water quantity locked in sea/ocean, only 0.3% is available for human consumption. But today even this is getting polluted due to human activities like mining, industrialization and overpopulation growth has created acute shortage of drinking water. Rain water harvesting is one of the most ancient and easiest methods that can be adopted at urban and rural level efficiently. The aim of this study is to investigate the possibility of using harvested rainwater as a source of drinking water without causing any health and environmental risks. This can be achieved by adopting suitable storage technique efficient and economical treatment methods.

It was very difficult to imagine few decades before that you will require to buy drinking. The use value of water was never undermined, but its about time that even its exchange value is given due importance. Fresh water today is a scarce resource, nd it is being felt the world over. More than 2000 million people would live under conditions of high water stress by the year 2050, according to the UNEP (United Nations Environment Programme), which warns water could prove to be a limiting factor for development in a number of regions in the world. About one-fifth of the world's population lacks access to safe drinking water and with the present consumption patterns; two out of every three persons on the earth would live in water-stressed conditions by 2025. Around one-third of the world population now lives in countries with moderate to high water stress—where water consumption is more than 10% of the renewable fresh water supply, said the GEO (Global Environment Outlook) 2000, the UNEP's millennium report. Pollution and scarcity of water resources and climate change would be the major emerging issues in the next century, said the report. These issues would be followed by problems of desertification and deforestation, poor governance at the national and global levels, the loss of biodiversity, and population growth, said the report - The Observer of Business and Politics, 12 October 1999.

The reality of water crisis cannot be ignored. India has been notorious of being poor in its management of water resources. The demand for water is already outstripping the supply. Majority of the population in the cities today are groundwater dependent. In spite of the municipal water supply, it is not surprising to find people using private tube wells to supplement their daily water needs. As a result, the groundwater table is falling at an alarming rate.

Extraction of groundwater is being done unplanned and uncontrolled thus this has resulted in:

Hydrological imbalance.

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Deterioration in water quality.

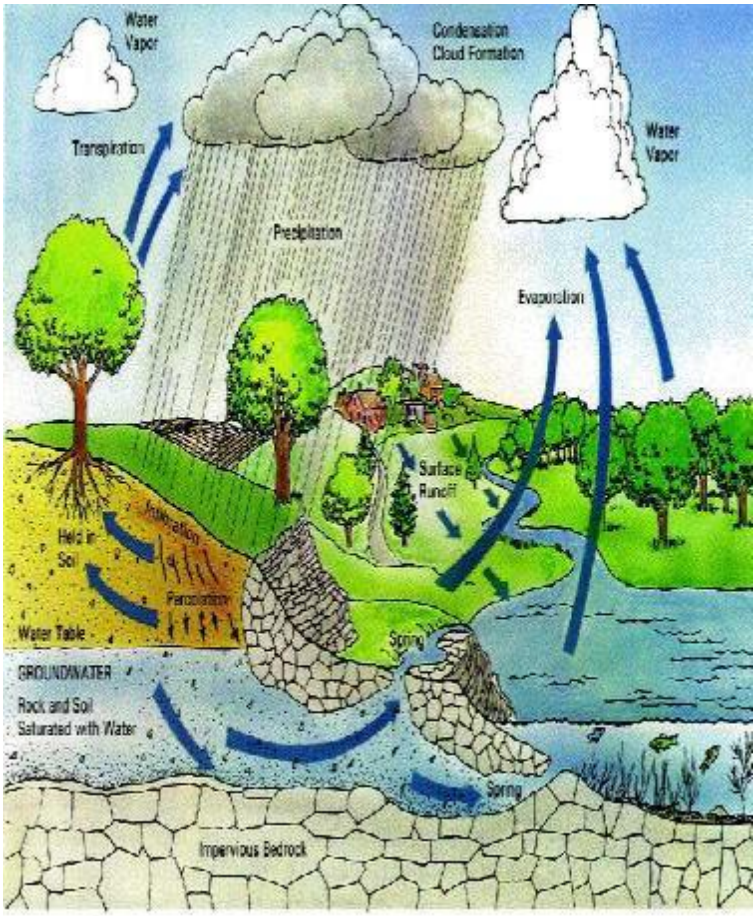
Rise in energy requirements for pumping.

Rain Water Harvesting, is an age-old system of collection of rainwater for future use. But systematic collection and recharging of ground water, is a recent development and is gaining importance as one of the most feasible and easy to implement remedy to restore the hydrological imbalance and prevent a crisis.

Technically speaking, water harvesting means A system that collects rainwater from where it falls rather than allowing it to drain away. It includes water that is collected within the boundaries of a property, from roofs and surrounding surfaces. Experts suggest various ways of harvesting water:

- *Capturing run-off from rooftops*
- *Capturing run-off from local catchments*
- *Capturing seasonal flood water from local streams*
- *Conserving water through watershed management*

Local water harvesting systems developed by local communities and households can reduce the pressure on the state to provide all the financial resources needed for water supply. In addition, involving people will give them a sense of ownership and reduce the burden on government funds.



I. OBJECTIVES

To collect groundwater and analyse data of knowledge park 3rd and examining its quality and quantity.

Rainwater harvesting structure installed at 'Iimt College of engineering Gr.noida, up'.

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Following steps were taken-

1. Rain water sample collected in order to analyse the impact of same on groundwater.
2. Test was conducted to analyse the chemical and physical impact of rainwater in the vicinity of "iimt college of engg.'' and various colleges at Greater Noida.
3. Quality of rainwater and groundwater is to be checked at a regular period of time to analyze and compare the impact and effect rainwater harvesting on groundwater .

II. METHODOLOGY

Following methodology have been adopted to achieve the main objective.

1. First of all various places considered to observe the readings of various parameters like pH value, chloride content, fluoride content, hardness etc
2. After that rain water harvesting construction is to done at IIMT COLLEGE OF ENGINEERING, greater noida.

3. Test were conducted on groundwater before and after construction of harvesting system and then it allowed to passed into the ground through perforated pipe into the borewell, and hence it recharged the ground water and improved quality of water we got at the end .

III. ADVANTAGES OF RAINWATER HARVESTING

1. To meet the ever increasing demand for water. Water harvesting to recharge the groundwater enhances the availability of groundwater at specific place and time and thus assures a continuous and reliable access to groundwater.
2. To reduce the runoff which chokes storm drains and to avoid flooding of roads.
3. To reduce groundwater pollution and to improve the quality of groundwater through dilution when recharged to groundwater thereby providing high quality water, soft and low in minerals.
4. Provides self-sufficiency to your water supply and to supplement domestic water requirement during summer and drought conditions.
5. It reduces the rate of power consumption for pumping of groundwater. For every 1 m rise in water level, there is a saving of 0.4 KWH of electricity.
6. Reduces soil erosion in urban areas
7. The rooftop rainwater harvesting is less expensive, easy to construct, operate and maintain.
8. In saline or coastal areas, rainwater provides good quality water and when recharged to ground water, it reduces salinity and helps in maintaining balance between the fresh-saline water interfaces.
9. In Islands, due to limited extent of fresh water aquifers, rainwater harvesting is the most preferred source of water for domestic use.
10. In desert, where rainfall is low, rainwater harvesting has been providing relief to people

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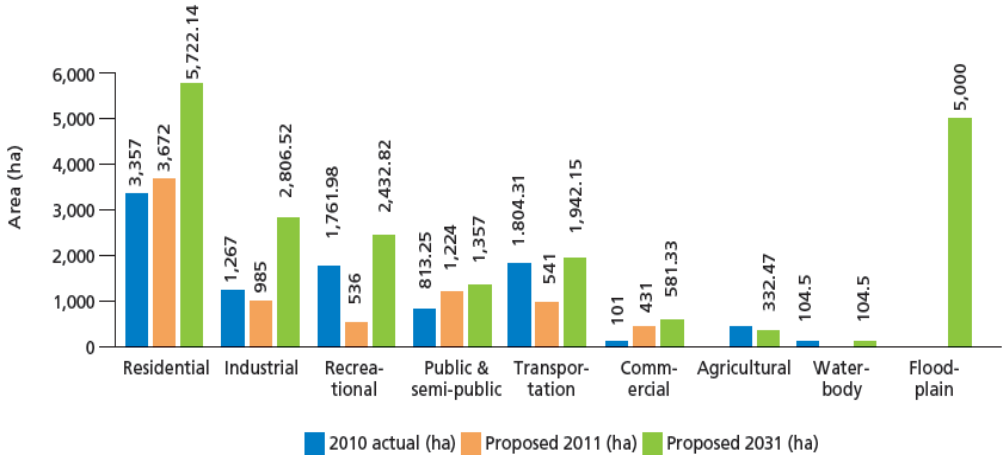
IV. ROOFTOP / RUNOFF RAINWATER HARVESTING FOR ARTIFICIAL RECHARGE TO GROUND WATER

Water harvesting is the deliberate collection and storage of rainwater that runs off on natural or manmade catchment areas. Catchment includes rooftops, compounds, rocky surface or hill slopes or artificially prepared impervious/ semi-pervious land surface. The amount of water harvested depends on the frequency and intensity of rainfall, catchment characteristics, water demands and how much runoff occurs and how quickly or how easy it is for the water to infiltrate through the subsoil and percolate down to recharge the aquifers. Moreover, in urban areas, adequate space for surface storage is not available, water levels are deep enough to accommodate additional rainwater to recharge the aquifers, rooftop and runoff rainwater harvesting is ideal solution to solve the water supply problems.



GRAPH: AREA COVERAGE IN GR. NOIDA

STUDY AREA (GREATER NOIDA)

Greater Noida is a town with a population of 107,676 (till March 2014) approximately is a part of G.B.Nagar district of Uttar Pradesh India. It comes under the purview of the National Capital Region of India . Greater Noida is 48 km distance from New Delhi, the capital of India. The city was developed based on Greater Noida Master Plan 2001, 2021 plan report 2013 Greater Noida Master Plan, 2001, 2021 plan report. (2013). (Greater Noida Authority). The notified area of Greater Noida comprising of 124 villages and about 40,000 hectare of area is broadly bounded by National Highway 24 in the north-west. Also River Hindon lies in the western side of the city. Due to nearness to Delhi and both these towns being are being well developed. Due to the pressure for development on Greater Noida the number of industries during the last decade, has grown more than ten times. Accordingly the problems related to environmental degradation have increased many folds. In summer i.e. from March to June the weather remains hot and average temperature ranges from minimum of 23 C to maximum of 45 C. Monsoon season prevails during mid-June to mid-September with an average rainfall of 93.2 cm (36.7 inches). Average temperature falls substantially down to as low as 3 to 4 C at the peak of winter. Total land use is 13,570 hectares with the total institutional area around 1,970 hectares along with 30 hectares of commercial area. The area is divided into different zones for water supply such as tube wells, overhead tanks and trunk and other supply lines. At present approximately 500 km length of water supply lines with

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approximately 460 km length of sewerage network and approximately 500 km length of drainage exists. The general slope of the ground water movement is from eastern side towards river Hindon in the west.

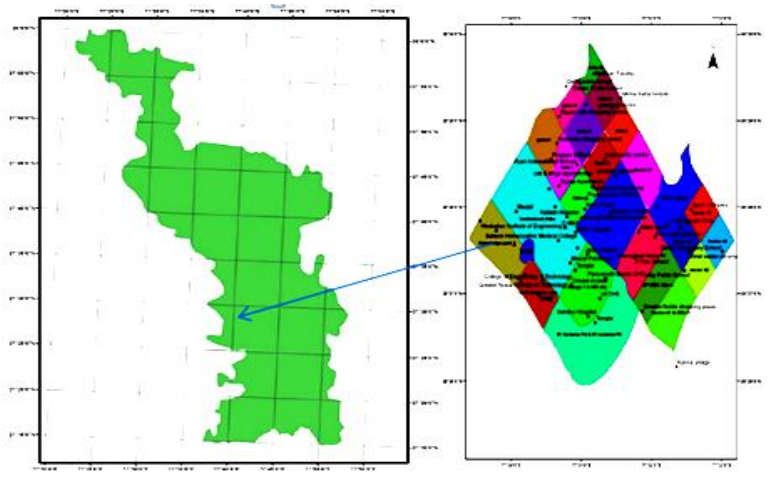

Fig: Study Area Gr Noida

GROUNDWATER ANALYSIS (MARCH AND AUGUST)

TABLE: 1(SKYLINE)

S.NO	PARAMETERS (CONC.)	PERMISSIBLE VALUES	OBSERVED VALUES (MARCH)	OBSERVED VALUES (AUGUST)
1.	PH	6.5-8.5	7.2	7.9
2.	NITRATE(ppm)	10.0	7.0	8.0
3.	CHLORIDE(ppm)	250	170	185
4.	HARDNESS(ppm)	200	140	160
5.	FLUORIDE(ppm)	1.0-1.9	1.4	1.7

TABLE: 2 (I.T.S)

S.NO.	PARAMETERS	PERMISSIBLE VALUES	OBSERVED VALUES (MARCH)	OBSERVED VALUES (AUGUST)
1.	PH	6.5-8.5	7.1	8.1
2.	NITRATE (ppm)	10.0	7.3	8.5
3.	CHLORIDE (ppm)	250	150	187
4.	HARDNESS (ppm)	200	120	156
5.	FLUORIDE (ppm)	1.0-1.9	0.9	1.4

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TABLE: 3(IIMT)

S.NO.	PARAMETERS	PERMISSIBLE VALUES	OBSERVED VALUES (MARCH)	OBSERVED VALUES (AUGUST)
1.	PH	6.5-8.5	7.3	7.4
2.	NITRATE (ppm)	10.0	6.7	7.8
3.	CHLORIDE (ppm)	250	173	175
4.	HARDNESS (ppm)	200	167	169
5.	FLUORIDE (ppm)	1.0-1.9	1.0	1.3

IV. CONCLUSION

In rural and urban areas, this method for collection of rainwater is very easy and economic. Harvested Rainwater samples were collected and analyzed between the month of **MARCH TO AUGUST 2016** without much change in chemical properties (pH, nitrate ,chloride content , hardness etc) . Physiochemical properties (DO, COD, BOD TDS etc.) of collected rainwater samples were very much similar to the limit of drinking water. All the adopted methods were suggested that highly effective in reducing the microbiological contamination and also viable both at rural and urban areas. At last, we concluded that harvested rainwater and its analysis are affordable by individuals and it will be highly useful in drought prone rural as well as urban areas.

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