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# Biography

PDF: (Commonwealth Fellow). Remote sensing applications in Geology(Remote sensing of Water resources), Earth & Ocean Sciences, The University of Liverpool, Liverpool, UK. • Ph.D: Geology, Banaras Hindu University, Varanasi (Collaboration with IIRS) • PhD Topic (Geology & Geochemistry of Pegmatites and Associated Rocks of Jorasemar and Sapahitola Area District Bihar with special reference to Applications of Remote Sensing Techniques in Exploration of Natural Resources) September 1989, 365 Pages • M.Sc.: Geology, Banaras Hindu University, Varanasi, 1st Div • B.Sc. : Geology, Botany, Chemistry, Banaras Hindu University, Varanasi, 1st Div • PGD: Environment & Ecology, IIEE, New Delhi., 1st Div • Certificate: Remote Sensing & GIS, RRSSC, IIT Kharagpur, West Bengal • Certificate: Groundwater Exploration and Management, CGWB, Govt.of India.

# Research interest

Earth Observation Applications for Water Resources Assessment and Management. (Remote sensing and GIS applications in Ground water Exploration, Rainwater Harvesting). Early warning of Natural Hazards and its relation with Water resources(Tornado, Cyclone, Earthquake, Tsunami, Snowfall, Forest Fire). Research guidance and publications in the following areas Monitoring, analyzing, and quantifying components of the water cycle Monitoring/Modeling real or near-real time surface and/or subsurface hydrological processes Analyzing interactions of land surface and atmospheric processes Investigating wetland dynamics Monitoring, forecasting and managing flooding and droughts Monitoring land use/cover change and impact on hydrological processes Determining effects of human activities on both the quantity and quality of water Developing products for use in integrated water resources management. Used Satellite data: IRS, LANDSAT, SPOT (INDIA, UK, and AFRICA), IRS (INDIA), RESOURCESAT and LIDAR Data (UK), SOHO data of Sun-Earth Environment.

# General Description

- ◆ Rainwater harvesting is a technology used for collecting and storing rainwater from rooftops, the land surface or rock catchments using simple techniques such as jars and pots as well as more complex techniques such as underground check dams.
- ◆ The techniques usually found in Asia and Africa arise from practices employed by ancient civilizations within these regions and still serve as a major source of drinking water supply in rural areas.
- ◆ Commonly used systems are constructed of three principal components; namely, the catchment area, the collection device, and the conveyance system.



In the present scenario management and distribution of water has become centralized. People depend on government system, which has resulted in disruption of community participation in water management and collapse of traditional water harvesting system.

As the water crisis continues to become severe, there is a dire need of reform in water management system and revival of traditional systems. Scientific and technological studies needs to be carried out to assess present status so as to suggest suitable mitigative measures for the revival to traditional system/wisdom. Revival process should necessarily be backed by people's initiative and active public participation.

Living creatures of the universe are made of five basic elements, viz., Earth, Water, Fire, Air and Sky, Obviously, water is one of the most important elements and no creature can survive without it.

# Extent of Use

- ❖ The history of rainwater harvesting in Asia can be traced back to about the 9th or 10th Century and the small-scale collection of rainwater from roofs and simple brush dam constructions in the rural areas of South and South-east Asia.
- ❖ Rainwater collection from the eaves of roofs or via simple gutters into traditional jars and pots has been traced back almost 2000 years in Thailand.
- ❖ A thin layer of red clay is generally laid on the bottom of the ponds to minimize seepage losses. Trees, planted at the edges of the ponds, help to minimize evaporative losses from the ponds.



# Why harvest rainwater ?



This is perhaps one of the most frequently asked question, as to why one should harvest rainwater. There are many reasons but following are some of the important ones.

- + To arrest ground water decline and augment ground water table
- + To beneficiate water quality in aquifers
- + To conserve surface water runoff during monsoon
- + To reduce soil erosion
- + To inculcate a culture of water conservation



# How to harvest rainwater

Broadly there are two ways of harvesting rainwater:

- (i) Surface runoff harvesting
- (ii) Roof top rainwater harvesting

## Surface runoff harvesting:

In urban area rainwater flows away as surface runoff. This runoff could be caught and used for recharging aquifers by adopting appropriate methods.

## Roof top rainwater harvesting (RTRWH):

It is a system of catching rainwater where it falls. In rooftop harvesting, the roof becomes the catchments, and the rainwater is collected from the roof of the house/building. It can either be stored in a tank or diverted to artificial recharge system. This method is less expensive and very effective and if implemented properly helps in augmenting the ground water level of the area.





# Precautionary Measures

- ❑ Roof or terraces uses for harvesting should be clean, free from dust, algal plants etc.
- ❑ Roof should not be painted since most paints contain toxic substances and may peel off.
- ❑ Do not store chemicals, rusting iron, manure or detergent on the roof.
- ❑ Nesting of birds on the roof should be prevented.
- ❑ Terraces should not be used for toilets either by human beings or by pets.
- ❑ Provide gratings at mouth of each drainpipe on terraces to trap leaves debris and floating materials.
- ❑ Provision of first rain separator should be made to flush off first rains.
- ❑ Do not use polluted water to recharge ground water.
- ❑ Ground water should only be recharged by rainwater.
- ❑ Before recharging, suitable arrangements of filtering should be provided.
- ❑ Filter media should be cleaned before every monsoon season.
- ❑ During rainy season, the whole system (roof catchment, pipes, screens, first flush, filters, tanks) should be checked before and after each rain and preferably cleaned after every dry period exceeding a month.
- ❑ At the end of the dry season and just before the first shower of rain is anticipated, the storage tank should be scrubbed and flushed off all sediments and debris.

## Advantages

Rainwater harvesting technologies are simple to install and operate. Local people can be easily trained to implement such technologies, and construction materials are also readily available. Rainwater harvesting is convenient in the sense that it provides water at the point of consumption, and family members have full control of their own systems, which greatly reduces operation and maintenance problems. Running costs, also, are almost negligible. Water collected from roof catchments usually is of acceptable quality for domestic purposes. As it is collected using existing structures not specially constructed for the purpose, rainwater harvesting has few negative environmental impacts compared to other water supply project technologies.

Although regional or other local factors can modify the local climatic conditions, rainwater can be a continuous source of water supply for both the rural and poor.

Depending upon household capacity and needs, both the water collection and storage capacity may be increased as needed within the available catchment area.

## Disadvantages

Disadvantages of rainwater harvesting technologies are mainly due to the limited supply and uncertainty of rainfall. Adoption of this technology requires a \*bottom up\* approach rather than the more usual \*top down\* approach employed in other water resources development projects. This may make rainwater harvesting less attractive to some governmental agencies tasked with providing water supplies in developing countries, but the mobilization of local government and NGO resources can serve the same basic role in the development of rainwater-based schemes as water resources development agencies in the larger, more traditional public water supply schemes.

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