

# Assessment of Wet Precipitation and Harvested Rainwater and Different Types of Roof Materials in Urban Area

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## Description

The study is an assessment of the quality of wet precipitation and the harvested rainwater samples from different types of roof catchments such as reinforced cement concrete (RCC), galvanized iron, asbestos cement & galvalume sheets in urban area consisting of residential, commercial, downstream of industrial area with Bengaluru urban area. The precipitation samples were collected using wet precipitation collector by placing it on the terrace of the building. The harvested rainwater samples were collected in a staggered manner as first, second and third flush from all the roofs. The samples were analyzed for pH, TDS, conductivity, cations, anions and some heavy metals. Mean pH of wet precipitation was around 5.44 which are less than neutral pH 5.60, depicts slight acidic nature of wet precipitation. The study shows that lower pH in precipitation was controlled by acidic species of sulphate and nitrate. The concentration of harvested rainwater is more than the concentration of wet precipitation and varied for different roof catchments. The harvested rainwater concentration is within the acceptable limit of drinking water standards IS 10500:2012 except iron. PH, total dissolved solids, conductivity, sulphate, bicarbonate, nitrate, calcium, magnesium and bicarbonate concentrations have been identified to be higher in RCC roof than galvanized iron, galvalume & asbestos cement sheet. Some heavy metals have been found to be lower in RCC roof than other roof catchments. In most of the cases, the first flush of the harvested rainwater has higher concentration compared to second and third flush. The presence of pollutants can be attributed towards atmospheric dry depositions, anthropogenic activities, industrial emissions and leaching of roof catchment due to acidic nature of wet precipitation. The harvested rainwater can be utilized for groundwater recharge or any other purpose by providing pre-treatment after separating it from the first flush.

Rainwater harvesting (RWH) is the collection and storage of rain, rather than allowing it to run off. Rainwater is collected from a roof-like surface and redirected to a tank, cistern, deep pit (well, shaft, or borehole), aquifer, or a reservoir with percolation, so that it seeps down and restores the ground water. Dew and fog can also be collected with nets or other tools. Rainwater

harvesting differs from storm water harvesting as the runoff is collected from roofs, rather than creeks, drains, roads, or any other land surfaces. Its uses include watering gardens, livestock, irrigation, domestic use with proper treatment, and domestic heating. The harvested water can also be committed to longer-term storage or groundwater recharge. Rainwater harvesting is one of the simplest and oldest methods of self-supply of water for households, and residential and household-scale projects, usually financed by the user. However, larger systems for schools, hospitals, and other facilities can run up costs only able to be financed by owners, organizations, and governmental units.

## Advantages of Harvested Rain Water

Rainwater harvesting provides the independent water supply during regional water restrictions, and in developed countries, it is often used to supplement the main supply. It provides water when a drought occurs, can help mitigate flooding of low-lying areas, and reduces demand on wells which may enable groundwater levels to be sustained. It also helps in the availability of potable water, as rainwater is substantially free of salinity and other salts. Applications of rainwater harvesting in urban water system provides a substantial benefit for both water supply and wastewater subsystems by reducing the need for clean water in water distribution systems, less generated storm water in sewer systems, and a reduction in storm water runoff polluting freshwater bodies. A large body of work has focused on the development of life cycle assessment and its costing methodologies to assess the level of environmental impacts and money that can be saved by implementing rainwater harvesting systems.

### Independent water supply

Rainwater harvesting provides an independent water supply during water restrictions. In areas where clean water is costly, or difficult to come by, rainwater harvesting is a critical source of clean water. In developed countries, rainwater is often harvested to be used as a supplemental source of water rather than the main source, but the harvesting of rainwater can also decrease a

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household's water costs or overall usage levels. Rainwater is safe to drink if the consumers do additional treatments before drinking. Boiling water helps to kill germs. Adding another supplement to the system such as a first flush diverter is also a common procedure to avoid contaminants of the water.

#### Supplemental in drought

When drought occurs, rainwater harvested in past months can be used. If rain is scarce but also unpredictable, the use of a

rainwater harvesting system can be critical to capturing the rain when it does fall. Many countries with arid environments use rainwater harvesting as a cheap and reliable source of clean water. To enhance irrigation in arid environments, ridges of soil are constructed to trap and prevent rainwater from running downhill's. Even in periods of low rainfall, enough water is collected for crops to grow. Water can be collected from roofs and tanks can be constructed to hold large quantities of rainwater.