

RAINWATER HARVESTING: A CONCEPT

Dr.Arjun Wagh

Arts and Commerce College, Kadepur, Dist.-Sangli

Ms. Rani Shinde

D.P.Bhosale College, Koregaon, Dist.-Satara

ABSTRACT

Rainwater harvesting is the accumulation and deposition of rainwater for reuse on-site, rather than allowing it to run off. Rainwater can be collected from rivers or roofs, and in many places the water collected is redirected to a deep pit a reservoir with percolation, or collected from dew or fog with nets or other tools. Its uses include water for gardens, livestock, irrigation, domestic use with proper treatment, and indoor heating for houses etc. The harvested water can also be used as drinking water, longer-term storage and for other purposes such as groundwater recharge. Although close to three fourths of our planet is made of water, not all of it is suitable for use. The water in the oceans and seas cannot be used as drinking water and little of it can be utilized for other purposes. As a result, there is a constant shortage of water that is either good for drinking or home and industrial use. Areas on the planet that have long faced water shortage were able to combat this problem by harvesting what little rain water they received. This slowly started spreading to areas where there was plenty of rainfall. As a result, the modern day rainwater harvesting system was brought into place.

The idea behind the process is simple. Rainwater is collected when it falls on the earth, stored and utilized at a later point. It can be purified to make it into drinking water, used for daily applications and even utilized in large scale industries. In short, Rainwater harvesting is a process or technique of collecting, filtering, storing and using rainwater for irrigation and for various other purposes.

Key Words - Rainwater, Irrigation, Harvesting, Roof water harvesting

OBJECTIVE

- i. To understand the concept of rainwater harvesting
- ii. To know the advantages and disadvantages of rainwater harvesting

DATA COLLECTION AND METHODOLOGY

Present article is informative.Required information collected through different books , news bulletins and other sources of information

RAIN HARVESTING SYSTEM

Rainwater harvesting systems can range in complexity, from systems that can be installed with minimal skills, to automated systems that require advanced setup and installation. The basic Rainwater harvesting system is more of a plumbing job than a technical job as all the outlets from the building terrace are connected through a pipe to an underground tank that stores water.

Systems are ideally sized to meet the water demand throughout the dry season since it must be big enough to support daily water consumption. Specifically, the rainfall capturing area such as a building roof must be large enough to maintain adequate flow. The water storage tank size should be large enough to contain the captured water.

For low-tech systems, there are many low-tech methods used to capture rainwater: rooftop systems, surface water capture, and pumping the rainwater that has already soaked into the ground or captured in reservoirs and storing it into tanks .

Before a rainwater harvesting system is built, it is helpful to use digital tools. For instance, if you want to detect if a region has a high rainwater harvesting potential, rainwater harvesting GIS maps can be made using an online interactive tool. Or if you need to estimate how much water is needed to fulfill a community's water needs, the Rain is Gain tool helps with this. Tools like these can save time and money before a commitment to build a system is undertaken, in addition to making the project sustainable and last a long time.

MODEL OF RAIN WATER HARVESTING

Contemporary system designs require an analysis of not only the economic and technical performance of a system, but also the environmental performance. Life Cycle Assessment is a methodology used to evaluate the environmental impacts of a product or systems, from cradle-to-grave of its' lifetime. Devkota , developed such a methodology for rainwater harvesting, and found that the building design and function play critical roles in the environmental performance of the system. The Economic and Environmental Analysis of Sanitations Technologies, EEAST model evaluates the greenhouse gas emissions and cost of such systems over the lifetime of a variety of building types.

To address the functional parameters of rainwater harvesting systems, a new metric was developed - the demand to supply ratio identifying the ideal building design and function in regard to the environmental performance of rainwater harvesting for toilet flushing. With the idea that supply of rainwater not only saves the potable water, but also saves the storm water entering the combined sewer network (thereby requiring treatment), the savings in environmental emissions were higher if the buildings are connected to a combined sewer network compared to separate one.

RAINWATER HARVESTING BY FRESH WATER AND FLOODED FOREST

Rain water harvesting is possible by growing fresh water flooded forests without losing the income from the used /submerged land. The main purpose of the rain water harvesting is to utilize the locally available rain water to meet water requirements throughout

the year without the need of huge capital expenditure. This would facilitate availability of uncontaminated water for domestic, industrial and irrigation needs.

NEW APPROACHES OF RAINWATER HARVESTING

Instead of using the roof for catchment, the Rain Saucer, which looks like an upside down umbrella, collects rain straight from the sky. This decreases the potential for contamination and makes potable water for developing countries a potential application. Other applications of this free standing rainwater collection approach are sustainable gardening and small plot farming. A Dutch invention called the Groasis Water box is also useful for growing trees with harvested and stored dew and rainwater. India

POSITION OF RAINWATER HARVESTING IN INDIA

KARNATAKA

In Bangalore it is mandatory for adoption of rain water harvesting for every owner or the occupier of a building having the sital area measuring 60 ft X 40 ft and above and for newly constructed building measuring 30 ft X 40 ft and above dimension. In this regard BWSSB has initiated and constructed “Rain Water Harvesting Theme Park” in the name of Sir. M. Visvesvaraya in 1.2 acres land situated at Jayanagar, Bangalore. In this park 26 different type of Rain Water Harvesting models are demonstrated along with the water conservation tips. The Auditorium on the first floor is set up with Green Air conditioning system and the same will be utilized to arrange the meeting and showing the video clip about the rain water harvesting to students as well as general public.

TAMIL NADU

In the state of Tamil Nadu, rainwater harvesting was made compulsory for every building to avoid groundwater depletion. It gave excellent results within five years, and every state took it as role model. Since its implementation, Chennai saw a 50 percent rise in water level in five years and the water quality significantly improved.

RAJASTHAN

In Rajasthan, rainwater harvesting has traditionally been practiced by the people of the Thar Desert. There are many ancient water harvesting systems in Rajasthan, which have now been revived. Water harvesting systems are widely used in other areas of Rajasthan as well, for example the chauka system from the Jaipur district.

MAHARASHTRA

At present, in Pune, rainwater harvesting is compulsory for any new housing society to be registered. In Mumbai city in Maharashtra rain water harvesting is being considered as a



good solution to solve water crisis. The Mumbai city council is planning to make rainwater harvesting mandatory for large societies. An attempt has been made at the Department of Chemical Engineering and Bangalore to harvest rainwater using upper surface of a solar still, which was used for water distillation.

ADVANTAGES OF RAINWATER HARVESTING

1. Easy to Maintain

Utilizing the rainwater harvesting system provides certain advantages to the community. First of all, harvesting rainwater allows us to better utilize an energy resource. It is important to do so since drinking water is not easily renewable and it helps in reducing wastage. Systems for the collection of rainwater are based on simple technology. The overall cost of their installation and operation is much lesser than that of water purifying or pumping systems. Maintenance requires little time and energy. The result is the collection of water that can be used in substantial ways even without purification.

2. Reducing Water Bills:

Water collected in the rainwater harvesting system can be put to use for several non-drinking functions as well. For many families and small businesses, this leads to a large reduction in their utilities bill. On an industrial scale, harvesting rainwater can provide the needed amounts of water for many operations to take place smoothly without having to deplete the nearby water sources. It also lessens the burden of soil erosion in a number of areas, allowing the land to thrive once again. In fact, it can also be stored in cisterns for use during times when water supplies are at an all time low.

3. Suitable for Irrigation:

As such, there is little requirement for building new infrastructure for the rainwater harvesting system. Most rooftops act as a workable catchment area, which can be linked to the harvesting system. This also lessens the impact on the environment by reducing use of fuel based machines. Rainwater is free from many chemicals found in ground water, making it suitable for irrigation and watering gardens. In fact, storing large reservoirs of harvested water is a great idea for areas where forest fires and bush fires are common during summer months.

4. Reduces Demand on Ground Water:

With increase in population, the demand for water is also continuously increasing. The end result is that many residential colonies and industries are extracting ground water to



fulfill their daily demands. This has led to depletion of ground water which has gone to significant low level in some areas where there is huge water scarcity.

5. Reduces Floods and Soil Erosion:

During rainy season, rainwater is collected in large storage tanks which also helps in reducing floods in some low lying areas. Apart from this, it also helps in reducing soil erosion and contamination of surface water with pesticides and fertilizers from rainwater run-off which results in cleaner lakes and ponds.

6. Can be Used for Several Non-drinking Purposes:

Rainwater when collected can be used for several non-drinking functions including flushing toilets, washing clothes, watering the garden, washing cars etc. It is unnecessary to use pure drinking water if all we need to use it for some other purpose rather than drinking.

7. Rainwater harvesting provides an independent water supply during regional water restrictions and in developed countries is often used to supplement the main supply.

8. It provides water when there is a drought, 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.

9. Application 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 system, less generated storm water in sewer system, as well as a reduction in storm water runoff polluting freshwater bodies.

DISADVANTAGES OF RAINWATER HARVESTING

1. Unreliable rainfall

Isn't it just always the case that right when you need something it suddenly isn't there? Rain is no different, and it can't be relied upon to fall exactly when it's needed. However, here in the UK we shouldn't worry too much. You are unlikely to spend very long periods of time without plenty of rainwater to use.

2. Starting costs

Installing a rainwater harvesting system can be costly, with systems ranging from the low hundreds to the low thousands in cost. Similarly to solar panels, costs can be recovered in 10-15 years depending upon the rainfall and the system's sophistication.

3. High-energy Maintenance

Rainwater harvesting tanks will take a lot of looking after, and even if this doesn't cost much in terms of money it can become a chore. Systems can be infiltrated by rodents, algae, and insects, and can become breeding grounds for all sorts of creatures if not properly maintained.

4. Chemical roof seepage

Some kinds of roof coverings will seep chemicals which will prove harmful to plant life if the water is used to sustain it.

5. Storage limits

You may find that you cannot store all of the water you would like to, and this could mean having to tailor your water usage to the capacity of the tank.

More development and knowledge is required to understand the benefits rainwater harvesting can provide to agriculture. Many countries especially those with an arid environment use rainwater harvesting as a cheap and reliable source of clean water. To enhance irrigation in arid environments, ridges of soil are constructed in order to trap and prevent rainwater from running down hills and slopes. Even in periods of low rainfall, enough water is collected in order for crops to grow. Water can be collected from roofs, dams, and ponds can be constructed in order to hold large quantities of rainwater so that even on days where there is little to no rainfall, there is enough available to irrigate crops.

REFERENCES

1. "Criteria and Guidelines for the "Rainwater Harvesting". Pilot Project Programme. Colorado Water Conservation Board . January 28, 2010.
2. Rain water Harvesting". Tamilnadu State Government of India. "Tamil Nadu praised as role model for Rainwater Harvesting". Hindu.com. 2011-09-29.
3. "Ancient water harvesting systems in Rajasthan". Rainwater harvesting.org.
4. "Chauka System". rainwaterharvesting.org: technology: rural: improvised. Centre for Science and Environment.
5. Anjaneyulu, L.; Kumar, E. Arun; Sankannavar, Ravi; Rao, K. Kesava (13 June 2012). "Defluoridation of Drinking Water and Rainwater Harvesting Using a Solar Still". Industrial & Engineering Chemistry Research .