

Water Harvesting: Need, Constraints and Future Challenges

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SUMMARY

Water is vital for all life forms; no one can survive without water for long. We all know that 71 % of Earth's surface is covered by water. However, the fast development of cities and population explosions lead to depletion of water sources. So, water harvesting becomes one of the means to meet the need of water for domestic, industrial and agricultural activities. Some places of India have high potential for adopting water harvesting. But due to lack of awareness and need of high cost for construction, it's hardly adopted except few. It has some constraints while using the harvested water. So we should be careful while constructing and using the harvested water.

INTRODUCTION

During last few decades, India has witnessed a rapid increase in the urban population. So all towns and cities are facing the problem of increasing water demand and the gap between demand and supply exerts pressure on the water resources and its supply requirements. The modern water management are cost intensive as long distance transfer of water is required to meet the increasing need. We all have to understand the value of each drop of water for sustainable water management, and to make optimum use of rainwater at the place where it falls. The best option is to harvest the rainwater where we get it and store it appropriately (on surface or into the aquifer) for crop production & for future use. Rain water harvesting can contribute considerably to tackle water crisis.

What is Water Harvesting?

Rainwater harvesting is the trapping and storage of rainwater for reuse, rather than allowing it to run off. Water harvesting systems have three components:

1. Catchment area is that part of land that contributes the rain water.
2. Storage facility is the place where the runoff water is stored.
3. Command area is where water is used.

$$[\text{Water harvesting potential} = \text{Rainfall (mm)} * \text{Area of catchment} * \text{Runoff coefficient}]$$

Why it is Needed?

1. To increase agriculture production.
2. To overcome the inadequacy of surface water to meet our demands.
3. To arrest decline in ground water levels
4. To enhance availability of ground water at specific place and time and utilize for sustainable development.
5. To improve ecology of the area by increase in vegetation cover etc.

Advantages of Water Harvesting

1. Relatively cheap materials can be used for construction
2. Low maintenance costs and requirements
3. Environmentally friendly
4. It can increase the quality and level of ground water
5. It can mitigate the impact of drought

- 6.It can reduce runoff losses
- 7.Reduce soil erosion
- 8.Can reduce water problem during summer season

Constraint of Water Harvesting

- 1.Additional expenditure- Treating rainwater to make it fit for human consumption will see you incurring additional expenses.
- 2.Uncertainty of rainfall- You can't harvest rainwater when it does not rain so we can't completely rely on the water harvesting.
- 3.Limited storage
4. Risk of contamination- If not preserved with care, rainwater can be contaminated. If we use the harvested water without proper treatment then several diseases may come up .
- 5.Cleaning and maintenance- The storage facilities have to be occasionally cleaned and maintained. But cleaning of underground tank become very difficult and its construction need to be very careful and incurred high cost. This makes the thought of harvesting rainwater unattractive.
- 6.Dual cost- You'll incur expenses twice because of paying your normal water bills and installing and maintaining the rainwater harvesting system.
- 7.Acidic rain- Due to pollution, sometimes the rain that falls is acidic. So rainwater harvesting is very dangerous due to the chemicals contained. Using acidic rain for irrigation can also cause the death of crops as it erodes the quality of soil and creates conditions that are not conducive for plant to germinate and make difficult for the plant to grow.
8. Lack of water for wildlife: Wild animals get their drinking water from natural sources such as seasonal streams and rivers. They also use them to withstand the hot weather. But harvesting of rainwater reduces the runoff affecting the ecosystem.

Methods of Water Harvesting

Rainwater harvesting can be done in different ways. Some methods are very effective in collection of lot of water even for commercial activities while others are only suitable for domestic purpose. Every system has its merits and demerits. These are the common methods of rainwater harvesting:

1.In- Situ Rain Water Harvesting

One of the methods frequently used in rain water harvesting is the storage of rain water in situ. This method consists of making storage available in areas where the water is going to be utilized.

2.Surface Water Collection System

Surface water is simply water that accumulates on the ground's surface. Usually water flows down slopes when rain and it moves towards a point of depression where it can be collect. For instance rivers, ponds, wells and drainage pipes.

3.Roof Top System

These can also be used to harvest rainwater. This method of rainwater harvesting is good because the accumulated water is mostly clean and usually requires no further treatment to make it fit for human use. In India ,Tamil Nadu became the first state to adopt compulsory roof top rainwater harvesting building to reduce groundwater depletion.. This is a good initiative taken up by the state government and all others state should follow.

4.Dams

These are barriers that are designed to trap water. Water can be accumulate directly or using drainage systems. The collected water is mostly used for irrigation purposes or distributed for domestic use after giving proper treatment.

5. Underground Tanks

These are also ideal for collecting rainwater. The top is sealed and the lower layer is also cemented to prevent infiltration losses. Underground tanks are wonderful for harvesting rainwater because the rate of evaporation is reduced since they are located underground where sunlight does not really penetrate.

6. Water Collection Reservoirs

Water collected through this method is not really clean and may be contaminated. However, the harvested water can still be used for irrigating agricultural crop.

7. Trenches

This is another great way to harvest rainwater for irrigation. When it rains, the water is directed to the farm using trenches. It is one of the traditional methods of rainwater harvesting that is still very much in use today.

8. Contour Bund

This is construction of small bund across the slope of the land on a contour so that the long slope is divided into numerous small slopes, check the flow of water, promote adsorption of water by soil and save soil from erosion.

9. Farm Pond

A farm pond is dug out pond constructed in or near the farm. Rainwater is collected in the pond and stored for future uses such as irrigating crops, recharging groundwater, and providing drinking water for farm animals.

10. Jalkund

A low-cost rainwater harvesting structure generally developed on a hilltop for accumulating flowing water.

In an experiment conducted, tied ridge with supplimental irrigation was found to be most effective in increasing the grain yield of sorghum in both the season (Abukaker et al., 2017)

Challenges

Providing sufficient water for drinking and agricultural production in remote dry areas is one of the most serious challenges for water harvesting research and development, related directly to the poor.

Potential Areas for Water Harvesting

- Where ground water levels are declining on regular basis.
- Where availability of ground water is inadequate in lean months.
- Where due to rapid urbanization, infiltration of rain water into subsoil has decreased drastically and recharging of ground water has diminished.
- Where rainfall distribution is more and frequent flood occurred.

Scope of Rain Water Harvesting in North East Hills

The average annual rainfall reaches a peak of 13,390 mm in the Cherrapunji-Mawsynram region. But areas that fall in the rain shadow region of the Meghalaya plateau need irrigation. While the northern slopes of the Brahmaputra valley receive an annual average rainfall of 2,500 mm, the area south of the valley and the northern part of Meghalaya receive an annual rainfall of about 2,000 mm. The water resources potential of the region is the largest in the entire country. The available surface water resources have hardly been tapped because of the rugged nature of the terrain. Even though these areas have the potential of water harvesting, it is hardly adopted by the farmers.

CONCLUSION

Rainfall is a very important weather phenomenon. It is very critical for the growth of crops and farming. Harvesting rainwater is a practice that has been going on for a while. Because of weather changes, water sources can dry up and in the process impact animal, human, and plant life negatively. Rainwater harvesting is a smart way of preparing for such times because even when the conventional water sources dry up, we can still use the stored water for many purposes. The best part is that this type of water is naturally occurring. Some of the setbacks can be avoided by taking precautionary measures. When we employ innovation and technology, we can come up with better ways of rainwater harvesting and increase the storage capacity.

REFERENCES

- Abubaker B., Hong L., Elshailh N. and Haofang Y., 2017. The role of supplemental irrigation to crop water use rainwater harvesting. *Biosci. J., Uberlandia*, 33(4):944-955.
<http://www.yourarticlelibrary.com/essay/rainwater-harvesting-objectives-and-advantages-of-rainwater-harvesting/30215>.
www.rainwaterharvesting.org.
http://www.rainwaterharvesting.org/index_files/site_urls.htm
<https://www.researchgate.net/publication/305772762>