WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

A Review on Rainwater Harvesting in India

Madhukar Saroj[1], Er.Anupam Kumar Gautam[2]

[1]M.Tech, Department of Civil Engineering, Maharishi University of Information Technology, Sitapur Road, Lucknow- 226013, Uttar Pradesh, INDIA.
[2]Guide M.Tech, Department of Civil Engineering, Maharishi University of Information Technology, Sitapur Road, Lucknow- 226013, Uttar Pradesh, INDIA.

ABSTRACT

Water scarcity is a problem in many parts of the world. In some regions, there is physical water scarcity because there are not enough resources of water to supply the increasing demand, while other parts of the world have an economic scarcity, where resources are more abundant but poor governance and other problems render water unavailable for most of the population. Where the problem is economic water scarcity, there are many solutions that could ameliorate the problem, but most times the solutions require a change in government, more economic resources and a better willingness. Solving the problem requires long-term changes; however the need for water is immediate. This is why many methods have been developed for water storage and reuse, however because the problem is not a lack of water but poor management, implementing and maintaining systems is simply not a reality in many parts of the world, particularly in Africa and Latin America. Water supply systems in Honduras provide service to approximately 86% of the total population (WHO/ UNICEF 2010), however the service is not continuous, and the quality of the water supplied is not high enough to be considered potable.

1 **Introduction**

Water is essential to all life forms on earth - human, animal and vegetation. It istherefore important that adequate supplies of water be developed to sustain such life.Development of water supplies should, however, be undertaken in such a way as to preservethe hydrological balance and the biological functions of our ecosystems. Consequently, thehuman endeavor in the development of water sources must be within the capacity of natureto replenish and to sustain. If this is not done, costly mistakes can occur with seriousconsequences. The application of innovative technologies and the improvement of indigenousones should therefore include management of the water sources to ensure sustainability andto safeguard the sources against pollution. As land pressure rises, cities are growing verticaland in countryside more forest areas are encroached and being used for agriculture. In Indiathe small farmers depend on Monsoon where rainfall is from June to October and much of theprecious water is soon lost as surface runoff. There is now increasing interest in the low costalternative-generally referred to as 'Rain Water Harvesting' (RWH). Water harvesting is theactivity of direct collection of rainwater, which can be stored for direct use or can berecharged into the groundwater. Water harvesting is the collection of runoff for productivepurposes. Rain is the first form of water that we know in the hydrological cycle, hence is aprimary source of water for us. Rivers, lakes and groundwater are all secondary sources ofwater. In present times, we depend entirely on such secondary sources of water. Waterharvesting is to understand the value of rain, and to make optimum use of rainwater at theplace where it falls. Rainwater is free from salinity as well as arsenic contamination and is safe too if it is maintained hygienically. The physical, chemical, and bacteriological characteristics of harvested rainwater usually represent a suitable and acceptable standard of potable water. Harvested rainwater can be used not only in drinking purposes but also in cooking, washing, and bathing. The main limitation of this option is non-availability of rain water around the year. But it can be widely used as supplementary source if rainwater is properly stored in rainy season.

2 Benefits of Rainwater Harvesting

1. Environment friendly and easy approach for water requirements
2. RWH is the ideal solution for all water requirements.
3. Increase in ground water level.
4. Mitigates the effects of drought.
5. Reduces the runoff, which otherwise flood storm water drains.
6. Reduces flooding of roads and low-lying areas.

7. Reduced soil erosion.
8. Improves the ground water quality.
9. Low cost and easy to maintain.
10. Reduces water and electricity bills.

There is method adopted for rooftop rain water and recharging of the underground water into acquifers directly. The comparision made between Cost of Brickwork, R.C.C. recharge pit and Cost of pit installed with recycled plastic drums.

(A) Cost of Brickwork, R.C.C. recharge pit

ITEM NO.	DESCRIPTIONOFITEM	UNIT	QUANTITY	RATEIN(RS.)	AMOUNT (RS)	DSR-2018 ItemNo.	DETAILOFQUANTITY
	DSR-2018 Items :						
1	Earth work in excavation by mechanical means (Hydraulics excavator) / manual means over areas(exceeding30 cmin depth, 1.5m in width as well as10sq.mon plan)including disposal of excavated earth, lead upto 50m and lift upto 1.5m, disposed earth to be leveled and neatly dressed: All kinds of soil	Cum	23.75	181.85	4318.94	2.6.1/74	(3.46*2.86*2.40)= 23.75CUM
2	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift upto 1.5 m.	Cum	2.16	219.65	474.44	2.25/77	(3.00*2.40*0.80) =2.16CUM
3	Filling of gravel 20-40mm thick	Cum	9.60	1943.00	18652.80	2.25/77	(2.40*2.00*2.00) =9.60CUM,MR-55*35.32=Rs.1943PERCUM
4	Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work upto plinth level. 1:5:10(1 cement:5 coarse sand: 10 graded stone aggregate 40mm nominal size)	Cum	0.44	5520.30	2428.93	4.1.10/86	(3.23+2.63)*.5*0.15 =0.44CUM
5	Providing and laying in position specified grade of reinforced cement concrete excluding the cost of centring, shuttering, finishing and reinforcement - All work upto plinth 1:1.5:3(1 cement:1.5 coarse sand:3 graded stone aggregate 20mm nominal size)	Cum	0.90	7718.25	6946.43	5.1.2/95	20*0.6*0.6*0.125 =0.90CUM
6	Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete upto plinth level. Thermo Mechanically Treated bars.	kg.	141.30	83.50	11798.55	5.22.6/100	STEEL@2%OFR.C.C.= 0.9*7850*2/100=141.30KG
7	Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 75 in foundation and plinth in : Cement mortar 1:6 (1 cement : 6 coarse sand)	cum.	1.75	6157.45	10775.54	6.1.2/108	(3.23+2.63)*0.46 *0.25+ (3.23+2.63)*0.23
8	15 mm cement plaster on the rough side of single or half brick wall of mix: 1:6 (1 cement : 6 coarse sand)	Sqm	7.20	303.90	2188.08	13.5.2/228	INNERSIDE(2*3.00 +2*2.40)*0.82 + 3.00*2.40=7.20SQM
9	Neat cement punning.	Sqm	7.20	42.60	306.72	13.18/228	INNERSIDE(2*3.00 +2*2.40)*0.82 + 3.00*2.40=7.20SQM
	Total for DSR 2018 Items :				**57890**		

DETAILEDESTIMATE(BILLOFQUANTITY)

The cost of construction of Brickwork, R.C.C. recharge pit about to 57,890/- which is highly precious to afford for individual in a small house area .

(B) Cost of pit installed with recycled plastic drums

ITEM NO.	DESCRIPTION OF ITEM	UNIT	QUANTITY	RATEIN (RS.)	AMOUNT (RS)	DSR-2018 ItemNo.	DETAIL OF QUANTITY
	DSR-2018 Items :						
1	Earth work in excavation by mechanical means (Hydraulics excavator) / manual means over areas(exceeding30 cmin depth, 1.5m in width as well as10sq.mon plan)including disposal of excavated earth, lead upto 50m and lift upto 1.5m, disposed earth to be leveled and neatly dressed: All kinds of soil	Cum	7.85	181.85	1427.52	2.6.1/74	π/4*2.00*2.00*2.50= 7.85CUM
2	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift upto 1.5 m.	Cum	5.65	219.65	1241.02	2.25/77	π/4*2.00*2.00*1.80 =5.65CUM
3	Filling of gravel 20-40mm thick	Cum	4.02	1943.00	7810.86	2.25/77	π/4*(2.00*2.00-1.20*1.20)*2.00=4.02 CUM,MR-55*35.32= Rs.1943PERCUM
4	Cost of the unserviceable reclycled plastic drum or container as per market rate	Each	1.00	850.00	850.00	M.R.	MR-850
5	PVC Pipes110mm 6kgf/cm2	Metre	6.00	175.00	1050.00	M.R.	MR-1050/6
6	Pvc fittings valve etc.nipple, vale, elbow, union adhesive etc.	Job	1.00	1000.00	1000.00	M.R.	MR-1000
	Total for DSR 2018 Items :				**13379.41**		

In this pattern the rainwater harvesting system installed in very economical price about to only Rupees13,379/- which is very cheaper in comparision to RCC, brickwork recharge pit.

The cost of plastic drum recharge pit is Rs.(57890/13379) = 4.32 about to 1/4th less than brickwork recharge pit. Hence it promoted to rainwater harvesting system to install in our houses, buildings, industries, land etc. whereever catchment area and runoff available.

Hence we recommend for adopting the recycled plastic drum recharge pit for rainwater harvesting system beacuse it is very economical and becomes a solution for disposal of unserviceable plastic drums or containers .

4. Conclusion

Values obtained for percentage removal of some constituents in experiments is quiet comparable to the theoretical values of percentage removal of those constituents.

Though the experiments were conducted only for some pollutants and about 50% were not experimentally checked, but by taking into account the comparability between the theoretical values and experimental values or remaining constituents, it can be concluded that the system works quiet effectively for these constituents and if only these constituents are considered, the filtered water has these constituents in a range that is safe enough to permit water to be directed underground. The cost comes very low by using of plastic drum recharge method in place of R.C.C., brickwork recharge pit as detailing pertains to above calculation sheets.

REFERENCE

- Report "Guide on Artificial Recharge to Ground Water" Central Ground Water Board,
- Ministry Of Water Resources New Delhi.
- The Journal of the Argentine Chemical society, "C HARAC TERIZATION OF SHUNGITE BY P HYS ICAL ADSOPTION OF GAS ES", Vol. 92-N* 4/6, 51-58.
- CPWD MANUAL RAIN WATER HARVESTING
- CPWD DSR-2018
- American water works association, water quality and treatment, McGraw Hills
- Vinod Kumar mishra: Water Problem, Bhagirath, National Water Academy, January- March,
- Culp G., Wesner G., Williams R. and V. Hughes Mark Jr, SWaste water reuse and recycling technology, Noyes Data Corp. Park ridge, New Jersey, U.S.A.