ISSN : 0974 - 7451 Volume 8 Issue 2

Trade Science Inc.

Environmental Science
An Indian Journal

Current Research Paper

ESAIJ, 8(2), 2013 [52-55]

Rainwater harvesting: The best alternative water supply in the future

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ABSTRACT

"Although water is nature's most wonderful, abundant and useful compound, yet is also the most misused one"

Water is very common substance due to its extraordinary features which often go unnoticed. Where, we are going to explain why water is one of the most unusual as well as one of the most abundant substances on the earth. It plays an important role in the biosphere. It is an essential and the principal component of living organism and also vital life processes. Its prominent use in agriculture industries and domestic need is well known. Human withdraws fresh water from lakes, ponds, rivers, wells and tube wells etc. Increase in population and expansion of industries and agriculture have increased the demand of water in manifolds. This increasing demand for water became necessities for its conservation.

KEYWORDS

Rainwater harvesting;
Conservation;
Method;
Drought;
Soil etc.

EXPERIMENTAL METHODS AND DESCRIPTION

India is agricultural country. In our country the lack of irrigation water in certain areas is the main problem. In view of the extremely uneven distribution of rainfall in our country, we need to store rain water in those areas where it is too much by utilizing rain water harvesting technique. The method employed to store rain water and recharge ground water is called rain water harvesting.

Steps taken for water conversation:

i) Be careful and economical in the use of water for domestic and industrial purpose so that no water is wasted.

ii) Prevent the wastage of water in irrigation through brick lining of channels, sub-surface and sprinkler techniques.

iii) Prevent water pollution by sewage and industrial waste in rivers so that water remains fit for use by human and others.

iv) Polluted water can be purified in treatment plants for reuse.

v) Building dams and reservoirs to hold back and store flood water for use during dry periods.

vi) A forestation and reforestation of hills, catchment

areas and slopes for increasing availability of water through out the year.

vii) Control soil erosion and maintain topsoil. The spongy top soil absorbs rain water which becomes the valuable ground water.

Method-I : Traditional methods

(a) On areas having high rainfall, rain water from roof tops (commercial and domestics) is collected into water storage tanks from where water diverted to some abandoned well and lifted by using a motor or hand pump. (As shown in below figure)

b) In foot hill areas, spring water is collected into water storage embankments.

c) In Rajasthan state, rain water is harvested either in underground tanks called" TANKAS" or in embankments called" KHADINS."

d) In the ancient times rain water was collected in talabs, johars, hauz, bawaries etc, to be used in dry periods.

Method-II : Modern techniques are used in arid and semi-arid regions

e) Rain water from large catchment areas is collected

Rain water harvesting

in check dams. This technique was effectively used in Rajasthan by Rajender Singh who won the Megasaysay Award for these efforts and earned the title of "WATER MAN".

f) Ground water dams are built for storing water underground. These are more advantageous than surface dams due to minimum loss by evaporation and low chances of contamination. According to Central Groundwater Authority (CGWA), rain water harvesting is the only option for the coming millennium. The main motto or theme of this authority has successfully completed the artificial recharge experiments in Mehasana (Gujarat), Amaravati (Maharashtra) and Kolar (Kerela) areas resulting in the rise in water level.

g) Now a day in Maharashtra, district Beed uses more modern methods to increase the water levels in the soils are RICHARGE SHAFT and TRENCHES CUM RICHARGE SHAFT in drought thasils or talukas under the guidance of Government authority like Maharashtra Soil-Water Survey and Management through Gav-gram Panchayat office.

TABLE 1 : The villages benefitted by modern techniques for rainwater harvesting

Sr. No.	Modern methods used in drought tahasils or talukas of Beed district	No. of drought villages in tahasils benefitted by methods
1	Dharur	09
2	Wadvani	10
3	Shirur-kasar	15
4	Patoda	22
5	Ashti	19
6	Kaij	07
7	Parli-Vaijnath	05
8	Ambajogai	05
9	Gavrai	02
10	Majalgaon	02
11	Beed	03

TABLE 2 : The districts benefitted by modern techniques for rainwater harvesting in in Marathwada regions of Maharashtra State.

Sr. No.	Modern methods used in drought Districts of Marathwada region	No. of drought villages in districts benefitted by methods
1	Aurangabad	105
2	Jalna	135
3	Beed	102
4	Osmanabad	135
5	Latur	109
6	Nanded	107
7	Parbhani	101
8	Hingoli	122

Out of eleven talukas of Beed district, the first eight talukas listed in the table are situated in the hilly areas. The more number of villages of that are using the modern techniques to increase the water level by rainwater harvesting methods. On other hand, last three talukas are situated in the foot hill areas so probably less numbers of villages are using the rainwater harvesting methods in current sinarios.

Recharge to ground water is a new concept of rainwater harvesting and the structures generally used are as follows.

Pits

Recharge pits are constructed for recharging the shallow aquifer. These are constructed about 2 m, wide and to 3 m. deep which are back filled with boulders, gravels, coarse sand.

Trenches

These are constructed when the permeable stram is available at shallow depth. Trench may be 1 m. wide, 1.5 m. deep and about 25 m. long depending up availability of water. These are back filled with filter materials.

Dug wells

Available dug wells may be utilized as recharge structure and water should pass through filter media before putting into dug well.

Hand pumps

The existing hand pumps may be used for recharging the shallow, if the availability of water is limited. Water should pass through filter media before diverting it into hand pumps.

Recharge wells

Recharge wells may be of say 100 to 200 mm. dia meter are generally constructed for recharging the deeper aquifers and water is passed through filter media to avoid choking of recharge wells.

Recharge shafts

For recharging the shallow aquifer which are located below clayey surface, recharge shafts of 1 to 2 m. diameter and about 25 to 30 m. deep are constructed and back filled with boulders, gravels and coarse sand.

Lateral shafts with bore wells

For recharging the upper as well as deeper aquifers lateral shafts of 1 to 2 m. wide and about 15 to 25 m. long depending upon availability of water with one or two bore wells are constructed. The lateral shaft is back filled with boulders, gravels and coarse sand.

Spreading techniques

When permeable strata start from top, then this technique is used. Spread the water in streams or Nalas by making check dams, nalas, bunds, cement plugs, gabion structures or a percolation pond may be constructed.

Roof top rainwater collection: A computation of artificial recharge

Following are some factors taken for computation of artificial recharge-

Roof top area 100 sq. m. for individual house and

500 sq. m. for multi-storied building.

Average annual monsoon rainfall - 700 mm.

Effective annual rainfall contributing to recharge 70% - 500 mm.

Particular	Individual Houses	Multistoried building
Roof top area	100 sq. m.	500 sq. m.
Total quantity available for recharge per annum	50 cu. m	270 cu. m.
Water available for 5 member Family	100 days	500 days

WATERSHED MANAGEMENT

Watershed management is the rational utilization of land and water resources for optimum production causing minimum damage to the natural resources.

Watershed is an area of high land where streams flow into river or sea. These watersheds are natural units of water and very important for future. Thus, health of watersheds is most significant. The Himalayas are one of the most critical watersheds in the world. The water regimes in the mountain ranges are threatened resulting in the depletion of water resources. The damage to reservoirs and irrigation system and misuse of Himalyan slopes are mounting as are the costs for control measure during the flood season every year. By proper control measures, we can harness vast hydroelectric power potential from Himalayan watersheds. Some steps suggested for watershed managements are

* Soil and land use survey
* Soil conservation in catchment areas
* Afforestation forestry program
* Drought prone areas development program
* Control of shifting cultivation.etc.

In the year 1949, the first Integrated Watershed Management was started by Damodar Valley Corporations. The watershed management programme was for the first time included in the 5 th five year plan and have shown good results at Sukhomajri and Panchkula with the active participation of the local people.

CONCLUSION

Rain water harvesting can ensure an independent water supply during water restrictions. Though somewhat dependent on end-use and maintenance, yields are usually of acceptable quality for most household needs and renewable at a acceptable volumes, despite climate, change forecasts. It produces beneficial effects by reducing peak stroms, water run off and processing costs. Rain water harvesting systems are simple to install and operate. Running costs are negligible and they provide water at the point of consumption.

ACKNOWLEDEMENT

The authors are grateful to Principal Dr.R K.Ippar, Vaidyanath Arts, Commerce and Science College, Parli-Vaijnath, Dist- Beed for providing the research facility

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