Rain Water Harvesting in Kathmandu

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There is acute water shortage in Kathmandu valley in dry season. The population of Kathmandu valley is about four million and in the dry season the water supply is 90 million liters/day against a requirement of 320 million liters per day. The water supply in the valley is 60% from tube wells and 40% from surface sources. Due to never ending local problems, water from Melamchi (a project to bring water from Melamchi River through a 26 km long tunnel) may not come to Kathmandu even in next 12 years. The residents of the Kathmandu valley face great hardship for water and in the coming years it will worsen due to climate change and population increases. The ground water table is dropping by 2.5 meters per year, and knowledgeable people fear subsidence of land damaging property as happened in Mexico City due to over pumping.

Rain water harvesting (RWH) is not a new technology; it is an ancient legacy. On the tops of hills and mountains of Nepal, ponds were dug in ancient times to collect rain water mainly for livestock use. In the towns, ponds and stone spouts were constructed and these were the main sources of water before introduction of piped water supplies. The intricate system of traditional water supply of Patan, Nepal, consisting of a network of *rajkulos* (royal irrigation channel), ponds, and stone spouts are centuries old. As a result of urbanization, however, this system has fallen into neglect/disuse, though some facets of the system are still working. The percolation/seepage from these ponds recharged the ground water and were fed to stone spouts. The *rajkulos* of Patan, which divert water from the Naldu and Lele rivers, is said to be 1,000 years old. *Sithi Nakha* is a festive day in Kathmandu valley to clean and maintain water sources, wells, stone spouts, etc. It has been observed as a civic duty from historic times.

As another example of RWH, with support from FINNIDA (the Finnish Development Agency), new water supply initiatives have been undertaken for domestic RWH projects in the rural Nepal districts of Palpa and Arghakhanchi. Under this program, several hundred ferro-cement jars have been constructed with community participation. These jars, with 2,000 (or higher) liter capacity, are used to collect rain water from household roof tops.

RWH is a simple and traditional technique which has been forgotten due to various reasons. Collecting rainwater in a small pond and allowing it to percolate to recharge the ground water aquifer is a cost effective way to augment water supply. As more than 85% of the annual rain falls during the three month monsoon season, it is difficult and expensive to store rainwater for prolonged use into the dry season. Where it is done, such as in Myanmar and Sri Lanka, there are three or four rainy seasons in a year and small containers are sufficient to hold rain water. In Nepal, however, this system is useful only for short periods due to the comparatively short rainy season.

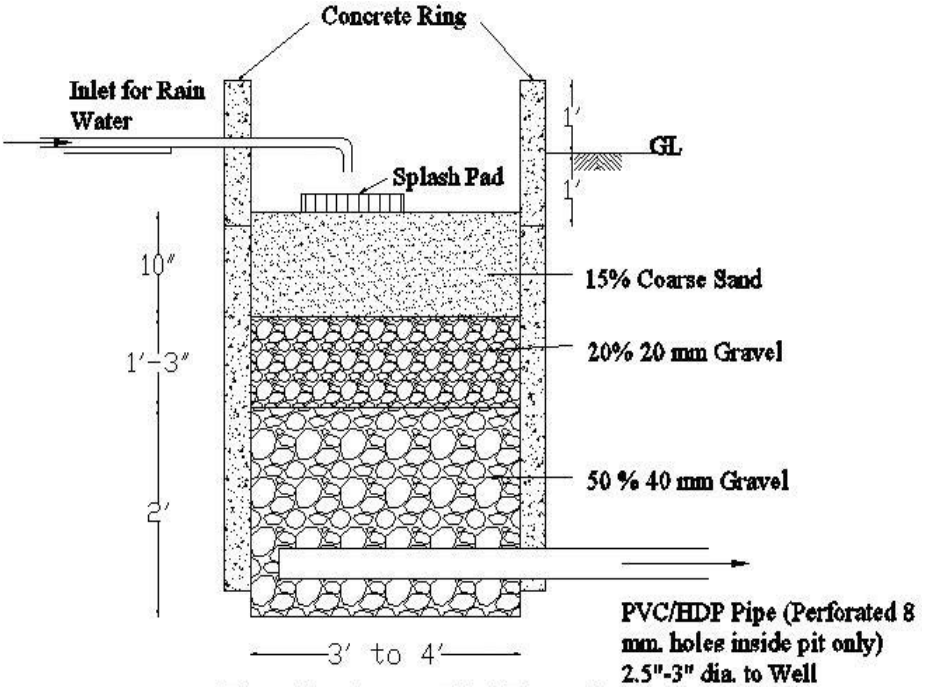

Fig : Recharge Pit / Trench

There are several problems in the Kathmandu valley that make water collection and storage difficult. One is that the northern part of the valley is good for infiltration of rainwater into the ground, compared with the southern part. And, due to the construction of roads and large numbers of houses, land is made impervious and only limited water gets percolated and hence most of the rain water finds its way to the river. Nonetheless, several RWH initiatives have been taken for collecting and storing rainwater. For example, in the Tri Chandra College at the center of the city, rain water is collected

off the roofs of the buildings and sent to the nearby *Rani Pokhari* (Queen's Pond) for storage.

While waiting for the Melamchi Drinking Water Project to be completed and water from the Melamchi river is diverted to the city, the population of Kathmandu will be increased by multiples. Then, the diverted water from this project may not be sufficient after a few years. Meanwhile, if RWH is practiced in sufficient scale, there would be no scarcity of water in Kathmandu until the Melamchi water arrives.

Kathmandu has about 1600 mm of rainfall per annum (equivalent to 160,000 liters per hectare of land). In Kathmandu, rainwater from large areas, such as Tribhuvan International Airport, the Singh Durbar government office complex, the Birendra International Convention Center, the large road area of Tinkune-Koteshower, and other road surfaces, etc., can be used to collect water. After filtering it in a sand/gravel filter, it can be sent through ground water systems to wells for public use. Large road surfaces are excellent places to collect rainwater to store in ponds where it is allowed to percolate and recharge the groundwater.

There are two distinct aquifer systems in Kathmandu valley: shallow and deep aquifers. Deep aquifer does not get recharged due to thick layer of clay. It is a very old stock dating back to thousands of years. We are only mining it. Hence, for simplicity recharging the shallow aquifer is suggested. RWH techniques are simple systems and no substantial investment is required. The only requirement is a strong will from the government and municipality authorities.

In addition, rainwater from rooftops can also be collected in tanks and other containers for use in toilet flushing, gardening, clothes and vehicle washing, etc. Water collected in such containers may not last to the dry season, but it can be useful during the non-rainy days. Every year about 4,000 new houses are constructed in Kathmandu city. We suggest that implementation of RWH systems should be made part of the mandatory approval system for building plans, as is required in many cities of India.

Another example is seen in the arid areas of China, where the people have benefited considerably from the implementation of RWH systems. One method is the construction of hundreds of thousand rain water harvesting structures (mostly underground jars). We have also learned how miracles have happened in the semi-arid regions of Rajasthan, India, with innovative rainwater harvesting.

Not long ago, the government of Nepal prepared a draft Policy on Rainwater Harvesting and a regional high level meeting was held on RWH in Kathmandu in June 2009. After that, however, not much has been done. We urge the government to run a strong media campaign to popularize RWH systems for Nepal. Eventhough, the Kathmandu and Dharan municipalities have granted 10% and 30% discount respectively in building plans approval fees for installing a water harvesting system in a home. But many people are not aware of such discounts. There should be a media campaign to popularise it.

We find it strange that such a simple solution to the water storage problems is not being used. An awareness campaign needs to be launched to propagate the concept of rainwater harvesting. It is not wise act to lose 1,600 mm of rainfall to drain into the river, and then to make hue and cry over the non-availability of water. Government, municipality and Kathmandu Upatyaka Khanepani, Ltd., (Kathmandu Water Utility) must understand that rainwater harvesting is a simple, inexpensive method to augment the Kathmandu valley's inadequate water supply. Corporations and companies, large and small, need to understand their corporate social responsibility; they, too, should contribute to such an important life-sustaining cause through rainwater harvesting. But, the strong support of government is required to realize the long term benefits from this simple but wonderful and relatively inexpensive technique of water harvesting.

We have written, here, the case for Kathmandu valley; but it is equally applicable to other parts of Nepal.

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