

Rainwater Harvesting Potential for Urban Agriculture in Hyderabad

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Agriculture in and around Indian cities is under pressure due to rapid urbanisation and associated land use change, and coupled with pressure on already scarce water resources. The major beneficiaries of UA in the larger cities are low-income communities that make use of the available resources – vacant land, river banks and wastewater – to supplement their meagre incomes. Rainwater is a valuable potential resource, and government attention to rainwater harvesting is growing, but its potential for UA is still poorly understood and documented.

Serilingampally

Hyderabad is a mega city, with a growing population of 7 million. In April 2007 the city limits were expanded (from 165 to 675 sq. km), absorbing 10 surrounding municipalities. Serilingampally is one such municipality that came under the Greater Hyderabad Municipal Corporation's (GHMC) jurisdiction. Between 2003 and 2006 Serilingampally lost 61 percent of its arable land to real estate development (IWMI, 2007: 19). Despite a booming IT sector and unprecedented economic growth, food security declined during this period for many of its inhabitants. Those who were once able to manage with the help of produce from their plots, have become dependent on food brought from afar with prices that are, in many cases, beyond their means. With nearly 30 percent of the population below the poverty line in 2003, Serilingampally has witnessed a shift in livelihood patterns among the low-income groups. Thus, the potential and need for localised household vegetable production for increased food

Rainwater harvesting unit, with compost bin
Photo: IWMI



In future all of the gardens will be using rooftop collection and drip irrigation

Purnima's story:

Purnima lives with her family of seven in Surabhi Colony. Their household income is 8000 INRs (US\$ 200) per month and their monthly expenditure on food (excluding meat and dairy products) prior to taking part in the kitchen garden project was 2500 INRs (US\$ 62). Purnima spends up to four hours each day gardening and although she had no previous knowledge about growing vegetables before the RUAF-CFF kitchen garden project began, she has been an active and enthusiastic participant and a team leader for five other families within the colony. With training and support provided by IWMI staff (the local NGO running the RUAF-CFF programme), Purnima estimates that her kitchen garden has saved the family an average of 200 INR a month during the winter months, representing 12.5 percent of her family's monthly food expenditure. There have been difficulties along the way, such as seeds not germinating and poor soil quality; however, it is the gradual decline of water supply that is the main problem. In the hot summer months only a few taps are functional, and Purnima collects her water from the next street where the water tap works allowing her to collect a 25 L bucket in a ten-minute round trip. It takes her two hours every morning to collect enough water for the family's daily use. Approximately 60 L of the 200 L of water collected is used for watering her vegetable garden.

This information is based on two interviews conducted with Purnima by IWMI staff on 24/4/08 and 26/4/08.

security is clear. In areas like Serilingampally, those with a home garden can be encouraged to develop it to improve their household food security.

Surabhi Colony

Surabhi Colony used to fall within Serilingampally municipality, but it is now within the GHMC of Hyderabad. It is situated on the western fringe of Hyderabad and is registered as a low-income community, allowing it access to the programmes of the Urban Poverty Alleviation and Livelihood Cell of the GHMC (www.ghmc.gov.in). Supported by strong community leaders and self-help groups, the members of the community are well positioned to represent themselves in seeking government support. Mixed livelihood activities are common despite the community's non-farming heritage. Nevertheless, one of the new challenges facing the community is household food security. Thus the RUAF-CFF programme sought to assist 38 households in the Surabhi Colony (December 2007) to realise the potential of urban kitchen gardens, with a view to improving household food security. By the end of the first growing season (February), however, water proved to be a considerable barrier to the full realisation of urban agriculture's potential. As in most semiarid regions, the rains come all at once, during the monsoon months June to September; and in the

summer (March – May), the temperature rises to 40 degrees Celsius and water shortages become even more acute.

The main agricultural systems in Hyderabad are fodder and vegetable cultivation, where the much-needed water for growing is extracted from the Musi River that runs through the city (see UA-Magazine no.8). However, no such water course is available to the Surabhi Colony, where groundwater is the main source for domestic use and other purposes. This too is erratic and inadequate. From interviews with members of Surabhi Colony (April 2008) it appeared that perceptions of water availability and daily usage vary depending on the resident's proximity and access to the single bore well that supplies water to the entire colony.

In April 2008, the number of households in Surabhi Colony rose to 240. Fifty-one taps distribute water for domestic use throughout the colony and this all comes from a single motorised bore well. While such a supply can be considered a blessing, this water is hard and undrinkable and the supply is restricted to four hours a day. Taps closer to the pump benefit from high water pressure, while those further away suffer from inadequate pressure and insufficient supply. This situation is exacerbated in the summer as groundwater levels go down. In addition to the piped water from the colony bore well, there are five hand pumps (four public and one private) distributed throughout the colony. However, the residents are less inclined to use these given the effort involved in extracting this water. More recently, their persistent representation at meetings with the local authorities resulted in the supply of potable water from the Krishna water project (Personal communication with IWMI project officer Radha). Supply was to be one 5000 L tanker every other day, an achievable target in the rainy season. However, in the recent summer months, supply has been reduced to two or three deliveries per week, as the demand for fresh cleaner drinking water throughout the city has increased. With a population of approximately 600, the average supply in summer works out to be between 2.38 L and 3.47 L of drinking water per person per day. For all other domestic purposes the bore well supply is the only source, but availability throughout the year is unreliable. So the kitchen gardens require an alternative source as a sustainable solution. While reusing greywater from kitchens is a potential option, the existing house plans are not conducive to this. All the washing (clothes and cooking utensils) is done outside where the water is stored in barrels or a concrete storage tank. A cemented area for washing where the effluent can be channelled to vegetable plots needs adequate planning, and investment of time and money.

It is in this setting that the imperative need for alternative sources of water, such as that provided by rainwater harvesting, to supplement the groundwater used for sustainable kitchen gardens becomes clear.

Rainwater for urban agriculture

Harvesting rainwater provides a free source of water, and utilising rainwater before it enters existing water systems within the urban area may provide a source of water that is less polluted than other sources of water within the city. If the water collected on rooftops is stored in private tanks it can be used by the residents, or, if directed to recharge the groundwater supply, it can help replenish local reserves. Thus, it can help reduce residents' dependence on local municipal supply and, depending on the

storage capacity, has the potential to see them through times of seasonal water scarcity.

In addition, proper rainwater harvesting systems can help reduce pressure on the local infrastructure in times of heavy rainfall by storing or redirecting rainwater runoff from stressed stormwater drainage systems. In regions that experience monsoonal rainfall, a particular issue can be the overloading of these systems. Flooding and the potential for sewer overflows have obvious health risks which rainwater harvesting may – at least in a limited capacity – help minimise (Hewa et al., 2006: 445.)

Rainwater harvesting includes three components: a watershed area to produce runoff, a storage facility (soil profile, surface reservoirs, or groundwater aquifers), and a target area for beneficial use of the water (agriculture, domestic, or industry) (Molden, 2007: 332). The rainwater harvesting potential of a building is calculated by multiplying the rainfall amount by the catchment area by the runoff co-efficient (see for instance www.rainwater-harvesting.org for more information).

In an urban setting, harvesting rainwater from one's rooftop is perhaps the most obvious example, but is not the only method available. Rainwater harvesting can be as simple as capturing water on a plastic sheet with its four corners tied to poles (Hewa et al., 2006: 445). Once captured, the rainwater can either be stored in a tank or container above ground and drawn from as necessary, or directed to an underground tank or pit where it is used to recharge the groundwater. The size of the storage container will be constrained by the space each housing plot has in its garden, and therefore a rainwater harvesting system that enables both limited storage and recharge of the local groundwater reserves would be preferable. Unless adequate water quality testing is carried out, the captured water should not be used for human consumption. The initial cost of construction of the catchment and storage system does not have to be high: a storage container of 500 L with the required pipes and labour can cost around INR 2000/-.

For urban agriculture, the following list offers some issues to consider:

- *Local climate: is the rainfall steady throughout the year or concentrated within a short period?*
- *Soil structure: will the soil absorb the water once directed for the purpose of recharging groundwater?*
- *Storage capacity and effects of storage on water quality.*
- *Scale of urban agriculture practice and the specific crop requirements.*

Given the water shortages identified in Surabhi Colony, utilising the rainwater harvesting potential of each house could make a considerable difference to the residents' daily life. Given the rainfall patterns of Hyderabad, rainwater will most likely be harvested and stored during the monsoon – the period when irrigation will be least necessary. The issue therefore is the dry summer months, which come some five months after the end of the monsoon. The

groundwater recharge could extend the supply over a two month period, but a mere 500 L storage water tank would most likely not be adequate to see the household through the remainder of the period. This predicament therefore illustrates the need for a diversified rainwater harvesting system, which includes recharging local groundwater supplies, and which will enhance the water supply throughout the year for crops and other domestic uses.

Rainwater harvesting on the government agenda

If Hyderabad city is to achieve the Hyderabad Metropolitan Water Supply & Sewerage Board's (HMWS & SB) vision to: "provide water of the highest quality, round the clock, at an affordable cost" (<http://www.hyderabadwater.gov.in/>) and if Hyderabad Urban Development Authority's (HUDA) plan to deliver 150 litres of water per capita per day (HUDA, 2006: 67) is to be met, then the harvesting of rainwater for both storage and groundwater recharge are vital steps that must be taken immediately.

The HMWS & SB has already envisaged the potential for rainwater harvesting in the city: in its attempt to promote rainwater harvesting it has drafted plans for rainwater harvesting units and offered a 10 percent subsidy to help cover construction costs (See: <http://www.hyderabadwater.gov.in/rwhu.htm>).

The need for such planning and action is imperative, since rapid building construction, coupled with plans to lay roadways throughout Surabhi Colony mean that the potential for the natural recharge of groundwater is in jeopardy. Awareness of the importance of rainwater harvesting has been increased through the RUAF's programme. The colony's leaders must be motivated to establish a diversified rainwater harvesting system for the colony; if not the scarcity of water will only intensify.

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Some useful websites

www.rainwaterharvesting.org

www.wateraid.org

www.rainwaterclub.org

www.iwmi.cgiar.org