POLICY PAPER 2

Measures for Ensuring Sustainability of Rainwater Harvesting

Prepared by

Water for Asian Cities Programme, India – UN-HABITAT
&
Directorate of Urban Administration & Development
Government of Madhya Pradesh

CONTENTS

PREFACE

Urban centers in India are facing an ironical situation with regard to water today. On one hand there is acute water scarcity and on the other, the streets are often flooded during the monsoons, requiring managerial efficiency of the Urban Local Bodies to use the surplus water of the rainy season to overcome the deficiency in other seasons. The shortage of ground water is more pronounced due to urbanization and limited open areas available for recharge of ground water. In some cities ground water extraction has reached very high levels and has brought problems like declining water table, failures of wells/ tube wells and deterioration in ground water quality and quantity. Water is more than often been seen as a cause for social conflicts, protests, demonstrations and road-blockades. In the given situation rainwater harvesting could prove to be a solution for overcoming this scenario.

Depending on local environmental conditions, water harvesting may provide a supplementary supply, an alternative supply or the only feasible improved supply, especially in urban areas. The current centralized water supply paradigm seems unsustainable and extremely high on energy consumption. As an alternative paradigm for more sustainable water availability harvesting rainwater, storing it in tanks, and recharging groundwater may be put in place. On the civil society becoming more aware and sensitized regarding its potential, rainwater harvesting can perhaps be scaled up to neighborhood and micro-watershed levels. Armed with complete information, it has been seen that people naturally would have a tendency to conserve their own resources.

To meet these challenges, the Government of Madhya Pradesh has made roof top rain water harvesting (RWH) mandatory for all buildings having plot size more than 250 square meters in municipal areas and even provided rebate on the annual property tax for the year in which the construction of rain water harvesting facility has been completed. Despite the provision of this incentive, compliance of the orders is not satisfactory. Under this back drop, UN-HABITAT and the Directorate of Urban Administration and Development, Government of Madhya Pradesh have jointly prepared a policy paper on sustainable measures for rainwater harvesting in urban areas, and in consultation with Municipal Corporation and stakeholders, to facilitate the state government to take appropriate steps to encourage the people to implement rooftop rainwater harvesting in urban areas.

The policy initiative suggested that the present financial incentive is not enough to motivate the household for the construction of roof top rainwater harvesting (RRWH) structures as it is not equal to the additional cost for the construction of RRWH structures therefore an equivalent incentive will prove to be effective. The defaulters will be liable to a penalty of equal amount per annum till the year they produces a certificate of having constructed the RRWH structure. The Municipal Corporation should issue the building permission of the buildings whose construction works are supervised by engineers/ architects registered with the Municipal Corporations who will submit full details to the Municipal Corporation of RRWH structures constructed in the buildings, designed and supervised by them. The colony residents should be required to provide for rainwater harvesting structures in the open area of the colony as one of the conditions in the license issued to them. The completion certificate will only be provided after ensuring that the RRWH structures have been constructed. The plots held by Municipal Corporation will be released only after ensuring the above compliance on rainwater harvesting measures.

The initiatives suggested in policy paper are targeted to Municipal Corporation to put in practice for ensuring efficient use of water. It is my hope that the policy document will help the state government to come up with new implementation measures for promoting rainwater harvesting in cities in a campaign mode.

Andre Dzikus
Programme Manager
Water for Cities Programme
UN -Habitat, Nairobi

Chapter – I

INTRODUCTION

Background

Urban centers in India are facing an ironical situation with regard to water today. On one hand there is acute water scarcity and on the other, the streets are often flooded during the monsoons, reflecting managerial inefficiency of the Urban Local Bodies to use the surplus water of the rainy season to overcome the deficiency in other seasons.

The shortage of ground water is more pronounced due to urbanization and limited open areas available for recharge of ground water. In some cities ground water extraction has reached very high levels and has brought problems like declining water table, failures of wells/ tube wells and deterioration in ground water quality and quantity. Water is more than often been seen as a cause for social conflicts, protests, demonstrations and road-blockades. In the given situation rainwater harvesting could prove to be a solution for overcoming this scenario.

Rain water harvesting (RWH) has been in practice for more than 4000 years owing to the temporal and spatial variability of rainfall, in its broadest sense, a technique used for collecting and storing rainwater for human use from roof tops, land surfaces or rock catchments. Simply stated a water harvesting system collects and stores water within accessible distance of its place of use. The physical and chemical properties of rainwater are usually superior to the sources of ground water that may have been subjected to contamination. Like other water resources, rainwater harvesting is an option to be considered when planning a community oriented water supply system. Depending on local environmental conditions, water harvesting may provide a supplementary supply, an alternative supply or the only feasible improved supply, especially in urban areas. Computation of rain water available and human demand as presented in Box -1, illustrates that rain water harvesting can satisfy half of our needs.

Box-1: Potential of water available through rainwater harvesting

The potential of roof top rainwater harvesting for a plot size 250 sq m for an average annual rainfall of 1000 mm, assuming 50% of plot area as roof area would be (0.5* 250*1*1000) i.e.125000 litres. Assuming that the only 60% of this potential could be stored, the quantity of water available in a year would be (0.6*125000) i.e. 75000 lit / year.

The quantity of water available for a day would be (75000 / 365) i.e. 250 litres per plot. Considering a family of 5 persons, then the availability of water would be (250 / 5) i.e. 50 litres for a person in a day.

The average water requirement of a person is approximately 100 liters in a day; hence rainwater harvested from the roof has the potential of satisfying half of the daily water requirement.

The current centralized water supply paradigm seems unsustainable and extremely high on energy consumption. As an alternative paradigm for more sustainable water availability harvesting rainwater, storing it in tanks, and recharging groundwater may be put in place. The first step could be to initiate domestic rooftop rainwater harvesting. In a house the highest point is the rooftop. However, common property resource issues have to be considered at larger level for rain water harvesting. An additional benefit is that the experience in this technique is considerable. The government has issued policy directives for encouraging this practice.

On the civil society becoming more aware and sensitized regarding its potential, rainwater harvesting can perhaps be scaled up to neighborhood and micro-watershed levels. Armed with complete information, it has been seen that people naturally would have a tendency to conserve their own resources. Therefore, a review of the approaches to rooftop rainwater harvesting as a practice of local water management, with a focus on the findings (and the failures) appears to be relevant for putting policy into practice.

Context and rationale of the initiative

Water for Asian Cities (WAC) Programme is a collaborative initiative between the United Nations Human Settlements Programme (UN-HABITAT), the Asian Development Bank (ADB) and Governments of Asia. WAC Programme in India is being pursued to accomplish the Millennium Development Goals (MDGs) relating to water and sanitation at the local level in four cities, viz. Bhopal, Indore, Gwalior and Jabalpur in the state of Madhya Pradesh. The WAC Programme is supporting the following areas agreed upon at the Regional Consultation held in August 2004 in New Delhi and reiterated later in the Consultation held in Bhopal in March 2005:

1. Pro-poor Urban Water and Sanitation Governance,
2. Integrated Urban Environmental Sanitation ,
3. Capacity Building ,
4. Monitoring and Evaluation and Knowledge Sharing.
5. Water Demand Management

In the area of Water Demand Management, UN-HABITAT had commissioned studies on water demand management in four cities of Madhya Pradesh through The Energy and Resources Institute (TERI), New Delhi and Water Resources Planning and Conservation (WRP), South Africa. The study revealed a high level of wastage of water at various stages of intake and distribution chain and that the unaccounted for water comprise of 28 to 56 %, which if managed properly could provide to a substantial portion of people who are presently deprived of it (Table 1).

Table 1: Water balance in the cities of Madhya Pradesh

	Bhopal	**Gwalior**	**Jabalpur**	**Indore**
Total system input (m^3 per annum)	8115522	56958250	55020731	34806244
Water losses (m^3 per annum)	1851122	24602470	18617690	28924206
Non-revenue water (m^3 per annum)	2290952 (28.20%)	25002510 (43.90%)	20313112 (36.90%)	39288756 (56.20%)
Authorised consumption	77.2%	56.8%	66.2%	35.2%

The study has further recommended the measures for comprehensive rain water harvesting to minimise the water supply and demand gap.

Chapter – II

POLICY FRAMEWORK AND IMPLEMENTATION

Policy framework for rainwater harvesting in urban areas of India

Managing freshwater scarcity constitutes to be one of the biggest responsibilities of governance everywhere in the world, and thus, local management of this resource is an indispensable component. Many countries have national water laws. In India, however there are no national laws as such, though there is a national water policy. The National Water policy 2002 is a cogent and comprehensive document and forms a basis that could be converted into a law.

In India, under the constitutional set up, water is a state subject. In urban areas its governance rests with urban local bodies in their areas of jurisdiction as per the 74th constitutional amendment

The need for a policy framework for water harvesting systems arises mainly because the prevailing policy statements do not touch extensively upon the issue. There is a clear need to evolve a decentralized legal regime with regard to water, which empowers people and makes them real managers of resources. For promoting urban water harvesting, a policy should include a mix of incentives and penalties. Measures that need to be undertaken include: -

- Rainwater harvesting / recharge of ground water system should be an essential town planning requirement and a pre-requisite for permission for the development of new colonies.
- Provision of rainwater and harvesting structures in all building plans should be mandatory for issuing of building permission.
- Appropriate rebates on property /fiscal incentives should be granted for effective implementation of rainwater harvesting systems.

A number of state governments have made rainwater harvesting compulsory for new buildings according to their plot sizes in various Indian cities. Some of the measures adopted in different states/ cities are highlighted in Box-2.

Box-2: Legislation on rainwater harvesting in Indian states/ cities – examples	
New Delhi	Since June 2001, the Ministry of Urban Affairs and Poverty Alleviation has made rainwater harvesting mandatory in all new buildings with a roof area of more than 100 sq m and in all plots with an area of more than 1000 sq m that are being developed. The Central Ground Water Authority (CGWA) has made rainwater harvesting mandatory in all institutions and residential colonies in notified areas. This is also applicable to all the buildings in notified areas that have tube wells. The deadline for this was March 31, 2002. The CGWA has also banned drilling of tube wells in notified areas.
Indore	Rainwater harvesting has been made mandatory in all new buildings with an area of 250 sq m or more. A rebate of 6 per cent on property tax has been offered as an incentive for implementing rainwater-harvesting systems
Kanpur	Rainwater harvesting has been made mandatory in all new buildings with an area of 1000 sq m or more.

Hyderabad	Rainwater harvesting has been made mandatory in all new buildings with an area of 300 sq m or more.
Chennai	Rainwater harvesting has been made mandatory in three storied buildings (irrespective of the size of the rooftop area). All new water and sewer connections are provided only after the iinstalation of rainwater harvesting systems.
Haryana	Haryana Urban Development Authority (HUDA) has made rainwater harvesting mandatory in all new buildings irrespective of roof area. In the notified areas in Gurgaon town and the adjoining industrial areas, all the institutions and residential colonies have been asked to adopt water harvesting by the CGWA. This has also been made applicable to all the buildings in notified areas having a tube well, and March 31, 2002 was was fixed as the deadline for compliance. The CGWA has also banned drilling of tube wells in notified areas.
Rajasthan	The state government has made rainwater harvesting mandatory for all public establishments and all properties on plots covering more than 500 sq m in urban areas.
Mumbai	The state government has made rainwater-harvesting mandatory for all buildings that are being constructed on plots that are more than 1,000 sq m in size. The deadline set for implementation was October 2002.

Policy framework for Rainwater harvesting in urban areas of Madhya Pradesh

The Government of Madhya Pradesh also formulated the State Water Policy in 2003. The references pertaining to rain water harvesting in the policy is reproduced in Box-3.

Box-3: Excerpts from the Madhya Pradesh State Water Policy, 2003

"Priority should be given to exploitation of ground water resources for drinking water purposes. Within the jurisdiction of municipal bodies ground water shall not be utilized without their permission for private use or any other purpose. If availability of ground water is more than the requirement of drinking water of a municipal body then the ground water can be used for any other purpose with due permission of the body.

In drought prone areas, to reduce the problem and severity related to drought, measures like water harvesting, soil humidity protection, works related to increasing the ground water table and transfer of water from areas having surplus water to scarce water areas etc shall be adopted. Development of grazing fields, afforestation and similar other works shall be encouraged. Priorities shall be given to the scarcity areas in the planning of water resources development and a special water management system shall be developed for economical use of water in these areas."

The Departments of Housing & Environment and Urban Administration and Development, Government of M.P. have issued various notifications and directives to urban local bodies for ensuring rain water harvesting. These are described below:

Roof top rainwater harvesting has been enforced in municipal areas through the Madhya Pradesh Bhumi Vikas Rules, 1984. Rule 78 (4) inserted vide order no. F-23(107)-95-XXXII, dated 07.04.2000 of the Housing and Environment Department, which provides that for rooftop rainwater water harvesting, methods, shall have to be provided on all type of buildings having plot size more than 500 sq m (see Box-4). This has been amended vide order F-23(107)-95-XXXII (1), dated 30.05.2001of the Housing and Environment Department reducing the minimum plot size for mandatory rooftop rainwater harvesting from 500 sq m to 250 sq m**.** The Urban Administration and Development Department vide its order no. F1-14/2000/18-3, Bhopal dated 1.11.2000 directed all the Municipal Corporations to ensure provision of rain water harvesting measures in the building plan before providing building permission to buildings for the plot sizes more than 250 Square Meters.

The Article 138 of M.P. Municipal Corporation Act, 1956 and the Article 126 of M.P. Municipalities Act, 1961 has been amended by order F-5-5-2001-XVIII (3), dated 13.03.2001 of Urban Administration and Development Department providing a rebate of 6 % to the property tax for the year in which the construction of rain water harvesting facility has been completed.

Box-4: Rule 78 (4) of Madhya Pradesh Bhumi Vikas Rules, 1984

It provides following specifications for rainwater harvesting measures in buildings and complexes:

- Percolation pit: Dig 3.0 m deep and 30 cm diameter pits at 3.0 m intervals around the plinth fill it with broken bricks and pack the top 15 cm with river sand. A 7.5 cm high dwarf walls is to be erected at the entrance to facilitate recharge.
- Pebble bed: On the three sides along the inner periphery adjoining the compound wall of the complexes, dig 1.0 m wide pit upto a depth of 1.5 m and fill it with 5 to 7.5 cm sized pebbles. Let the rain water falling on the terrace flow into this pebble bed.
- Service well: Dig a well of 1.2 m diameter for a depth of 10.0 m and divert the rain water from the terrace into the well through pipes.
- Recharge well: Divert the rainwater falling around the open space surrounding the building to the frontage where a gutter having a depth of 1.0 m and width of 0.6 m and provided with perforated slabs is created. The rainwater collected in the gutter is discharged into another recharge well of 1.2 m diameter and 10.0 m depth through necessary piping arrangements.

Rain water harvesting measures prevailing in Municipal Corporations