Adopting Integrated Urban Water Management in Indian Cities (AdoptIUWM)

KISHANGARH

About the Project

European Commission funded project on **Adopting Integrated Urban Water Management in Indian Cities (AdoptIUWM)** is being implemented by ICLEI South Asia in partnership with ICLEI European Secretariat and Association of Flemish Cities and Municipalities (VVSG). This 3.5 year project is being undertaken in 2 **cities of Rajasthan (Jaisalmer & Kishangarh) and 2 cities of Maharashtra (Solapur & Ichalkaranji).** The **aim of the project is to build the capacity of Indian Local Authorities to undertake water sector reforms** through the adoption of Integrated Urban Water Management (IUWM) principles and practices in their planning and implementation processes.

Key Issues & Challenges

- **Pollution of ponds and lakes, especially Eutrophication of Gundolav**
- **Untreated waste water discharge into ponds**
- **Need to address the issue of marble waste disposal**
- **Poor management of catchment area of water bodies**
- **High T&D losses**
- **Need to revive natural drainage channels**
- **Need to replenish water table**
- **Poor status of services in slum areas**

Marble Processing Industry Related Issues

Marble industries, scattered across the city, are key consumers of water. Water for the industries is either sourced directly by industries as groundwater or purchased through tanker supply (saline groundwater supplied by private tankers @Rs. 150 to 200/ tanker). Though the water consumption in marble processing is high, no exact estimates of water consumed by these plants have been recorded. **Based on preliminary calculations, water consumption by the marble industry can be estimated at a minimum of 5.25 MLD.** The key issues related to these industries are:

- High water consumption from ground water sources
- Marble slurry waste is dumped along the banks of lakes for drying and hence, finds its way into the lakes. It is also believed that deposition of marble waste at the base of the ponds has reduced the recharge capacity of these water bodies, more so in case of Hameer Sagar since it has marble industries and other informal settlements in its catchment.
- Marble slurry and marble waste dump along the nallahs has led to choking of some nallahs
- Marble slurry is dumped at the marble dump yard which is now nearly full and a new dump yard is being developed towards the back side of the existing site.
- Pollution of ground water and soil due to discharges from the marble slurry dump yard is also a possibility, although no instances have been reported as yet. **The soil around the processing industries to the North of Hameer Sagar have turned white due to marble dust (As can be seen in the satellite image).**
- **Particulate matter from the industry has led to air pollution, especially RSPM levels are likely to be high. Respiratory diseases are also common around the processing plants.**

This document has been produced with the financial assistance of the European Union (Europe Aid/131 956/ACT/IN). The contents of this document are the sole responsibility of ICLEI South Asia and can under no circumstances be regarded as reflecting the position of the European Union

About Kishangarh

Kishangarh, located in Ajmer District, also known as the **"Marble city"**, has traditionally been an industrial town. **The city is strategically located in close proximity to Ajmer and Jaipur and also well connected by NH8 and NH 79A and hence, is an important commercial centre in the district.**

Area	45.79 Sq. Km*
Population as per Census 2001	1,16,222
Population as per Census 2011	1,54,886
Gross Population Density based on Census 2011	3382 persons/km
Projected Population till 2035	3,03,611**
Sex Ratio	935 females per 1000 males
Overall Literacy Rate	78.97%
Work Participation Ratio	30.85%

**As per Master Plan, Kishangarh*

*** As per projections by ICLEI based on Census Data*

Kishangarh with about 1000 marble processing units has more than 515 granite gangsaws and 71 marble gangsaws, 500 edge cutting machines, godowns and several marble traders who provide employment to more than 50 thousand workers. Marble, mined from all parts of Rajasthan, is brought to Kishangarh for processing, cutting and polishing, after which the finished product is marketed across the country.

The city is divided into 45 wards for administrative purposes and has 15 notified slum pockets housing 24.59% of total population of the city. The catchment area around the city comprises of undulating terrain, some hillocks and scrubland.

The hard rock area of the city, limits the scope for recharging but efforts are being made by the city authorities to make people understand the potential for low cost local level RWH measures.

The city also has several lakes and ponds, few of which are interconnected, Gundolav and Hameer Sagar being the prime ones. But both these lakes suffer from pollution from slurry and marble waste dump from marble industry and untreated wastewater discharge from HHs. Pollution from the neighbouring areas has led to extensive eutrophication of Gundolav. A unique feature of Kishangarh is that there are already active citizen groups that are working towards environmental conservation. The Marble Association is also looking for options to recycle the marble waste at the dump yard.

Activities Undertaken In Kishangarh

Project activities in Kishangarh started from May 2013 with the first city visit. Since the start of the project, the Municipal Council has signed a **MoU with ICLEI South Asia for the project and passed a Council Resolution showing the commitment of the City Representatives towards the Project and the cause. A Project Core Team and a Stakeholder Committee** have been formed in the city.

The first **Stakeholder Workshop** was held in October 2013 wherein all related stakeholders came together and discussed the issues faced by the city and the need for an integrated approach.

First Stakeholder Meeting for AdoptIUWM Project held in Kishangarh

Issues related to pollution of Gundolav Lake leading to eutrophication, pollution of Hameer Sagar Lake due to untreated wastewater discharge & waste from marble processing plants; and blocking of drainage channels due to the unregulated marble waste dumping & plastics have been raised several times during stakeholder consultations and discussions with officials.

The project team has prepared a **Baseline Assessment Report** for the city after several meetings with relevant Depts., data collection & analysis and ward level reconnaissance surveys. A **State Level Meeting had been organized to inform the State Government of the issues being faced by the city and the steps being planned under the project.**

Eutrophication of Gundolav

This meeting chaired by Principal Secretary, Department of Urban Development and Housing, Govt. of Rajasthan and attended by various State level Organizations and Departments, was held in April 2014 where the ongoing project activities were discussed.

Rajasthan State Level Meeting for AdoptIUWM Project

Recently, a **Water Quality Testing Workshop** was conducted in Kishangarh in partnership with **Development Alternatives** for hands on experience of water quality monitoring where representatives from Municipal Council, NGOs and other Institutions were trained to understand the significance of water quality parameters and how these parameters can be monitored. A portable water quality testing kit was provided to the city under the project which can be used by NGOs, Institutions, Municipality and citizens to monitor water resources in and around the city.

The second stakeholder workshop would be conducted in Kishangarh in coming months, to discuss an Integrated Urban Water Management based Action Plan for the city and to finalize pilot project for implementation.

Water Quality Monitoring workshop in Kishangarh

Existing Status of Services in Kishangarh

Water Supply

The major source of water supply to the city is Bisalpur Dam located 120 km away, but the city is facing issues related to competing users and reducing water availability at the dam. Groundwater in Kishangarh region has been found to have high Salinity, Fluoride (More than 1.5mg/l) and Chloride (More than 1000mg/l) levels[1]. Dependence on ground water is low owing to the rocky terrain. There are 4 large water bodies in the city, major ones being Hameer Sagar Lake and Gundolav Lake which suffer from issues of marble waste pollution, eutrophication and siltation.

Total Water Supply to the city	14.31 MLD
Major Source of Supply	Bisalpur Dam
Per Capita Quantum of Water Supplied	70 lpcd (SLB data)
Non-Revenue Water (NRW)	32% (SLB data)
Total Water Connections	22800 (94% Domestic)
% of HHs with Water Connections	14969 53% of Total HHs, as per SLB
Metering	12627 (working only 2574)
Water Treatment Plant	Not present (provided at dam)
Projected Water Demand for 2035	49.18 MLD (incl. 20% T&D losses)

Based on the Service Level Benchmark (SLB) data, the Non -Revenue Water (NRW) losses in the city are as high as 32% of the total supply. Some areas in the city face shortage of water during summers and rely upon water tankers supplied by PHED for meeting their water demand. Kishangarh doesn't have a water treatment plant and water is distributed after chlorination through 7 service reservoirs spread across the city.

[1] Central Ground Water Board (CGWB), 2008

Water sector in the city suffers from low per capita supply, high T&D losses, spatial inequality and lack of basic water and sanitation facilities in slums.

Plan for up-gradation of the water supply network in Kishangarh is being developed by PHED. The map shows the existing and proposed distribution network with service reservoirs, as proposed by PHED. But owing to paucity of funds, this scheme is yet to be implemented.

Existing and Proposed Water Supply Network in city. Source: PHED

Slums in the city receive an intermittent water supply and face shortage of community taps and other facilities. With the hand pumps lying defunct in most of the slums, slum dwellers are dependant either on water supplied through PHED tankers or neighbouring tube wells.

Based on discussions from the First Stakeholder Workshop, waste from marble slurry is believed to aggravate choking of the base of the lake, thereby reducing the infiltration potential.

Sewerage

Kishangarh city does not have an underground sewerage system and most of the houses are dependant on septic tanks and soak pits. Only a small area of the city has sewers which are lying defunct at present. The city doesn't have a Sewerage Treatment Plant (STP) at present and the nutrient rich wastewater finds its way into the ponds of the city.

Under RUIDP proposal, work on Phase 1 of laying underground sewerage system in the city has started and an STP is also being constructed on Kishangarh Nasirabad SH 79A near Rajsmand Talab. Municipality has transferred about 12 hectare land to RUIDP for construction of STP.

The proposed STP is located along the banks of Gundolav and hence, treated waste water discharge from this STP can also lead to pollution of lakes. It is thus, important to treat this wastewater and reuse it for industrial purposes to reduce groundwater withdrawal by marble units.

Wastewater Generation @ 75% of water supply	10.73 MLD
Wastewater Generation in 2035	30.74 MLD
Coverage of Septic Tanks	70% of HHs covered as per data records of KMC
Total Drainage length	569 kms as per data records of KMC

Untreated wastewater from settlements enters Hammer Sagar. Nutrient exchange between Hameer Sagar and Gundolav takes place through a channel connecting the two lakes and causes eutrophication of Gundolav. This exchange of nutrients is even more pronounced during monsoons.

The lakes in the city are highly polluted due to the disposal of untreated sewage and marble waste. Hameer Sagar Lake has foul smell due to discharge of untreated wastewater whilst Gundolav suffers from severe eutrophication.

A study of water quality of Gundolav Lake was conducted by Sharma et al which found level of BOD of upto 49.42mg/l (std 3mg/l for bathing quality) and low DO of upto 3.68 mg/l (5mg/l for bathing quality), indicating the high level of pollutants in the lake.

In slum areas, sewerage infrastructure is even poorer and slum dwellers resort to open defecation. There are no drains in slums and wastewater collects in open pockets along the streets and causes further contamination of groundwater leading to several health related issues. The issue of open drains not being cleaned regularly by municipal sanitary workers was brought out during the reconnaissance survey and interviews.

Condition of Drains in the city

Drainage

The city has an open network of drains which carry wastewater as well as runoff/storm water. These open drains suffer from clogging due to solid waste disposal and often lead to water-logging conditions. Though plastic bags have been banned in the city, this has not been successfully implemented yet. Plastic waste is a key issue in the city and leads to clogging of drains

The city has two prominent drainage channels: One connecting Ransamand Lake to Gundolav and the other connecting Gundolav to Hameer Sagar. Most drains from the city ultimately empty in the Hameer Sagar Lake which flows to the Gundolav Lake.

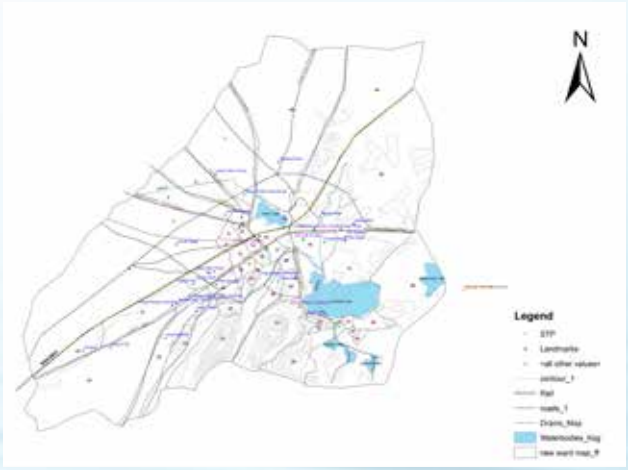
Based on Focus Group Discussion and consecutive meetings, attempts made by citizens for rain water harvesting in the city are limited - it is a general belief that the cost of construction of rain water harvesting structure would be very high owing to the hard terrain of the region. But the citizens need to be made aware of low cost rain water harvesting techniques.

Other than these, there is one prominent nallah flowing along the main road of the city which enters Hameer Sagar and carries the runoff from SW to NE. There is another nallah that runs to the east of NH3 and carries wastewater from SW to NE and drains into Gundolav. Other than these, there are several small and medium nallahs and drains around the city. These natural and manmade drainage channels can be seen on the map.

Waste Management – Solid Waste & Marble Slurry

The city doesn't have Door to Door collection facility, and hence waste is dumped in open areas. Despite the presence of free dumping at Marble slurry dumpyard, marble waste is also disposed off along ponds. Many of the drainage channels to the ponds are getting blocked due to waste disposal and dump from marble industry. The waste from the city is dumped

Nallahs/Drains emptying in Hameer Sagar Lake and Satalao lake



Drainage Map of the city

at the trenching ground, located 5 km away from the city along Silora Road, without any processing or scientific disposal.

Marble slurry from most marble processing units is brought to the dump yard which has 2 decant wells which settle the solid particles and the slurry waste finds its way into the water bodies and nallahs. The present dumping site is full and a new site is being developed adjacent to the old one.

Clogging of open drains due to solid waste and marble waste, frequently leads to water logging conditions in monsoon. Plastics / Polythene waste management is also an issue.

Studies have found that marble slurry waste disposed in the open, causes changes in the character of soil over time and destroys the upper strata of soil[2]. Few large industries have marble slurry treatment plants

[2] Dhanwar S., 2012, Study of soil affected by the waste product of marble industries, International Journal of Geology, Earth and Environmental Sciences, ISSN 2277 to 2081, 2012, Vol 2 (2), May to August, pp 16 to 17.

Marble Slurry Dump yard where marble slurry and waste is dumped

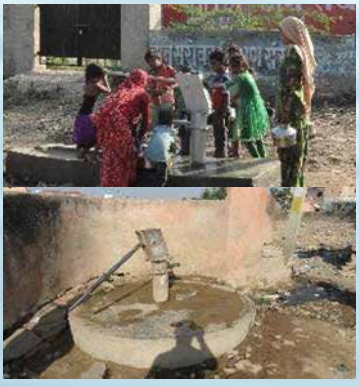
while most of them dispose their waste at the dump yard without treating.

Need for Integration Across Sectors

Kishangarh has a linear water cycle at present and has ample potential to transform this into a cyclic water cycle while also integrating water sector with other sectors like land use.

Present Scenario: Linear Water Cycle

Water abstracted from Bisalpur dam (nearly 120km) is supplied to the city. Water is used at HH level and grey water is discharged into open drains, black water in septic tanks. Discharge from septic tanks also enters open drains. Open drains and nallahs carry wastewater as well as storm water and empty into the lakes, thereby polluting them. No inter-linkages of water sectors with other sectors like land use, buildings, etc. Integration within water related sectors is missing and schemes for each sector are planned in isolation



Benefits of Integration

Integration across sectors can help Kishangarh meet water shortage by recycling wastewater

- **Recycling of wastewater will help restore the natural freshwater channels and ponds**
- **Reuse of treated wastewater by industries can help reduce burden on groundwater withdrawal (estimated 5.2 MLD used daily)**
- **Integrating ponds in water supply for secondary uses**
- **Integration across sectors can help in integrated planning**
- **Sustainable urban drainage systems to retain runoff and enable recharge**
- **Integration of water sectors with other sectors like land use, buildings, etc can help maximize efficient service delivery**

Future Activities

In the subsequent years of the AdoptIUWM Project the following activities would be undertaken -

- **A second Stakeholder Workshop will be conducted to**
  - **Formulate IUWM based Action plan**
  - **Finalize pilot project**
- **Training programmes on IUWM in Kishangarh**
- **Exposure visit to Europe**
- **Implementation of Pilot Projects**
- **Associating a Technical Consultant with the Municipality**
- **National level workshop**

For further information please contact: **ICLEI South Asia, New Delhi, Email: adoptiuwm@iclei.org**