



European
Commission



Adopting Integrated Urban Water Management in Indian Cities (AdoptIUWM)

JAISALMER

About the Project

Adopting Integrated Urban Water Management in Indian Cities (AdoptIUWM) is a project funded by European Commission and 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 implemented 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.

Jaisalmer has a wealth of traditional Rain Water Harvesting structures (City level to household level) which have immense potential to resolve the water woes of this water scarce region. These traditional structures are in a state of neglect and need immediate attention to ensure their conservation.

Inter-linkages exist between ponds in the city which ensure flow of runoff between ponds and hence, prevent flooding. Most of these interlinkages thrive till date but are getting encroached. The drainage channels and catchment areas of these ponds are also getting impacted by development activities.

Key Issues & Challenges

- Old water transmission mains and distribution system leading to leakages and T&D losses to the tune of 40%. New water supply infrastructure being laid by RUIDP will reduce leakage losses
- Inadequate distribution across wards
- Traditional Rain Water Harvesting structures in and around the city need conservation
- Large number of illegal/multiple connections (in single household)
- Need for active measures towards Rain Water Harvesting
- Need for capacity building of Municipal staff
- Deterioration of inter-linkages between ponds in Jaisalmer and encroachment in catchment area
- Wastewater from the city is not treated and is disposed off on vacant land, leading to safety issues as this is a ground for mosquito breeding. With the new treatment plant becoming functional soon, this issue is likely to be solved.
- Urban poor resort to open defecation in the absence of adequate sanitation facilities
- Mixing of overflow from septic tanks in storm water drains leads to hazardous conditions
- Clogging of open drains due to waste, especially polythene waste, leads to water logging
- Need to increase rain water harvesting potential
- Poor sanitary condition around ponds and other water sources
- Need for waste water reuse
- Scope for dual supply lines in the city can be explored
- Greenery around water resources needs to be revived





About Jaisalmer

Jaisalmer, often referred to as the 'Golden City of India' due to the sand dunes and yellow sand stone used in buildings, is also the administrative headquarter of Jaisalmer district. Located in the extreme north-west of India in the Thar desert region, Jaisalmer is an important urban centre for its vast desert hinterland, and a prominent tourist city on the **National and International Tourist circuit**. The city is renowned for its rich cultural and built heritage, sand dunes and traditional rain water harvesting structures.

Agriculture hasn't been a major economic activity in the district owing to the limited rainfall and physiography. However, **water from Indira Gandhi Canal has enabled farming of Rabi crops**¹. Both domestic and international tourist influx in Jaisalmer city has been steadily increasing and in 2011, **nearly 2.8 lakh domestic and 1.2 lakh international tourists visited Jaisalmer**².

The city has 6 notified slums housing nearly 22.5% of the total population.

Area	126.27 Sq. km.
Population (Census 2001)	57,537
Population (Census 2011)	65,471
Gross Population Density 2011	518 persons / sq. km.
Slum Population (2011)	14,741 (3,211 HHs)
Floating Population	4 lakh tourists annually and nearly 50,000 floating population on festivals*
Projected Population (2035)	88,755**
Sex Ratio	797 females per 1000 males
Overall Literacy Rate	78.46%
Work Participation Ratio	35%

* As per Draft Master Plan, Jaisalmer, 2013

** As per projections based on Census Data

Activities Undertaken In Jaisalmer

Project activities have been initiated in Jaisalmer since April 2013 and Core Team and Stakeholder Committee have been formed in the city. The Municipal Council has passed a Council Resolution showing the commitment of the City Representatives towards the Project. Data collection activities and

reconnaissance visit to key areas in the city have been undertaken by ICLEI team, along with officials from the Municipal Council.

The first **Stakeholder Workshop** held in September 2013, was a highly interactive workshop and brought stakeholders together to discuss the need for an integrated approach towards water management and conservation of traditional rain water harvesting structures in and around the city.



First Stakeholder Meeting for AdoptUWM Project held in Jaisalmer

Functional transfer of water supply services from PHED to Municipal Council is ongoing but capacity of Municipal Council is limited.

A **Focus Group Discussion (FGD)** was conducted in the city for understanding and mapping the urban water cycle (through spatial mapping exercise), undertake discussions on the traditional rain water harvesting systems in Jaisalmer and long-listing of potential pilot projects that can be taken up in Year 2 of the project.

A **State Level Meeting** was also conducted to inform the State Government of the issues being faced by the city and the steps being planned under the project. This meeting held in April 2014, was chaired by **Principal Secretary, Department of Urban Development and Housing, Govt. of Rajasthan and was attended by various State level Organizations and Departments.**

Recently, a **Water Quality Testing Workshop** was conducted in Jaisalmer in co-ordination with **Development Alternatives** for hands on experience of water quality monitoring in which representatives from Municipal Council, NGOs and other Institutions were trained to understand the significance of water quality parameters and techniques for monitoring these parameters. A portable water quality testing kit was provided to the city under the project which can

¹ Draft Jaisalmer Master Plan (2011-2031), 2013

² Draft Jaisalmer Master Plan (2011-2031), 2013

be used by NGOs and Institutions to help Municipality and citizens monitor water resources in and around the city.



State Level Meeting for AdoptIUWM Project held in Jaipur



Stakeholders getting hands on experience in Water Quality Testing

Existing Status of Services in Jaisalmer

Water Supply

Water is supplied to the city by Public Health and Engineering Department (PHED) from **Indira Gandhi Canal** and 12 tube wells. The water supply services have been officially handed over from PHED to the Municipality in 2013 and the functional takeover is in process. Water is supplied in 30 water zones of the city through 12 kms of water mains, 70 kms of water distribution line and 9 Service Reservoirs (SRs).

Total Water Supply to city	9.5 MLD at source Estimated amount reaching consumers: 5.7 MLD ³
Major Source of Supply	Indira Gandhi Canal and 12 tube wells
Per Capita Supply	87 lpcd after T&D losses
T&D Losses	40% based on Water Supply Subproject Report by ADB

³ Estimates based on calculations. 40% T&D losses as per ADB report

Total Water Connections	9453 (Draft Master Plan)
% of HHs with Water Connections	80% as per ADB report
Metering	24% (SLB). Data needs to be verified. Partial metering, often defunct
Water Treatment Plant	19.2 MLD
Projected Water Demand for 2035	14.38 MLD (including 20% T&D losses)

Groundwater in the region is unfit for consumption, especially due to the high Fluoride content but groundwater from 12 tubewells is being used to supplement supply from Indira Gandhi Canal, especially during summers

The Fort area located on top of the hill is supplied water through pumping. Leakage from water distribution network in the fort area is causing severe degradation of buildings, fort walls and foundations.

Tourists & floating population have put incremental pressure on the scarce water resources in the city. Though Jaisalmer is endowed with rich wealth of traditional rain water harvesting structures, these structures are barely maintained and are lying defunct.

The city has an estimated 2000 illegal/multiple connections in single household which are largely unaccounted for and hence, add to the water shortage (FGD).

As discussed in Focus Group Discussion, most of the water distribution network in the city is 30-40 years old with a mix of asbestos lines in older areas and PVC pipelines in newer developments in South. RUIDP is undertaking project on upgradation of water supply distribution network in the city.

Water is available for only 1-2 hours per day, mainly because of high leakage losses (estimated as high as 40% by ADB Report) and low/unequal network pressure. Variation in pressure in the water distribution network leads to spatial inequalities and reduced water supply to the end consumers.



Interlinking channel between Gadisar and Rani Talab

The water table ranges from 38-46 m below ground level, according to the ADB Report⁴. Ground water in Jaisalmer district has high salinity, Fluoride (more than 1.5 mg/l), Nitrates (more than 45g/l) and Iron (More than 1.0 mg/l).

Under ADB funded Water supply infrastructure project, the following key works are proposed.

- New transmission mains from raw water reservoir to WTP at Gajroop Sagar (7.5km)
- Upgradation of existing WTP
- Distribution mains in slums and developing areas
- 3 Overhead tanks
- Chlorination plant
- Repairing leaks in 5000 small pipes
- 14,000 small meters to replace defunct meters

The condition of slums in the city is poor but most of them are being upgraded under IHSDP funding. Lack of adequate water connectivity is the biggest issue faced by slum dwellers and the situation gets worse during summers.



Bada Bagh: Traditional RWH structure

⁴ Initial Environmental Examination - Jaisalmer: Water Supply Subproject, ADB, 2008

Based on Focus Group Discussions, RUIDP has initiated a pilot project of 24x7 Water Supply in Babbar Majra Slum area which might be replicated in other areas. Under the project, certain parts of the city would be connected to improved water supply distribution network, including slums and new areas.

Sewerage

The city does not have a formal sewerage system, except in the fort area (covering only 2% of the city population and was developed in 1994). Most of the HHs are presently dependent on septic tanks and pit latrines in the absence of access to sewer network. Overflow from the septic tanks and grey water from the households flows into open drains/ underground sewerage network (in the fort area) which ultimately drain into the main nallahs of the city, thus polluting them.

In absence of sewage treatment facility, wastewater is disposed on open ground close to Railway line, which has become a ground for mosquito breeding. Some farmers also use untreated wastewater for irrigation informally.

5 MLD Sewage Treatment Plant (STP) is being constructed by RUIDP (ADB funded) and treated wastewater from this STP is proposed to be sold to farmers for irrigation. The main nallah of the city has been connected to the STP. Key tasks under the scheme include

- 14,000 HH sewer connection
- 10km secondary network
- 7km trunk sewer (peripheral)
- 10 MLD STP: 5 MLD STP (Phase 1), 5 MLD STP (Phase 2)

Though RUIDP sewerage network proposal considers the need for integration of water and sanitation, lack of institutional integration between Municipality and RUIDP at the city level needs to be addressed. Also, it is proposed by Municipality that the treated wastewater from the STP would be sold to farmers through tankers. This will lead to increased emissions, hence, formal integration of treated wastewater in the water cycle through a network (preferably natural network) is required.

Wastewater Generation @ 75% of water supply	4.27 MLD
Projected Wastewater Generation in 2035	8.99 MLD
Sewerage Treatment Plant (STP)	Proposed 5 MLD Plant by RUIDP (Total 10 MLD)



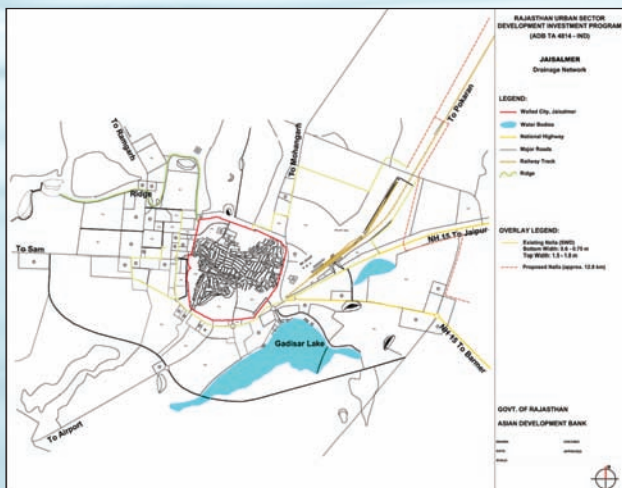
Drainage

Being located in a hilly terrain, runoff generation around the city, despite low rainfall, is significant. But lack of efforts towards catchment management and encroachment of drainage channels is compromising the existence of natural drainage channels and resources. Master Plan for the city proposes a catchment management approach to conserve water resources and drainage channels in and around the city.

The city has few large and medium sized water bodies like Gadisar Sagar, Gajroop Sagar, Amar Sagar, Gulab Sagar, Ranisar Talab, Ganga Sagar, etc. Gadisar Lake is the major water body in the city and is linked to Rani talab through natural drainage channel. It was mentioned during Focus Group Discussion, that the city and surrounding areas have approximately 150 big and small ponds. Many of these ponds are interlinked with each other and need to be conserved as they play an important role in facilitating recharge of water table.

Jaisalmer doesn't have a proper drainage network in place and relies mostly on natural channels. The city has few prominent natural nallahs flowing from the western to the eastern side along the periphery of the fort city and draining towards the railway line. Under the RUIDP proposal, two nallahs are proposed to be concretized and extended to carry runoff towards the NW area along the railway line. **Concretization of natural drainage networks should not be undertaken as it impacts the hydrological processes associated with the natural drainage channels.**

Tree cover in the catchment area is minimal which increases evaporative losses from various lakes. Given the topography around the city and the fort, runoff from the region also causes erosion and hence, plantation suited to desert climate needs to be promoted to arrest soil loss and to reduce evaporative losses.



Existing And proposed Drainage System in the city;
Source: RUIDP (ADB Report)



Amar Sagar: Different quality of water for different uses



Amar Sagar: Traditional rainwater harvest structure

Though the city receives less rainfall, extreme events like sudden storms (including one in 2006) can cause widespread flooding, damaging property due to encroachment in catchment areas. Runoff from the fort area causes flooding in the main city. If recharged, this runoff can elevate the water table as well as reduce flooding.

Waste Management

Solid waste management (SWM) system in the city is not very effective and is also impacting the traditional water harvesting structures in Jaisalmer. Some of the ponds and wells are clogged due to unregulated waste dumping in and around these water bodies. The city does not have a landfill site at present and waste is dumped in the open at the proposed landfill.

Present Waste Generation	21 MT considering @321g/capita/day ⁶
Projected Waste Generation for 2035	36 MT
Sanitary Landfill Site	Proposed



During stakeholder consultations, the issue of plastic waste causing blockage of flow in nallahs was identified as one of the major issues in the city.

Need for Integration Across Sectors

Jaisalmer has a linear water cycle at present with no integration across sectors. The city has an added advantage with numerous existing rainwater harvesting structures in and around the city which can be revived to transform this linear cycle into a closed loop.



Main nallah to the STP

The role of IUWM is extremely crucial in Jaisalmer as the city is dependent on River Ganga located nearly a thousand kilometre from Jaisalmer. With increasing impacts of climate change becoming evident, water scarcity in the region is likely to increase

Present Scenario: Linear Water Cycle

Indira Gandhi Canal is the major source of water supply for Jaisalmer which brings water from the Ganga basin to this desert region. In Jaisalmer, water is sourced at Mohangarh (82km from the city) and is routed to Gajroop Sagar through a 71 km pipeline, treated at Gajroop Sagar WTP (19.2MLD) and supplied across the city through a network of OHTs. The water supply network is old and leakages have been estimated at approximately 40%. The city has a very low coverage of road side drains and grey water is also discharged in to the open drains. Open defecation in slum areas is common in the absence of adequate sanitation facilities. Wastewater from the city ultimately collects on open ground close to railway line and is left untreated. Jaisalmer has traditional rain water harvesting structures and interlinked ponds which are in a state of neglect.

Despite handover of water supply from PHED to Municipality, capacity of Municipal staff to take up water supply provision is limited. The implementation of RUIDP schemes for sewerage, water, drainage and waste has limited Municipal involvement.

Benefits of Integration

- Impacts of Climate change on Ganga basin are becoming increasingly evident. In such a scenario, utilizing local water resources can help reduce water scarcity in future.
- Jaisalmer has a wealth of traditional Rain Water Harvesting structures which have the potential to reduce the water scarcity situation
- Reuse of treated wastewater can reduce dependence on canal water and water table depletion. Treated wastewater can also be used for aquifer recharge.
- Runoff from fort area causes water logging during monsoons, RWH can reduce water logging and help recharge water table
- Interlinkages between ponds need to be conserved through incorporation of ponds, interlinkages and floodplains as Conservation zone/ Green buffer under Master Plan
- Decentralized supply from Gadisar pond can reduce water burden of the city
- City level IUWM Committee or an IUWM hour during Council meetings can facilitate integration across sectors
- Integration of water network with Master plan to create decentralized zones.
- Integration of water sectors with other sectors like land use, buildings, etc. can help maximize efficient service delivery

Future Activities

In the coming years, the following activities would be undertaken under the AdoptIUWM Project -

- Second Stakeholder Workshop to
 - Formulate IUWM based Actions for the city
 - Finalize pilot projects
- Training programmes on IUWM
- Exposure visit to Europe
- Implementation of Pilot projects
- Associating a Technical Consultant with the Municipality
- National level workshop

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