Integrated Urban Water Management Planning and Implementation in Kishangarh, Rajasthan

Programme Duration
Overall Duration (**12)**
- Start Date (**01.01.2017**) End Date (**31.12.2017**)

Report Submitted to:
India Water Partnership (IWP)
Secretariat - WAPCOS Ltd.,
76-C, Sector-18, Institutional Area, Gurgaon - 122015 (Haryana)

Submitted By:
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New Delhi - 110016, India

Year: **2017**

Brief Summary of the Activity

Today most cities have become 'black holes' for water which is being brought from distant points to meet the needs of growing urban populations. The landscape of India is dotted with a large number of lakes, reservoirs and wetlands, which are very important urban and rural features. They are vital in the hydrological severe conditions like drought and floods; they influence the micro-climate as well as enhance the aesthetic beauty of the landscape and offer various recreational opportunities. Kishangarh city is blessed with five lakes (Gundolav Talav, Hameer Sagar, Ransamand Talav, Jaltaman Talav and Satolav Talav).Encroachment in the catchment areas around the ponds is impacting the drainage networks of the city. The disposal of solid waste in the open drains and nallahs causes blockage and water logging, affecting drainage. The waste is ultimately carried off by rainwater run-offs and by flood water to the main streams and contaminate the main water bodies of the city. Considering the above issues in Kishangarh city, ICLEI SA in collaboration with IWP initiated a project on Integrated Urban Water Management (IUWM) Planning and Implementation in Kishangarh City, with focus on conservation of ponds in the city through measures for pollution abatement (for liquid and solid waste).

Under this initiative a Rapid IUWM methodology was developed based on IUWM toolkit that was developed by ICLEI SA under Adopting Integrated Urban Water Management in Indian Cities (AdoptIUWM) project funded by European Union (EU) and was implemented in the city. The methodology was modified for rapid implementation of the IUWM process in four Indian cities, Kishangarh being one of them. Various IUWM tools were included in the Rapid IUWM methodology, for example First Integration Assessment Matrix (FIAM tool) is used to understand the level of integration among various sectors (water and water allied sectors like waste water and storm water), institutional integration and governance. An IUWM based vision for the city is formulated by the stakeholders. IUWM tool on Urban Water Loop Mapping is used to understand the water flow in the city and to map the critical and potential areas in the city. A list of potential strategies/ projects was identified. A Project Prioritization Tool is used to shortlist the initiative/project to be implemented in the shortlisted ward/area. An action plan is developed for the city based on the tools to integrate IUWM approaches in the municipal line of functions.

Various activities were conducted to successfully implement the selected pilot project on door to door waste collection in two wards of the city. Both the wards are located in the catchment area of the major water body (Gundolav and Hamir Sagar) in the city. The IUWM approach implemented in the city is based on the recognition that waste management and urban water sectors are elements of the same Urban Water Loop. The co-operation among these sectors and between stakeholders was identified for efficient water management. To build a systematic collection and disposal of municipal solid waste in the wards, Municipal Council Kishangarh officials were trained to collect segregated waste from households (wet waste for compost and plastic and recyclable to generate revenue by recycling). A decentralized compost plant was set up within the two pilot wards. Local residents in the wards were provided with dustbins to segregate waste at household level.

Series of IEC activities and training programs were conducted to generate awareness on waste segregation, WASH, rain water harvesting methods and wet waste composting. This has enabled the Municipal council to adopt a sustainable and holistic waste management approach that indirectly promotes an alternative approach for water management (to improve the quality of water in the natural drains connected to Hamir Sagar and Gundolav). It helped the municipal council to involve communities to protect the local water bodies and natural drainage systems in the cities and implement IUWM initiatives economically and efficiently. It also helps in building ownership at grass root level and community involvement at all stages. Information, Education, and Communication (IEC) interventions focused on creating a demand for a sustainable system and this led to set up a system for waste

disposal in such a way that it has tangible impact on the individual hygiene and overall environment. The community and local municipal staff were encouraged to come forward and take part in this system, which they can subsequently operate and maintain. Monitoring and Evaluation framework has also been developed with Municipal council to define the roles and responsibilities to maintain the system.

Executive Summary

Water bodies are an important part of urban ecosystems. They perform significant environmental, social and economic functions. In urban India, however, the number of water bodies is declining rapidly. For example, in the 1960s Bangalore had 262 lakes—now only 10 hold water. Similarly, in 2001, 137 lakes were listed in Ahmedabad city—65 of them have construction work underway. Hyderabad is another example—in the last 12 years, it has lost 3,245 ha of its wetlands (Status of water bodies in India)1.

Kishangarh have five main lakes, Gundolav Talao, Hameer Sagar, Ransamand Talao, Jaltaman Talao and Satolav Talav. But only two major lakes in the city (Gundolav Talav and Hameer Sagar) have water throughout the year. The Gundolav Lake was earlier used as the source of water supply to the city but owing to pollution in the water body and eutrophication in the lakes, water is now supplied from Bisalpur Dam. Encroachment in the catchment areas around the ponds is impacting the drainage networks of the city. Solid waste is another major issue. The disposal of waste in the open drains and nallahs causes blockage and water logging. The waste is ultimately carried off by rainwater run-offs and by flood water to the main streams and contaminate the main water bodies of the city.

A project based on Integrated Urban Water Management principles and approaches was implemented in two wards by ICLEI South Asia and India Water Partnership (IWP) in the catchment areas of the Lake Hameer Sagar and Gundolav In Kishangarh city. The project promotes integration, coordination, participation and innovation and advocates closing the urban water loop by considering water supply, wastewater and storm water as part of the same loop. Solid waste management is also considered part of the same loop because of its impacts on drainage and contamination of water sources. Activities under the project focus on conservation of ponds in the city through measures for pollution abatement (for liquid and solid waste). As part of this initiative, 500 houses in 2 wards of Kishangarh (ward 13 and 18) have been sensitized on waste segregation to reduce pollution in the natural drain and catchment of the Hamir Sagar pond. More than 30 Municipal officials and sanitary workers were trained on segregated waste collection and vermi-composting. The project has been able to achieve more than 60% segregation as of now and total 150 kg/month of wet waste is being collected and composted.

The project has led to an improved environment which, in turn has led to an efficient management systems, improved drainage system, and economic & social benefits for the community as well as vulnerable sections of the society. The project also helped in building efficient water use and improved natural resource management. The adoption of an IUWM-based approach also helped the city to work towards Sustainable Development Goals: good health and wellbeing (Goal 3), for clean water and sanitation (Goal 6) and for sustainable cities and communities (Goal 11).

[1] CSE, 2016

Acknowledgement

This Report is an output of collaboration between India Water Partnership and ICLEI-South Asia. This project would have not been successfully implemented without the support and guidance of Kishangarh Municipal council.

The aim of the project was to build the capacity of the municipal council to undertake water reform to conserve local water bodies/ponds in the city through measures for pollution abatement (for liquid and solid waste). The project was supported by Global Water Partnership under core activities Goal 1 – Catalyse change in policy and practice.

We gratefully acknowledge the support of Mr Narayan Lal Meena, Commissioner Municipal Council Kishangarh, Mr Sitaram Sahu, Chairman Kishangarh Municipal Council, Ms Sanju Meena, Executive engineer Swatch Bharat Mission, Mr Rajendra Choudhary City Sanitary Inspector (CSI) Kishangarh Municipal Council and Ward councilors. We especially like to thank the Municipal team Mr Raju Malakar -Project Monitor, Mr Dileep - Driver, Kishangarh Municipal Council and Mr Lalchand- Helper, Kishangarh Municipal Council.

The project would have not been possible without the generous support of all the concerned departments from the state level and city, technical consultant from Concept Bio and support of local residents of the wards. We extend our sincere gratitude towards all those who were part of the implementation of the project and preparation of the project report.

Emani Kumar
Deputy Secretary General, ICLEI &
Executive Director, ICLEI South Asia
ICLEI - Local Governments for Sustainability - South Asia

Details of Training Programs/Workshops

1. Stakeholder Workshop to Implement Rapid IUWM process and to formulate updated IUWM Action Plan

A workshop was conducted with Core Team and Stakeholder Committee representatives in Kishangarh on 27th January 2017. The key tools for the Rapid IUWM (First Integration Assessment Matrix Tool (FIAM) was implemented) to understand the level of integration at city level and also to formulate a vision for the city. The discussions on integration targets/strategies brought forth the need to reuse wastewater and storm water (for industrial, horticulture, agriculture, firefighting or other secondary purposes), integration of local level water resources in water supply (ponds, wells, baories, etc.), improved infrastructure provision for urban poors in slum areas around Hamir Sagar pond, measures for revival of ponds in the city (including measures for pollution control), measures for rain water harvesting and measures towards institutional integration.

The city was evaluated on the basis of first integration assessment matrix. The assessment was made on IUWM principals and initiatives to improve the water sector, waste water, solid waste and storm water sectors. The city was ranked based on these parameters measures (like increasing sewerage and water supply network, decentralized sewage treatment plants, tertiary treatment for STPs, Rain water harvesting under many schemes such as Smart City Mission, AMRUT, Swatch Bharat Mission etc. were included which will help the city to improve the integration status. Kishangarh was scored 195 points and ranked average category.

Outcome:

- Updated core team and stakeholder team
- Existing level of Integration
- Rapid IUWM based Vision for Kishangarh

Existing level of Integration:

Table 1: Ranking for the first Integration Assessment for Kishangarh City	
Final Score	195
Existing status of integration in the city (Excellent, Good, Average, Poor)	Average
Focus sector (based on First Integration Assessment Matrix)	Water

Score	**Status**	**Implications**
Above 410	Excellent	Good level of integration in place at most levels, city needs to continue existing measures
330 to 410	Good	Good level of integration but certain sectors might require attention Additional measures towards integration can improve situation
165 to 330	**Average**	**Some level of integration across sectors Measures towards integration should be taken to solve the water related issues being faced**
80 to 165	Poor	Hardly any integration Need for immediate measures towards integration across sectors

Below 80	Critical	No integration across sectors Immediate measures towards integration City needs to rethink the planning and management concepts for redesigning the urban water cycle

Vision for Kishangarh City *: Integrated Urban Water Management for the city by integrating local resources into water supply, conserving local water resources and ponds, using water of different quality for different uses, utilizing the RWH potential of the city; and extensive mass awareness to reduce wastage.*

Updated core team:

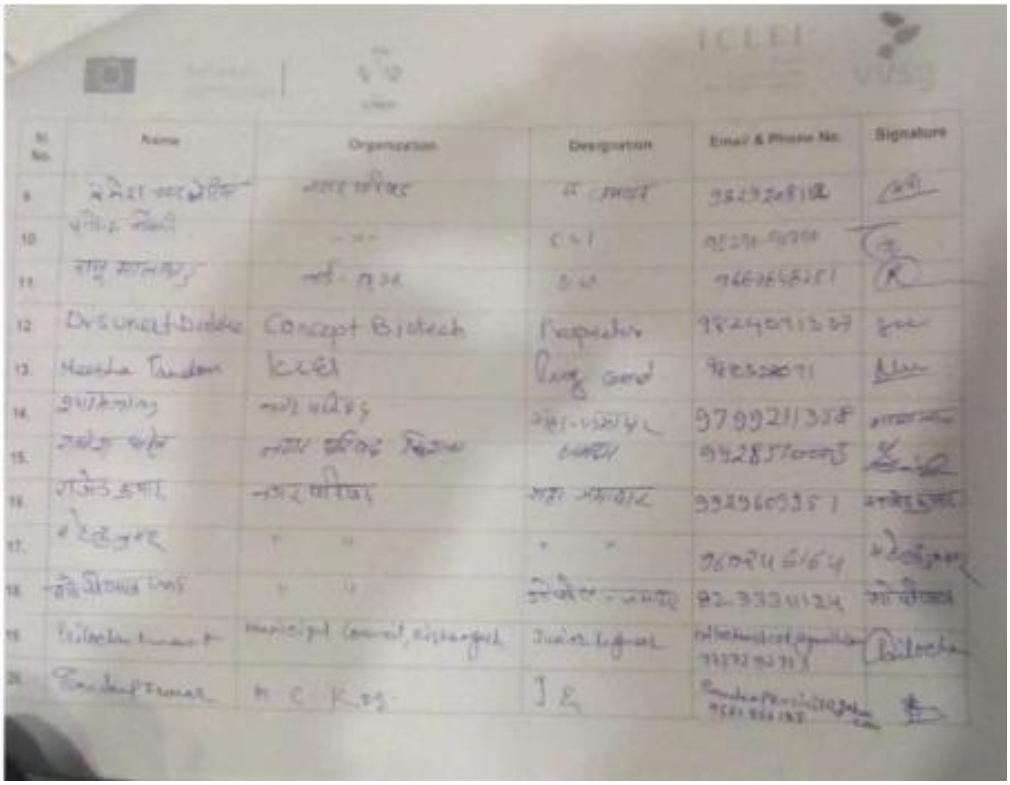
Updated list of Core Team Members:

Sr.No	Team Member	Designation
1	Chairman, Kishangarh Municipal Council	Head
2	Commissioner, Kishangarh Municipal Council	Project Nodal Officer
3	Mr. Rakesh Kaakda, Councillor	Member
4	SDM, Kishangarh	Member
5	Executive Engineer, Kishangarh Municipal Council	Member
6	AEN (SWM) , Kishangarh Municipal Council	Member
7	TPA, Kishangarh Municipal Council	Member
8	Chief Sanitary Inspector (CSI) , Kishangarh Municipal Council	Member
9	Assistant Engineer (AEN), Rajasthan Urban Infrastructure Development Project (RUIDP)	Member
10	Assistant Engineer (AEN), Public Health Engineering Department	Member
11	Professor Devesh Sharma , Kishangarh Central University	Member

Stakeholder Team Members

Sr..No	Team Member	Designation
1	Suresh Kumar Tank , President, Kishangarh Marble Association	Member
2	Sampat Rai Sharma, CEO, Marble Association	Member
3	Rajesh Gangwal, President , Rotary Club ,Kishangarh	Member
4	Pankaj Paharia, President, Jain Social Group	Member
5	Pawan Goyal , Head, Bharat Vikas Parishad, Kishangarh	Member
6	Naveen Agarwal, President, Loyans Club, Kishangarh	Member
7	Tara Chand Jain, Social Worker	Member
8	Krishna Gopal Pareek, Social Worker	Member
9	Pandit Manmohan Sharma, Social Worker	Member
10	Sajjan Singh Rajawat , Retired Teacher	Member
11	Ms. Athashree Parekh, Environmental Activist	Member
12	AEN, Electricity Department	Member
13	Shiv Kumar Vyas, Dainik Navjyoti	Member
14	Chandra Prakash Ved	Member
15	Hari Singh GVSS	Member
16	Premraj Rathi, Social Worker	Member
17	Saroj Sharma Mahila Sewa Samiti	Member
18	Acharya Virendra Krishna Pareek, Jheel Sankrakhshan Samiti	Member
19	Kiranjith Kaur, MVSS	Member

Registration sheets:



Sl. No.	Name	Organization	Designation	Email & Phone No.	Signature
9					
10					
11					
12	Dr Sunil Dabke	Concept Biotech	Proprietor		
13	Neelu Tandon	ICLEI	Prog Coord		
14				9799211338	
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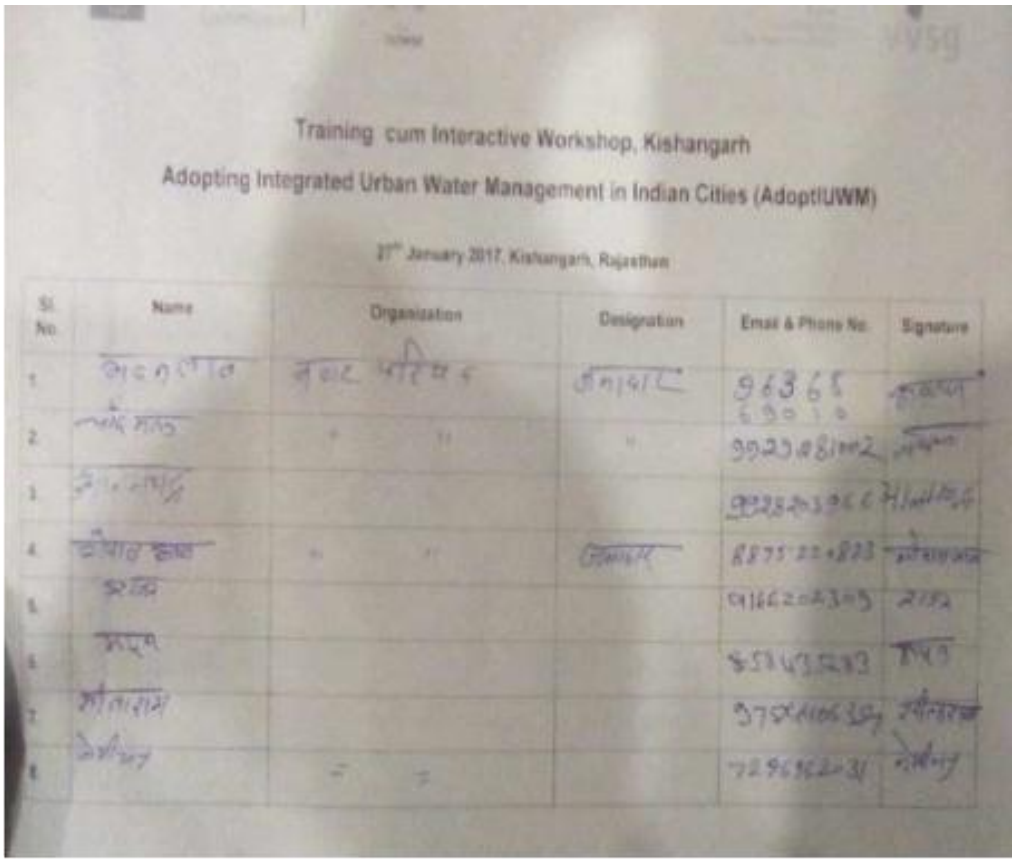

Training cum Interactive Workshop, Kishangarh

Adopting Integrated Urban Water Management in Indian Cities (AdoptIUWM)

27th January 2017, Kishangarh, Rajasthan

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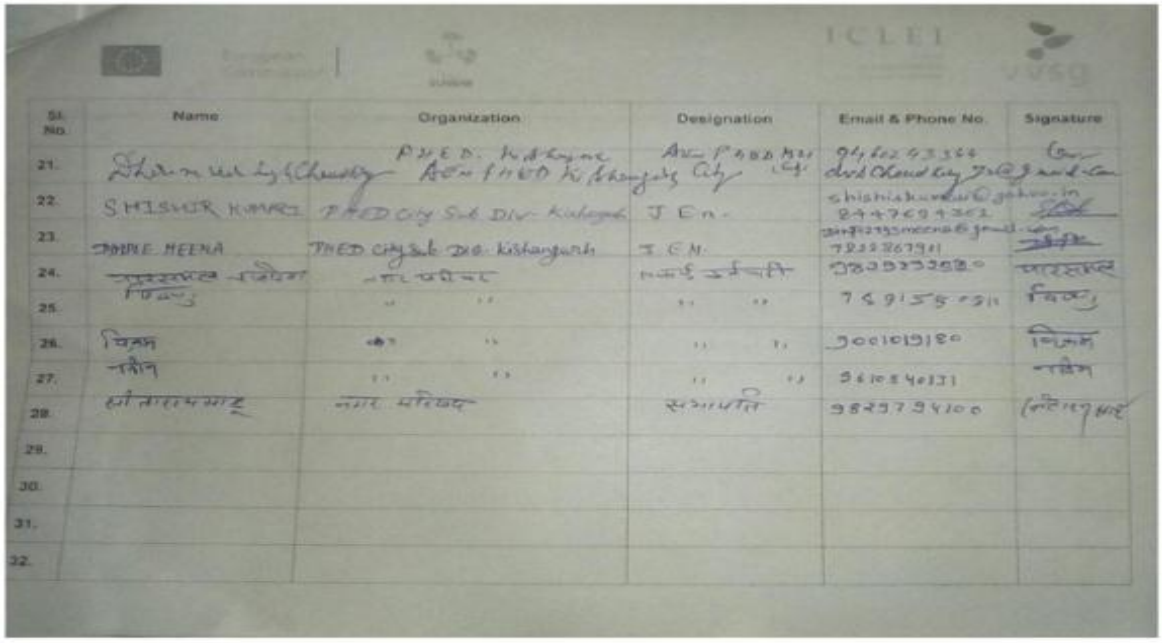

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2. Second Stakeholder workshop for Implementation of Rapid IUWM process to formulate updated IUWM Action Plan (Water cycle mapping , Project prioritization)

Second Stakeholder workshop was organised on 23rd May, 2017 with the support of Kishangarh Municipal Council. The workshop was headed by Shri Mahendra Jain, Chief Account Officer Kishangarh Municipal Council and IWP. The workshop was attended by Mr Vyas, Office Superintendent, KMC, Ms Sanju Meena, Assistant Engineer (SWM), Mr Ashish Lodha, Town Planning Assistant from KMC, members from NGO Bharat Vikas Parishad, Gramin Mahila Vikas Sansthan (GMVS), Gramin Vikas Sewa Sansthan, representatives from Government College Kishangarh, Municipal contractor for door to door waste collection, Municipal workers engaged in solid waste management activities and local residents of ward 28 and 17 (Adopt IUWM wards).

The workshop focused on implementing IUWM tool on Urban Water Loop Mapping: critical and potential areas and Project Prioritization Tool for shortlisting projects. Project wards were shortlisted based on Urban Water Loop Mapping: critical and potential areas and a list of initiatives/strategies were listed based on the Project Prioritization Tool.

Urban Water Loop Mapping:
An existing ward map and a Google image of the city were used to mark urban water bodies and drainage systems with the Technical Committee. This map is used for the Urban Water Loop Mapping exercise and various components were marked

- Water Treatment Plant (WTP) and Elevated Storage Reservoir (ESR), Ground Storage Reservoir (GSR) etc.
- Water logging areas

The aim of this exercise was to understand flow of water to the city, within the city and from the city; and to identify the potential and most critical areas/wards for each Integration Indicator. Stakeholders focused on major indicators like water availability, waste management and waste dumping facilities. They also discussed the approach and

technology proposed by the Technical Committee, that is best suited to the local context and can help the city attain the long and short term targets for each indicator.

For example: composting facility for wet waste within the city limit or trenching ground was discussed.

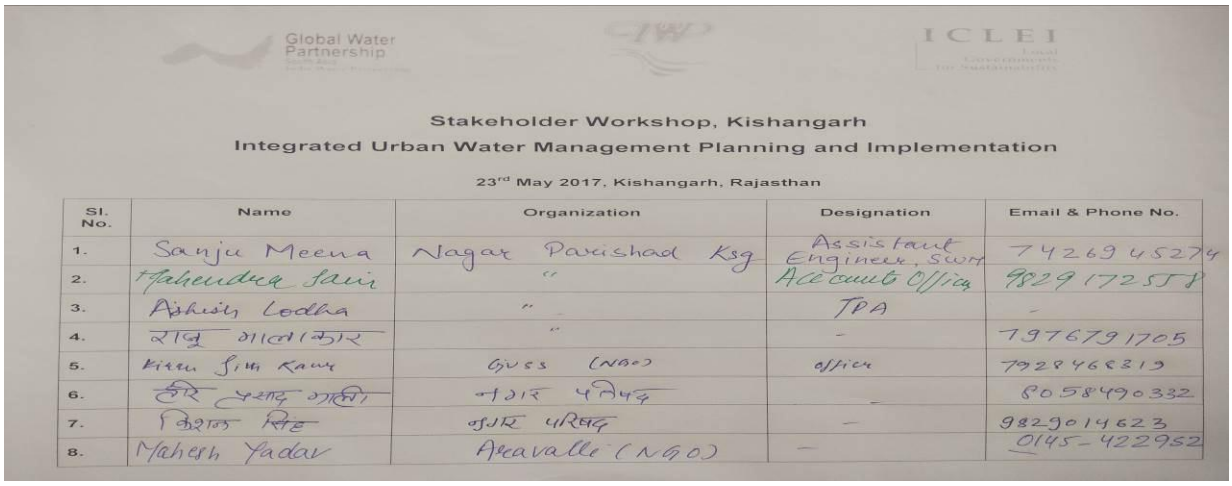
Project prioritization exercise:
Based on the indicators few pilot projects were identified. These potential projects were taken up to address issues and potentials for each indicator that were discussed in earlier workshop. Most key projects were already developed by the City Authorities and included in city planning documents. Also some of them were the projects that are already being implemented under AdoptIUWM. The potential projects were then discussed on the basis of their interactions with land use and other water allied sectors and the overall positive impacts on urban water sectors. Each filtered project was given weightage on the basis of importance of social benefits, environmental benefits, economic feasibility and participatory approach for their city with respect to planning and management of urban water sectors. Stakeholders discussed and assigned weights to these parameters (4 for highest priority, 1 for lowest priority)

Selected project after ranking:

1. 100% door to door collection to prevent pollution of surface and ground water sources
2. Demonstration of low cost RWH Project to promote cost effective methods of RWH for recharge /reuse
- Building level
- Permeable pavers in parking's, roads
- Recharge though abandoned tube wells
3. Comprehensive management plan for the ponds
4. Awareness generation programs by involving NGOs/Institutes on
- Plastic waste management
- Significance of ponds
- Door to door segregation of waste
- Cause and impacts of pollution of lakes etc

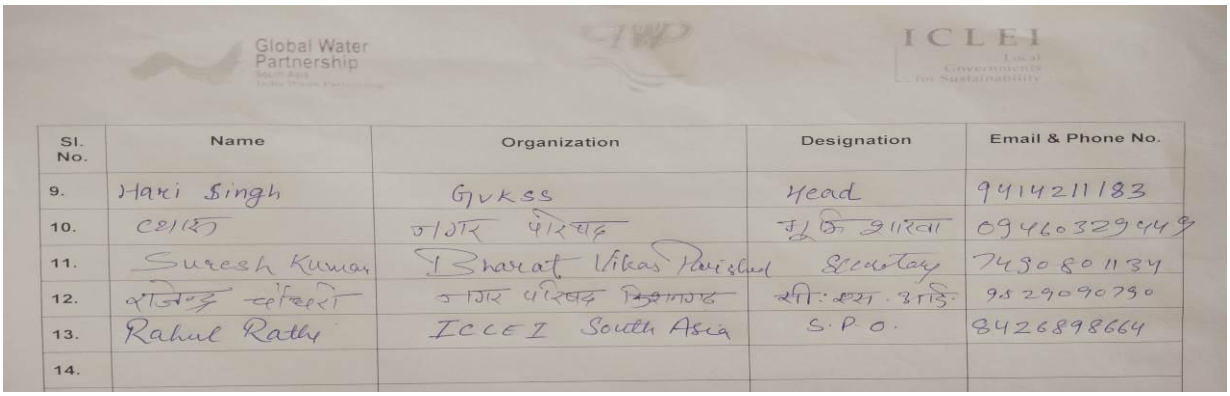
Outcome:
- List of prioritized projects/strategies
- Areas and wards with issues : potential wards for pilot project

Annexure Registration Sheet:



Stakeholder Workshop, Kishangarh
Integrated Urban Water Management Planning and Implementation
23rd May 2017, Kishangarh, Rajasthan

Sl. No.	Name	Organization	Designation	Email & Phone No.
1.	Sanju Meena	Nagar Parishad Ksg	Assistant Engineer, Survey	7426945274
2.	Mahendra Soni	"	Accounts Officer	9829172558
3.	Ashish Lodha	"	TPA	-
4.	[illegible]	"	-	7976791705
5.	Kirti Singh Kaur	Gvkss (NGO)	office	7928468319
6.	[illegible]	[illegible]	-	8058490332
7.	[illegible]	[illegible]	-	9829014623
8.	Mahesh Yadav	Aravalli (NGO)	-	0145-422952



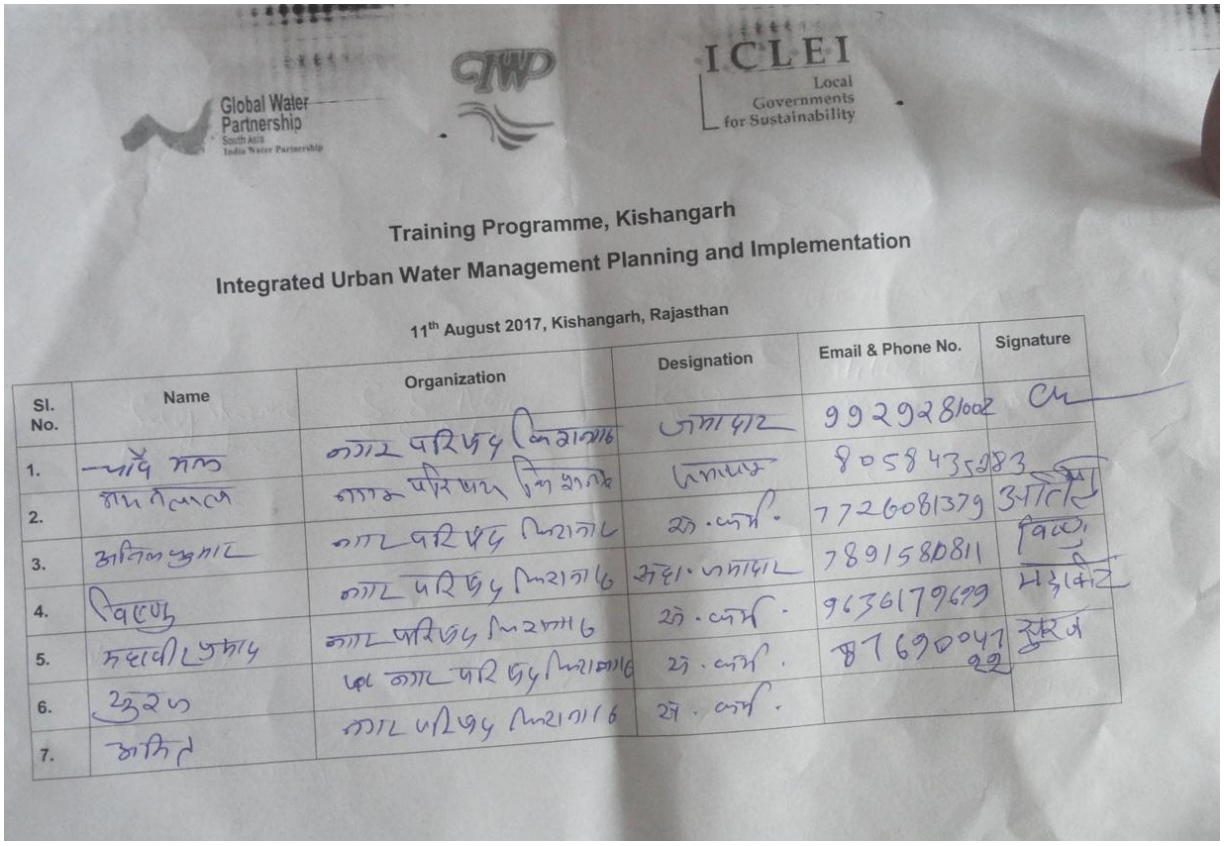
Sl. No.	Name	Organization	Designation	Email & Phone No.
9.	Hari Singh	Gvkss	Head	9414211183
10.	[illegible]	[illegible]	[illegible]	09460329449
11.	Suresh Kumar	Bharat Vikas Parishad	Secretary	7430801134
12.	[illegible]	[illegible]	[illegible]	9529090790
13.	Rahul Rathi	ICCEI South Asia	S.P.O.	8426898664
14.				

3. Training and Capacity Building of the Municipal officials and sanitary workers in the ward

A training program was conducted in two project wards (Ward 13 & 18) on door to door segregated waste collection and management under the Integrated Urban Water Management Planning and Implementation project on 11th August in Kishangarh Municipal Council. The aim was to build capacity of the municipal officials and sanitary workers on methods of waste segregation and management techniques. This training program also focused on dissemination of knowledge on vermi-composting and information and best practices in waste composting and techniques of recycling of plastic waste in other Indian cities. The training was headed by sanitary chief officer Kishangarh municipal council and was attended by more than 30 participants' including Municipal officials, sanitary workers, wards sanitary heads (Jamadars) and municipal contractors working under the door to door waste collection in the selected two wards. The training was provided by Mr Suneet Dabke, from Concept BioTech.

Exercise on waste segregation: An interactive exercise with the stakeholders was conducted on waste segregation to make the stakeholders aware about the techniques on segregation for dry and wet waste.

Annexure : Registration sheet



Training Programme, Kishangarh

Integrated Urban Water Management Planning and Implementation

11th August 2017, Kishangarh, Rajasthan

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2.	[illegible]	[illegible]	[illegible]	8058435983	
3.	[illegible]	[illegible]	[illegible]	7726081379	
4.	[illegible]	[illegible]	[illegible]	7891580811	
5.	[illegible]	[illegible]	[illegible]	9636179699	
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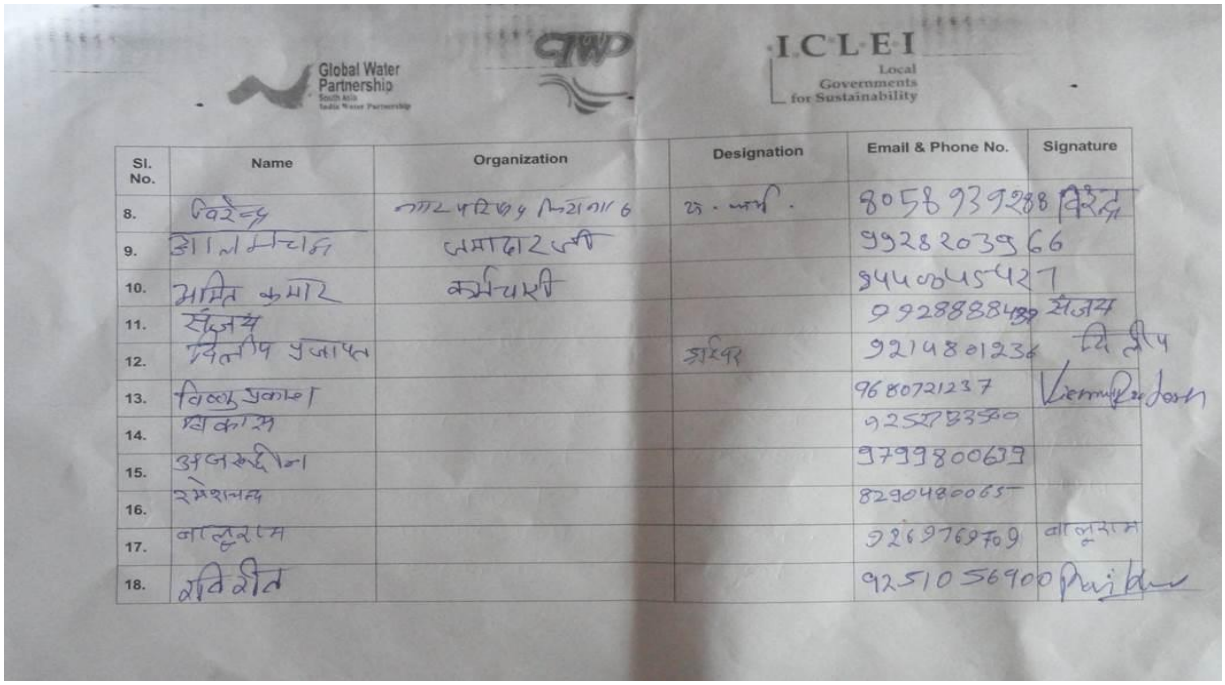

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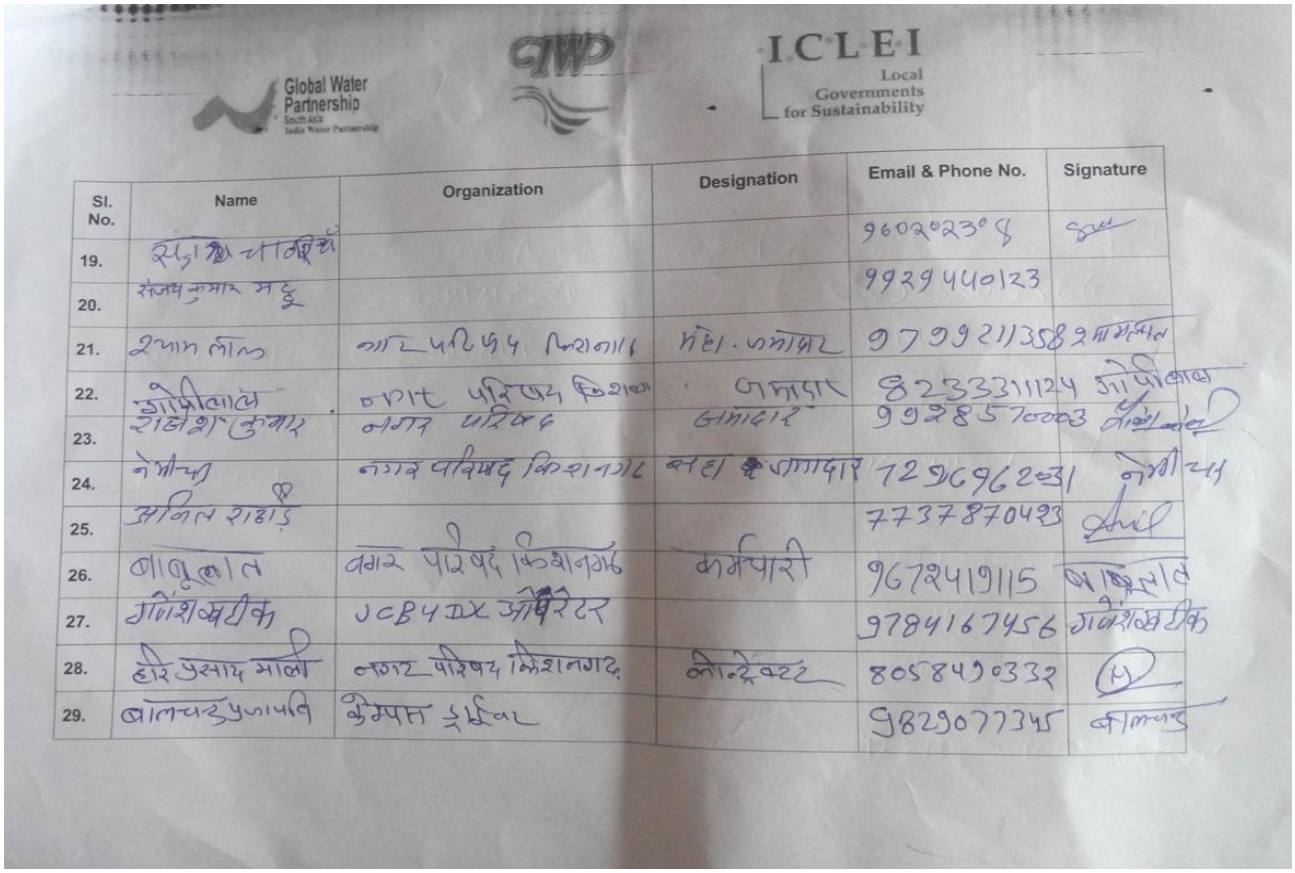

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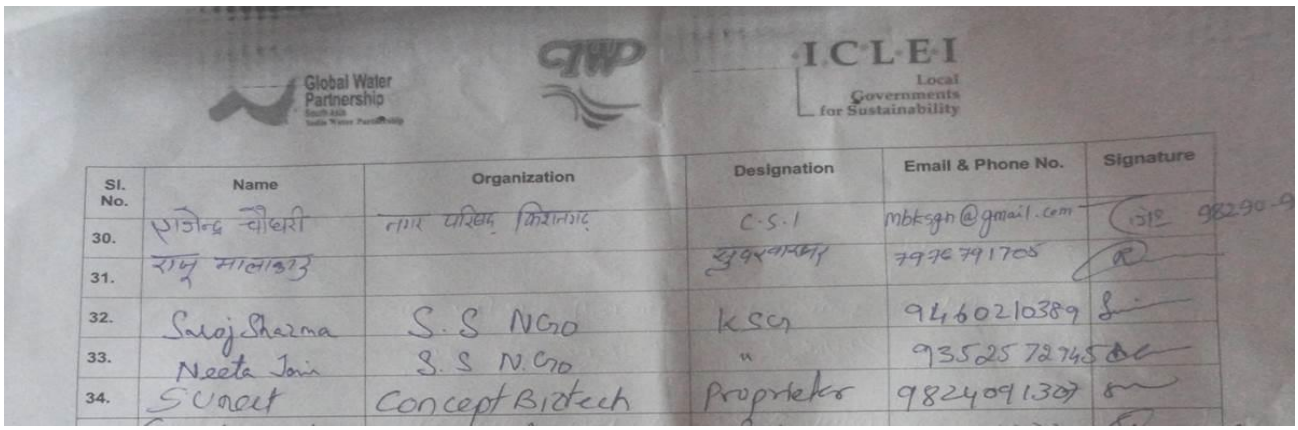
19.	[illegible]			9602023[illegible]	
20.	संजय कुमार मंडल			9929440123	
21.	[illegible]	[illegible]	मेंबर	9799211358	
22.	गोपीलाल	DPIT परियोजना	जमादार	8233311124	
23.	राकेश कुमार	नगर परिषद	Gangdar	9928570003	
24.	नेमीचन्द	नगर परिषद किशनगढ़	बस्ती जमादार	7297629[illegible]	
25.	अनिल राहड़			7737870423	
26.	गोपीलाल	नगर परिषद किशनगढ़	कर्मचारी	9672419115	
27.	गणेशचन्द्रिक	JCB4DX ऑपरेटर		9784167456	
28.	हीरालाल माली	नगर परिषद किशनगढ़	लोडर	8058490332	
29.	बालचन्द्र पुजारी	कैम्पस इंजिनियर		9829077345	



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30.	राजेन्द्र चौधरी	नगर परिषद किशनगढ़	C.S.I	mbksgn@gmail.com	98290-9
31.	राजू मालाकार		सुपरवाइजर	7976791705	
32.	Saroj Sharma	S.S NGO	KSCA	9460210389	
33.	Neeta Jain	S.S N.GO	"	9352572745	
34.	Sumeet	Concept Biotech	Proprietor	9824091307	

Results

i) Narrative reporting on results:

Kishangarh city faces water scarcity issues due to absence of perennial rivers and hard rock strata. The city does have several large ponds (largest ponds being Gundolav and HameerSagar) but most of these are polluted. Hence, Kishangarh is dependent on Bisalpur dam for water supply. These lakes are getting polluted due to changing urban dynamics and poor management of liquid and solid waste in the city.

A project based on Integrated Urban Water Management principles and approaches was implemented in two wards in the catchment area of the lake Hameer Sagar and Gundolav. The project promotes integration, coordination and participation. The implemented approach advocates closing the urban water loop by considering water supply, wastewater and storm water as part of the same loop, as well as considering waste management as the part of the same loop. Major activities under the project focus on conservation of ponds in the city through measures for pollution abatement (for liquid and solid waste). As part of this initiative, 500 houses in 2 wards of Kishangarh (ward 13 and 18) have been sensitized on waste segregation to reduce pollution in the natural drain and catchment of the Hamir Sagar pond. More than 30 Municipal officials and sanitary workers are trained on segregated waste collection and vermi-composting. The project has been able to achieve more than 50% segregation as of now and total 120 kg of wet waste is collected and composted.

Various activities were conducted to build a systematic collection and disposal of municipal solid waste in the catchment areas of the main water body in the city. Municipal Council Kishangarh was facilitated to collect the kitchen waste for compost in two pilot wards and separate the recyclable waste to generate revenue enabling Municipal council to adopt a sustainable approach based on the recognition that waste management and urban water sectors are elements of the same Urban Water Loop. This led to set up of a system for waste disposal in such a way that it has tangible impact on the individual hygiene and overall environment. The community and local municipal staff were encouraged to come forward and take part in building the system, which they can subsequently operate and maintain.

The project has led to an improved environment which, in turn has led to an efficiency management systems in the system, improved drainage system, economic & social benefits for the community as well as vulnerable sections of the society. The project also helped in building efficient water use and improved natural resource management. The adoption of an IUWM-based approach also helped the city to work towards Sustainable Development Goals: good health and wellbeing (Goal 3), for clean water and sanitation (Goal 6) and for sustainable cities and communities (Goal 11). The city is now preparing for Swachh Survekshan 2018**.**

ii) Outcomes:

- A systematic disposal of solid waste from two wards (wet waste and plastic waste)
- Help the cities to integrate various sectors while planning and designing
- Better understanding on closing the water cycle loop in the city
- Building efficient water use and improved natural resource management.
- The adoption of an IUWM-based approach helped the city to work towards Sustainable Development Goals: good health and wellbeing (Goal 3), for clean water and sanitation (Goal 6) and for sustainable cities and communities (Goal 11).
- Baseline for Swachh Survekshan 2018

iii) **Outputs:**

- IUWM based action plan for the city (Annexure 1)
- More than 800 properties (households and commercial units) covered under the pilot project on door to door waste collection and management
- More than 4000 beneficiaries in the wards and adjoining wards
- Capacity building of more than 20 municipal officials and sanitary workers
- Sensitization of more than 800 families on WASH and IUWM in the catchment area.
- Overall city got benefitted by the up scaling of the project in the other wards.

Monitoring Arrangements

A monitoring and evaluation framework was developed to make the project sustainable. The framework focused on smooth operation of the system in future. The framework also helps in assessing the success of the project and potential for replication in future. The monitoring and evaluation framework developed for the pilot project on 'Door to Door collection and management of solid waste' is presented in following table

Table 1 Monitoring and Evaluation framework

Project	Aspects of O and M	Responsibility	Funding	Frequency	Complaint redressal
Waste management and Vermi composting	Check on the Collection of segregated waste	Municipal Council Kishangarh	Not required	Monthly inspection by KMC	KMC
	Plastic waste management and recyclable	Municipal Council Kishangarh	Not required	Quarterly	KMC
	Vermi composting plant	Municipal Council Kishangarh	Not required	CSI will inspect the plant quarterly	KMC+ Local Stakeholders

IUWM based vision	***Integrated Urban Water Management for the city will include integrating local resources in water supply, conserving local resources and ponds, using different quality for different uses, utilizing the RWH potential of the city; and extensive mass awareness to reduce wastage.***				
Integration target	**Parameter**	**Indicator**	**Responsibility**	**Methodology**	**Frequency**
Short term	Technical	Segregated Waste collection	KMC	Waste auditing	Once in a year
	Social	Impact on overall environment	Ward members and KMC	Discussions	Once in a year
Long term	Environmental	Water quality in the catchment	KMC	Visual Analysis of the local drains passing	2 times in a year(post and pre monsoon)

IUWM based vision	*Integrated Urban Water Management for the city will include integrating local resources in water supply, conserving local resources and ponds, using different quality for different uses, utilizing the RWH potential of the city; and extensive mass awareness to reduce wastage.*				
Integration target	**Parameter**	**Indicator**	**Responsibility**	**Methodology**	**Frequency**
		area		through the wards	
	Financial	Cost saved in provision of waste transportation	KMC	Calculation of the municipal budget	Once in a year
		Revenue from the sale of compost and plastics	KMC	Survey	Once in a year

Success Story (case study)

Title: An Integrated approach to improve catchment areas of local water bodies– A case study of Kishangarh city

Background: Kishangarh, also known as Marble city is located in Ajmer District in Western Rajasthan. The city is traditionally known for its artistic paintings, religious places, marble processing unit and industries. The Kishangarh fort is the most prominent heritage structure in the city. Today, population of Kishangarh city is 154,886 (Census, 2011). The decadal growth rate of Kishangarh (33.27%) is much higher than the growth rate of Ajmer district (18.4%) and Rajasthan State (21.44%). One of the reasons for the growth rate could be the prominent industrial base of Kishangarh. The city has two lakes namely Gundolav Talav and Hameer Sagar. These lakes are interlinked and water from Hameer Sagar overflows and enters Gundolav. Other small water bodies in the city are Ransamand Talav, Sumer Sagar and Satolav Talav. The largest and the oldest lake within the city is Gundolav Talav. Kishangarh fort and older settlements developed around this water body. Gundolav Lake earlier was a source of water supply to the city but owing to the extensive water pollution in the water body, now water from Bisalpur Dam has been sourced to the city. Presently the water bodies in the cities are suffering from water pollution due to the discharge of untreated wastewater and solid waste. Besides that encroachment of drainage channels and pollution in the catchment area is impacting the water quality as well as the drainage potential of the city. In 2013 – 2016 a project on Adopting integrated urban water management in Indian cities (AdoptIUWM) was implemented to guide the city on closing the urban water loop. IUWM toolkit developed as a step by step guide for practitioner under the AdoptIUWM was tested in four Indian cities and Kishangarh is one of them. The integrated urban water management planning and implementation project supported by Global Water partnership (GWP) and was implemented by ICLEI Local Governments for Sustainability South Asia (ICLEI SA) and India water partnership (IWP) to strengthen the integrated urban water management approach in Kishangarh city and to upscale the initiatives implemented under AdoptIUWM project. A Rapid IUWM process is developed based on IUWM toolkit and an IUWM based vision for the city is formulated. A door to door waste collection and management project on pilot basiswas selected through Rapid IUWM process with the aim to conserve of local ponds and clean the catchments through measures for pollution abatement (for liquid and solid waste).

Figure 1 Dumping of waste at the ponds

Figure 2: Water channels between the two lakes


Objectives: The objectives of the pilot project are:

a. To implement door to door waste segregation and collection system in two wards

b. To set up a decentralized wet waste composting plant for two wards

c. To improve the awareness of the local residents within the wards on WASH and water management system

d. Reduce the water logging incidents in the wards

Activities: Ward no 13 and 18 were selected to implement the intervention as both the wards were located in the catchment area of Hamir Sagar pond and Gundolav Talav and were facing issues related to water logging and open dumping of solid waste. Disposal of solid waste and polythene along the channels blocks the flow of the natural drains in the wards and led to water logging /urban flooding especially during monsoons in these wards. Owing to the pollution and heaps of waste in the drains was a breeding ground for mosquitoes and other disease-carrying vectors.

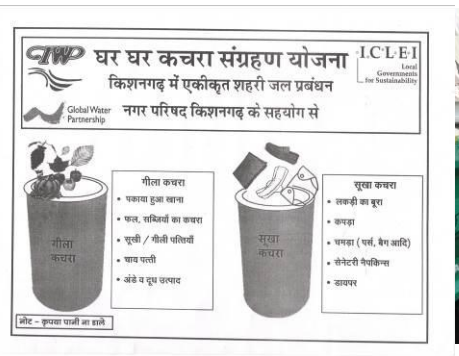
Figure 3 Open dumping in the wards and water logged drains


Community awareness:

To initiate the project in these wards an awareness and community engagement programs were conducted.

Kishangarh Municipal Council and ICLEI South Asia initiated household level sensitization activity on waste segregation and water conservation. Local residents were involved in discussions and community talks. Importance of waste management and impact of solid waste on water were discussed. Dustbins for wet waste collection were distributed at the level of each household. Segregation of waste was undertaken: wet waste, separate food items for Gaushala (cow shelter) and recyclables were segregated. This was done as segregation of wet and dry waste was not able to capture recyclables like paper, boxes, bottles, metals etc. separately and are potential source of revenue. The collection of food for Gaushala was undertaken to address the religious belief. Residents were also informed about the water cycle and WASH activities. To make them understand the waste segregation a sticker to showing category wise waste segregation was also attached on the dustbins. Pamphlets were distributed and announcement over mikes were made to inform people about door to door waste collection program and vehicle timings.

Figure 4: Distribution of Dustbins in the Wards and IEC Activities ward no. 13 &18.



Training and Capacity building of municipal staffs

Municipal Council Staff was also trained under this pilot project on waste segregation process and methods to build capacity of the municipal officials and sanitary workers on methods of waste segregation and management techniques. This training program disseminated knowledge on vemi-composting and information and best practices in waste composting and techniques of recycling of plastic waste in other Indian cities. An interactive exercise with the stakeholders was conducted on waste segregation to aware the stakeholders about the techniques on segregation for dry and wet waste.

Figure 5: Training and Capacity Building of the Municipal officials and sanitary workers in the ward

Decentralized Compost facility in the wards

A decentralized vermi-compost facility within the wards was established and is presently being managed by Municipal Council Kishangarh. This decentralized compost plant have five compost beds (12 feet x 4 feet x 2 feet) 340 GSM each. Collected wet waste from the wards is segregated, shredded and then composted at the facility.

Figure 6: Compost facility in Kishangargh wards

Evaluating the initiative and Monitoring framework

A focus group discussion was conducted with the households near the water logging areas to assess the pre and post project implementation scenario and evaluate the project activities. A monitoring and evaluation framework was developed to make the approach sustainable. The framework focused on smooth operation of the system in future.

Figure 7: Before project implementation and after project implementation scenario in ward number 13

Outputs:

More than 800 properties (households and commercial units) covered under the pilot project on door to door waste collection and management with 4000 people in the wards and adjoining wards benefiting from the pilot project. Capacity building of more than 20 municipal officials and sanitary workers on waste segregation, vermi composting and rain water harvesting. Sensitization of more than 800 families on WASH and IUWM in the catchment area has been conducted.

Outcomes:
The pilot project helped the local residents of the wards to understand the concept of IUWM. The pilot project has shown tangible impacts on the individual hygiene and overall environment in the wards and will ultimately help in overall improvement of catchment area. The community and local municipal staff came forward to build the system, which they can subsequently operate and maintain. The project has led to an improved environment which, in turn has led to an efficient management systems, improved drainage system, health & social benefits for the community as well as vulnerable sections of the society..

Annexure 1: Action Plan

Integrated Urban Water Management Planning and Implementation in Kishangarh

Table of Contents

1 Background

The integrated urban water management planning and implementation is an initiative of IWP and ICLEI South Asia to strengthen the integrated urban water management approach in Kishangarh city. The aim is to upscale the activities implemented under AdoptIUWM pilot project to clean the catchments of the major ponds in the city and save local water resources.

Objectives

The objective of the intervention is to build capacity of urban local bodies to undertake water sector reforms for closing the urban water loop through formulation of an updated IUWM Action Plan for the city; and undertaking on-ground implementation to demonstrate benefits of an IUWM based approach.

Expected Outcome of the Project

- IUWM Action Plan for Kishangarh
- At least 2 wards covered under solid waste management initiative
- At least 10 additional Municipal staff and sanitation workers would be trained in door to door waste segregation and composting
- At least 500 households would be sensitized in door to door waste segregation

1.1 Introduction to the city

Kishangarh, also known as Marble city, is located in Ajmer District in Western Rajasthan. The city is traditionally known for its artistic paintings, religious places, marble processing unit and industries. Due to the strategic location and close proximity of the city to Ajmer and Jaipur, the city serves as a commercial centre. The Kishangarh fort is the most prominent heritage structure in the city.

Till 19th century, the growth of the city was confined to the walled city, but after independence the city started expanding outwards. Today, population of Kishangarh city is 154,886 (Census, 2011). The decadal increase of 33.27% (as per census 2001), which is lower than the growth rates over the last few decades. The decadal growth rate of Kishangarh (33.27%) is much higher than the growth rate of Ajmer district (18.4%) as well as that of Rajasthan State (21.44%). One of the reasons for this high growth rate could be the prominent industrial base of Kishangarh. The city is divided into 45 wards with a municipal area of 45.79 sq.kms (as per Master Plan, Kishangarh).

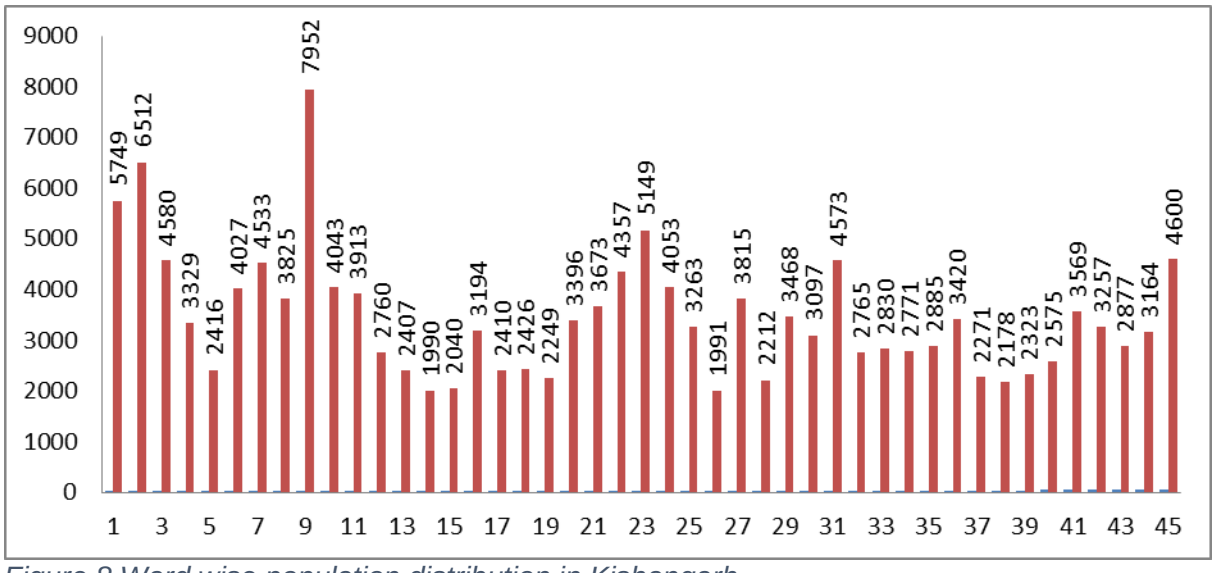


Figure 8 Ward wise population distribution in Kishangarh

1.2 Climate and Geographical Setting

Kishangarh is located on the plateau region of Aravali range a semi-arid region of Rajasthan. The climate is primarily hot and dry. The average annual rainfall of Kishangarh is approximately 500 to 600 mm (Rathore, 2005). Rajasthan has a relatively high drought frequency and Ajmer district has a drought recurrence interval of once in 4 years.

As per the Rajasthan State Action Plan on Climate Change, the average temperature of the State is likely to increase by 2035. Average temperature of Ajmer district is likely to increase by 2.0 to 2.1°C by 2035. This implies that evaporative losses are likely to increase and increase in temperatures would also increase the total water requirement, possibly making it worse during summers. The average precipitation received by the district is also likely to increase by 2035 by 5 to 10%. This implies that more runoff is likely to be generated in the district and if adequate measures are taken towards rain water harvesting, this excess water might be available to recharge the water table in the district.

1.3 Water management in Kishangarh City

The city has two lakes namely Gundolav Talav and Hameer Sagar. The largest and the oldest lake within the city is Gundolav Talav, besides which the Kishangarh fort and older settlements developed. There are other small water bodies like Ransamand Talav, Sumer Sagar and SatolavTalav. Encroachment in the catchment areas around the ponds is impacting the drainage networks of the city. Solid waste is another issue impacting the city water drainage. The disposal of waste in the open drains and nallahs causes blockage and water logging. The waste is ultimately carried off by rainwater run-offs and by flood water to the main streams and contaminate the main water bodies of the city.

Figure 9 Water bodies in Kishangarh and main source of water supply for the city: Based on Google Earth Image

2 Rapid IUWM Implementation in Kishangarh City

To guide Indian cities on closing the urban water loop, an IUWM toolkit has been developed as a step by step guide for practitioner under the European Union funded project on Adopting Integrated Urban Water Management in Indian Cities (AdoptIUWM). The toolkit can be implemented in six stages. The toolkit was implemented in Kishangarh in 2014-2016.

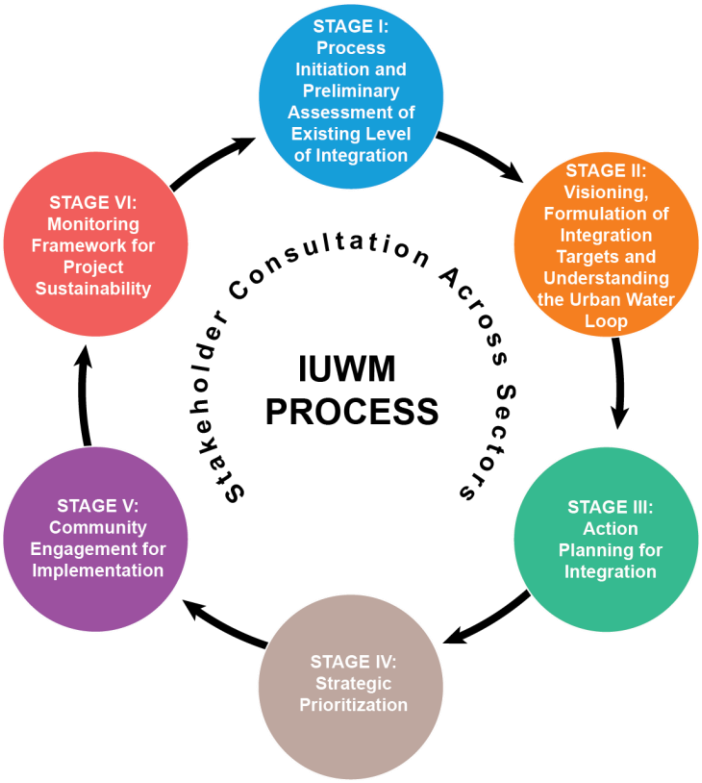


Figure 10: IUWM Process: Toolkit stages

Under **Integrated Urban Water Management Planning and Implementation** a rapid version of the toolkit is implemented and a multi stakeholder platform is provided to the city. **Integrated Urban Water Management Planning and Implementation** project approach is based on the recognition that waste management and urban water sectors are elements of the same Urban Water Loop and to close the urban water loop in the city it's important to improve the catchment areas of the local water bodies and protect the natural drainage system.

A Rapid IUWM process was discussed with the stakeholders and implemented in the city to develop an action plan for the city based on the vision formulated by stakeholders. The IUWM Action Plan focuses on conservation of ponds in the city through measures for pollution abatement (for liquid and solid waste).
To initiate the process a stakeholder consultation workshop was organised to update the core team and stakeholder team that was formulated under AdoptIUWM project in (2013-14). The core team was updated and newly joined engineer SWM Kishangarh Municipal Council and Town Planning Assistant from KMC were added to previous list. A ranking after first integration assessment matrix was conducted and an IUWM vision for the city was formulated. A roadmap for integrated action plan was developed through discussions to strategize measures to achieve the IUWM-based vision through formulation of Integration Targets.
The city selected a pilot project on door to door waste management in two wards of the city (ward 13 and 18) for implementation of the approach under ICLEI SA and IWP initiative on integrated urban water management and implementation project.

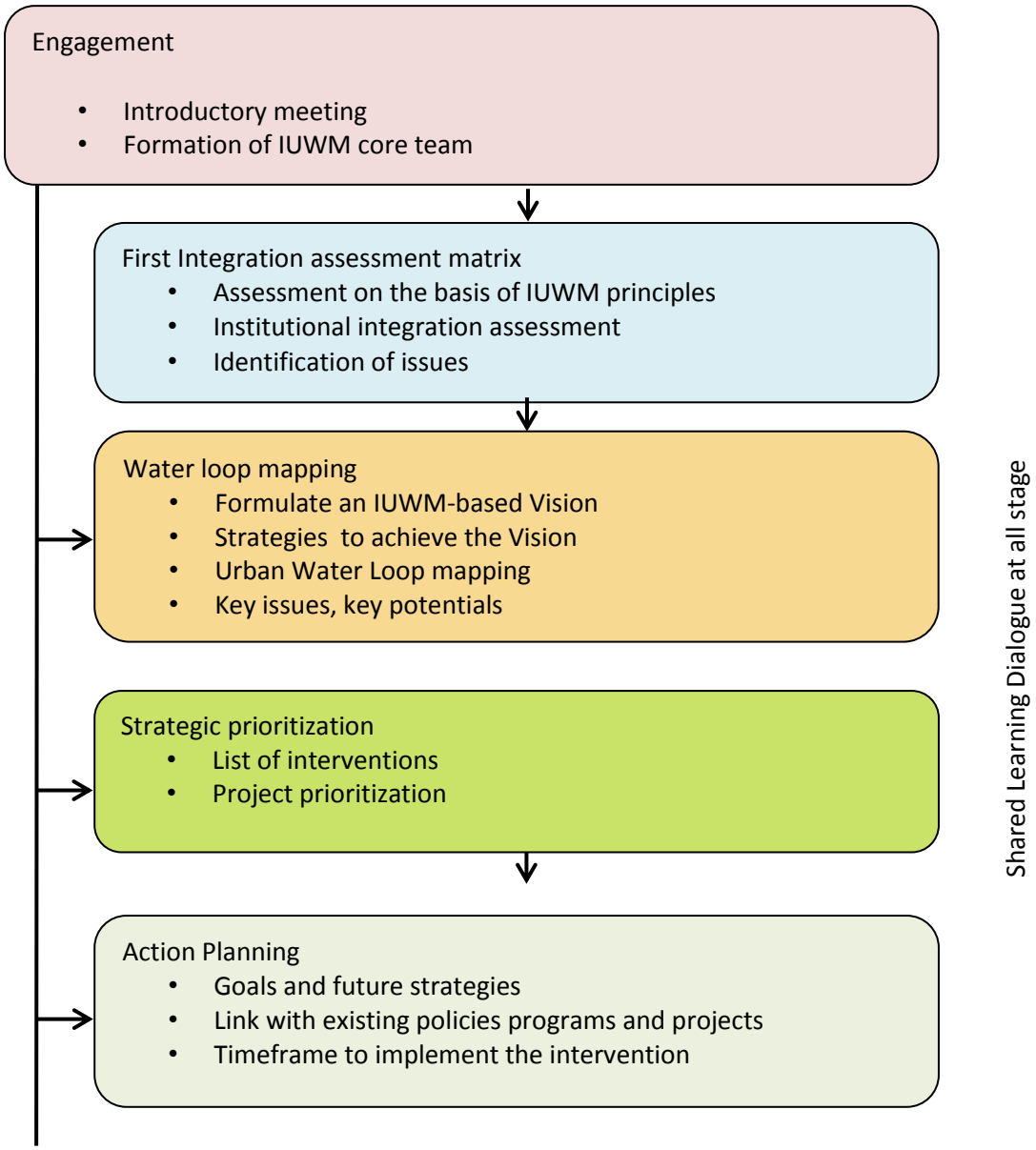
Table 2: Stakeholder and Core Teams in Kishanagrh

S.No	Team Member	Designation
1	Chairman, Kishangarh Municipal Council	Head
2	Commissioner, Kishangarh Municipal Council	Project Nodal Officer
3	Mr. Rakesh Kaakda, Councillor	Member
4	SDM, Kishangarh	Member
5	Executive Engineer, Kishangarh Municipal Council	Member
6	AEN (SWM) , Kishangarh Municipal Council	Member
7	TPA, Kishangarh Municipal Council	Member
8	Chief Sanitary Inspector (CSI) , Kishangarh Municipal Council	Member
9	AEN, RUIDP	Member
10	AEN, PHED	Member
11	Professor Devesh Sharma , Kishangarh Central University	Member

Table 3: Stakeholder Team

S.No	Team Member	Designation
1	Suresh Kumar Tank , President, Kishangarh Marble Association	Member
2	Sampat Rai Sharma, CEO, Marble Association	Member
3	Rajesh Gangwal, President , Rotary Club ,Kishangarh	Member
4	Pankaj Paharia, President, Jain Social Group	Member
5	Pawan Goyal , Head, Bharat Vikas Parishad, Kishangarh	Member
6	Naveen Agarwal, President, Loyans Club, Kishangarh	Member
7	Tara Chand Jain, Social Worker	Member
8	Krishna Gopal Pareek, Social Worker	Member
9	Pandit Manmohan Sharma, Social Worker	Member
10	Sajjan Singh Rajawat , Retired Teacher	Member
11	Ms. Athashree Parekh, Environmental Activist	Member
12	AEN, Electricity Department	Member
13	Shiv Kumar Vyas, Dainik Navjyoti	Member
14	Chandra Prakash Ved	Member
15	Hari Singh GVSS	Member
16	Premraj Rathi, Social Worker	Member
17	Saroj Sharma Mahila Sewa Samiti	Member
18	Acharya Virendra Krishna Pareek, Jheel Sankrakhshan Samiti	Member
19	Kiranjith Kaur, MVSS	Member

Figure 11: Rapid integrated urban water management process



2.1 First Integration Assessment matrix for Existing Level of Integration

The city was evaluated on the basis of first integration assessment matrix. The tool helps the city to score itself on the bases of IUWM principals. The city was evaluated on the basis of first integration assessment matrix. The assessment was made on IUWM principals and initiatives to improve the water sector, waste water, solid waste and storm water sectors. The city was ranked based on these parameters measures (like increasing sewerage and water supply network, decentralized sewage treatment plants, tertiary treatment for STPs, Rain water harvesting under many schemes such as Smart City Mission, AMRUT, Swatch Bharat Mission etc. were included which will help the city to improve the integration status. Kishangarh was scored 195 points and ranked average category.

Table 4: First Integration assessment matrix

Recognizes the significance of the local context and addresses it from environmental, social, cultural and economic perspective				
S.No.	**Indicators**	**Criteria Scoring**		
		Criteria	**Scale**	**Score**
1	Location of major water source(s)	Water abstraction from source(s) within Municipal boundary	15	0
		Water abstraction from source(s) located less than 20 km from the city	10	
		Water abstraction from source(s) located less than 50 km from the city	5	
		Water abstraction from source(s) located more than 50 km from the city	0	
		Abstraction from distant sources leading to marginalization of other uses/users	-5	
		Abstraction from distant sources leading to conflicts at local level	-10	
		Abstraction from distant sources is leading to conflicts at regional level	-15	

Includes all stakeholders in planning and decision making process for water and allied sectors				
S.No.	**Indicators**	**Criteria Scoring**		
		Criteria	**Scale**	**Score**
2	Participatory process	Multi stakeholder platforms created and institutionalized to bring stakeholders together for planning and decision making from the beginning of water related projects	15	5
		Multi stakeholder platforms are created on need basis for consultations on most projects	10	

Includes all stakeholders in planning and decision making process for water and allied sectors				
S.No.	**Indicators**	**Criteria Scoring**		
		Criteria	**Scale**	**Score**
		Stakeholder consultations only for large scale projects/ comments invited after preparation of final plan	5	
		No involvement of stakeholders, plans and projects are prepared by government departments without consultations	0	

Acknowledges that water can have multiple uses and matches water quality (surface, recycled, reclaimed) with water use so that different quality of water can be used for different uses.				
S.No.	**Indicators**	**Criteria Scoring**		
		Criteria	**Scale**	**Score**
3	Grading of uses	Varied quality of water is used/reused for varied purposes as part of city level supply systems like: Dual water supply lines, SUDS	15	0
		Varied quality of water supplied/reused at local level through decentralized loops like housing cluster level loops	10	
		Single grade supply at present but initiatives being taken to match differential quality of treatment with use	5	
		All water treated and supplied to potable quality standards and no willingness or awareness to adopt differential use of water	0	
		Centralized single grade supply leading to neglect of local level water resources	0	

Addresses all water requirements: anthropogenic as well as ecological. Accounts for non-urban users that are dependent on the same water source				
S.No.	**Indicators**	**Criteria Scoring**		
		Criteria	**Scale**	**Score**
4	Water sharing	Water sharing pattern is decided jointly by district level stakeholders for rural, urban and ecological uses while considering all requirements (including industrial)	15	10
		Water sharing pattern is decided for key uses by government departments without consultation	10	

Addresses all water requirements: anthropogenic as well as ecological. Accounts for non-urban users that are dependent on the same water source				
S.No.	**Indicators**	**Criteria Scoring**		
		Criteria	**Scale**	**Score**
		but due allocation is made for all other uses (like non-urban, ecological)		
		Water sharing pattern is adhoc and keeps adjusting to suit the demands of various sectors/seasons	5	
		Water sharing pattern steered solely by urban users and marginalizes non-urban and ecological uses	0	

It considers all parts of the water cycle, natural and manmade; surface and subsurface, while recognizing them as a part of an integrated system; & Recognizes water storage, distribution, treatment, recycling and disposal as part of the same resource management cycle; &Acknowledges balance between demand and supply management as a potential solution						
S.No.	**Indicators**		**Criteria Scoring**			
			Criteria		**Scale**	**Score**
	INDICATORS					
5	Water Portfolio for supply to the city	Source(s) of water	Multiple sources of water for supply to the city (more than 2)		15	5
			More than one major source of water for supply		10	
			Dependent on single source of water (surface water)		5	
			Dependent on single source of water (ground water)		0	
		Transmission and Distribution losses	Less than 15%		15	5
			15 to 25%		10	
			25 to 35%		5	
			More than 35%		0	
		Existing Water Portfolio	Surface water / groundwater use for supply (annually)	Conjunctive water use (mix of groundwater and surface water) is undertaken in a sustainable manner	15	10
				Predominantly based on surface water	10	
				Predominantly based on groundwater abstraction without focus on sustainable recharge	5	

It considers all parts of the water cycle, natural and manmade; surface and subsurface, while recognizing them as a part of an integrated system; & Recognizes water storage, distribution, treatment, recycling and disposal as part of the same resource management cycle; &Acknowledges balance between demand and supply management as a potential solution						
S.No.	**Indicators**		**Criteria Scoring**			
			Criteria		**Scale**	**Score**
	INDICATORS					
				Solely based on groundwater abstraction without focus on recharge	0	
			Reuse (annually)	More than 30%	15	10
				20 to 30%	10	
				10 to 20%	5	
				Less than 10%	5	
				No reuse	0	
		Summer water deficit status	Water deficit managed through existing Municipal infrastructure		15	10
			Water deficit managed in partnership with external service providers		10	
			Private tankers are hired by users directly during summers to solve scarcity issue		5	
			Frequent droughts impact life		0	
			Extreme adverse social and environmental impacts (like negative impacts on livelihood, livestock, vegetation)		-5	
			Seasonal migration due to water scarcity		-10	
			Area(s) abandoned due to water scarcity		-15	
		Future water security (for next 10 to 20 years)	Planned source(s) of water	Multiple sources of water for supply to the city (more than 2)	15	5
				More than one major source of water for supply	10	
				Dependence on single source of water (surface water)	5	
				Dependence on single source of water (ground water)	0	
			Planned Reuse (as % of projected water demand)	More than 40%	15	5
				20 to 40%	10	
				Upto 20%	5	
				No reuse planned	0	

It considers all parts of the water cycle, natural and manmade; surface and subsurface, while recognizing them as a part of an integrated system; & Recognizes water storage, distribution, treatment, recycling and disposal as part of the same resource management cycle; &Acknowledges balance between demand and supply management as a potential solution						
S.No.	**Indicators**		**Criteria Scoring**			
			Criteria		**Scale**	**Score**
	INDICATORS					
			Planned Surface water, groundwater mix	Conjunctive water use (mix of groundwater and surface water) is undertaken in a sustainable manner	15	10
				Predominantly based on surface water	10	
				Predominantly based on groundwater abstraction without focus on sustainable recharge	5	
				Solely based on groundwater abstraction without focus on recharge	0	
				Not planned	0	
		Future Planning for demand and supply balance	Measures for demand reduction are taken before securing supply for future		15	5
			Demand and supply balance and sustainable abstraction considered while planning for future		10	
			Water demand calculations used as sole basis for future water abstraction		5	
			Adhoc projects undertaken for supply provision		0	
6	Industrial wastewater	Industrial water use	Industries complement supply with recycled/reused water		15	5
			Industries dependent on fresh water supply from Municipality		10	
			Industries have high dependence on groundwater		5	
			Industrial water use (surface and/or groundwater) causing water scarcity/water conflicts in the city		0	
		Industrial effluent	More than 75% industrial effluent is treated upto standards		15	5
			Industrial effluent is treated but impacted by regular power cuts or other such causes		10	
			Treated but not upto the requisite		5	

It considers all parts of the water cycle, natural and manmade; surface and subsurface, while recognizing them as a part of an integrated system; & Recognizes water storage, distribution, treatment, recycling and disposal as part of the same resource management cycle; &Acknowledges balance between demand and supply management as a potential solution					
S.No.	**Indicators**		**Criteria Scoring**		
			Criteria	**Scale**	**Score**
	INDICATORS				
			standards		
			Not treated and disposed of into nallahs or water bodies or open areas	0	
			Industrial effluent is causing extreme contamination of water resources and is leading to health hazards	-5	
			Untreated industrial effluent leading to fatal diseases	-10	
			Untreated industrial effluent leading to long term mutations or genetic disorders	-15	
7	Service Level Benchmark Ranking given to the city at National level		Rank: Top 15 or leaders	15	0
			Rank: 15 to 25 or aspiring leaders	10	
			Rank: 36 to 53 or cities where acceleration is required	5	
			Rank: Beyond 53 or slow movers	0	
			Rank: SLBs not prepared	0	
8	Municipal Wastewater discharge		Municipal wastewater is recycled and reused after treatment as per standards	15	-5
			Municipal wastewater as per standards is treated and discharged into freshwater sources/ open areas	10	
			Inadequately treated wastewater is used for irrigation	5	
			Inadequately treated wastewater is being discharged into water bodies	0	
			Wastewater being discharged without any treatment	-5	
			Untreated wastewater discharge leading to localized pollution of water/soil	-10	
			Untreated wastewater is polluting water resources leading to spread of diseases	-15	

Seeks to protect and conserve water resources at source				
S.No.	**Indicators**	**Criteria Scoring**		
		Criteria	**Scale**	**Score**
	INDICATORS			

Seeks to protect and conserve water resources at source					
S.No.	**Indicators**		**Criteria Scoring**		
			Criteria	**Scale**	**Score**
	INDICATORS				
9	Water pollution	Extent of pollution	Water quality (surface and groundwater) within permissible limits	15	5
			Either surface or groundwater resources have issues related to pollution	10	
			Polluted pockets of surface or groundwater in the city but not city wide pollution	5	
			Critical level of surface pollution (Coliform, BOD, DO level, eutrophication, etc.)	0	
			Critical level of groundwater pollution (Fluoride, Arsenic, etc.)	0	
			Saline water ingress	0	
			No information with officials on condition of water resources	0	
			Contamination of water supply source	-5	
			Water pollution is extremely high and impacting human health in the city	-5 to -15	
			□ Fatality (-15)		
			□ Impacts on aquatic life (-10)		
			□ Long term impacts surfacing but not clearly evident yet (-5)		
10	Conservation of natural drainage channels and catchment area of water bodies		Planning and urban development are undertaken while conserving natural drainage channels and catchment area	15	10
			Considered in planning but not adequately conserved due to lack of enforcement	10	
			Not adequately considered in planning or enforcement	5	
			No consideration, drainage channels and catchment area are prone to encroachment	0	
			Why does Municipality have to look at the catchment? That is not in our scope of work	0	

Seeks to protect and conserve water resources at source					
S.No.	**Indicators**		**Criteria Scoring**		
			Criteria	**Scale**	**Score**
	INDICATORS				
11	Link between water and energy	Energy	Link between energy and water is realized and measures towards this are taken (like use of Renewable Energy or RE, energy efficient pumps & motors)	15	0
			Link between energy and water are realized and measures are planned	10	
			Link is realized but no measures being planned	5	
			Link not recognized, measures not taken	0	
		Sludge	Sludge is utilized for energy generation or farming through Municipality	15	0
			Municipality is disposing off the sludge and this sludge is taken up by individuals for reuse	10	
			Sludge is not reused but is disposed of safely	5	
			Improper management of sludge is leading to pollution of water resources	0	
12	Integration with planning process		Strategies/actions towards closing the water loop are formulated and are included in the Master Plan or other important planning documents	15	10
			Or		
			Water Infrastructure plans are a part of land use plan document		
			Not integrated with planning documents but special planning schemes like Smart City Plan/AMRUT include aspects of integration	10	
			No integration but city recognizes the need for integration	5	
			No integration and need not recognized	0	

It aligns formal institutions (organizations, legislation, and policies) and informal practices (norms and conventions) that govern water in and for cities				
S.No.	**Indicators**	**Criteria Scoring**		
		Criteria	**Scale**	**Score**

	Indicators			
13	Institutional mechanism	Institutionalized Integration of departments working in water and allied sectors (Existing institutional framework ensures that all water and allied departments collectively undertake planning and management of water and allied sectors)	15	5
		Separate organizations dealing with water and allied sectors but interact before finalizing all projects/programmes related to water	10	
		Separate organizations with interactions only for finalization of project/programme	5	
		No interaction before project planning or implementation	0	
14	Role of informal institutions and practices	Informal institutions recognized and integrated with formal institutions	15	5
		Informal not yet integrated with formal but plans being developed for integration	10	
		Informal not integrated but role of informal sector is recognized	5	
		Role of informal sector not recognized	0	

Aims at sustainability, efficiency and equity; while balancing environmental, social & economic needs (and sustainability) for short, medium and long term				
S.No.	**Indicators**	**Criteria Scoring**		
		Criteria	**Scale**	**Score**
	Indicators			
15	Infrastructure provision for urban poor	Infrastructure provision (water, wastewater, storm water) covers at least 70% urban poor population in the city	15	5
		Infrastructure provision (water, wastewater, storm water) covers at least 50% urban poor population	10	
		Infrastructure provision (water, wastewater, stormwater) not adequate but Municipality has provided for alternate arrangements (like water tankers/community toilets) to cover at least 50% urban poor	5	
		Substandard service provision for urban poor leading to lack of basic infrastructure and spread of diseases	0	
16	Water quality monitoring (surface water and ground water)	Regularly monitored and records maintained at City/State/National level	15	10
		Monitored by State agencies, Municipality aware of outcomes	10	
		Monitored by State agencies, Municipality not aware of outcomes	5	
		Not monitored	0	
17	Decline in	Less than 1m decline	15	5

Aims at sustainability, efficiency and equity; while balancing environmental, social & economic needs (and sustainability) for short, medium and long term				
S.No.	**Indicators**	**Criteria Scoring**		
		Criteria	**Scale**	**Score**
	Indicators			
	groundwater level in recent past (last 10yr)	Less than 5m decline	10	
		5 to 10m decline	5	
		More than 10m decline	0	

Acknowledges and seeks to address impacts of climate change and vulnerability of urban poor to these impacts				
S.No.	**Indicators**	**Criteria Scoring**		
		Criteria	**Scale**	**Score**
	Indicators			
18	Climate change and water resources	Impacts of climate change on water resources are recognized and adaptation measures are taken (like Climate Adaptation Plan) at local level	15	10
		Regional level impacts are known and measures are being taken at regional level	10	
		No measures being taken to reduce adverse impacts of CC on water resources but need for same is recognized	5	
		Impacts of climate change leading to negative impacts on water related sectors but need for measures not recognized	0	
19	Vulnerability of urban poor	Key urban sectors impacting urban poor are known, existing local adaptations being strengthened	15	10
		Key urban sectors impacting urban poor are known and measures to enhance adaptability are being planned	10	
		Key sectors known, measures taken only in case of extreme events	5	
		What is climate change? And how will it impact urban poor?	0	
20	Instances of water or vector borne diseases (Malaria, Typhoid, Jaundice, Hepatitis)	Not common	15	15
		Occasional occurrence in some areas	10	
		Occurs every year in some areas (like slum areas)	5	
		No information	0	
		Outbreak of epidemic in recent past but is not common	-5	
		Outbreak of epidemic is common (occurs annually/seasonally)	-10	
		Water borne diseases leading to fatality	-15	

Recognizes need to empower and mobilize stakeholders

S.No.	Indicators	Criteria Scoring		
		Criteria	Scale	Score
	Indicators			
21	Capacity (skills, resources, awareness, willingness) of Municipal staff	Institutionalized capacity building cell in place. Also provides training towards integration to all new and existing staff	15	0
		No permanent cell but all new staff are oriented on aspects including integration at the time of joining (at all levels)	10	
		Staff trained at work on integration aspects but not much capacity in the existing system to undertake inter sectoral integration	5	
		No knowledge on aspects of integration	0	

Additional indicator for city specific aspect				
S.No.	Indicators	Criteria Scoring		
		Criteria	Scale	Score
	Indicators			
22	City specific indicator (details and criteria for city specific indicator to be added by Core Team. Example: Landslides/ springs/ saline water ingress, etc)		15	15
			10	
			5	
			0	

Table 1: Ranking for the first Integration Assessment for Kishangarh City	
Final Score	195
Existing status of integration in the city (Excellent, Good, Average, Poor)	Average
Focus sector (based on First Integration Assessment Matrix)	Water

Score	**Status**	**Implications**
Above 410	Excellent	Good level of integration in place at most levels, city needs to continue existing measures
330 to 410	Good	Good level of integration but certain sectors might require attention Additional measures towards integration can improve situation
165 to 330	**Average**	**Some level of integration across sectors** **Measures towards integration should be taken to solve the water related issues being faced**
80 to 165	Poor	Hardly any integration Need for immediate measures towards integration across sectors
Below 80	Critical	No integration across sectors Immediate measures towards integration City needs to rethink the planning and management concepts for redesigning the urban water cycle

2.2 Vision for the city

The stakeholder committee formulated vision for the city:

Integrated Urban Water Management for the city by integrating local resources in water supply, conserving local resources and ponds, using different quality for different uses, utilizing the RWH potential of the city; and extensive mass awareness to reduce wastage.

2.3 Urban Water Loop Mapping

During the discussion the integration targets for the city (short and long) were discussed with the core committee including the technical people. Spatial mapping exercise was conducted as part of the workshop to understand the urban water cycle in and around the city. To achieve prioritised list of strategies the committee assured to have discussion with the Municipal council. The mapping exercise focussed on the urban water cycle of the city and identifying areas with water logging issues. During the spatial mapping exercise and subsequent discussions on the urban water cycle, some important issues were brought forth by the attendees and are mentioned below:

The list of initiatives were identified based on the key issues discussed during the workshop

Water Sector:

- There is need to focus on rainwater harvesting as an alternative water resources within the city. Declining water table (ranging from 35 to 125m in hard rock areas). Rainwater harvesting to recharge groundwater.
- High leakage losses (approx. 32%) due to old pipelines. Need to reduce water leakages and illegal connection.

Wastewater:

- Partial sewerage network in the city and HHs are still dependent on septic tanks;
- Discharge from septic tanks overflows into open drains which empty into nallahs which enter Hameer Sagar Lake and Gundolav Lake.

Solid Waste:

- No clause to segregate solid waste in Door to Door collection in recent (March 2017);
- There is no processing and scientific disposal or recycling of waste;
- Clogging of open drains due to solid waste is an issue;
- Lack of awareness amongst citizens towards waste management.

Storm Water:

- Hameer Sagar Lake and Gundolav Lake are interlinked and hence discharge of untreated wastewater in Hameer Sagar also pollutes Gundolav;
- Clogging due to solid waste dumping and water hyacinth in open drain connecting Hameer Sagar Lake and Gundolav Lake;

Table 5: Urban water loop mapping

URBAN WATER LOOP MAPPING					
S. No.	**Integration indicators**	**Critical/potential Areas/wards**	**Approach**	**Potential Projects**	**Land u intervention required**
Key indicators					
Municipal water supply					
	Non-Revenue Water loss reduction Short term target: • Long term target	City level/ward level	• Installation of water meter system and promotion of decentralized water supply system	Project 1: Water audit and installation of water meters	Improving la topography that s distribution network, identification areas w water theft
	• Key issues	Sites where leakage in the pipeline is spotted in the wards			
	• Key potentials	Metered water supply system		Project 2 : water leakage detection system in the city	
	• Key stakeholders	PHED, Municipal council, local residents, land use department			
	• Rain water harvesting at individual household level	HH level	• Installation of rain water harvesting system to recharge local bore wells and water bodies	Project 3: rooftop rain water harvesting	Data properties plots coveri more than 5 sq m in urb areas.
	Key issues				
	Key potentials	Decentralized water supply system			
	• Key stakeholders	Individual households, municipal corporation			
Wastewater					

URBAN WATER LOOP MAPPING					
S. No.	**Integration indicators**	**Critical/potential Areas/wards**	**Approach**	**Potential Projects**	**Land u intervention required**
	Wastewater reuse Short term target: • Long term target:	City level	Sale of treated wastewater • like Nagpur		Example:
	Key issues	Water body where the 2.5 MLD of partially treated STP effluent is presently being discharged		Project 4: Establishment of an additional 2.5 MLD tertiary treatment plant at the STP site	50m gre buffer around S site where p of treat wastewater from STP c be reused plantation
	Key potentials	STP site where new tertiary plant can be provided and receiving industrial area where treated wastewater can be supplied		Project 5: Laying of pipeline from tertiary treatment plant to the industrial area	Identification of natu drainage channels around t STP site Diversion a storage of natural run on site Land requirements (if any) pumping treated wastewater from STP industries
	• Key stakeholders	Municipal council			
Strom water					
	Pollution reduction of surface water Sources. Short term target:	Ward level	• • Waste management system in the city . Awareness programs on waste management	Project 6: door to door waste collection and management. Project 7: Awareness generation program on	Location waste dumping s and mainstreami efficiency a conservation in urban wa and drainage/sto managemen
	Key issues	Waste dumping points and water logged area			
	Key potentials	Natural drainage system and water bodies			

URBAN WATER LOOP MAPPING					
S. No.	**Integration indicators**	**Critical/potential Areas/wards**	**Approach**	**Potential Projects**	**Land u intervention required**
	• Key stakeholders	Local residents, Municipal council, contractor		waste water and solid waste management impact on water bodies. Project8: Comprehensive management plan for the ponds	
	Storm water recharge/reuse Long term target:	City level , ward level	• • Waste management to reduce the impact of solid waste on natural drains, SUDS to improve water quality. A decentralized SUD system	Project 9: Sustainable Urban Drainage Systems (SUDS)	Land use m of the city identify sto water draina network
	• Key issues	Water logging due to choked drains and water			
	• Key potentials	Decentralized waste management and diversification of water portfolio			
	• Key stakeholders	Municipal council, transportation department			

Based on the discussions a long-list of projects for implementation in the city was developed. These projects are based on the identified critical and potential areas for each sector. List of potential Pilot Project that can be taken up is:

- Water audit and installation of water meters
- Water leakage detection system in the city
- Rooftop rain water harvesting
- Establishment of an additional 2.5 MLD tertiary treatment plant at the STP site
- Laying of pipeline from tertiary treatment plant to the industrial area
- Door to door waste collection and management.
- Awareness generation program on waste water and solid waste management impact on water bodies.
- Comprehensive management plan for the ponds
- Sustainable Urban Drainage Systems (SUDS)

2.4 Project prioritisation

Using the Project Prioritization Tool from IUWM toolkit, the stakeholders prioritized the list of projects and top ranking projects were shortlisted for implementation. The pilot projects were selected based on highest positive impact on water cycle, with focus on economic, social and environmental viability; and participatory approach.

The stakeholders were asked to rank the projects on the basis of:

- **Positive impact on sector:** Positive impacts of a project on water, wastewater, storm water and solid waste management were identified. In order to qualify, a project must have a positive impact on at least two sectors out of water, wastewater and storm water
- **Weightage and Ranking**: The participants were asked to rank the projects on the basis on 4 parameters based on predefined parameters:
    - Social benefits/feasibility
    - Economic benefits/feasibility
    - Environmental benefits/feasibility
    - Participatory approach

Stakeholders discussed and assigned weights to these parameters (4 for highest priority, 1 for lowest priority). Example, if the stakeholders decide participatory approach is most important, followed by social benefits, environmental benefits; and economic feasibility is the least important parameter to determine relevance of a project for the IUWM Action Plan, then participatory approach would get a weightage of 4 and economic feasibility would get a weightage of 1.

3 IUWM action plan - Broad goals and targets for the city

To develop an IUWM action plan the analysis done for each of the stage is summarized in detail. It discusses the potential actions for sectors. The summary sheet for each of the sectors highlights the major issues, the existing measures, potential funding and time frame needed. Further, it also provides with a brief analysis of the issues identified by stakeholders in each sectors. Appropriate actions to address the issues of each sector have been suggested.
Issues identified by stakeholder are:

Water Sector:

- Declining water table (ranging from 35 to 125m in hard rock areas). Rainwater harvesting to recharge groundwater.
- High leakage losses (approx. 32%) due to old pipelines. Need to reduce water leakages and illegal connection.

Wastewater:

- Partial sewerage network in the city and HHs are still dependent on septic tanks;
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ACTION PLAN					
Sector	**Objective**	**Goals**	**Strategies**	**Present programs and policies**	**Time frame** **Short term / Medium/ Long term**
Water sector	Water Resource Management	Meeting water demand for future (2035) through diverse sources.	Diversification of water portfolio to reduce to pressure on water resources 1. Rain water harvesting 2. Recharging the ground water with roof top rain water 3. Revive the local water bodies 4. Reduce water loss by improving water supply network 5. Water metering to improve water theft and water loss	1. Mukhyamantry Jal Swavalamban Abhiyan (MJSA) 2. Atal Mission for Rejuvenation and Urban Transformation (AMRUT)	Medium term
Waste water sector	Reuse and recycle Waste water		1. Reuse of treated wastewater to prevent pollution of water bodies 2. Improving the sewer network in the city 3. Using different quality of water for different uses and decentralized water sources/dual supply	1. RUIDP sewerage scheme ❖ 10 MLD STP 2. Atal Mission for Rejuvenation and Urban Transformation (AMRUT	Long term
Strom water management	Improve and protect natural drainage system and storm water management	Revival local water sources and channels / natural drainage system	1. Planned land use 2. Implementation of SUDS 3. Solid waste management to reduce blockage and water logging	1. Swacch Bharat Mission 2. Atal Mission for Rejuvenation and Urban Transformation (AMRUT	Small term programs under SBM Long term projects under AMRUT
Solid waste	Extensive	Awareness	1. Pollution abatement and	1. Rajasthan State Environment	Short term

ACTION PLAN					
Sector	**Objective**	**Goals**	**Strategies**	**Present programs and policies**	**Time frame** **Short term / Medium/ Long term**
management	Mass Awareness & Regulatory framework to support better conservation and management of water resources	generation with involvement of all sections of society	solid waste management system 2. IEC at city level , and community level 3. Implementation of SPCB Laws	Policy, 2010 2. Swacch Bharat Mission	