IUWM Toolkit for Indian Cities

Adopting Integrated Urban Water Management in Indian Cities (AdoptIUWM)

Adopt IUWM

PROJECT SUPPORTED BY

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A famous Hindi proverb on diversity in India says:

> *Kos kos pe badle paani, char kos pe baani*

[The type of water changes every three kilometers; and the language changes every twelve kilometers]

In a country so diverse, there can hardly be a single toolkit that can address all aspects related to planning and management of urban water sectors. This Toolkit, hence, is a humble attempt to address the common water-related issues that impact Indian cities and to guide Indian cities towards adopting an approach that can help cities better manage urban water sectors through identification of co-benefits between water supply, wastewater and storm water; and between these sectors and other urban sectors.

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ACKNOWLEDGEMENTS

This document has been produced with the financial assistance of the European Union(Europe Aid/131 956/ACT/IN)

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INTRODUCTION

Integrated Urban Water Management (IUWM) Toolkit for Indian Cities is a step by step guide for integrated management of urban water sectors (water supply, wastewater and storm water) in Indian cities. This Toolkit would help the city address the issues related to urban water sectors in a sustainable and inclusive manner by developing an understanding of the interlinkages among urban water sectors and interlinkages of urban water sectors with other urban sectors. The Toolkit enables the adoption of a sustainable and holistic water management approach, ensuring equitable allocation of water resources. It promotes an alternative approach for water management which is based on the recognition that urban water sectors are elements of the same Urban Water Loop and co-operation among these sectors and between stakeholders can be identified for efficient water management. An IUWM-based approach can lead to improved demand-supply balance which, in turn, can lead to water efficiency, economic benefits for the community, equitable water distribution, improved water access, efficient water use, improved natural resource management and social benefits for vulnerable sections of the society and improved natural resource management leading to an inclusive, sustainable and water secure future. The adoption of an IUWM-based approach would also help cities work towards Sustainable Development Goals: Goal 3 for good health and wellbeing, Goal 6 for clean water and sanitation and Goal 11 for sustainable cities and communities.

This Toolkit has been developed as a part of the European Union funded project on Adopting Integrated Urban Water Management in Indian cities (AdoptIUWM) and has been tested in four project cities (Jaisalmer and Kishangarh in Rajasthan; Solapur and Ichalkaranji in Maharashtra).

The toolkit provides step-wise guidance for adoption of the IUWM process in cities. The Process is based on a cyclical planning approach, which is to be reviewed periodically. It is designed to be a continuous on-going process in cities, which requires political commitment and allocation of adequate and appropriate resources. It is envisaged that the Municipality will institutionalize the IUWM process and integrate it with regular planning processes. This Toolkit is to be considered as a first step in the direction of promoting IUWM based planning; further revisions shall be made to the IUWM Process, over subsequent years, based on experiences of cities which adopt this process.

The following section gives the salient features of this Toolkit and the IUWM Process for Indian cities.

SALIENT FEATURES OF THE IUWM TOOLKIT

What is IUWM?	'Integrated Urban Water Management (IUWM) is a comprehensive approach to urban water services, viewing water supply, drainage, and sanitation as components of an integrated physical system, and recognizes that the physical system sits within an organisational framework and a broader natural landscape', *Mitchell, 2006*
What is this Toolkit about?	IUWM Toolkit is based on the principles of SWITCH Training Kit (Sustainable Water Management Improves Tomorrow's Cities Health, www.switchtraining.eu) developed as part of the European Union supported SWITCH research project with 33 international partners from 15 countries). The Toolkit presents an Indian adaptation to promote Integrated Urban Water Management (IUWM) in Indian cities. It has been developed under the European Union funded project on Adopting Integrated Urban Water Management in Indian cities (AdoptIUMW). The IUWM Process has been tested and modified based on the experiences from implementing an IUWM-based approach in four Indian cities (Kishangarh and Jaisalmer in Rajasthan; Solapur and Ichalkaranji in Maharashtra).
What is the purpose of this Toolkit?	To guide Indian cities towards closing the Urban Water Loop through integration of urban water sectors
What kind of integration?	**Integration across urban water sectors to close the Urban Water Loop** ● Water supply ● Waste water ● Storm water Urban water sectors and their linkages to the larger urban system, including land-use, urban poor, housing, etc., are considered. Solid waste management practices have a direct impact on urban water management in India. The IUWM Process addresses these interactions as well.
Target group for the Toolkit	● Indian municipalities, in particular, Class I cities (with population between 1 lakh and 10 lakh), that are on the way to develop their urban water sector framework and infrastructure ● Consultants/NGOs who can guide/handhold cities in implementation of an IUWM framework ● Other groups or individuals interested in learning about IUWM
Contents of the Toolkit	This Toolkit is a step by step guide for implementing an IUWM-based approach for planning and management of urban water sectors. Key tools in the Toolkit include: **PROCESS TOOLS** ● First Integration Assessment Matrix (to identify Strengths, Weaknesses, Quick Improvement Areas and existing status of integration of urban water sectors in the city) ● Institutional Integration ● Existing Status of Institutional Integration ● Impacts of Climate Change on Water Resources ● Integration Targets for the city ● Urban Water Balance Tool (to assess benefits of integration on demand-supply gap) ● Urban Water Loop Mapping (to understand flow of water to, through and from the city) ● Project Prioritization Tool (to prioritize projects based on social and environmental benefits, economic feasibility and participatory approach) ● IUWM Action Plan **SUPPORTING TOOLS** ● Approaches and Technologies Tool (national and international case studies for addressing common issues related to urban water sectors) ● Project Financing Tool (potential sources of funding for water-related projects) This Toolkit is proposed to be implemented by Municipalities on their own or with the help of a consultant/process facilitator. The IUWM Process has been intentionally kept less technical, to enable all stakeholders develop an understanding of urban water sectors in the city. Cities can choose to use more detailed and complex tools for implementation of IUWM Process, like modelling, GIS, multi criteria analysis, etc.

What does my city get by implementing the IUWM Process?	• An approach that can help address the existing water-related issues through integrated planning of urban water sectors in the city • Resource efficient water management for improved water security • Creation of multi-stakeholder platforms for participatory planning and decision making • Identification of co-benefits among urban water sectors and among urban water sectors and other urban sectors • Improved capacity of Municipal staff towards managing interlinkages among urban water sectors • IUWM-based Vision • IUWM-based Action Plan • Priority projects for implementation
How long will it take to implement the IUWM Process?	IUWM Process is a continuous, ongoing process and cities will have to revisit their IUWM-based strategies and projects over time to refine and institutionalize the IUWM Process in the city
What are the resources or inputs required from the Municipality for the IUWM Process?	• Manpower resources: Allocation of a full time Nodal Officer to steer activities related to the initiative • Material resources: Workspace for Nodal Officer (if not already available) including computer, printer, internet connectivity and provision of resources for conducting stakeholder workshops • Financial resources: For organising stakeholder consultations and for implementation of IUWM Action Plan formulated using the Toolkit
Will this Toolkit help my city work towards Sustainable Development Goals (SDGs)?	This Toolkit will help the city work towards Goal 3 (good health and wellbeing), Goal 11 (sustainable cities and communities) and most importantly, Goal 6 for clean water and sanitation (specifically target 6.5 on implementing Integrated Water Resources Management, target 6.6 on protecting and restoring water-related ecosystems, target 6.3 on improving water quality by reducing pollution and target 6.1 on equitable and safe drinking water)
What after my city completes implementation of the IUWM Process?	Cities that have implemented the IUWM Process and have developed a basic understanding of IUWM should institutionalize this process as a cyclic process to be undertaken by the Municipality periodically. The city can subsequently, choose to adopt additional tools for implementing the IUWM Process like modelling, GIS database development, multi criteria analysis, etc.

MARBLE SLURRY DUMP-YARD, KISHANGARH

STEP BY STEP PROCESS FOR IUWM

OVERVIEW OF INTEGRATED URBAN WATER MANAGEMENT (IUWM) AND WHY IT IS RELEVANT IN THE INDIAN CONTEXT

Before introducing the Toolkit, let's try and answer some basic questions:

- Why does my city need this Toolkit?
- What is Integrated Urban Water Management (IUWM)?
- What does the IUWM Process entail?

Why Cities Need IUWM Toolkit?

Before we narrow down to cities, let us understand the water stress scenario at the national level. Estimates by the erstwhile Planning Commission[2] suggest that of all the precipitation received across India[3], only 1,123 BCM is available as average annual utilizable water[4]. Water usage in the country was estimated at 634 BCM[5] - nearly 56% of the total utilizable water; and is projected to grow to 1447 BCM by 2050: much above the available utilizable potential. In such a situation, with India heading towards 50% urbanization[6] by 2050 and a water scarcity level of less than 1000m^3/capita/annum[7] water availability, the management of water sector needs to be rethought!

Many Indian municipalities are struggling with issues related to abstraction from distant sources, Non-Revenue Water (NRW) losses, low infrastructure coverage, inadequate wastewater treatment capacity, flooding, water scarcity and others. In such a scenario, emphasis on integration of urban water sectors along with interactions of urban water sectors with other urban sectors (like land use, housing, urban poor and others) through an IUWM-based approach given in this Toolkit, can provide a potential solution.

What is IUWM?

The Urban Water Loop and its significance is central to the IUWM planning process.

The Urban Water Loop

The Urban Water Loop signifies that water flow within a city can form a loop where water entering the system/city and the water leaving the system/city is accounted for. Closing of the Urban Water Loop emphasizes the need to reduce the amount of water entering the system as well as that leaving the system by using water in varied forms, from varied sources and for varied purposes.

CLOSING THE URBAN WATER LOOP

The Urban Water Loop is the system of abstracting water from water sources in and around the city, purifying and distributing it for different uses in the city, collecting and treating the wastewater and channelizing the treated wastewater back to surface or groundwater sources or re-using it directly.

FIGURE 1.1: URBAN WATER LOOP

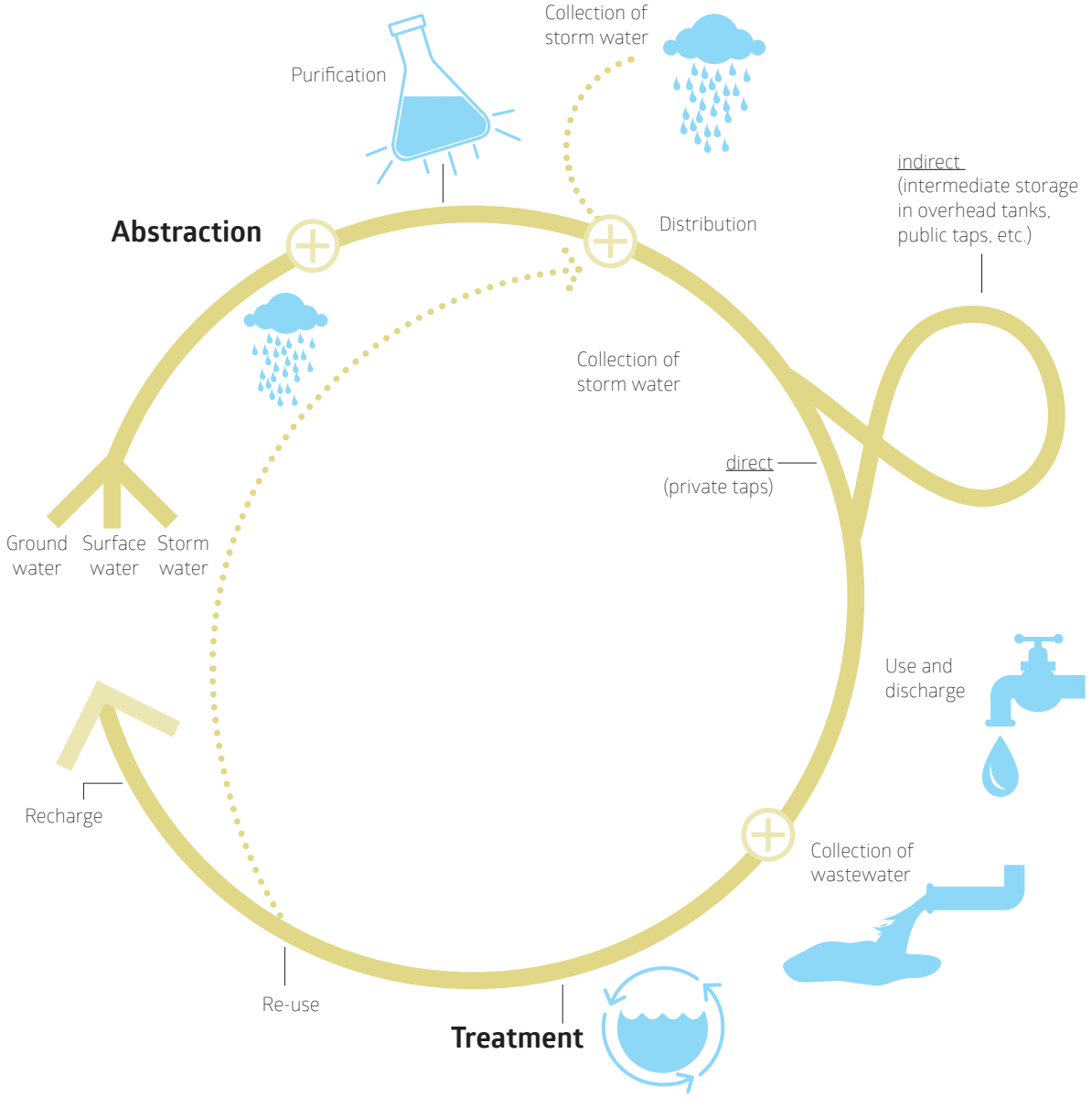


Figure 1.1 depicts the conventional flow of water through a city[8]. Various elements of the Urban Water Loop need to be managed to ensure provision of sufficient quantum of water, of a permissible quality, on a continuous, consistent, equitable and sustainable basis.

Introduction to IUWM

The key to IUWM is that individual processes within the Urban Water Loop should be planned and managed such that deleterious impacts can be minimized and the collective system efficiency can be maximized. The primary aim of IUWM is to enable 'multi-functionality[9] of urban water services to optimize the outcomes achieved by the system'[10]. The IUWM tools address soft (education, awareness, regulations), hard (infrastructural) and non-structural measures (ecosystem services). They are designed for multiple scales, ranging from city level to the community level. These tools will help assess and prioritize the need for decentralized and centralized infrastructure.

PRINCIPLES OF IUWM

The concept of IUWM is based on certain principles which have evolved over time to overcome the shortcomings of conventional water management practices within a city, with an aim to provide sustainable and inclusive access to water. These principles showcase how working with an IUWM-based approach is different from how we conventionally work with urban water sectors in our cities. The key underlying principles of IUWM outlined in Mitchell, 2006[11]; and GWP, 2012[12] have been compared with the conventional approaches observed in cities (based on interactions with city officials and stakeholders):

S. No	Principle	Difference between conventional and IUWM-based approach
		IUWM-based approach
1	Recognizes the significance of the local context and addresses it from environmental, social, cultural and economic perspective	Stakeholders choose the option best suited to local context through consultative process
		In practice
		Preference given to strengthen existing local systems over introduction of alien systems
2	Includes all stakeholders in the planning and decision making process	All related organisations and stakeholders are involved throughout the planning process
		In practice
		Stakeholders decide the course of plan preparation through consultative process. Community involvement is integral part of the process
3	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	Water use is matched with water quality Reduce freshwater demand by supplementing with alternate sources of a permissible quality
		In practice
		All water does not have to be treated to drinking water standards
4	Addresses all water requirements: anthropogenic as well as ecological. Accounts for non-urban users that are dependent on the same water source	All users and uses considered while planning; priority is given to drinking and irrigation
		In practice
		Ecological flows, rural and other marginalized stakeholders given representation in planning process
5	It considers all parts of the water loop, natural and man-made; surface and subsurface, while recognizing them as a part of an integrated system	Water supply, wastewater, storm water are interlinked[14]
		In practice
		Water supply schemes should have component of recycling, reuse and recharge
6	Recognizes water storage, distribution, treatment, recycling and disposal as part of the same resource management cycle	City Master Plan and water infrastructure planning should be complementary and conjunctive
		In practice
		Dedicated entities/parastatals can be constituted for integration of urban water sectors; as well as integration with other urban sectors

SOME CASE EXAMPLES FOR IUWM

Towards closing the Urban Water Loop, Solapur

Solapur is taking measures to treat wastewater to tertiary standards and reuse by supplying to industrial cluster(s) to reduce dependence on municipal supply. Solapur has also set up additional wastewater treatment plants for decentralized treatment.

Bridging Institutional Silos, Jamshedpur

Private company as an integrated urban water service provider for Jamshedpur city: JUSCO (Jamshedpur Utilities and Services Company) undertook measures towards community involvement, established District Metering Areas (DMAs) and made provision for treatment of wastewater (effluent treated to international standards; part supplied to industries, part discharged downstream). Sludge is sold to rural areas as manure.

	Conventional approach (common practice in cities)	Case example
	Modular solutions fit all	Each city can have a different interpretation or focus for IUWM. For Jaisalmer, IUWM signifies revival of traditional rain water harvesting structures. For Ichalkaranji, IUWM signifies management of pollution of water resources
	Large infrastructural projects replicated across cities	
	Plans prepared with little or no consultation	Core Team and Stakeholder Committee formed in each city under AdoptIUWM project from the beginning of the project
	Plans put up for approval and objections after preparation. Community involvement is as per project requirement	
	Treat all water to drinking water standards	Dual supply lines being promoted in housing developments in Bangalore to promote reuse for secondary purposes Singapore uses 'NEWater' (treated wastewater equivalent to drinking water standards) to supplement supply
	Example: As per service level benchmarks, 135 lpcd water should be treated and supplied (whereas, less than 20% is used for potable purposes)	
	Top priority: Drinking, Irrigation	Namami Gange Mission of Government of India acknowledges the need for Nirmal Dhara, Aviral Dhara which addresses ecosystem services
	Minimum environmental flow or ecological flow might or might not be provided for Rural stakeholders might be marginalized	
	Water supply, wastewater, storm water are separate sectors and need to be planned and managed separately	Solapur is taking measures to treat wastewater to tertiary standards and reuse by supplying to industrial cluster(s)
	Water supply schemes planned in isolation without consideration of wastewater management	
	Planning in institutional silos	IWVA, Belgium undertakes holistic planning of water resources incl. source conservation, abstraction, supply, treatment of wastewater and recharge of treated wastewater
	Source management: Irrigation department Water supply management: Municipality	

Closing the Urban Water Loop, Singapore

Island city aspires to tap and reuse every drop of water to reduce dependence on external sources/imported water. Multipronged approach: recycling of treated wastewater to high grade reclaimed water (NEWater) which is reintroduced into the Urban Water Loop (planned to be 50% of demand by 2060), reusing storm water for supply, reducing user demand and targeting reduction in per capita consumption (reduced from 175 to 150 lpcd in 20 years) and desalination.

S. No	Principle	Difference between conventional and IUWM-based approach	
		IUWM-based approach	
7	Seeks to protect, conserve and utilize water resources at source	Source conservation and supply go hand in hand	
		Partnerships need to be developed for long term, sustainable use of water resources	
8	Encompasses alternative water sources	Dependence on multiple sources of water to reduce source exploitation or dependence on a single source	
		In practice	
		Diversified water portfolio with multiple sources	
9	Recognizes linkages between water, land use and energy	Strong interlinkages exist between urban water sectors and other urban sectors; and all plans should address these interlinkages	
		In practice	
		Water and energy are interlinked and savings in one can translate into savings in the other	
10	It aligns formal institutions (organisations, legislation, and policies) and informal practices (norms and conventions) that govern water in and for cities	Formal and informal sectors are involved in planning for urban water sectors	
		In practice	
		Government is taking more initiatives to recognize the role of private suppliers	
11	Aims at sustainability, efficiency and equity; while balancing environmental, social and economic needs (and sustainability) for short, medium and long term. Balance between demand and supply is crucial	Balance between demand and supply is crucial. Natural resources are inputs, very little waste is generated and most resources are recycled within the city	
		In practice	
		Reducing leakage losses is equivalent to additional abstraction. Demand management leads to reduction in per capita demand translating into social, economic, environmental benefits	
SUGGESTED ADDIT			
12	Recognizes impacts of climate change and vulnerability of urban poor to extreme events; and seeks to address these	Process planning for urban water sectors should address impacts of climate change	
		In Practice	
		Urban poor, vulnerable and marginalized communities are identified; and adaptation measures are planned with focus on strengthening existing adaptation measures	
13	Recognizes need for capacity building and mobilization of stakeholders	Institutionalization of training and capacity building activities is required at all levels, especially Municipalities and for vulnerable sections	

SOME CASE EXAMPLES FOR IUWM

Decentralized Treatment and Reuse, Jabalpur

Jabalpur Municipal Corporation installed a decentralized wastewater treatment plant along the banks of Narmada to treat wastewater from a nallah which led to odour near Ghat area (used for religious purposes). Wastewater nallah has been diverted, provided with screen to filter waste and connected to a standalone decentralized plant for tertiary treatment. This treated wastewater is being reused for horticulture in the temple complex. Local youth have been trained in plant maintenance.

	Conventional approach (common practice in cities)	Case example
	Focus is on abstraction of water from source	New York developed partnerships with catchment level stakeholders for catchment conservation of water resource instead of investing in WTP
	Water abstraction and source conservation are separate tasks and separate agencies deal with these aspects	
	Dependence on one or two key water sources. Long distance abstractions are common	Centralized supply leads to neglect of local level resources, which have the potential to reduce burden on water supply infrastructure. Traditional rain water harvesting structures and systems are crucial for integration with urban sector infrastructure in water scarce areas like Jaisalmer
	Water can be brought to the city from sources located hundreds of kilometers away	
	Plans for water, land use, energy are to be prepared by separate departments	Ichalkaranji supplies treated wastewater from STP to farmers for irrigation and earns revenue from sale of dried sludge as compost
	Water and energy are separate sectors managed by separate departments	
	Institutional silos for water supply, wastewater, storm water	Under Swachh Bharat Mission, measures towards formal integration of ragpickers with the waste collection system are proposed
	Private water tanker suppliers are not recognized as a part of water supply system	
	Schemes are based on demand projections as per standards Natural resources are inputs into the city and waste is disposed off, mostly downstream	MSPGCL (Maharashtra State Power Generation Corporation Ltd) has entered into an Memorandum of Understanding (MoU) with Nagpur Municipal Corporation (NMC) for supply of treated wastewater from Nagpur Municipal Sewage Treatment Plant (STP) to meet additional water demand of MSPGCL's proposed expansion plan. The Financial Model is based on MSPGCL paying NMC Rs 15 crores/year for the next 15 years as royalty fee for ensured supply of wastewater. MSPGCL will also facilitate construction of a new STP for Nagpur city with tertiary treatment facility for supply to its plant
	Water supply infrastructure schemes are designed for standard per capita supply + T&D losses. Do we have enough fresh water availability for designing schemes for our cities along these parameters in the long term?	
TIONAL PRINCIPLES		
	Impacts of climate change are not considered during project planning	As part of the City Resilience Strategy to combat climate change, development of an Early Warning System was taken up by Surat for flood management. An integrated model based on meteorological, hydrological and reservoir modelling system was developed to forecast reservoir levels and increase preparedness of the city for flood management
	Standard schemes are replicated for vulnerable sections without much understanding/focus on climate change	
	Municipalities face challenges related to manpower, skill set and efficiency	Capacity Building for Urban Development (CBUD) is an important component of World Bank projects with cities

Investments in Watershed Services, New York

Authorities in New York decided to invest in improving the Catskill Delaware catchment (one of the source catchments) instead of installing a conventional water treatment plant to deal with the issue of water pollution and long-term water security. Authorities developed partnerships with farmers in the catchment area to reduce pollution at the plot level. Extensive consultations with stakeholders and farmers were conducted and within five years, nearly 95% of farmers participated in this partnership (Whole Farm Program) and the city managed to sustainably control pollution at 1/8th the cost of construction of a water treatment plant. The regulatory authorities have even given permission for this partnership based model to continue for another decade without the need for installation of a water treatment plant.

What does the IUWM Process Entail?

The IUWM Toolkit is a step by step process that the city can follow to address its water-related issues through an integrated approach. The IUWM process is a cyclic process: once the city has completed one cycle of the IUWM process, it should periodically revisit the process (in totality or in parts) for continued integration of urban water sectors. The IUWM Process is divided into six main stages as given below:

I. **Process initiation and preliminary assessment of existing level of integration:** This is the most important stage of the process as the institutional framework for implementation of the IUWM Process in the city is established here: through constitution of multi-stakeholder platforms. First Integration Assessment Matrix Tool helps cities understand where they stand in terms of existing level of integration and what are their strengths and weaknesses in urban water sectors. This stage also helps cities identify which of the urban water sectors needs focus on a priority basis. The stakeholders also discuss the existing institutional framework in their cities and identify the key roadblocks for integration. Impacts of climate change on water resources area also discussed.

II. **Visioning, formulation of Integration Targets and understanding the Urban Water Loop:** Dialogues on urban water sectors are undertaken to formulate an IUWM-based Vision for the city and to set Integration Targets to achieve this Vision. Urban Water Balance assessment (from a demand-supply gap approach to a demand-supply balance approach) demonstrates the benefits of achieving Integration Targets. Urban Water Loop mapping exercise enables stakeholders to understand the flow of water to, within and from the city. Critical and potential areas would be identified for each Integration Target. Key issues, key potentials and key stakeholders for each Integration Target are discussed.

III. **Action Planning for Integration:** Multi-stakeholder platforms undertake discussions to develop a long-list of projects for implementation in the city. Attainment of integration targets is a key criterion for project selection. These projects are based on the identified critical and potential areas for each Integration Target from Stage II. Interlinkages between land use and urban water sectors are also established here.

IV. **Strategic prioritization:** This long-list of projects is scrutinized for criticality, technical and financial feasibility and for any inherent risk to come up with shortlisted projects. The Project Prioritization Matrix tool is used to identify projects for implementation. These projects are included in the IUWM Action Plan.

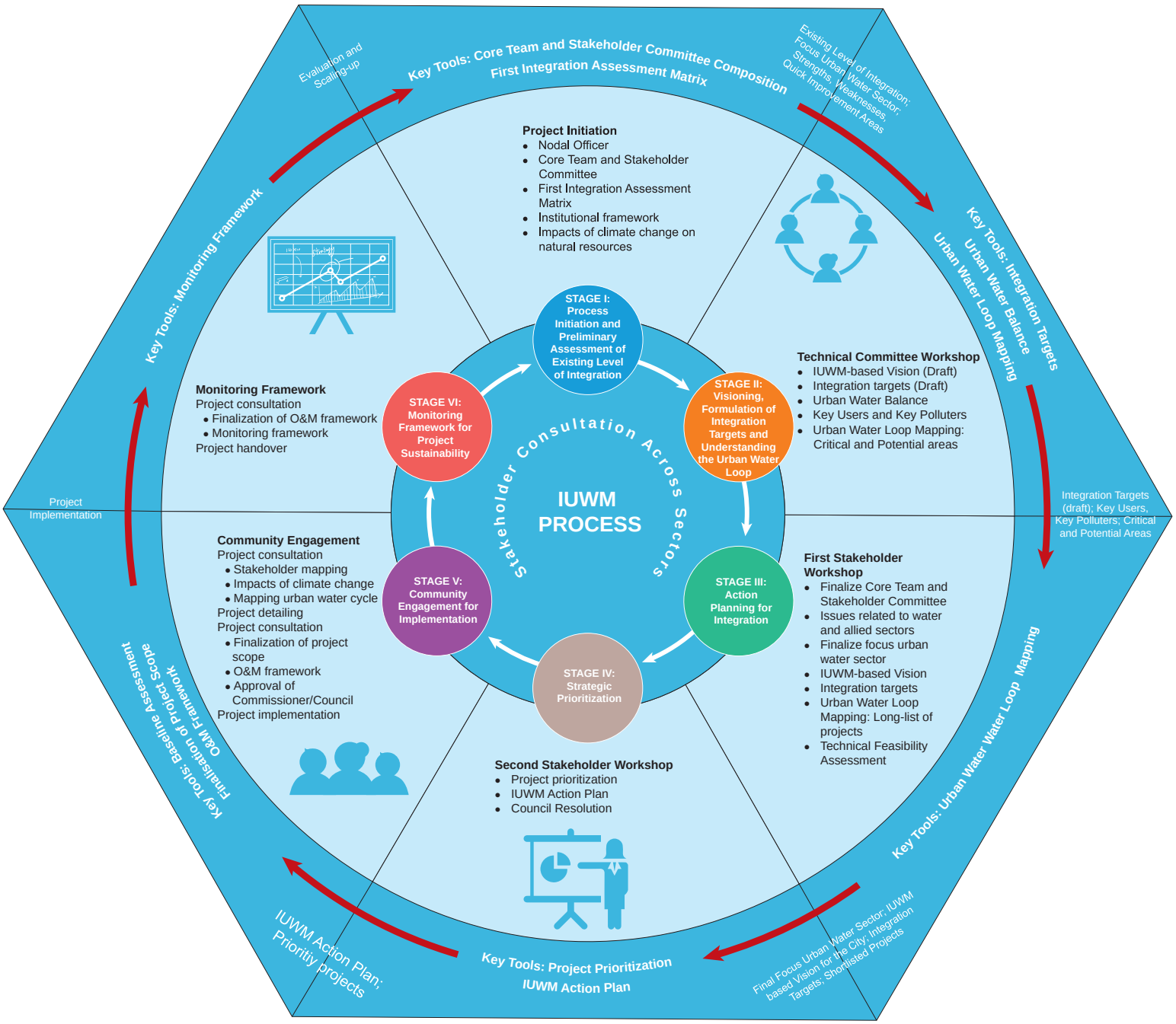
V. **Project detailing and community involvement:** Selected projects are further detailed. An institutional framework is created for implementation of the IUWM Action Plan. Local level Project Committees are identified to over see and support project implementation

Toolkit is a step by step implementation guide

COMMUNITY INVOLVEMENT

Involvement of local community in decision making, early on in the planning process, facilitates integrated and inclusive action planning and implementation.

IUWM PLANNING PROCESS



VI. **Community ownership:** Defining roles and responsibilities of stakeholders and defining O&M framework (what to monitor, how to monitor, who will monitor and when to monitor). Project would be handed over to the local authority and community for maintenance.

The Nodal Agency for implementation of the Toolkit should be the Municipality. It should be noted that this process is indicative and cities are encouraged to make modifications to the process to best suit their local context.

OVERVIEW OF IUWM TOOLKIT STAGES

STAGE I

Process Initiation and Preliminary Assessment of Existing Level of Integration

INPUTS/ACTIVITIES

Core Team Workshop

IMPLEMENTATION

- Multi stakeholder platforms: Core Team (including Technical Committee) and Stakeholder Committee (**Tool I**)
- First Integration Assessment Matrix Tool (FIAM) (**Tool II**)
- Climate change impacts, Institutional framework analysis (**Tool III and IV**)

OUTPUTS

- Draft composition of Core Team and Stakeholder Committee → A
- Existing status of integration
  Strengths, Weaknesses, Quick Improvement Areas
  Focus Urban Water Sector (draft) → B

STAGE IV

Strategic Prioritization

INPUTS/ ACTIVITIES

C D F

Second Stakeholder Workshop

IMPLEMENTATION

- Project Prioritization Tool for shortlisted projects (**Tool XIIa, XIIb**)
- Screening for projects showing positive impacts on urban water sectors
- Weightage for social, economic, environmental and participatory approach
- Project scoring
- Final rank

OUTPUTS

- Projects with positive impact on focus urban water sector
- **IUWM Action Plan** (**Tool XIII**)
  - Projects for Key Indicators
  - Projects for indicators on FIAM
  - Additional indicators → G
- Priority projects → H
- Council Resolution → I

STAGE V

Community engagement for implementation

INPUTS/ACTIVITIES

G H I

Project consultations

IMPLEMENTATION

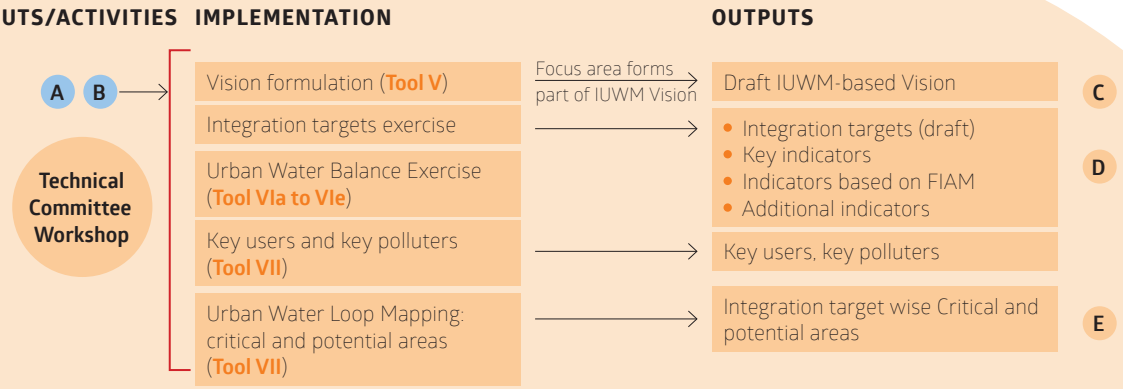
- Urban Water Loop in project area (**Tool XIV**)
  Interlinkages between urban water sectors
  Stakeholder mapping
  Impacts of climate change
  Restructure project to suit local context
  Delineate project and impact area
- Finalization of project scope (**Tool XV**)
  Project sustainability
  O&M framework (**Tool XVI**)

OUTPUTS

- Draft Project report
- Final Project Report
  Project implementation → J

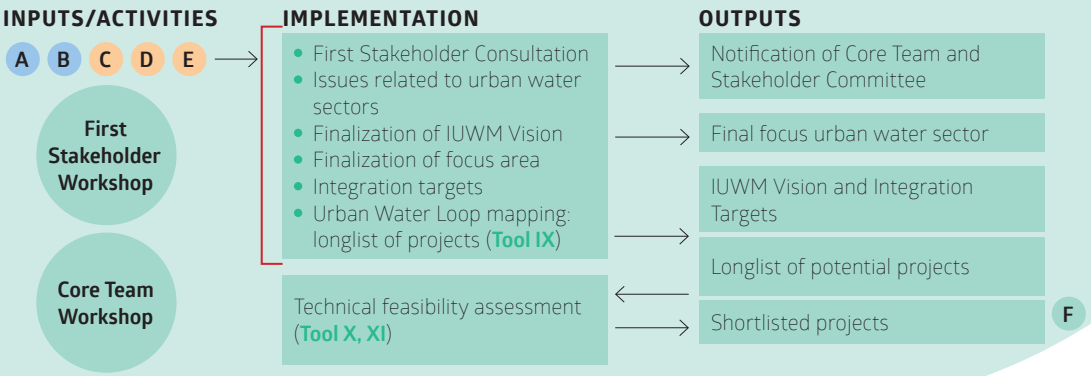
STAGE II

Visioning, Formulation of Integration Targets & Understanding Urban Water Loop



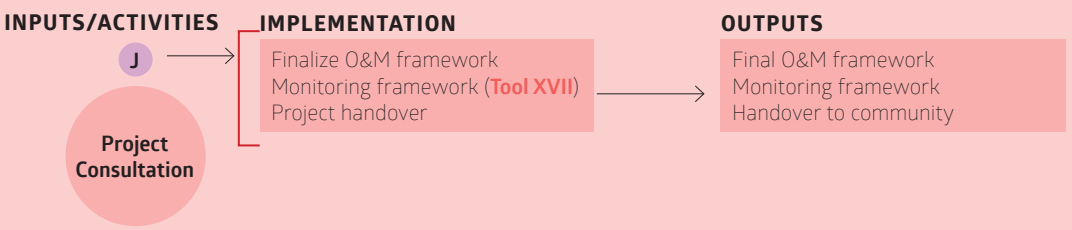
STAGE III

Action Planning for Integration



STAGE VI

Monitoring Framework



Step by Step Process for IUWM

STAGE – I

PROCESS INITIATION AND PRELIMINARY ASSESSMENT OF EXISTING LEVEL OF INTEGRATION

STEP BY STEP PROCESS FOR IUWM

PROCESS INITIATION AND PRELIMINARY ASSESSMENT OF EXISTING LEVEL OF INTEGRATION

Overview

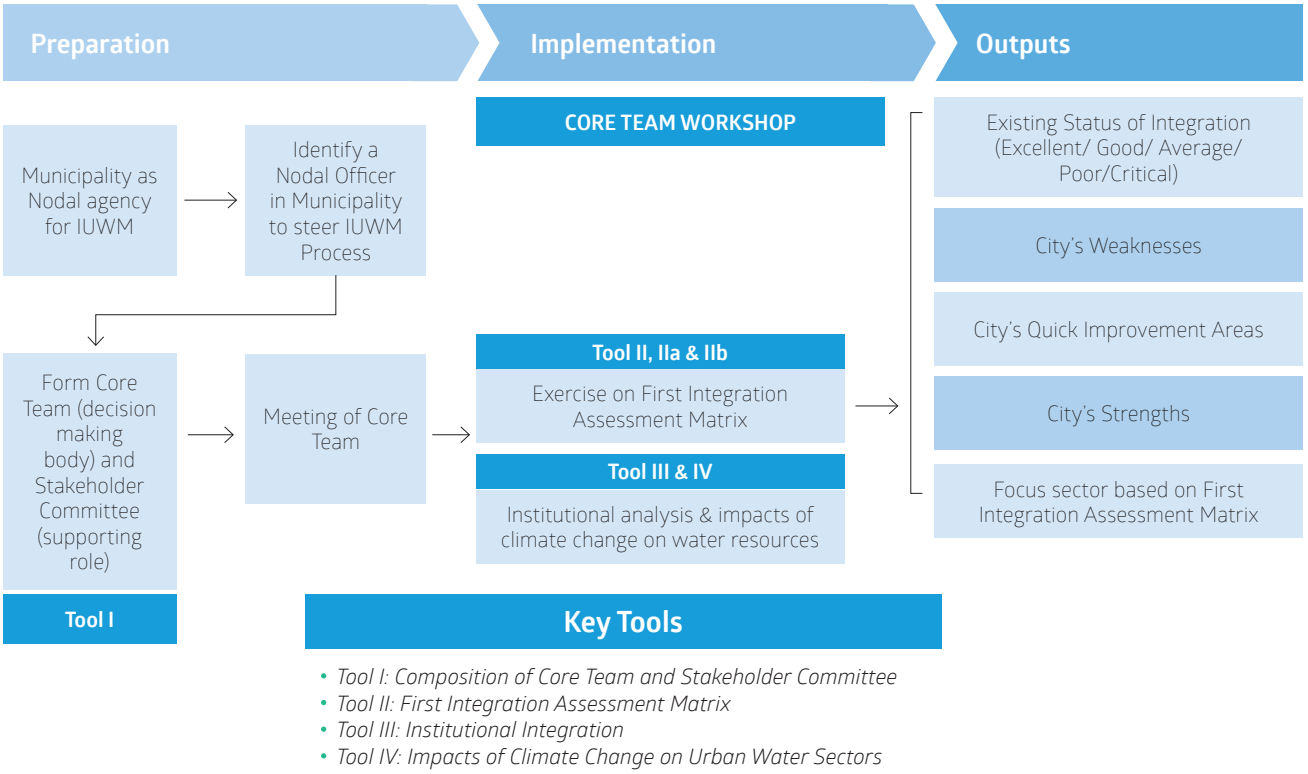
This stage aims to initiate an IUWM Process in the city - a process which will build the capacity of the local authority to undertake integrated planning and management of urban water sectors (water supply, wastewater and storm water) for a resource efficient and sustainable future. This stage provides guidance to establish an institutional framework for the IUWM Process. Also, it helps the city to undertake a self-assessment in terms of existing integration across urban water sectors using the First Integration Assessment Matrix Tool.

The city should have the willingness to implement the IUWM Process by committing the required time and manpower. The city should identify a Nodal Officer who would be the key contact for all IUWM related activities; should constitute an IUWM Core Team (decision makers) and an IUWM Stakeholder Committee (supporting role) to steer the process.

To start with, the city should undertake an initial assessment using the First Integration Assessment Matrix Tool to understand the existing level of integration among urban water sectors in the city and identify its key strengths and weaknesses related to urban water sectors.

The results of the initial assessment (First Integration Assessment Matrix Tool) will also help in identification of the focus urban water sector for the city (water supply or wastewater or storm water). This priority sector should be considered as the starting point to achieve multi-sector integration.

OVERVIEW OF STAGE I



KEY TASKS:
CORE TEAM

- Decision making
- Leading the IUWM process
- Conflict resolution
- Timely progress of IUWM Process
- Facilitation of stakeholder dialogue
- Coordination for developing IUWM Action Plan
- Ownership of IUWM Action Plan

The city should be the Nodal Agency for the IUWM process. IUWM will help the city to identify co-benefits for efficient planning and management of urban water sectors (water supply, wastewater and storm water). In the Indian context, waste management practices have an impact on the urban water sectors. Hence, interactions of urban water sectors with the waste sector have also been considered. The Municipal Commissioner's consent and commitment towards the IUWM Process is required for process initiation by the city.

1.1 Identification of the Nodal Officer in the Municipality

The Municipal Commissioner should appoint an officer–in–charge who would coordinate activities related to the initiative. This 'Nodal Officer' should preferably be a mid-level engineer working in water-related sector(s) (and with knowledge of other urban sectors and good communication skills to be able to coordinate with multiple departments). The Nodal Officer would be required to commit time for successful implementation and institutionalize the IUWM process in the city.

1.2 Constitution of Core Team and Stakeholder Committee

The Commissioner (in consultation with key stakeholders in the city), should constitute a Core Team which would be the decision making body for the IUWM Process. Core Team should preferably be headed by the Commissioner or Mayor and can have representatives from Municipality, Municipal departments/ parastatal agencies dealing with water supply, wastewater, storm water and solid waste management; along with representatives from the Pollution Control Board, Irrigation Department/Water Resources Department, Public Health and Engineering Department, Ground Water Board, Town Planning Department, other key organizations working in the water sector, etc. Additional departments in the city related to urban water sectors can also have representation in this committee. Representatives of urban poor, key water-related NGOs and institutions working in the city should also be included. However care should be taken that Core Team does not exceed more than 15 members.

Once the Core Team has been formulated, a Technical Committee should be constituted within the Core Team comprising key technical experts. Key functions of Technical Committee would be to provide technical inputs and departmental expertise on aspects related to IUWM.

A Stakeholder Committee with citizen representatives needs to be constituted to support the Core Team and provide insights on ground level issues. This Stakeholder Committee should have representatives from vulnerable sections like women, senior citizens, urban poor and marginalized communities. The Stakeholder Committee can also include representatives from other departments at district level or local level government departments that are indirectly related to urban water sectors like Forest Department, Horticulture Department, Energy Department, Transport Department, Agriculture Department, Waste Management Department; NGOs, institutions, research organizations, youth groups, civil society organizations, etc. This Committee should be limited to a maximum of 50 representatives. Use Tool I to structure composition of Core Team and Stakeholder Committee (Annexure 1).

1.3 First workshop of Core Team

The Nodal Officer, in consultation with Commissioner, should call for a workshop of the Core Team to undertake the exercise on First Integration Assessment Matrix

and formulate IUWM-based Vision for the city (draft). This Matrix would help to undertake a **quick review of the existing level of integration in the city** for urban water sectors. Outputs of the workshop will include:

- Existing status of integration in the city ('Excellent', 'Good', 'Average', 'Poor' or 'Critical')
- Identification of 'Strengths' and 'Weaknesses' of the urban water sectors
- Identification of focus sector (water supply or wastewater or storm water)
- Status of institutional framework
- Assessment of impacts of climate change on water resources
- IUWM-based Vision for the city (draft)

1.3.1 First Integration Assessment Matrix (Tool II)

First Integration Assessment Matrix or Tool II (given in Annexure II) is a self-assessment tool that contains questions, based on principles of IUWM, to assess the existing status of integration in the city. Nodal Officer should present each principle and the related question(s) to the Core Team at the first workshop of the Core Team. Each question has been provided with possible responses that can reflect the situation in the city and each possible response has been given a score from '15' (indicating best scenario) to '0' (indicating worst scenario). Negative scores have also been given for some responses (-5 to -15) to highlight the negative impacts of the indicator.

KEY TASKS:
STAKEHOLDER COMMITTEE

- Support Core Team
- Participation in decision making process
- Participation in interactive dialogues
- Involvement of concerned stakeholders at city level for better citizen representation
- Facilitation of project activities
- Inputs on preparation of IUWM Action Plan

TOOL II: EXCERPT FROM FIRST INTEGRATION ASSESSMENT MATRIX (EXAMPLE)

S. No.	Integration Indicators	Criteria Scoring				Remarks
		Criteria/ sub-criteria		Score	Selected Score (A)	
Principle 7: Seeks to protect and conserve water resources at source						
10	Water pollution	Extent of pollution	Water quality (surface and groundwater) within permissible limits	15	5	
			Polluted pockets but mitigation plans are being implemented by officials	10		
			Polluted pockets are being confined, no mitigation plan/measures yet	5		
			Critical level of surface water 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		
			- Long term impacts surfacing but not clearly evident yet (-5)			
			- Impacts on aquatic life (-10)			
			- Fatality (-15)			

STEPS TO FILL TOOL II

Step 1:
For each indicator, discuss and select the option best suited to the city from 'Criteria'
Step 2:
Choose the corresponding score from the column on 'score'
Step 3:
Write the selected score in Column 'A'

The Core Team should discuss and assign a score (in column 'A') to each indicator, based on the options best suited to the city and note this score under column 'A'. For indicators where accurate data for the city is not available, the Core Team can use broad estimates that best depict the existing situation. In cases where two or more responses are applicable, the option best suited to the city should be selected.

The Core Team will be asked questions based on the 15 principles of IUWM. An example is given here and the complete tool is available in Annexure II. If required, the Core Team can also modify some indicators to suit the local context.

Similarly, questions on other principles of IUWM would be asked and the stakeholders have to select the best suited option from the 'score' column under Tool II. Results of Tool II would be summarized in Tool IIa - Summary sheet for First Integration Assessment Matrix (Tool IIa is given in Annexure IIa). Once scoring for the First Integration Assessment Matrix has been completed, the scores from Column 'A' of Tool II, will reflect in Column 'B' of Tool IIa. Tool IIa will give:

In Tool IIa, if the city does not have any scores below '5', then refer to Quick Improvement Areas to identify the focus sector for the city

a. Existing status of integration

Tool IIa will give the total integration score (total of column 'B' of Tool IIa) for the city. This score should be compared with Reference Table 1 to get the existing status of integration across urban water sectors in the city.

TOOL IIA: EXCERPT FROM SUMMARY SHEET FOR FIRST INTEGRATION ASSESSMENT MATRIX (EXAMPLE)

Principle	Indicator/ Sub Indicator	Corresponding sector (water, Wastewater, Storm water) (A)	Score (B)	Weakness (0 or -ve score) Quick Improvement Area (5 or 10 score) Strength (score 15) (C)	Focus sector based on First Integration Assessment Matrix (D)
1	Location of major source(s) of water supply	Water	10	Quick Improvement Area	Water
	Traditional RWH structures and systems	Water	5	Quick Improvement Area	
2	Participatory process	All	5	Quick improvement area	
3	Grading of uses	All	0	Weakness	
4	Water sharing pattern	Water	0	Weakness	
--	--	--	--	--	
ADDITIONAL PRINCIPLES					
13	Climate change and water resources	Water, Storm water	5	Quick Improvement Area	
	Instances of water or vector borne diseases	All	10	Quick improvement area	
14	Capacity of Municipal staff and other stakeholders	All	0	Weakness	
	City-specific indicator		10	Quick Improvement Area	
TOTAL			150		

STEPS TO FILL TOOL IIA

Step 1: To fill Column B
Scores given by Core Team in Col 'A' of Tool II will appear in this column of the webtool
Step 2: To fill Column C
If score in Col B = 0 or negative, write Weakness
= 5 or 10, write Quick Improvement Area
= 15, write Strength
Step 3: To fill Column D
Refer to Column A and Column C
Urban water sector (water supply or wastewater or storm water) with most 'weakness' comes under Focus sector
Step 4: Get Total Score of Column B
Step 5: Compare Total Score of Column B with Reference Table 1 to get the existing level of integration in the city

b. Strengths, Weaknesses and Quick Improvement Areas

From column 'C' of Tool IIa:

- All indicators with a score of '15' are the Strengths of the city.
- Indicators with a score of '10' and '5' are the Quick Improvement Areas where with minimal intervention, the city can make improvements in the level of integration. These Quick Improvement Areas would be further discussed in the Toolkit.
- Indicators with a score of '0' or negative marking would correspond to Weaknesses of the city. These are critical areas that the city should focus on.

The results of this exercise would be used further for setting Integration Targets in Stage II.

c. Focus sector based on First Integration Assessment Matrix

The column 'A' and 'C' of Tool IIa will indicate the sector (water supply or wastewater or storm water) that has appeared maximum under 'weaknesses' of the city. This will indicate the urban water sector that should be focused by the city on priority, based on findings of First Integration Assessment Matrix.

Outputs of First Integration Assessment Matrix

Tool IIb would summarize the results from First Integration Assessment Matrix (on the basis of Tool IIa).

TOOL IIB: RESULTS OF FIRST INTEGRATION ASSESSMENT MATRIX (EXAMPLE)

Final Score	**150**
Existing status of integration in the city (Excellent, Good, Average, Poor, Critical)	Poor
Focus sector (based on First Integration Assessment Matrix)	Water supply
Weaknesses	'Institutional mechanism' and 'capacity'
Strengths	-
Quick Improvement Areas	'Climate change and water resources', 'infrastructure for urban poor', 'industrial wastewater'
City-specific indicator(s)	-

EXAMPLE

If the city's score is 150, the corresponding status is 'poor'. This means that the city demonstrates very low level of integration across urban water sectors and needs to take immediate measures towards integration across sectors

OUTPUTS

1. *Existing status of integration in the city*
2. *Strengths, Weaknesses and Quick Improvement Areas*
3. *Focus sector based on First Integration Assessment Matrix*

The results of this exercise would be used to formulate IUWM - based Vision for the city and in setting Integration Targets for impacts of climate change on water resources in Stage II

1.3.2 Understanding institutional framework for urban water sectors

At the Core Team meeting, after the First Integration Assessment Matrix exercise, the Nodal Officer should initiate the discussion on IUWM. The discussions should also focus on the existing level of interdepartmental coordination for planning, management and implementation of urban water sectors.

The discussions will include issues of each department related to coordination with other departments and the existing level of integration across departments (low or medium or high). The results of this discussion will be used as inputs in Tool III (given in Annexure III). This tool will help the city identify:

- key departments related to urban water sectors in the city
- role of each department
- road blocks to integration
- level of community integration undertaken by each department
- capacity and data related issues
- existing measures being taken for integration with other departments
- existing level of integration of urban water sector departments

REFERENCE TABLE 1: EXISTING LEVEL OF INTEGRATION

Score	Explanation	Status	Implications
Above 350	More than 80% indicators with a score of '15' or equivalent	**Excellent**	Urban water sectors demonstrate good integration, city needs to continue and improve upon existing measures
250 to 390	More than 60% indicators with a score of '15' or equivalent	**Good**	Urban water sectors demonstrate good integration but certain sectors might require attention
			Additional measures towards integration can improve situation
170 to 250	More than 40% indicators with a score of '15' or equivalent	**Average**	Some integration across urban water sectors exists
			Measures towards integration need to be taken to solve issues related to urban water sectors
90 to 170	More than 20% indicators with a score of '15' or equivalent	**Poor**	Hardly any integration
			Need for immediate measures towards integration across sectors
Below 90	Less than 20% indicators with a score of '15' or equivalent	**Critical**	No integration across sectors
			Immediate measures towards integration needed
			City needs to rethink planning and management of urban water sectors

EXAMPLE

A city with existing integrations status of 'poor' might decide to target achieving 'excellent' integration status in future.

1.3.3 Impacts of climate change on water resources

Stakeholders should discuss Tool IV (given in Annexure IV) to understand the impacts of climate change in terms of:

- what are the climate change trends (for precipitation, temperature and extreme events)?
- how can these trends impact water resources in the city?
- how can these trends impact other urban sectors?
- how can the existing local adaptation measures help combat impacts of climate change?

1.3.4 Discussion on IUWM-based vision for the city

At this stage, the city's Core Team is aware about the existing status of integration in the city, analysis of institutional framework and impacts of climate change on urban water sectors. With this information, the Core Team should aim at improving the existing integration status of the city while framing the Vision – 'what integration status should we target to achieve in the future?'. The Core Team should consider longer time horizons of 20-30 years while formulating the IUWM-based vision.

The Core Team should now decide a target year to achieve this integration status (*say 20 years*). This target should overlap with the target year for the city's key planning documents/schemes like Master Plan or City Development Plan or Smart City Proposal.

Once the target integration status and target year for the IUWM Vision are finalized, the Core Team should discuss and develop this vision structure based on the city's Strengths, Weaknesses, Quick Improvement Areas, impacts of climate change on water resources and institutional analysis (Tool II to IV). The vision structure can be decided and draft vision statement can be further framed in Stage II.

1.4 MINUTES OF MEETING

Nodal Officer should prepare Minutes of Meeting and after approval of Commissioner, should circulate these to respective departments/members of Core Team.

Step by Step Process for IUWM

STAGE – II

VISIONING, FORMULATION OF INTEGRATION TARGETS AND UNDERSTANDING THE URBAN WATER LOOP

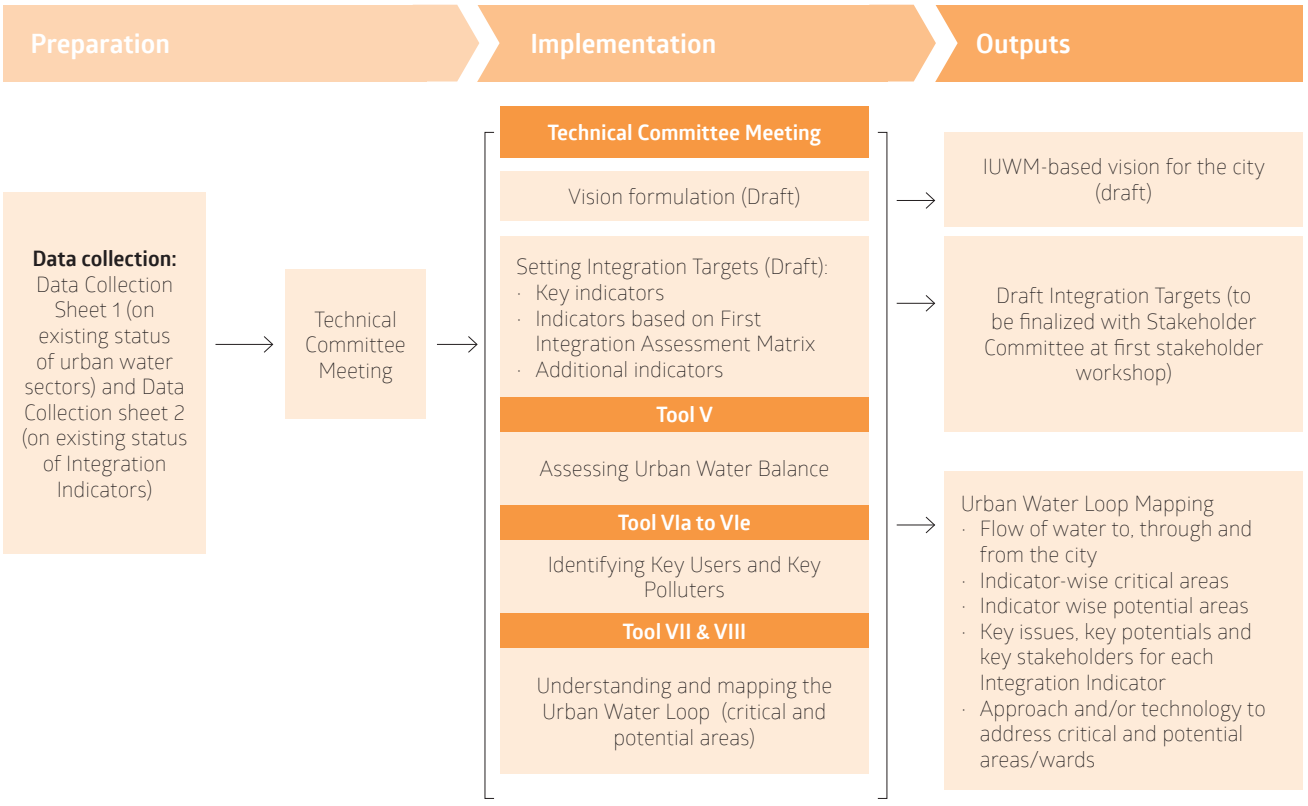
STEP BY STEP PROCESS FOR IUWM

VISIONING, FORMULATION OF INTEGRATION TARGETS AND UNDERSTANDING THE URBAN WATER LOOP

Overview

This stage is meant to set the roadmap for integration in the city. Technical experts from the city need to discuss and strategize measures to achieve the IUWM-based vision through formulation of Integration Targets. This stage would make the city authorities aware of the flow of water to, from and out of the city (Urban Water Loop mapping) and would help them to identify alternative sources of water that can be used to reduce city's demand-supply gap (Urban Water Balance exercise). This stage would initiate a dialogue on the Urban Water Balance, Urban Water Loop and interactions of spatial fabric of the city with the urban water sectors to help the city move towards future water security.

OVERVIEW OF STAGE II



Inputs from Stage I

- *Strengths, Weaknesses, Quick Improvement Areas from First Integration Assessment Matrix*
- *Impacts of climate change on water resources*
- *Institutional analysis*

Key Tools

- *Tool V: Integration Targets (draft)*
- *Tool VIa to VIe: Urban Water Balance*
- *Tool VII: Key users and Key Polluters*
- *Tool VIII: Urban Water Loop Mapping: Critical and potential areas/wards*

Supporting tools

- *Approaches and Technologies Tool*
- *Municipal budget for urban water sector*
- *Data Collection Sheet 1 and 2*

This exercise would help the city work of Sustainable Development Goals, especially: Goal 6 on Clean Water and Sanitation and Goal 11 on Sustainable Cities and Communities.

2.0 Preparation for Technical Committee Workshop

For this stage, the Nodal Officer, with consent from the Municipal Commissioner, should prepare for a full day workshop of the Technical Committee (including members from Water Supply Department, Sewerage Department, Storm Water Drainage Department, Solid Waste Management Department, Water Resources Department, Pollution Control Board, Town Planning Department, Public Health and Engineering Department, etc.). Before this workshop, Nodal Officer in consultation with urban water sector departments, should collect data using:

- Data Collection Sheet 1 on existing status of urban water sectors in the city
- Data Collection Sheet 2 on existing status of Integration Targets and
- Data Collection Sheet 3 on existing status of Municipal budget for urban water sectors (given in handout on Support Tools).

Key objectives of Technical Committee Workshop would be:

- Formulation of Integration Targets to attain IUWM-based vision for the city
- Understanding urban water balance of the city
- Understanding and mapping Urban Water Loop of the city

Once Data Collection Sheet1 and 2 has been completed, the Nodal Officer should call for the Technical Committee workshop.

2.1 Technical Committee Workshop

At the Technical Committee Workshop, the Nodal Officer should summarize the outputs of the Core Team Workshop (existing level of integration in the city, focus sector, Strengths, Weaknesses and Quick Improvement Areas of the city, impacts of climate change, institutional analysis and draft Vision for IUWM). Subsequently, the participating departments should discuss and undertake the following exercises.

2.1.1 Draft IUWM-based Vision for the city

Based on consultations at the Core Team Workshop, the Technical Committee should formulate the statement for the draft IUWM-based vision. The identified focus sector for the city (Column 'D' from Tool IIa) should form a part of this Vision. The draft IUWM-based vision would be further discussed and finalized in consultation with Stakeholder Committee at the first stakeholder workshop.

IUWM-BASED VISION FOR THE CITY (DRAFT) (EXAMPLE)

IUWM-based Vision for the City (draft)	*A resource efficient sustainable city with green landscapes, clean water bodies, rich biodiversity and happy communities.*
Target Year: 2035	

OUTPUTS:
IUWM BASED VISION FOR THE CITY

REFERENCE TABLE 2: PROJECTED INFRASTRUCTURE DEMAND

2.1.2 Projecting infrastructural demand

Projections for infrastructure demand for the target year (same as target year for IUWM Vision) are calculated based on existing baseline information as provided in Data Collection Sheet 1 (given in handout on Support Tools). This information can be calculated or can be taken from existing planning documents for the city like master plans, city development plans or smart city proposals.

Projections	For target year (e.g. 2035)
Projected population	200,000
Projected water demand (MLD)	30
Projected wastewater generation (MLD)	22.5
Projected solid waste generation (MT)	60

2.1.3 Integration Targets for the city (draft)

The city needs to finalize the Integration Targets that will help to achieve the IUWM Vision. Since the Strengths and Weaknesses of each city would be different, this Toolkit tries to identify certain indicators for which all cities should set targets, in order to attain integration across urban water sectors. The focus of these indicators is on closing the Urban Water Loop and bridging institutional silos. There are three categories of indicators: (i) Key indicators (ii) Indicators based on First Integration Assessment Matrix and (iii) Additional indicators.

TOOL V: INTEGRATION TARGETS FOR THE CITY (DRAFT) (EXAMPLE)

Integration Indicator	INTEGRATION TARGET		
	EXISTING STATUS	SHORT TERM TARGET (For next 3 years or earlier)	LONG TERM TARGET (For target year more than 3 years)
	%/ Numbers/ Others	%/ Numbers/ Others	%/ Numbers/ Others
KEY INDICATORS			
Municipal water supply			
Demand-supply balance	40 MLD supply, 20 MLD gap	40 MLD supply, 20 MLD gap	80 MLD supply, 0 MLD gap
NRW loss reduction	25%	25%	10%
Per capita consumption reduction (lpcd or %)	150 lpcd	150 lpcd	140 lpcd
Urban water sector infrastructure coverage/availability for urban poor (for selected focus sector)	20%	35%	100%
Alternative water use in the city			
Wastewater reuse	0 MLD	1 MLD	20 MLD
Storm water reuse/recharge (while ensuring ecological flow in water bodies)	0 MLD	200 rain water harvesting structures	2000 rain water harvesting structures
Status of water quality management			
Pollution reduction of surface water sources	4 polluted water bodies	Revival of 1 pond	Revival of all 4 ponds
Biological indicators in & around major water bodies (like floral & faunal biodiversity: presence of fish, phytoplankton, benthic/riverbed biodiversity)	None	Revival of biological indicators in 1 water body	Revival of biological indicators in 4 water bodies

Integration Indicator	INTEGRATION TARGET		
	EXISTING STATUS	SHORT TERM TARGET (For next 3 years or earlier)	LONG TERM TARGET (For target year more than 3 years)
	%/ Numbers/ Others	%/ Numbers/ Others	%/ Numbers/ Others
Pollution reduction of ground water sources (% of total samples monitored)	4 polluted pockets	3 polluted pockets	None
Water quality of drinking water supply (% samples from supplied water)	95%	100%	100%
Institutional Integration			
Institutional Integration (within urban water sectors and between urban water sectors and other urban sectors like land use, etc.)	None	IUWM hour in Council meeting	Institutional cooperation among parastatal agencies and the municipality for IUWM.
Climate change: Adaptation measures			
Local adaptation measures: Traditional water management practices	Traditional rain water harvesting structures are defunct	Revival of 5 traditional rain water harvesting structures	Revival of 50 traditional rain water harvesting structures
Preparedness/local adaptation measures for dealing with extreme events and disasters (floods, droughts, cyclones, epidemic, etc)	None	Establishment of disaster management cell	Strengthening of disaster management cell
Financial sustainability			
Financial sustainability of urban water sectors (key sources of revenue generation /key sources of expenditure reduction)	Pumping from source to city	Replacement of 1 pump with energy efficient pump	Replacement of all pumps with energy efficient pump
Cost recovery from sale of reusable water (treated wastewater, storm water, etc)	-	Sale of 5 MLD of reusable water	Sale of 20 MLD of reusable water
Private sector involvement (for service provision related to urban water sectors)	Private tankers	Water ATMs in slum areas	Door to door waste collection
INDICATORS BASED ON FIRST INTEGRATION ASSESSMENT MATRIX			
Indicator based on 'Weakness(es)' of the city (Tool IIb)	No training cell in Municipality	Training cell in Municipality	Strengthening of training cell in Municipality
Indicator based on 'Quick Improvement Area(s)' of the city (Tool IIb)	No supply of treated wastewater to industries	Suppply of 5 MLD treated wastewater to industries	Suppply of 15 MLD treated wastewater to industries
Indicator based on 'Strength(s)' of the city (Tool IIb)	-	-	-
City-specific indicator (Tool IIb)	-	-	-
ADDITIONAL INDICATORS (OPTIONAL)			
Water supply coverage (% population covered)	70%	70%	100%
Status of metering	0%	1%	100%
Status of illegal connections	2000 connections	500 connections	No illegal connections
Status of tariff collection/ cost recovery	20%	25%	100%
Dependence on groundwater with the aim of reducing groundwater consumption (as % of total water consumption)	80%	75%	20%
Sewerage or other wastewater treatment network coverage (% population covered)	30%	35%	100%
Complaint redressal for water supply, wastewater, drainage and sanitation related issues (selected focus sector)	60%	100%	100%
Any other indicator required to attain the IUWM-based Vision for the city	-	-	-

1. Key indicators:

MUNICIPAL WATER SUPPLY

a. ***Demand-Supply balance:*** This indicator will encourage cities to shift perspective from a demand-supply-gap based approach to a demand-supply-balance based approach by managing water demand more efficiently to ensure future water security and to minimize unsustainable exploitation of water resources. Cities should focus on reducing water demand by managing water efficiently. This will be economically beneficial for the city and would enable better water resource management.

b. ***Non-Revenue Water (NRW) loss reduction:*** This indicator will encourage cities to reduce NRW losses (transmission and distribution losses and losses due to illegal connections/thefts).

c. ***Per capita consumption reduction:*** Cities with per capita availability higher than standards should certainly aim at reducing per capita supply to conserve water. Cities with per capita demand below standards (Urban and Regional Development Plans Formulation and Implementation guidelines) can set targets to increase per capita availability to meet standards. Cities should also encourage consumers to reduce per capita consumption in those areas within the city, where consumption is above standards, to promote water efficiency.

d. ***Urban water sector infrastructure coverage for urban poor:*** This indicator will ensure focus on vulnerable sections. The city can set target for the identified 'focus sector' for urban poor. If the Core Team decides that an urban water sector other than the selected focus sector is a priority for urban poor, then based on consensus, such urban water sector can be selected.

EXAMPLE

If wastewater is the selected focus sector (from Tool IIb) but the Core Team opines that for urban poor, water supply is a key priority, then water supply can be selected for this Integration Target

ALTERNATIVE WATER USE IN THE CITY

e. ***Wastewater reuse:*** Wastewater reuse has been used an indicator to emphasize the need for collection, treatment and reuse of wastewater.

f. ***Storm water reuse/recharge:*** This indicator aims at bringing runoff back into the Urban Water Loop instead of diverting it away from the city.

STATUS OF WATER QUALITY MANAGEMENT

g. ***Water quality (surface water, ground water and drinking water; also biological indicators):*** This indicator has been included for setting targets to regulate pollution of surface and ground water sources. Biological indicators of water quality have also been given emphasis, along with physical and chemical parameters.

Use conceptual understanding here to complete the table (Tool V). These targets will be discussed in detail for the Urban Water Loop Mapping exercise and will be finalized with the Stakeholder Committee at the first stakeholder workshop.

INSTITUTIONAL INTEGRATION

h. Institutional integration: To identify the most suitable measures required to bridge institutional silos across urban water sectors; and between urban water sectors and other urban uses. This indicator would also emphasize the need to improve citizen involvement in planning, implementation and management of urban water sectors.

CLIMATE CHANGE ADAPTATION MEASURES

i. ***Local adaptation measures: Traditional water management practices:*** This indicator will help cities identify and protect traditional water management

practices, which are identified as measures to combat climate change impacts. Such measures also help align water use with water quality.

j. ***Preparedness measures for dealing with extreme events and disasters:*** To help cities identify key challenges related to climate change and to develop adaptation measures to respond to changes through local practices.

FINANCIAL SUSTAINABILITY

k. ***Financial sustainability target (key source of revenue generation/ key source of expenditure reduction):*** To identify the head(s) which are the key sources of revenue generation/expenditure for urban water sectors to help city work towards financial sustainability of urban water sectors. Data Collection Sheet 3 would be useful for this analysis.

l. ***Cost recovery from sale of reusable water (treated wastewater, storm water, etc):*** This indicator has been included to facilitate creation of a market for reusable water in the city. This indicator would also emphasize the need to take initiatives towards improvement in treated wastewater quality and for storage of excessive runoff as potential source of revenue generation for the city in future.

m. ***Private sector involvement (for service provision related to urban water sectors***: This indicator will encourage public private partnership across urban water sectors.

Indicators related to the selected focus sector would be given a higher target while working on Integration Targets (Tool V).

2. Indicators based on First Integration Assessment Matrix:

This section is for city-specific indicators. The city-specific Strengths, Weaknesses and Quick Improvement Areas identified from First Integration Assessment Matrix will be taken up under this section and targets would be set up with the aim of converting Weaknesses and Quick Improvement Areas to Strengths.

a. ***Weakness(es) of city:*** From weaknesses of city (identified in Tool IIb on Summary of First Integration Assessment Matrix), Technical Committee should select the most important weakness(es) that needs immediate attention to help attain the IUWM Vision. For this weakness (es), Technical Committee should formulate an indicator and set short & long term targets.

b. ***Quick Improvement Area(s):*** Similarly, identify the most important Quick Improvement Area(s) (QIA) for attaining the IUWM-based vision and formulate an indicator for these. Short term and long term targets for this indicator should be formulated.

c. ***Strength(s) of city:*** Similar procedure as above should be followed for identified Strengths of city.

d. ***City-specific indicator:*** If the city has formulated any other city-specific indicator, short and long term targets for the same should be identified and discussed.

3. Additional indicators:

These indicators are based on infrastructure coverage, Service Level Benchmarks (SLB) and quality of service provision. Cities are encouraged to work towards these

indicators. The city can refer to Service Level Benchmark indicators to understand existing status of these indicators and to set targets for future. This exercise is optional as cities are working towards these Service Level Benchmark indicators already. However, undertaking this exercise as part of the IUWM Process would help cities identify concrete actions required to attain SLB targets. These indicators include:

a. Water supply coverage (% population covered)
b. Status of metering
c. Status of illegal connections
d. Status of tariff collection/ cost recovery
f. Dependence on ground water (as % of total water consumption)
g. Sewerage or other wastewater treatment network coverage
h. Complaint redressal for water supply, wastewater, drainage related issues (selected focus sector)
h. Any other indicator required to attain the IUWM-based Vision for the city

OUTPUTS:
Integration targets for attaining IUWM-based Vision

Nodal Officer should discuss with the stakeholders at the workshop and complete Tool V for Integration Targets to define them to achieve the city's IUWM-based vision. Technical Committee should set short term targets (achievable within next 3 years) and long term targets (for the selected target year) for each Integration Indicator. Information on existing status of indicators collected in Data Collection Sheet 2 (given in handout on Support Tools) should be used for this exercise. Integration Targets set here would be discussed further with Stakeholder Committee and finalized in the first stakeholder workshop.

2.1.4 Urban Water Balance

Technical Committee should discuss and undertake the Urban Water Balance Exercise. The importance of this exercise is that it illustrates to the stakeholders the benefits of achieving the identified Integration Targets. This exercise helps demonstrate an alternative pathway to reduce the demand-supply gap and move towards a demand-supply balance based approach without any additional water abstraction. Since Indian cities face issues related to water scarcity in summer, this has been included as an additional indicator for urban water balance exercise. The details are given in Tool VI on Urban Water Balance (given in Annexure VI).

Tool VI has 5 parts:

VIa. **Urban Water Balance: Data for Status of Demand-Supply Gap**: The Technical Committee fills data related to existing or projected scenarios of urban water sectors (for existing and future scenario). In this tool the grey boxes are to be filled using data from Data Collection Sheet 1. Information in the red boxes will appear based on calculations in Tool VIa. Separate categories have been included for bulk users and summer deficit to assess benefits of integration on these categories. For sections where data is not available, realistic estimates can be used.

VIb. **Urban Water Balance: Existing and Future Demand-Supply Gap under Business as Usual Scenario:** From the data entered in Tool VIa, information will appear in Tool VIb (based on calculations) giving the demand-supply gap, including summer demand-supply gap under the Business as Usual scenario (for existing and future scenario).

TOOL VIB: URBAN WATER BALANCE: EXISTING AND FUTURE DEMAND-SUPPLY GAP UNDER BUSINESS AS USUAL SCENARIO (EXAMPLE)

BUSINESS AS USUAL SCENARIO	Parameter		Value (MLD)	
			EXISTING SCENARIO	FUTURE SCENARIO
	MUNICIPAL SUPPLY			
	B	Total Municipal water supply	66	89
	C	Total Municipal water demand	86	113
	D	Demand and supply gap: Municipal water supply	-20	-24
	ALTERNATIVE WATER USE IN THE CITY			
	E	Supply for bulk uses	0	0
	F	Demand for bulk uses	10	15
	G	Demand-supply gap for bulk uses	-10	-15
	TOTAL			
	H	Total Demand-supply gap	-30	-39
	I	Summer water supply	56	75
	J	Summer Municipal water demand	94	134
	K	Summer: Demand and supply gap	-38	-59

VIc & VId. **Urban Water Balance: Integration Targets for Bulk Uses and Municipal Water Supply:** Once the city's demand and supply gap is known, there is a need to look at options to reduce this gap using Integration Targets (Tool V). Five key Integration Indicators are used to address the urban water balance:

- Wastewater reuse
- Storm water reuse/recharge
- NRW loss reduction
- Per capita supply reduction
- Service provision to urban poor

Integration Targets filled in Tool V for these Integration Indicators would be reflected in Tool VIc and VId of the webtool (on Integration Targets for bulk uses and municipal water supply) to demonstrate additional water already available in the city for bulk uses and for municipal supply (while providing additional water to urban poor, without any additional abstraction).

VIe. **Demand-Supply Balance : After Integration:** This tool shows how the demand-supply gap of the city (assessed using Tool VIb) can be reduced if the city works towards achieving Integration Targets. This tool assists in the identification of alternate approaches/options to meet the increasing water demand, without resorting to additional abstraction.

Once the demand-supply balance for the existing scenario is assessed, these tools (Tool VI) are to be used to make a similar assessment for the future. The use of Long-term Integration Targets (defined using tool V) to assess the future scenario

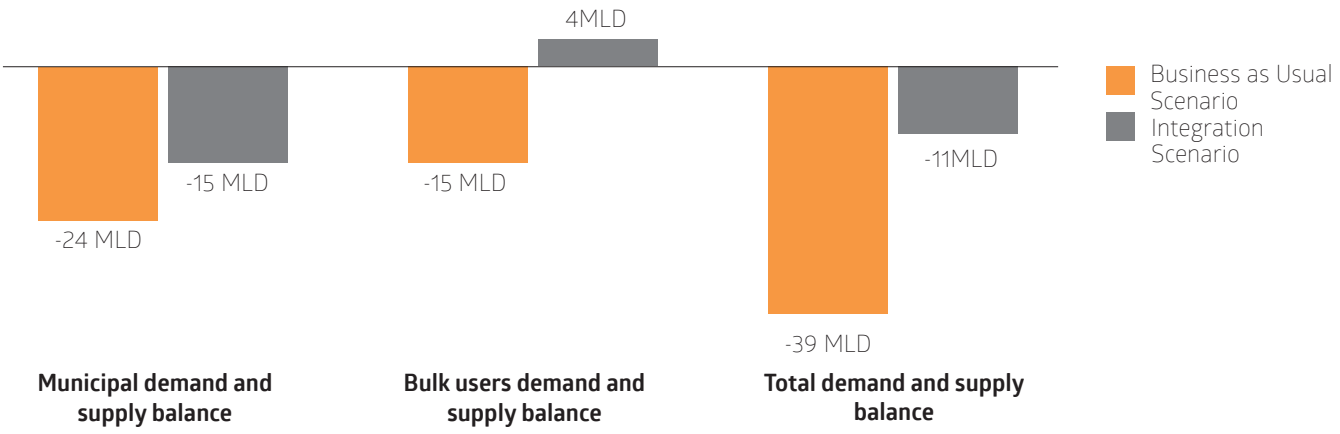
will enable cities to transition from addressing demand - supply gaps to achieving a demand-supply balance. The city can plan to meet future water supply demand not only through abstraction, but also through utilisation of treated wastewater and storm water and enhancement of water use efficiency.

The findings of Urban Water Balance exercise will lay the foundation for further discussion on Urban Water Loop mapping exercise by developing an understanding on the benefits of Integration Targets.

TOOL VIE: URBAN WATER BALANCE: DEMAND-SUPPLY BALANCE AFTER INTEGRATION (EXAMPLE)

AFTER INTEGRATION	Parameter		Business As Usual Scenario Value (MLD)	After Integration Value (MLD)	Business As Usual Scenario Value (MLD)	After Integration Value (MLD)
			EXISTING SCENARIO		PROPOSED SCENARIO	
	U	Total Municipal supply available	66	67	89	104
	V	Total supply available for bulk uses	0	5	0	19
	W	Demand-supply balance municipal supply	-20	-19	-24	-15
	X	Demand-supply balance: bulk uses	-10	-5	-15	4
	Y	Total demand-supply balance	-30	-24	-39	-11
	Z	Summer: Demand-supply balance	-38	-30	-59	-25

DEMAND-SUPPLY BALANCE: 'BUSINESS AS USUAL (BAU)' AND 'AFTER INTEGRATION SCENARIO' (EXAMPLE)



2.1.4 Identifying key users and key polluters

Technical Committee should complete the Tool VII (given in Annexure VII) on key users and key polluters. This will give key users and key polluters of water sources in and around the city (upstream, within city and downstream).

TOOL VII: KEY USERS AND KEY POLLUTERS

Category	Name of Water Resource	Key Users	Key Polluters	Critically Polluted	
				Yes/No	If Yes, Area/ Stretch
Upstream water resources	Ekrukh Lake	Municipality	-	No	-
Water source for the city	Dam	Municipalities	-	No	
Water resources within city	-	-	-	-	
Downstream water resources	-	-	-	--	
Groundwater		Farmers	-	No	-

2.1.5 Understanding and mapping the Urban Water Loop

Once we have identified the key users and key polluters, the city's Nodal Officer has to put up an existing ward map or image (at least A0 size) of the city for discussion with the Technical Committee. This map will be used for the Urban Water Loop Mapping exercise. Additionally, maps of water supply and sewerage network in the city (if available) can also be used. The aim of this exercise is to understand flow of water to the city, within the city and from the city; and to identify the most potential and critical areas/wards for each Integration Indicator.

The Tool VIII on Urban Water Loop Mapping (critical and potential areas; given in Annexure VIII) helps the Technical Committee understand the existing flow of water to, from and out of the city.

Step 1

For each Integration Indicator, the Technical Committee should enter the short and long term integration targets (defined using Tool V) into column A of tool VIII. The city should subsequently develop a detailed understanding on each indicator using the guidance questions (indicative only, not prescriptive) for each indicator given in Column 'B'. Based on the discussion on guidance questions, key issues and potentials are included in Column 'E' and 'F' at the end of each indicator. Key stakeholders who would be impacted or are vulnerable to or can play a key role in achieving targets for each indicator are identified and included in row 'G'. Critical and potential areas/ wards are to be included in column 'C'.

Step 2

Based on discussions for Column 'B' and information filled in rows 'E', 'F' and 'G', Technical Committee should discuss and identify spatial areas which are the most critical or have the greatest potential for achieving targets set for each indicator.

Step 3

Once the critical and potential areas/wards related to each indicator are known, Technical Committee should discuss and decide on the approach and/or technology that has potential to address the issues and potentials to achieve the short and long term targets. Support Tool 1 on Approaches and Technologies (given in handout on Support Tools) can be used for this purpose. This tool provides a compilation of case examples (national and international case studies) which can help the city identify an approach best suited to the local context. The selected approach should be noted under Column 'D'.

OUTPUTS:
Key users, Key polluters

Step 4

Step 1 to 3 should be repeated for each indicator and the potential and critical areas/ wards for each indicator should be identified. All these areas should be marked on the city map. The approach and/or technology for each Integration Indicator should also be identified to arrive at concrete, on ground actions required to achieve the Integration Targets.

At the end of this exercise, the city should have:

- An understanding of each Integration Indicator
- Indicator-wise list of critical/potential areas
- Approach and/or technology that will help achieve the long and short term targets for each indicator.

It is important to involve the Stakeholder Committee beyond this exercise to finalize the results from Stage I and Stage II. Finalization of activities conducted till Stage II would be undertaken after discussion with Stakeholder Committee in Stage III.

Example of Urban Water Loop Mapping exercise from one of the AdoptIUWM Project cities

TOOL VIII: EXCERPTS FROM URBAN WATER LOOP MAPPING (CRITICAL AND POTENTIAL AREAS/WARDS) (EXAMPLE)

KEY INDICATORS				
S. No.	**INTEGRATION INDICATORS (A)**	**PARAMETERS TO BE MAPPED AND DISCUSSED (GUIDANCE QUESTIONS) (B)**	**CRITICAL/ POTENTIAL AREAS/WARDS (C)**	**APPROACH (D)**
Municipal water supply				
1	**Demand-Supply Balance** Short term target: Say 2 MLD abstraction Long term target: Say 10 MLD additional requirement	Where are we getting our water supply from? (Amount and location)	Dam and its catchment area	Partnership with catchment area users like Nainital
		How far is it from the city?		
		How much water are we taking from this source(s) ?		
		Does this source dry out in summers?		
		Where do we get the summer supply from?		
		What is the surface water-groundwater ratio in our supply?		
		Are there any water conflicts?		
		With whom? Why?		
		Are we leaving enough water for non-urban and ecological uses		
		Where is our WTP located? What is the capacity of WTP?		
		Is any additional treatment required?		
		Which areas are not covered by water supply network?		
		Based on findings of Urban Water Balance exercise,		
		What interventions are required to cater to bulk uses?		
		What interventions are required to reduce summer deficit?		
		What interventions are required to reduce demand-supply gap?		
		Impacts of climate change on water resources and future water security (Refer to Tool IV)		
		a. What trends are being observed over last 10 or more years for # Rainfall/precipitation # Temperature # Extreme events		
		b. Do these impacts match the predicted impacts for your region (based on 4x4 Assessment Report of Government of India)?		
		c. How is climate change impacting water availability?		
		d. Will water availability worsen in future due to climate change?		
		e. What measures should we take for future water security?		
		f. Do the sources within or near our city have enough water for our future requirement?		
		g. How can we reduce our requirement to match water availability?		
	E	**SUMMARY OF KEY ISSUES**	Siltation of dam, deforestation	
	F	**SUMMARY OF POTENTIALS**	Reforestation	
	G	**KEY STAKEHOLDERS**	Farmers and Municipality	

MINUTES OF MEETING

With this exercise, the Nodal Officer should close the workshop. Minutes of meeting should be prepared and circulated with Commissioner's approval after the workshop.

OUTPUTS:
Urban Water Loop Mapping: Critical and potential areas

Step by Step Process for IUWM

STAGE – III

ACTION PLANNING FOR INTEGRATION

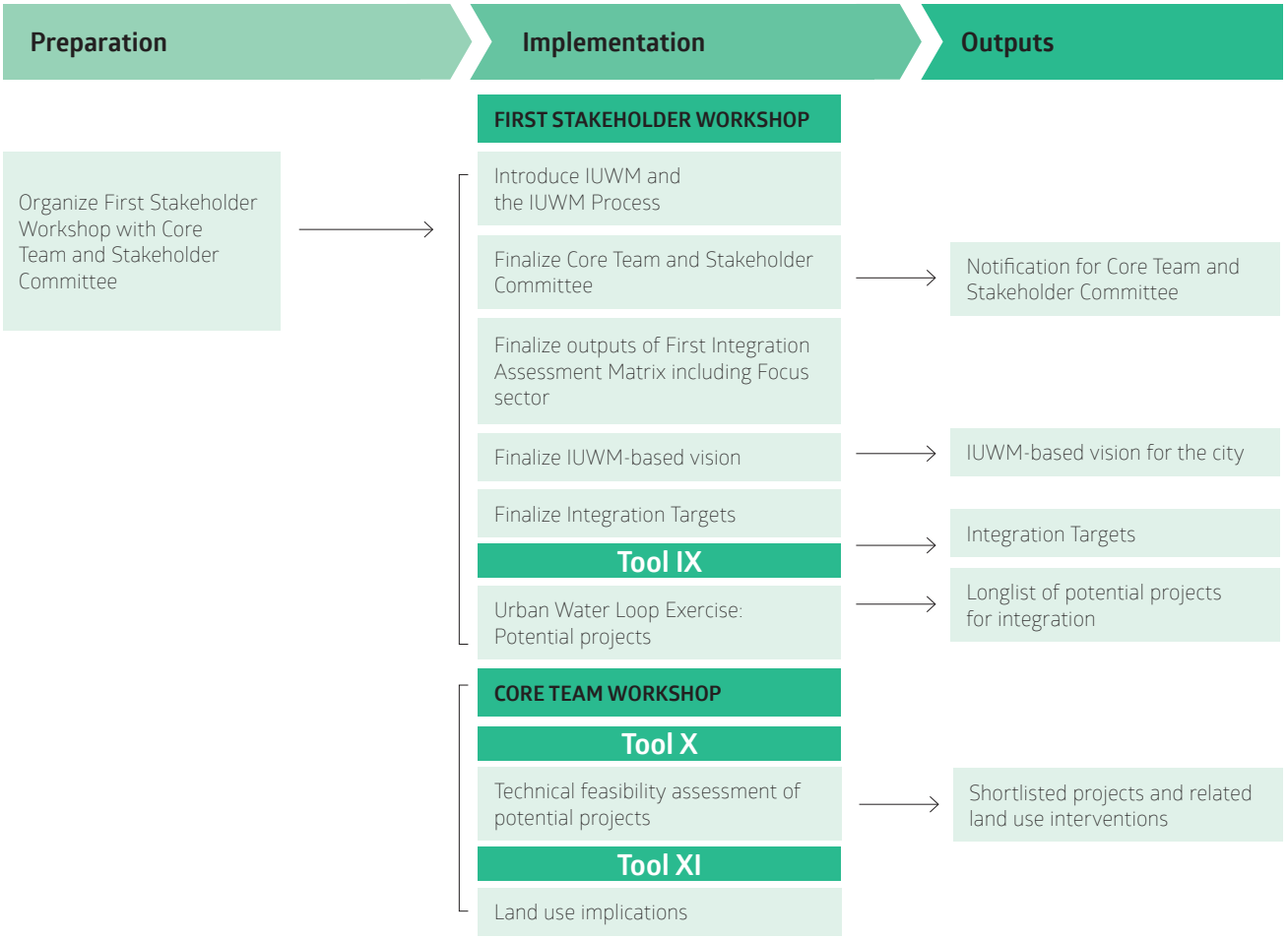
STEP BY STEP PROCESS FOR IUWM

ACTION PLANNING FOR INTEGRATION

Overview

Now that the Core Team has identified the focus urban water sector (draft), formulated an IUWM-based Vision for the city (draft), set Integration Targets (draft) and undertaken Urban Water Loop Mapping, the city needs to involve the larger stakeholder group (Stakeholder Committee) to finalize these outputs as part of the IUWM Process. It is crucial to involve Stakeholder Committee in decision making. All the outputs from activities undertaken by the Core Team till Stage II, would be discussed further with Stakeholder Committee before finalization. This stage would introduce the initiative to the Stakeholder Committee for better ownership and

OVERVIEW OF STAGE III



Inputs from Stage I and II

- *Composition of Core Team and Stakeholder Committee*
- *IUWM-based Vision*
- *Integration Targets*
- *Strengths, Weaknesses, Quick Improvement Areas*
- *Focus sector*

Key Tools

- *Tool IX: Urban Water Loop Mapping: Potential Projects*
- *Tool X: Technical feasibiltiy assessment of potential projects*
- *Tool XI: Land use implications, implementing agency and potential source(s) of funding*

Supporting tools

- *Approaches and Technologies Tool*

also to incorporate citizens' opinion in planning for urban water sectors through consultations at the first stakeholder workshop. Any key stakeholders related to urban water sectors, other than the Core Team and Stakeholder Committee, can also be invited to this stakeholder workshop.

The Core Team and Stakeholder Committee would come together to discuss the existing situation of the urban water sectors in the city and to finalize the IUWM-based Vision. The Integration Targets would be finalized to ensure that local level issues are adequately addressed; and a long list of projects to achieve these targets would be discussed with Core Team and Stakeholder Committee. This stage also establishes the interlinkages between urban water sectors and land use.

This stage would involve the larger stakeholder group (Stakeholder Committee) for discussions on existing status of urban water sectors in the city to finalize IUWM-based Vision, Integration Targets and prepare a longlist of projects required to attain Integration Targets. All results from Stage I and Stage II would be discussed with Stakeholder Committee before finalization.

3.1 First Stakeholder Workshop

In consultation with the Commissioner, the Nodal Officer should call for a full-day workshop of the Core Team and Stakeholder Committee with the aim of bringing all stakeholders on one platform for discussions on urban water sectors. The main objectives of this workshop would be:

1. To introduce stakeholders to IUWM and the IUWM Process
2. To finalize composition of Core Team and Stakeholder Committee
3. To discuss issues faced by the city related to urban water sectors
4. To finalize findings of First Integration Assessment Matrix including focus sector
5. To finalize IUWM-based Vision for city
6. To finalize Integration Targets (for attaining IUWM-based Vision)
7. To inform stakeholders of findings of Urban Water Loop exercise
8. To prepare longlist of projects for attaining Integration Targets

All results of Stage I & II would be discussed with Stakeholder Committee before finalization

3.1.1 Introduction to IUWM and the IUWM Process

The Commissioner and Nodal Officer should introduce the stakeholders to Integrated Urban Water Management using the principles of IUWM, benefits and examples of IUWM (discussed under section on 'Overview of IUWM'). Work being undertaken for the IUWM initiative by the Municipality should be introduced to the stakeholders and the IUWM Process diagram should also be introduced.

3.1.2 Finalization of Core Team and Stakeholder Committee

Composition of the Core Team and Stakeholder Committee (Tool I) should be discussed with the stakeholders.

TOOL IIB: RESULTS OF FIRST INTEGRATION ASSESSMENT MATRIX TO BE DISCUSSED WITH STAKEHOLDER COMMITTEE (EXAMPLE)

Final Score	**150**
Existing status of integration in the city (Excellent, Good, Average, Poor, Critical)	Poor
Focus sector (based on First Integration Assessment Matrix)	Water supply
Weakness(es) of the city	Water sharing, summer water deficits, industrial water use
Strengths	Location of major water source Interlinkage between water, land use, sludge and energy
Quick Improvement Area(s)	Infrastructure provision to urban poor, impact of climate change on water resources, capacity of Municipal staff, etc.
City-specific indicator(s)	Springs and their catchment area

Any modifications to the Stakeholder Committee can be discussed and incorporated. Any suggestions or modifications to the Core Team can also be included with consensus of members of Core Team. Stakeholders should also be informed about the roles and responsibilities of these teams and that the composition of these teams is not static and can change over time as per requirements of the initiative.

3.1.3 Discuss issues related to urban water sectors

To build an understanding on the Urban Water Loop, and to *break the ice*, an open dialogue on issues related to urban water sectors (water supply, wastewater and storm water) should be initiated to understand the ground issues that are impacting citizens. This exercise should be conducted as an interactive session where stakeholders should share their experiences and issues. Potentials pertaining to the urban water sectors in the city should also be discussed. This exercise will help the Core Team better understand the concerns of the citizens.

3.1.4 Finalize outputs of First Integration Assessment Matrix

After the discussions on issues and potentials related to urban water sectors, Core Team and Stakeholder Committee would have a better understanding of some of the key Strengths and Weaknesses of urban water sectors in the city. At this stage, the stakeholders should be informed of the First Integration Assessment Matrix scoring exercise and the existing status of integration in the city. The stakeholders also need to be informed of the Strengths, Weaknesses and Quick Improvement Areas of the city based on First Integration Assessment Matrix (Tool IIb).

EUTROPHICATION OF PANCHGANGA RIVER, ICHALKARANJI, MAHARASHTRA

There is a good chance that the opinions of the Core Team and Stakeholder Committee on scoring for parameters under First Integration Assessment Matrix might vary. Hence, if the Stakeholder Committee disagrees with the findings of the First Integration Assessment exercise undertaken by the Core Team, the scoring given under First Assessment Matrix can be reviewed with the Stakeholder Committee before proceeding to the next step. Additional indicators based on inputs of Stakeholder Committee can also be added to 'City-specific indicators'. The Weakness(es), Quick Improvement Area(s) and Strength(s) of the city might change on the basis of the final scoring.

Stakeholders should also be informed about the selected focus sector based on First Integration Assessment Matrix. If this selected focus urban water sector is in line with the discussions on issues and potentials related to urban water sectors, the Core Team and Stakeholder Committee, can finalize this focus sector. If the Core Team and Stakeholder Committee have reviewed scoring for First Integration Assessment Matrix, this selected focus sector might also change and should be finalized based on consensus of Core Team and Stakeholder Committee. Tool IIb should be revised and finalized based on the final information.

IUWM- BASED VISSION FOR JAISALMER

Implementing Integrated Urban Water Management with community involvement as a measure towards promoting sustainable economic growth and sustainable tourism in the city through conservation of water bodies and their catchment areas, ensuring reuse of treated wastewater and utilization of runoff.

3.1.5 IUWM-based vision for the city

Once the city has finalized the focus sector, the target year and draft IUWM-based vision for the city formulated by the Core Team should be shared with the stakeholders. The stakeholders should discuss the Vision and modify it, if required. This Vision should also include the final focus urban water sector of the city.

3.1.6 Integration Targets

By now, the city has finalized the IUWM- based Vision, the focus sector, Weakness(es), Quick Improvement Area(s) and Strength(s). Now the Core Team and Stakeholder Committee need to come together to finalize the Integration Targets that are required to achieve the IUWM-based Vision.

The Integration Targets for the city set out by the Technical Committe in Tool V should be discussed with Core Team and Stakeholder Committee. The stakeholders should discuss each indicator and its short and long term targets with respect to the final focus sector and the final IUWM-based vision for the city. Based on consensus, targets set under Stage II can be reviewed and modified. The stakeholders should ensure that all indicators based on the selected focus urban water sector are accorded a higher target. This exercise will give the final short and long term targets required to achieve the IUWM-based vision for the city.

RESULTS:

Shortlisted projects, land use interventions required for each Integration Indicator

3.1.7 Urban Water Loop Mapping exercise: Long-list of projects

For this exercise, the Nodal Officer should display the map(s) used during the Technical Committee workshop for the Urban Water Loop exercise. The details for the flow of water to, within and from the city (Tool VIII on Urban Water Loop mapping) should be shared with the stakeholders. Critical and potential areas/ wards identified for each Integration Indicator should also be discussed with the stakeholders. The stakeholders can modify the identified critical and potential areas/ wards based on consensus. Once these critical and potential areas/wards have been finalized and marked on the city map, the stakeholders should discuss and finalize the approach and/or 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. Stakeholders should use Support Tool 1 on Approaches and Technologies (given in handout on Support Tools) for this purpose to finalize approach/technology for each Integration Indicator.

Once the approach has been finalized, the stakeholders should use Tool IX on Urban Water Loop Mapping: Potential Projects (given in Annexure IX) to discuss the projects that can be taken up to address issues and potentials for each indicator. These projects should be as specific and tangible as possible. Key projects already being developed by City Authorities or included in city planning documents like smart city plan or city development plan, but not being implemented yet, can also be included in this list of potential projects. These potential projects should be formulated while considering the identified critical and potential areas/wards for the respective indicator.

Once these potential projects have been identified, their interactions with land use should be discussed. The land use related interventions required, if any, to attain the long and short term targets for that indicator, should be identified and noted in Column 'E' of Tool IX. While identifying land use related interventions, attention should be given to not only identify all the land use interventions required for a particular project, but also to identify the land use related interventions required to attain the long and short term targets for that particular Integration Indicator.

The workshop concludes with the identification of the long-list of projects.

TOOL IX: EXCERPT FROM URBAN WATER LOOP MAPPING TOOL: POTENTIAL PROJECTS (EXAMPLE)

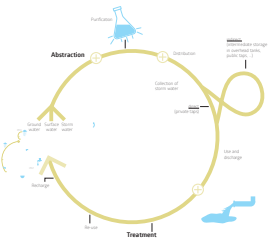
KEY INDICATORS					
S. No.	**INTEGRATION INDICATORS**	**CRITICAL/POTENTIAL AREAS/WARDS**	**APPROACH**	**POTENTIAL PROJECTS**	**LAND USE INTERVENTIONS REQUIRED**
	(A)	**(B)**	**(C)**	**(D)**	**(E)**
5	Wastewater reuse Short term target: 2.5 MLD Long term target: 19 MLD Key issues Key potentials Key stakeholders	*Critical area* *Water body where the 2.5 MLD of partially treated STP effluent is presently being discharged* *Potential area* *STP site where new tertiary plant can be provided and receiving industrial area where treated wastewater can be supplied*	*Sale of treated wastewater like Nagpur*	*Project 1: Establishment of an additional 2.5 MLD tertiary treatment plant at the STP site* *Project 2: Laying of pipeline from tertiary treatment plant to the industrial area*	*Example: 50m green buffer around STP site where part of treated wastewater from STP can be reused for plantation* *Identification of natural drainage channels around the STP site* *Diversion and storage of natural runoff on site* *Land requirements (if any) for pumping treated wastewater from STP to industries*

3.1.8 Site visit to crucial areas and key sites (recommended)

Within one week of the workshop, the Commissioner, Nodal Officer and key stakeholders should visit crucial sites and areas that have come up during discussions in the first stakeholder workshop.

From the stakeholder workshop and the site visits, the Commissioner can also identify a lead stakeholder who is taking interest in the initiative, has knowledge of the urban water sectors in the city and has good communication skills. This stakeholder can act as a Champion to promote the initiative across platforms.

URBAN WATER LOOP



3.1.9 Minutes of meeting

With approval of Commissioner, minutes of the meeting should be finalized and circulated, along with notification on composition of the Core Team and Stakeholder Committee members.

3.2 Technical Feasibility Assessment of potential projects

Now that the city has developed a longlist of projects required to attain Integration Targets, it is important to scrutinize these projects to ensure their technical feasibility. For this purpose, a second workshop of the Core Team (including Technical Committee) should be called for. The aim of this workshop would be:

- Technical feasibility assessment of potential projects
- Financial feasibility assessment of potential projects
- Criticality assessment of potential projects (urgency for the project)
- Assessing risks associated with potential projects
- Assessing estimated costs for implementation of projects
- Identification of potential implementing agency for the project
- Identification of potential sources of funding (including private sector funding)

3.2.1 Second Core Team workshop

Nodal Officer, in consultation with the Commissioner, should call for a half day workshop of the Core Team (including Technical Committee) to undertake a technical feasibility assessment of the potential projects (Tool X).

Step 1

At this workshop, the longlist of the projects and related land use interventions from the First Stakeholder workshop should be presented to the Core Team (Tool IX on Urban Water Loop Mapping: Potential Projects).

Step 2

Core Team should analyze each project based on four parameters:

- ***Technical feasibility:*** Whether this project and related land use intervention is implementable and realistic? Is it suited to the local context? Will it give the expected results for the Integration Indicator?
- ***Financial feasibility:*** Whether the financing required for this project and related land use intervention is available at the city or at state or national level? Can we find any low hanging fruits for early implementation?
- ***Criticality:*** How critical or important is this project and related land use intervention for the city? Will the city really benefit from this project? (example:

construction of a diversion channel might be critical to divert runoff from city core to a dry pond to meet summer deficits).

- ***Risk:*** What is the risk associated with this project and related land use intervention; that can lead to hindrances in implementation (like legal issues related to land acquisition, etc.)?

For each of these parameters, the Core Team should discuss and decide a scoring for the parameters (low or medium or high) for each potential project using Tool X (given in Annexure X). After each project has been scored, the projects with

- 'low' scoring under 'technical feasibility', 'financial feasibility' and 'criticality'; and
- 'high' scoring under 'risk' would not qualify for the next step. All other projects qualify for the next stage.

TOOL X: EXCERPT FROM TECHNICAL FEASIBILITY ASSESSMENT TOOL (EXAMPLE)

KEY INDICATORS							
S. No.	**INTEGRATION INDICATORS**	**POTENTIAL PROJECTS**	**LAND USE INTERVENTIONS REQUIRED**	**TECHNICAL FEASBILITY**	**FINANCIAL FEASIBILITY**	**CRITICALITY**	**RISK**
	(A)	**(B)**	**(C)**	**(D)**	**(E)**	**(F)**	**(G)**
Municipal Water Supply							
1	Demand-Supply Balance Short Term Target: 2 MLD abstraction Long Term Target: 10 MLD additional requirement	Project	None	Low	Medium	High	Medium
		Project	Catchment conservation	Medium	Low	Medium	Medium
2	Non Revenue Water loss reduction Short term target: 1.2 MLD Long term target: 5 MLD	Project	None	High	High	High	High
		Project	Land acquisition	Low	High	Low	High
3	Per Capita Consumption reduction Short term target: 114 lpcd Long term target: 128 lpcd	Project	None	High	Medium	Medium	Low
		Project	None	High	Medium	Low	Medium
4	Urban water sector infrastructure coverage/ availability for urban poor (selected focus sector) Short term target: 14 MLD Long term target: 5.4 MLD	Project	Green buffer along natural drains	Low	Medium	Medium	High
		Project	None	Medium	Low	Medium	Medium

Projects in green would qualify

Step 3

Once the potential projects have been screened and the shortlisted projects have been identified, the Core Team should undertake another exercise to discuss the implementation strategy for the projects and related land use interventions. Using Tool XI (given in Annexure XI), the following aspects should be identified for the selected projects:

- Estimated cost of implementation
- Implementing agency
- Potential sources of funding
- Potential for community involvement
- The feasibility of the proposed land use interventions, with respect to the existing Master Plan of the city should be discussed. Representative from Town Planning Department or equivalent should play a major role in this exercise.

Using Tool XI on land use implications and potential source(s) of funding, the implementing agency needs to be identified. Subsequently, the Core Team should discuss the potential sources of funding available for these projects. These sources of funding can be from the Municipal budget or departmental budget of the implementing agency or Public Private Partnership (PPP) based revenue models or others. Project Financing Tool (given in handout on Support Tools) should be used for this purpose. Projects for which potential source(s) of funding cannot be identified can be ruled out.

After this initial scrutiny, a robust list of projects would be available to the city for further strategic prioritization and discussion with the Stakeholder Committee. This exercise is important to ensure that only projects that are technically feasible and implementable; and have potential for community involvement go across for prioritization by Stakeholder Committee. With this, the Nodal Officer should close the workshop and circulate the minutes of the meeting to the Core Team.

INTERLINKED PONDS, JAISALMER

Step by Step Process for IUWM

STAGE – IV

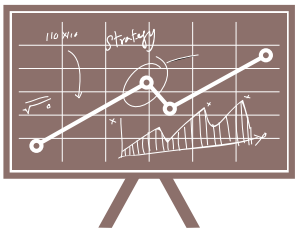
STRATEGIC PRIORITIZATION

STEP BY STEP PROCESS FOR IUWM

STRATEGIC PRIORITIZATION

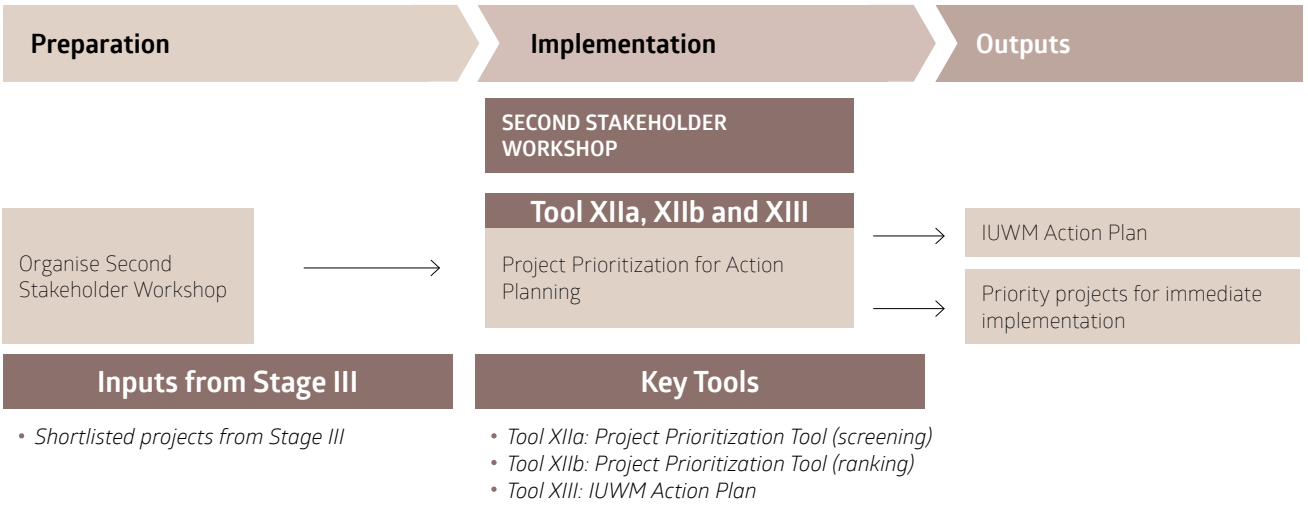
Overview

This stage will help the city formulate an IUWM-based Action Plan for achieving the IUWM-based Vision for the city. This Action Plan can be updated regularly (at least once in a year) to include progress made and changes in the urban scenario/urban growth & development over a period of time.



The second stakeholder workshop would be conducted as part of this stage to prioritize potential projects that would constitute the IUWM Action Plan for attaining the IUWM-based vision; with the involvement of the Core Team and Stakeholder Committee. A participatory approach has to be adopted for prioritization of potential interventions to ensure social benefits, environmental benefits, economic feasibility and community involvement. This workshop would also be useful in building ownership for the IUWM Action Plan.

OVERVIEW OF STAGE IV



4 Second stakeholder workshop

The Nodal Officer should discuss with the Commissioner and call for the second stakeholder workshop of Core Team and Stakeholder Committee to formulate the IUWM Action Plan. The objectives of this workshop are:

1 To share the shortlisted potential projects with stakeholders
2 To prioritize projects for Action Planning
3 To finalize the IUWM Action Plan

4.1 Shortlist of projects required to attain Integration Targets

Subsequent to the first stakeholder workshop, the Nodal Officer should update the stakeholders on the Core Team meeting for assessment of technical feasibility of projects. The shortlisted projects that have qualified through the screening, should be shared with the stakeholders. This list would now be prioritized by stakeholders during the second stakeholder workshop.

4.2 Project Prioritization for Action Planning

To prioritize projects for implementation, the stakeholders should undertake screening and scoring of the shortlisted projects to formulate the IUWM Action Plan for the city. Use tool XIIa on Project Prioritization (Screening) and Tool XIIb on Project Prioritization (Ranking) for this exercise (given in Annexure XIIa and XIIb).

Step 1: Screening of projects to demonstrate integration

As a first step, we need to assess whether the shortlisted projects would have overall positive impacts on urban water sectors. For this, an approach used by Mitchell *et al., 2006* could be adopted: **any project should demonstrate potential to have a positive impact on at least two of the three urban water sectors (water supply or wastewater or storm water).** Additionally, since the stakeholders have already identified a focus urban water sector, only projects that can have a positive impact on the selected focus sector would be selected after this screening. Any beneficial impacts on solid waste sector would be an additional advantage.

It is mandatory for a selected project to show positive impact on the selected focus sector for the city.

An example is given in the following table. A project showing positive impacts on any two urban water sectors (including focus sector) can qualify. If any project considered important for the city, does not pass through this filter, the stakeholders can modify this project to demonstrate beneficial impacts on at least two water sectors.

TOOL XIIA: EXCERPT FROM PROJECT PRIORITIZATION TOOL (SCREENING) - EXAMPLE

S. No.	INTEGRATION INDICATORS (A)	POTENTIAL PROJECTS (B)	PROJECTS DEMONSTRATING POSITIVE IMPACTS ON URBAN WATER SECTORS				PROJECTS DEMONSTRATING INTEGRATION
			MANDATORY (MINIMUM 2)			ADDITIONAL	
			WATER SUPPLY (selected focus sector)	WASTE-WATER	STORM WATER	WASTE	
KEY INDICATORS							
Municipal water supply							
1	Demand-Supply Balance Short term target: 2 MLD abstraction Long term target: 10 MLD additional requirement	Project	Yes		Yes		Project qualifies
		Project		Yes			
2	Non Revenue Water loss reduction Short term target: 1.2 MLD Long term target: 5 MLD	Project	Yes				
		Project		Yes	Yes	Yes	
3	Per Capita Consumption reduction Short term target: 114 lpcd Long term target: 128 lpcd	Project			Yes	Yes	
		Project				Yes	
4	Urban water sector infrastructure coverage/ availability for urban poor (selected focus sector) Short term target: 14 MLD Long term target: 5.4 MLD	Project		Yes			
		Project	Yes	Yes			Project qualifies

If the selected focus sector is water supply, a project that shows positive impact on wastewater and storm water but negative impact on water supply will not qualify.

A project on water abstraction might not qualify but if this project is modified to water abstraction and runoff storage for use during lean period, then this project can qualify.

Step 2: Weightage

Now that a list of filtered projects has been developed, stakeholders should decide weightage or 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 should discuss and assign 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.

REFERENCE TABLE 3: WEIGHTAGE ASSIGNED BY STAKEHOLDERS (EXAMPLE)

Parameter	Weightage for each parameter given by stakeholders during the workshop
Social benefits	3
Environmental benefits	2
Economic feasibility	1
Participatory approach	4

REFERENCE TABLE 4: PROJECT PRIORITIZATION SCORING

SOCIAL BENEFITS

Score	Details
10	**Project benefits most sections of society with special focus on urban poor**
	Or
	Urban poor centric project
5	**Project benefits most sections of society, no specific emphasis on urban poor**
1	Project benefits only few
	Or
	Has indirect social benefits
0	**No significant impacts** on urban poor or other sections of society
	Or
	Adverse impacts

ENVIRONMENTAL BENEFITS

Score	Details
10	**Has long term positive impacts on environment and focuses on environmental conservation**
	Or
	Has positive impacts on living environment of urban poor over a large area
5	**Has short term positive environmental impacts**
	Or
	Has positive environmental impacts over a small area
1	Might have some environmental benefits over a small area
	Or
	Indirect environmental benefits
0	**No positive impacts**
	Or
	Adverse impacts

ECONOMIC FEASIBILITY

Score	Details
10	**Funding can be secured internally within the city through multiple sources**
	Can be funded by municipality in association with citizens or community contributions/ CSR/ NGOs or Shramdan or PPP or other options
5	**Internal funding within the city from single source**
	Can be funded by Municipality or any other single source within the city
1	**Accessible external funding**
	Can be funded through state or central government funding or international or other funding schemes which can be accessed in near future
0	**External funding sources, not easily accessible**

PARTICIPATORY APPROACH

Score	Details
10	**Involvement of stakeholders from the beginning of the project till the end, including implementation**
	Community consultations at all stages
	Involvement of all related government departments
	Involvement of urban poor in decision making
5	**Stakeholder consultation before finalization of project**
	Involvement of all related government departments and stakeholders in final decision making
	Or
	Community mobilization before project commencement
1	**No stakeholder consultation but plan/project is put in public domain for comments**
	Stakeholder comments are invited before finalization
	Or
	Involvement of very select stakeholders (site specific)
0	**No stakeholder involvement**

Step 3: Scores

After the weightage has been finalized, stakeholders should undertake the Project Prioritization Exercise. Use Tool XIIb on Project Prioritization (ranking) given in Annexure XIIb for this exercise. The stakeholders should give a score to each project (between 0 and 10) for each of the four parameters (social benefit, environmental benefit, economic feasibility, participatory approach) using Reference Table 4. Projects getting a score of '0' under any of the four parameters, should be ruled out.

Step 4: Final ranking

Once the scores for each parameter have been assigned to all projects, these scores would be automatically multiplied with the weighted average for each parameter, in the webtool to get a total score for each project (weighted average score for each project). The ranking for each project, based on the weighted average score for each project would also appear against the respective project in the webtool.

TOOL XIIB: EXCERPT FROM PROJECT PRIORITIZATION TOOL (RANKING) - EXAMPLE

S. No.	INTEGRATION INDICATORS	POTENTIAL PROJECTS AFTER SCREENING	SCORING BY STAKEHOLDERS				TOTAL WEIGHTED AVERAGE	RANK
			WEIGHTED AVERAGE					
			3	1	2	4		
			SCORE					
			SOCIAL BENEFITS	ENVIRONMENTAL BENEFITS	ECONOMIC FEASIBILITY	PARTICIPATORY APPROACH		
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
KEY INDICATORS								
Municipal water supply								
1	Demand-Supply Balance Short term target: 2 MLD abstraction Long term target: 10 MLD additional requirement	Project	5	5	5	10	7	4.5
		Project	5	1	5	5	4.6	8.5
2	Non Revenue Water loss reduction Short term target: 1.2 MLD Long term target: 5 MLD	Project	1	10	5	5	4.3	11
		Project	5	10	1	1	3.1	16
3	Per Capita Consumption reduction Short term target: 114 lpcd Long term target: 128 lpcd	Project	5	1	1	10	5.8	8
		Project	5	1	5	1	3	17
4	Urban water sector infrastructure coverage/ availability for urban poor (selected focus sector) Short term target: 14 MLD Long term target: 5.4 MLD	Project	1	1	5	5	3.4	15
		Project	10	1	5	1	4.5	11

4.3 IUWM Action Plan

Now that all projects have been ranked according to their benefits, the Nodal Officer should compile the top ten projects from Tool XIIb for the IUWM-based Action Plan. If the city has undertaken the exercise for additional indicators, then an additional five top ranking projects from the section on additional indicators can be added to the IUWM Action Plan.

- Key indicators: Select the top seven projects (based on ranking given in Tool XIIb) from key indicators for the IUWM Action Plan
- Indicators based on First Integration Assessment Matrix: Select the top three projects from this section (based on ranking given in Tool XIIb) and add them to the IUWM Action Plan
- Additional indicators: If the city has taken up the exercise for additional indicators, select top five ranking projects from this section (based on ranking given in Tool XIIb)

These top ten projects (or 15 projects, if the city has undertaken the exercise on additional indicators) constitute the IUWM Action Plan (Tool XIII) for the city. From the projects selected under the IUWM Action Plan, the Mayor and Commissioner should discuss and finalize the top five projects for immediate implementation.

4.4 Council resolution

The Commissioner and Mayor should take a council resolution on the IUWM Action Plan finalized on the basis of second stakeholder workshop along with a tentative budgetary allocation for the IUWM Action Plan. This would ensure commitment of the council towards the initiative.

TOOL XIII: IUWM ACTION PLAN

S. No.	INTEGRATION INDICATORS	IUWM ACTION PLAN TOP RANKING PROJECTS (SHORT TERM TARGETS)
	(A)	(B)
KEY INDICATORS		
1	Municipal water supply	1. Revival of abandoned borewells in core city wards 2. Revival of defunct community toilets in core city wards 3. Revival of city lake 4. Developing partnerships with farmers in catchment area of city lake 5. Implementation of SCADA system 6. Implementation of water supply metering in 2 wards 7. Awareness generation camapaigns on WASH in all schools and institutes
2	Alternative water use in the city	
3	Status of water quality management	
4	Institutional Integration	
5	Climate change adaptation measures	
6	Financial sustainability	
INDICATORS BASED ON FIRST INTEGRATION ASSESSMENT MATRIX		
7	Indicators based on First Integration Assessment Matrix	8. Conservation plan for catchment area of water bodies 9. Training cell in municipality 10. Policy for IUWM
8	City-specific Indicator	
ADDITIONAL INDICATORS (OPTIONAL)		
9	Additional indicators	11. 100% water supply coverage 12. 100% metering coverage 13. 100% sewerage network coverage 14. Reducing NRW losses to 20% 15. 100% complaint redressal

Step by Step Process for IUWM

STAGE – V

COMMUNITY ENGAGEMENT FOR IMPLEMENTATION

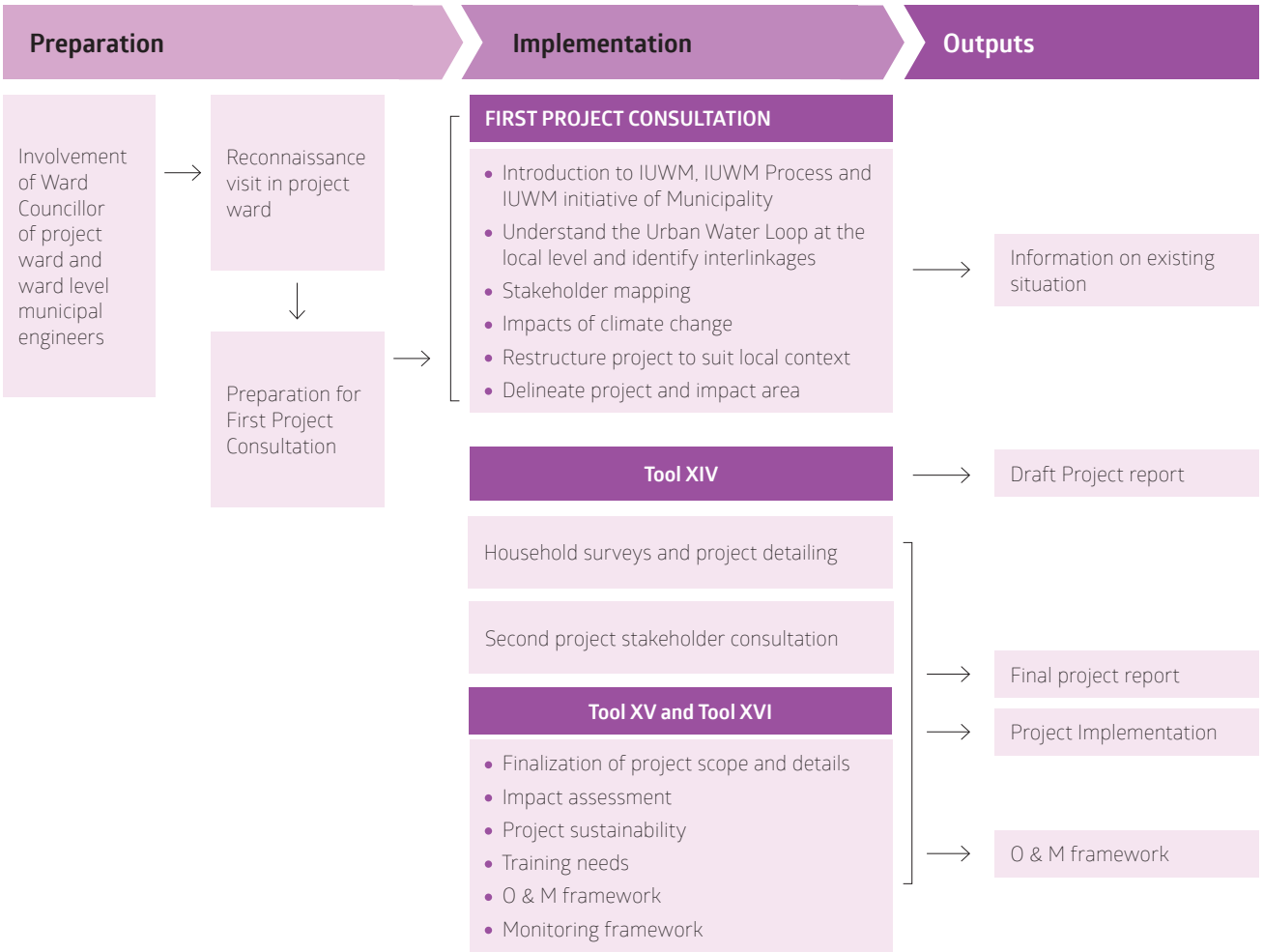
STEP BY STEP PROCESS FOR IUWM

COMMUNITY ENGAGEMENT FOR IMPLEMENTATION

Overview

Now that the city's IUWM Action Plan is ready, it is time to look into implementation of projects. The priority projects from the Action Plan need to be discussed and detailed with stakeholders at the selected sites to make them climate proof, gender sensitive, socially inclusive, environment friendly, technologically sound, participatory and financially sustainable. This stage focuses on laying a road map for inclusive decision making for closing the Urban Water Loop at the city level and also at the local level. Although the exact nature and scope of each project would vary with the context and the city, the key aspects to be considered for project implementation are highlighted here for one project. The Municipality would have to replicate this process for implementation of all priority projects under the IUWM Action Plan.

OVERVIEW OF STAGE V



Inputs from Stage IV

- *IUWM Action Plan*
- *Priority projects from IUWM Action Plan*

Key Tools

- *Tool XIV: Baseline assessment of project area*
- *Tool XV: Finalization of project scope*
- *Tool XVI: O & M framework*

Once the IUWM Action Plan with details of projects, sites and related land use interventions has been prepared, the city should take up priority projects under IUWM Action Plan for implementation. This stage would help officials from the city detail out priority projects under IUWM Action Plan with community involvement, by identifying interlinkages among urban water sectors, and between urban water sectors and other urban sectors. Aspects related to climate change, gender, vulnerable sections, financial sustainability, etc. would be considered to make the project sustainable in the long run.

Though the implementation process for each project can vary greatly based on the type, location and scope of the project, this section gives broad guidelines for project implementation with focus on integration across sectors and community involvement in decision making. The implementation phase can be divided into 3 phases:

A. Assessment of existing situation and strategization with community involvement
B. Project detailing
C. Community consent and project implementation

A. Assessment of existing situation and strategization with community involvement

To start a project, it is imperative to understand the water flow in the project area or ward (depending upon the scale of the project), understand the key issues impacting the project area and involve the community in the decision-making process. For this, the Nodal Officer, along with the Ward Councillor and/or the ward level municipal engineers for water supply, wastewater, storm water and waste along with the project design team/consultant for the project (collectively called project team), should undertake a reconnaissance survey of the project area/ward. The project team should interact with local stakeholders to identify the key institutional stakeholders related to urban water sectors, identify vulnerable stakeholders (marginalized communities, women, senior citizens, children, others) and identify key drivers of change. The project team should try to understand the flow of water through the project area and understand key issues related to urban water sectors being faced by stakeholders. On the basis of stakeholder discussions during reconnaissance survey, the project team should make a list of key stakeholders for project consultation workshops.

After the reconnaissance visit, Nodal Officer, with consent from Commissioner and Councillor, should call for a project consultation meeting to bring all stakeholders together for a discussion on the key issues and potentials related to urban water sectors in the project area. The stakeholders identified during the reconnaissance visit should be invited for this consultation and venue for the consultation should be within the project ward. A map or image of the project ward/area (A0 size) should be used for the consultation.

First project consultation

At the first project consultation, the project team should undertake the following tasks (some guidance questions for undertaking this exercise are given in Tool XIV on baseline assessment of project area that is given in annexure XIV):

a. Introduction to IUWM and the IUWM Process: The project team should introduce the stakeholders to the concept of IUWM and its benefits. The IUWM Process cycle should also be explained.

b. Introduction to the IUWM initiative of the Municipality: The stakeholders should be introduced to the IUWM initiative being implemented by the city and the activities undertaken thus far (till Stage IV), especially the IUWM–based Vision and Action Plan. The priority projects identified under IUWM Action Plan should also be introduced along with the project to be implemented in the selected area.

c. Understanding the Urban Water Loop at the local level: The inflow of water into, through and from the project area should be understood. This information should be marked on the area map. The existing infrastructure for urban water sectors and key issues being faced by the stakeholders in the area related to urban water sectors should be identified.

d. Identify interlinkages: Once the issues and stakeholders related to urban water sectors in the area are known, it is important to identify interlinkages that exist among these sectors in the project area. The stakeholders should discuss how the Urban Water Loop of the project area can be closed, and also try to identify interlinkages of urban water sectors with other urban sectors like land use, transportation, energy, housing, etc. Once these interlinkages are understood, the co-benefits among these sectors would be easier to identify.

e. Stakeholder mapping: Discussions should be undertaken to identify all key stakeholders in the project area. The institutional structure and roles of all departments involved in service provision for urban water sectors would also be discussed here. It is also important to identify the most vulnerable stakeholders; and how they are being impacted by urban water sectors. A Project Committee (comprising of local stakeholders) needs to be constituted within the project area to oversee and manage project related activities along with the municipality. This Committee should be headed by a local champion from the project area and should comprise of government as well as non government stakeholders for the area. It is also important to include representatives of marginalized communities, women, senior citizens and youth in this Committee. Any prominent teachers or health professionals, who regularly interact with the stakeholders in the area and are looked up to should be involved in the initiative to improve outreach.

f. Impacts of climate change: It is important to discuss the local level observations of the community in terms of impacts of climate change and trends over time, especially temperature variations, changes in precipitation and extreme events. The stakeholders should also discuss the impacts of these climate trends on water resources in the area. These observations should be compared with the observations made under Tool IV (on impacts of climate change on urban water sectors) by the Core Team.

g. Restructure the selected project to suit the local context: By now the existing situation of the area with regards to the urban water sectors would be clear to the project team. Now, the selected project for this area (from the IUWM

Action Plan) should be introduced in detail and its relevance at the city level should be communicated to the stakeholders. The Integration Target associated with this project should also be explained. With the information collected thus far in the project consultation meeting, the stakeholders should discuss the relevance of this project to their area and its benefits for the Urban Water Loop at ward level and city level. If the project is considered relevant for the city as well as the project area, project scope should be discussed with the stakeholders to assess how the project can be moulded to address the local issues to achieve Integration Targets.

h. Delineate project area and impact area: Once the scope of the project is clear, the area or site in which the project would be implemented and the immediate impact area of the project should be identified and mapped.

With this discussion, the project consultation can be closed. The Nodal Officer should share the minutes of the consultation with Commissioner, Councillor and Project Committee.

B. Project detailing

After the first project consultation, the project team would have a better idea of the local level issues and potentials. It is advisable that before project detailing, a sample household survey is undertaken in the project area, to assess the socio-economic character of the population and issues related to urban water sectors.

Based on outcomes of first project consultation and stakeholder survey, the Project Committee should work closely with the technical team from the Municipality to detail out the project components along with the estimated costs. The following aspects should be included in detailed project report (both in a short and long term perspective, where applicable):

- Significance of the project in attaining the IUWM-based vision for the city and Integration Targets
- Technical specifications and drawings
- Detailed costs
- Operation and maintenance (O&M) requirements for the project
- Financial feasibility model with private sector involvement
- Institutional arrangements for the project
- Capacity building interventions required
- Details of community involvement for project implementation and management
- Mechanism for risk mitigation

Once the project details are ready, the detailed project report should be sent to the Councillor and Commissioner for comments. After incorporation of these comments, the Project Committee should call for a second project consultation to discuss and finalize the project details for implementation.

Second project consultation

At the second project consultation, the Project Committee and Nodal Officer should share the details from the project report with stakeholders. The Project Committee can refer to Tool XV on finalization of project scoping (given in Annexure XV) for reference. These tools are indicative and the details can vary according to the

requirements of the project. The following aspects should be discussed at the second project consultation meeting:

a. Finalization of project scope and details: Discuss the project report with the stakeholders and share details of all project components. Stakeholder feedback on all components of the project should be taken to make the project user friendly and community centric. The details of how the project would attain Integration Targets should also be discussed.

b. Impact assessment: Any negative impacts (short term or long term) that the project might have, should be discussed and identified. Intensity of these negative impacts should also be assessed (low/medium/high). It is important to identify risks which can delay the project: before, during and after implementation. The key stakeholders that might be affected by these negative impacts should also be identified. Measures to mitigate these negative impacts should be discussed with stakeholders.

c. Project sustainability: Project sustainability in terms of environmental, social and economic sustainability should be discussed in detail. The project should focus on resource efficient measures for environmental conservation, should be all inclusive and should look at innovative options for revenue generation (including private sector involvement).

d. Training needs: Training needs of stakeholders should be identified, especially in terms of skills neccessary for implementation. Aspects on which awareness generation activities are required should also be discussed with the stakeholders.

e. O&M framework: A list of activities that require O&M should be made and roles and responsibilities for each task should be defined. Finalize the institutional framework required for project implementation and management. The Project Committee should play a key role in project implementation as well as post implementation management. The roles and responsibilities of each institutional stakeholder and each member of Project Committee should be discussed with stakeholders and finalized. Tool XVI on O&M framework (given in Annexure XVI) can be used for this exercise for reference. The details for each tool can be modified based on the project.

f. Monitoring framework: Once the O&M framework is finalized, the Project Committee should undertake a preliminary discussion on the monitoring framework for the project. A discussion on:

What indicators will help us decide project success in terms of:

- technical soundness
- social inclusiveness
- financial feasibility
- environmental sustainability

What needs to be monitored?

How is it to be monitored?

At this stage, it is important to decide on the indicators that will determine project success post implementation because the project design will have to address these indicators.

With this the Councillor or head of Project Committee should close the workshop. The minutes of the meeting should be circulated to the Commissioner, Councillor and Project Committee.

C. Community consent and project implementation

The project details should be revised in accordance with the discussions at the second project consultation. Once finalized, the project report along with the implementation timelines should be sent to the Core Team and Project Committee; and budgetary sanctions for implementation should be attained.

Implementation work for the project should start after this. If any unforeseen changes are to be made during the implementation phase, due justification for these changes should be provided. These changes would require written consent of the Project Committee and Councillor before implementation.

Step by Step Process for IUWM

STAGE – VI

MONITORING FRAMEWORK FOR PROJECT SUSTAINABILITY

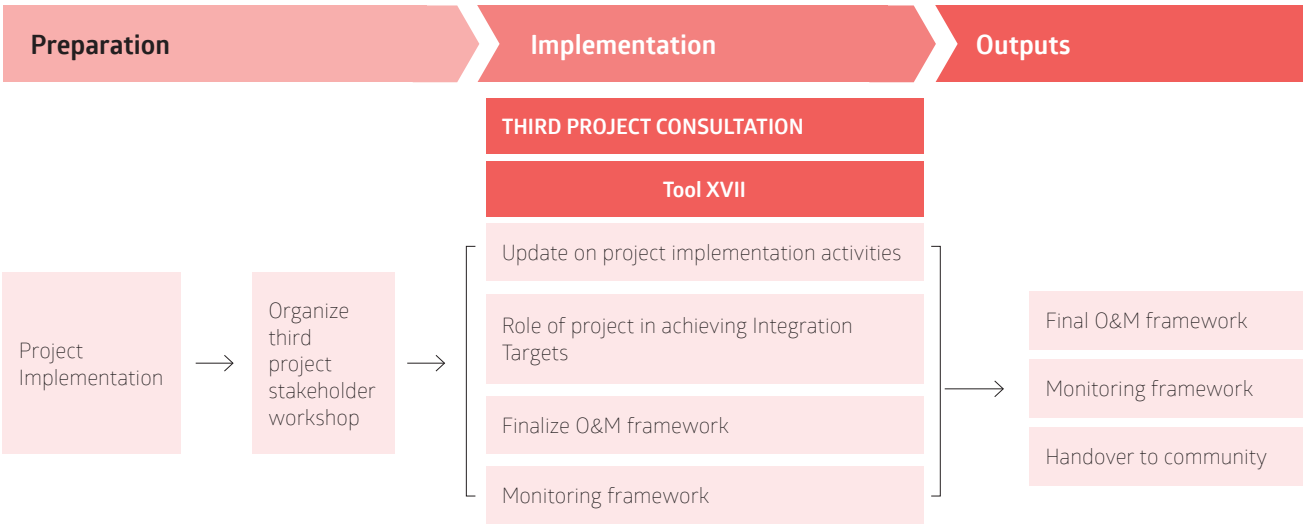
STEP BY STEP PROCESS FOR IUWM

MONITORING FRAMEWORK FOR PROJECT SUSTAINABILITY

Overview

Once the implementation of priority projects under the IUWM Action Plan is complete, it is crucial to ensure project monitoring and supervision with community involvement for project sustainability in the long run. This stage will guide the city through measures that can be taken towards building community ownership for monitoring and supervision of project after implementation. This stage will guide stakeholders on development of a monitoring framework for the project and define roles and responsibilities for sustainability of the project. The monitoring framework would help the city evaluate the success of the project and its role in achieving Integration Targets under IUWM Action Plan. The city would have to replicate this process for all priority projects under the IUWM Action Plan.

OVERVIEW OF STAGE VI



Inputs from Stage V

- *O&M framework from Stage V*
- *Preliminary indicators identified for monitoring framework*

Key Tools

- *Tool XVII: Monitoring framework*

Once the implementation of the priority project under IUWM Acton Plan is complete, the Nodal Officer needs to engage community to finalize the monitoring framework for the project. The monitoring framework will help the city to establish a benchmark for assessing success of project and identify indicators that will quantify this success in terms of technical soundness, social inclusiveness, environmental sustainability and financial feasibility. For this, a final project consultation needs to be organized with Project Committee to involve community in project supervision. The project monitoring framework needs to be finalized and roles and responsibilities need to be defined.

1.1. Third project consultation

The Nodal Officer and Project Committee should conduct this workshop to set the stage for handover of project to the community. For this, it is important to develop a monitoring framework and assign roles and responsibilities. The following exercise can guide the team through development of a monitoring framework:

Update on project implementation activities: The community should be updated on the activities undertaken since the last consultation on implementation of the project. The details of project components that have been implemented should be shared with the stakeholders. Stakeholders should be informed of project completion and any modifications made to the project design since the last consultation, along with the justification for these changes.

Role of project in achieving Integration Targets: The Project Committee should again give an overview of the IUWM-based Vision, IUWM Action Plan and Integration Targets for the project. Details of how the project would help achieve the Integration Target (based on project report) should be presented.

Finalize O&M framework: O&M framework from Stage V needs to be revisited and aspects that require O&M, need to be finalized with stakeholders in the light of modifications made to the design since last consultation. Roles and responsibilities and source of funding (including revenue model, where applicable) should be discussed and finalized.

Monitoring framework: The Project Committee needs to define a monitoring framework for the project. Indicators to be monitored that were broadly identified in Stage V, need to be reviewed post completion of the project. Indicators for technical soundness of the project, social inclusiveness, environmental sustainability and financial sustainability should be identified to address questions like - How can we say that the project is socially inclusive? How is the project addressing Integration Targets? Who will monitor, what will we monitor and how will we monitor?

Additional indicators can be added or existing indicators from Stage V can be modified to provide for any modifications that might have been made to the project scope during implementation.

Use Tool XVII on monitoring framework (given in Annexure XVII) for this exercise. Based on this tool, the roles and responsibilities of the stakeholders should be defined. The Project Committee would be the key agency responsible for monitoring and supervision of the project and should meet regularly to discuss project progress.

TOOL XVII: MONITORING FRAMEWORK (EXAMPLE)

IUWM-BASED VISION FOR THE CITY	INTEGRATION TARGET FOR SELECTED PROJECT	PARAMETER	MONITORING FRAMEWORK				
			INDICATOR TO BE MONITORED	AGENCY RESPONSIBLE FOR MONITORING	HOW TO MONITOR	FREQUENCY OF MONITORING	ROLE OF PROJECT COMMITTEE IN MONITORING
Integrated Urban Water Management to conserve ponds in the city, ensure reuse of treated wastewater, utilize runoff and conserve catchment area of water bodies for sustainable tourism and sustainable development of the city; through community involvement	25% wastewater reuse Setting up of decentralized treatment plant for treated wastewater reuse in irrigation	Technical soundness	Reduction in pollution	Project Committee	Potable Water Testing Kit	Weekly	Responsible for water quality monitoring, training of local youth in water quality monitoring
			Elevation of water level	Municipality	Water level indicator	Monthly	Maintaining record of measurement by Municipality
		Social inclusiveness	Acres of farms irrigated using treated wastewater	Project Committee	Community consultation	Monthly	Arrange for community consultations and get feedback from urban poor
		Environmental sustainability	Provision of green buffer around STP with fruit bearing trees	Project Committee	Drip irrigation using treated wastewater	Daily	Project Committee to take full care of plantation. Can sell fruits to earn revenue
		Financial feasibility	Sale of at least 50% of treated wastewater to large farms	Farmer Committee and Project Committee	Monitoring amount of wastewater sold at plant	Monthly	Motivation of farmers to ensure minimum 50% sale per month revenue collection from farmers

6.3 Handover to community

With this consultation, the Councillor and the Municipal Commissioner should complete the formalities and handover the project to the community. Minutes of meeting should be prepared and shared with the Councillor, the Municipal Commissioner and the Project Committee. A mechanism for complaint redressal for the project should also be discussed and finalized. After handover, municipal representatives and the Project Committee should meet at regular intervals to ensure ensure successful functioning of the project.

This exercise should be completed for all priority projects under IUWM Action Plan.

WAY FORWARD

Once the IUWM Process cycle has been completed, the city should analyse the benefits that the approach has brought over time. The foundation for integration of urban water sectors and integration of water sectors with other urban sectors has been laid in the city. Now the city has to continue this effort by revisiting the IUWM Process (in totality or certain stages) with the ultimate aim of institutionalizing the IUWM Process in the long term. Revisiting the IUWM Process would help the city to:

Review Core Team and Stakeholder Committee composition: With changes in political leadership and bureaucratic and technical structure in the city, the Core Team and Technical Committee might require revision over time. Any champions or vulnerable sections that might have come forth during the first implementation cycle, should be included in the teams. Any stakeholders who are not actively participating in the process can be sent a request for improved participation in the next cycle.

Reassess Strengths, Weaknesses, Quick Improvement Areas; and focus urban water sector: Reassessing the existing level of integration in the city by revisiting the First Integration Assessment Matrix will determine the level of improvement that has been brought about in the existing status of urban water sectors post implementation. The Strengths, Weaknesses, Quick Improvement Areas of the city might have changed over time and First Integration Assessment Matrix will help the city re-strategize its priorities, especially the focus urban water sector.

Institutionalize database for the city: The data collected for the city under data collection sheets should be revised and an online database for the same should be developed. This database should be regularly updated and should be made available in the public domain. Database on ward level infrastructure (natural and man made) for urban water sectors should be developed and indicators based on functionality, user satisfaction and efficiency of these infrastructural elements should be added to this database along with spatial details on a city map.

Review IUWM-based vision for the city and Integration Targets: After completion of one cycle the IUWM-based vision for the city should be reviewed and Integration Targets can be revised to address the present context, based on outcomes of First Integration Assessment Matrix.

Redraw the Urban Water Loop and identify potential projects: The Urban Water Loop for the city might have changed due to additional abstractions or improved reuse of wastewater and storm water. Hence, the potential longlist of projects would be revised to include projects that address recent developments in the city and its future aspirations for urban water sectors.

Reprioritize IUWM Action Plan: The IUWM Action Plan for the city should be reprioritized through stakeholder consultation to identify the new priority interventions for the city.

Upscaling plan: Once the results of the implementation of priority project from the first cycle of IUWM Process are known, the city should make a plan for scaling up these successful interventions across the city.

Institutionalize training and capacity building: A training and capacity building unit should be provided in the municipality to provide regular trainings, especially practical trainings, to existing officials and to orient new officials.

Integrated land use planning: City should take formal measures to revise its Master Plan to integrate water sector infrastructure in the plans for future development of the city.

Institutionalize the IUWM framework in the municipality: To ensure that the initiative does not stop with the transfer of municipal officials, the IUWM Process should be institutionalized in the day to day workings of the municipality through formal integration strategies for cross departmental coordination.

With continued efforts towards achieving the Integration Targets and institutionalization of the IUWM framework over time, the city would be able to successfully work towards closing the Urban Water Loop and attaining Sustainable Development Goals for a water secure future.

ENDNOTES

(1) Cities that have once implemented the IUWM Process can further improve the level of integration between urban water sectors; and that of water sectors with other urban sectors (like land use, transport, housing, etc.) with greater focus on local or community level integration
(2) The Planning Commission, Government of India, 2007. Report on the Expert Group on Ground Water Management and Ownership, available at http://planningcommission.nic.in/reports/genrep/rep_grndwat.pdf, accessed in July 2014
(3) 4000 billion cubic meters of precipitation (including snowfall)
(4) 690 BCM from surface water sources and 433 BCM from groundwater sources
(5) 2007; with 85% accounting for irrigation
(6) India projected to add 404 million urban dwellers by 2050. World Urbanization Prospects, United Nations, 2014. Available at http://esa.un.org/unpd/wup/Publications/Files/WUP2014-Highlights.pdf
(7) Brown, 2011. A Review of water scarcity Indices and Methodologies, https://www.sustainabilityconsortium.org/wp-content/themes/sustainability/assets/pdf/whitepapers/2011_Brown_Matlock_Water-Availability-Assessment-Indices-and-Methodologies-Lit-Review.pdf
(8) The elements of the Urban Water Loop depicted in the figure are indicative of conventional urban systems. Yet, they can vary from city to city, or even within parts of a city. While some cities directly re-use and distribute treated wastewater or recharge their water sources with it, others may not treat their wastewater at all, discharging it directly into receiving water bodies. While some cities may also collect storm water and use it as alternative water supply source, others may not.
(9) Like affordability, amenity, recreation, community satisfaction, ecosystem protection, etc.
(10) Mitchell, 2006
(11) Mitchell G.V., 2006. Applying Integrated Urban Water Management Concepts: A Review of Australian Experience. Springer Science + Business Media. Inc. Available at http://www.yemenwater.org/wp-content/uploads/2013/04/Applying-Integrated-Urban-Water-Management-Concepts-A-review-of-Australian-experience.pdf, accessed in February 2013.
(12) Bahri Akica, 2012. Integrated Urban Water Management, Global Water Partnership, Technical Committee (TEC), TEC Background Papers, No. 16. Global Water Partnership. Available at http://www.gwp.org/Global/The%20Challenge/Resource%20material/GWP_TEC16.pdf, accessed in February 2013.
(13) Under IDRC supported project on Integrated Rural Urban Water Management for Climate based Adaptation measures in Indian Cities (IAdapt)
(14) Under 12th Five Year plan, it has been mandated for large water supply schemes to have component on wastewater reuse for approval but in practice, schemes are still being sanctioned in isolation
(15) Positive or negative impact of the project can be assessed through:
- Impact of project on existing level of service provision for that sector
- Impact of project on existing level of integration in that sector
- Overall strategic benefit of the project for the Urban Water Loop

Case Study References: Asian Development Bank, Solapur Municipal Corporation, Forest Trends, PUB, Singapore's National Water Agency, Jabalpur Municipal Corporation.

Step by Step Process for IUWM

STAGE – I

ANNEXURE

ANNEXURE I

TOOL I: COMPOSITION OF CORE TEAM (INCLUDING TECHNICAL COMMITTEE) AND STAKEHOLDER COMMITTEE

TOOL IA: COMPOSITION OF CORE TEAM AND TECHNICAL COMMITTEE

CORE TEAM						
Name	**Designation**	**Role/ designation in Core Team**	**Sector represented**	**Contact number**	**Email**	**Member of Technical Committee (Yes/ No)**
Maximum 15 persons						

TOOL IB: COMPOSITION OF STAKEHOLDER COMMITTEE

STAKEHOLDER COMMITTEE					
Name	**Designation**	**Role/designation in Stakeholder Committee**	**Sector represented**	**Contact number**	**Email**
Maximum 50 persons					

ANNEXURE II

TOOL II: FIRST INTEGRATION ASSESSMENT MATRIX

S. No.	Integration Indicators	Criteria Scoring			Remarks
		Criteria/ sub-criteria	Score	Selected Score (A)	
Principle 1: Recognizes the significance of the local context and addresses it from environmental, social, cultural and economic perspective					
1	Location of major source(s) of water supply to the city	Main source(s) within municipal boundary	**15**		
		Main source(s) located within planning area	**10**		
		Main source(s) located at district level	**5**		
		Main source(s) located outside district	**0**		
2	Traditional rain water harvesting (RWH) structures and systems	These exist and are integrated with water infrastructure	**15**		
		These exist but are not integrated with water infrastructure	**10**		
		These exist but are in poor condition	**5**		
		No such structures or systems exist	**0**		
		Not aware	**0**		
Principle 2: Includes all stakeholders in planning and decision making process for urban water sectors					
3	Participatory process for integration of urban water sectors	All stakeholders and water sector departments are involved throughout planning and implementation (through stakeholder consultations)	**15**		
		Stakeholders and water sector departments are involved only for specific projects or programmes	**10**		
		No direct stakeholder involvement, comments invited after preparation of final plan	**5**		
		No involvement, plans prepared internally by government departments	**0**		
Principle 3: 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					
4	Grading of uses	Varied quality of water is used/reused for varied purposes at city level	**15**		
		Varied quality of water supplied/reused at community level	**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 realization towards differential use of water	**0**		
Principle 4: Addresses all water requirements: anthropogenic as well as ecological. Accounts for non-urban users that are dependent on the same water source					
5	Water sharing pattern	Decided jointly by district level stakeholders for rural, urban and ecological uses	**15**		
		Decided by government departments without consultation but due allocation is made for all uses (including non-urban, ecological)	**10**		
		Decision making is adhoc and keeps adjusting to suit the demands of various sectors/seasons	**5**		
		Decision making steered by select groups and marginalizes non-urban and ecological uses	**0**		

S. No.	Integration Indicators	Criteria Scoring					Remarks
		Criteria/ sub-criteria			Score	Selected Score (A)	
Principle 5, 6 and 12: It considers all parts of the water loop - 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							
6	Water Portfolio for supply to the city	Existing Water Portfolio	Source(s) of water for supply to the city	Multiple surface water sources and ground water use	**15**		
				Single source of surface water coupled with ground water	**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 20%	**15**		
				20 to 30%	**10**		
				30 to 40%	**5**		
				More than 40%	**0**		
			Reuse (annually)	More than 20%	**15**		
				10 to 20%	**10**		
				Less than 10%	**5**		
				No reuse	**0**		
			Summer water deficit status	Managed through existing Municipal infrastructure	**15**		
				Managed by Municipality in partnership with external service providers	**10**		
				Private tankers are hired by users directly	**5**		
				Area(s) abandoned due to water scarcity	**0**		
		Future water security (for next 10 to 20 years)	Planned source(s) of water for future supply	Multiple sources of water for supply to the city	**15**		
				Dependence on single source of surface water coupled with ground water	**10**		
				Dependence on single source of water (surface water)	**5**		
				Dependence on single source of water (ground water)	**0**		
				No planning for future	**0**		
			Planned reuse (as % of projected water demand)	More than 20%	**15**		
				10 to 20%	**10**		
				Less than 10%	**5**		
				No reuse planned	**0**		

S. No.	Integration Indicators	Criteria Scoring				
		Criteria/ sub-criteria		Score	Selected Score (A)	Remarks
7	Industrial wastewater	Industrial water use (surface and groundwater)	Industries complement water use with recycled/reused water	15		
			Industries dependent mainly on Municipal supply	10		
			Industries have independent unsupervised/supervised systems for freshwater withdrawal	5		
			Industrial water use causing water scarcity/water conflicts in the city	0		
		Industrial effluent	Zero liquid discharge from industries	15		
			Treated as per standards and discharged	10		
			Treated but not upto standards	5		
			Untreated discharge used for irrigation	0		
			Untreated discharge leading to occasional diseases	-5		
			Untreated discharge leading to epidemics	-10		
			Untreated discharge leading to fatal diseases	-15		
8	Municipal wastewater discharge		More than 75% wastewater treated as per standards	15		
			50 to 75% treated as per standards	10		
			25 to 50% treated as per standards	5		
			Less than 25% treated as per standards	0		
			Inadequately treated wastewater is being discharged into water bodies	-5		
			Untreated wastewater discharge leading to localized pollution of water/soil	-10		
			Untreated wastewater is polluting water resources leading to spread of diseases	-15		
9	Service Level Benchmark Ranking given to the city at National level		Rank: Top 15 or leaders	15		
			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		
			SLBs not prepared or rank not given	0		

S. No.	Integration Indicators	Criteria Scoring				Remarks
		Criteria/ sub-criteria		Score	Selected Score (A)	
Principle 7: Seeks to protect and conserve water resources at source						
10	Water pollution	Extent of pollution	Water quality (surface and groundwater) within permissible limits	**15**		
			Polluted pockets but mitigation plans are being implemented	**10**		
			Polluted pockets are being confined, no mitigation plan/ measures yet	**5**		
			Critical level of surface water 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 well-being in the city	**-5 to -15**		
			· Long term impacts surfacing but not clearly evident yet (-5)			
			· Impacts on aquatic life and spread of diseases due to pollution (-10)			
			· Fatality (-15)			
Principle 9: Recognizes linkages between water, land use and energy						
11	Link between water and energy	Link between Water and Energy	Link is realized and measures are taken (like use of Renewable Energy, Energy Efficiency)	**15**		
			Link is realized and measures are planned	**10**		
			Link is realized but no measures are planned	**5**		
			Link not recognized	**0**		
		Link between Water and Sludge	Sludge is utilized for energy generation or farming by Municipality	**15**		
			Sludge is disposed off safely by Municipality and is reused by individuals/farmers	**10**		
			Sludge is not reused but is disposed off safely by Municipality	**5**		
			Improper management of sludge is leading to pollution of water resources	**0**		

S. No.	Integration Indicators	Criteria Scoring				Remarks
		Criteria/ sub-criteria		Score	Selected Score (A)	
12	Integration of water and land use		Water infrastructure plans are a part of Master Plan	15		
			Not integrated with Master Plan but special planning schemes like Smart City Plan/AMRUT include water infrastructure plans	10		
			No integration but city recognizes the need for integration	5		
			No integration and need not recognized	0		
13	Institutional mechanism for urban water sectors (water supply, wastewater and storm water)	Successful institutional mechanism for coordinated working of departments exists		15		
		Institutional mechanism exists but is not adequately practised or needs modifications		10		
		Project/programme - specific coordination between departments		5		
		No coordination between departments		0		
14	Role of informal institutions and practices	Informal institutions recognized and integrated with formal institutions		15		
		Plans for integration of informal organizations being developed		10		
		Informal institutions not integrated but recognized by role		5		
		Role of informal sector not recognized		0		
Principle 8 and 11: Encompasses alternative water sources; & Aims at sustainability, efficiency and equity; while balancing environmental, social and economic needs (and sustainability) for short, medium and long term						
15	Infra-structure provision for urban poor	Water supply coverage	Covers at least 90% urban poor	15		
			Covers at least 70% urban poor	10		
			Coverage not adequate but Municipality has provided for alternate arrangements (like water tankers) to cover at least 50% urban poor	5		
			Lack of basic infrastructure for urban poor	0		
		Wastewater (sewerage network/ septic tanks/ soak pits) and drainage	Covers at least 70% urban poor	15		
			Covers at least 50% urban poor	10		
			Coverage not adequate but Municipality has provided for alternate arrangements (like community toilets) to cover at least 50% urban poor	5		
			Lack of basic infrastructure for urban poor	0		

S. No.	Integration Indicators	Criteria Scoring			
		Criteria/ sub-criteria	Score	Selected Score (A)	Remarks
16	Water quality monitoring (surface water and ground water)	Regularly monitored and records maintained at City/State/National level	15		
		Monitored by State agencies, Municipality aware of outcomes	10		
		Monitored by State agencies, Municipality not aware of outcomes	5		
		Not monitored	0		
17	Depletion of water table (last 10 years)	Sustainable groundwater abstraction balanced with recharge	15		
		Ground water withdrawal is within permissible limits	10		
		Water table has reached critical withdrawal limit	5		
		No information	0		
		High water table leading to contamination or flooding related issues	0		
18	Major water bodies (rivers/ lakes/ponds/ wetlands) in the city	Has major water bodies which contribute directly to city's supply	15		
		Has major water bodies which contribute to summer scarcity and ground water recharge	10		
		Has minor water bodies which have the potential to be used for summer scarcity	5		
		Water bodies in poor condition due to pollution and/or encroachment	0		
ADDITIONAL PRINCIPLES					
Principle 13: Acknowledges & seeks to address impacts of climate change & vulnerability of urban poor to these impacts					
19	Climate change and water resources	Impacts of climate change on water resources are recognized and adaptation measures are taken up, especially for urban poor	15		
		Regional level impacts are known and measures are being taken at regional level, with focus on urban poor	10		
		No measures being taken but need is recognized	5		
		Impacts of climate change leading to negative impacts on water related sectors but need for measures not recognized	0		
20	Instances of water or vector borne diseases (Malaria, Typhoid, Jaundice, Hepatitis, etc)	Not common	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		
Principle 14: Recognizes need to empower and mobilize stakeholders					
21	Capacity (skills, resources, awareness, willingness) of Municipal staff and other stakeholders	Capacity related constraints are limited, addressed regularly	15		
		Capacity related constraints are limited but addressed only in extreme cases	10		
		Significant capacity related constraints, not addressed regularly	5		
		Significant capacity related constraints, not addressed at all	0		

CITY- SPECIFIC INDICATOR					
22	**City-specific indicator** (details and criteria for city-specific indicator to be added by Core Team. Example: Landslides/ springs/ saline water ingress, etc.)				
			GRAND TOTAL		

ANNEXURE IIA

TOOL IIA: SUMMARY SHEET FOR FIRST INTEGRATION ASSESSMENT MATRIX

Principle	Indicator	Sub Indicator		Corresponding sector (water, wastewater, storm water)	Score	Weakness (0 or -ve score) Quick Improvement Area (5 or 10 score) Strength (score 15)	Focus sector based on First Integration Assessment Matrix
				(A)	(B)	(C)	(D)
Principle 1	Location of major source(s) of water supply			Water			
	Traditional RWH structures and systems			Water			
Principle 2	Participatory process			All			
Principle 3	Grading of uses			All			
Principle 4	Water sharing pattern			Water			
Principle 5, 6 and 12	Water Portfolio for supply to the city	Existing Water Portfolio	Source(s) of water	Water, storm water			
			T&D losses	Water			
			Reuse (annually)	All			
			Summer water deficit status	Water, storm water			
		Future water security	Planned source(s) of water	Water, storm water			
			Planned reuse	All			
	Industrial wastewater	Industrial water use		Water, storm water			
		Industrial effluent		Wastewater			
	Municipal wastewater discharge			Wastewater			
	Service Level Benchmark Ranking			All			
Principle 7	Water pollution	Extent of pollution		All			
Principle 9	Link between water & energy	Energy		All			
		Sludge		All			
	Integration of water and land use			All			
Principle 10	Institutional mechanism			All			
	Role of informal institutions and practices			All			
Principle 8 and 11	Infrastructure provision for urban poor		Water	Water			
			Wastewater and drainage	Wastewater, storm water			
	Water quality monitoring (surface water & ground water)			All			
	Depletion of water table			Water			
	Major water bodies in the city			Water, storm water			
ADDITIONAL PRINCIPLES							
Principle 13	Climate change and water resources			Water, storm water			
	Instances of water or vector borne diseases			All			
Principle 14	Capacity of Municipal staff and other stakeholders			All			
City-specific indicator							
TOTAL							

ANNEXURE III

TOOL III: INSTITUTIONAL FRAMEWORK

Sector	Interaction with other sectors / departments	Key departments	Role (Regulatory / Planning / Service provision/ Management/ other)	Road blocks to integration	Level of community engagement	Capacity and data related issues	Existing measures for integration	Level of integration with other departments (low, medium, high)
(1)	(2)	(A)	(B)	(C)	(D)	(E)	(F)	(G)
Water	Wastewater							
	Storm water							
	Sanitation & waste							
	Town Planning							
Wastewater	Water							
	Storm water							
	Sanitation & waste							
	Town Planning							
Storm water	Water							
	Wastewater							
	Sanitation & waste							
	Town Planning							
Sanitation and waste	Water							
	Wastewater							
	Storm water							
	Town Planning							

STEPS TO FILL KEY TOOL III

Col. A: Write key department for each urban water sector in the city in Col. 2
Col. B: Write role of this department
Col. C: Identify what road blocks does this department face towards integration with other sectors given in Col. 1
Col. D: To what extent does this department involve community in planning and decision making
Col. E: What capacity and data related issues does this department face?
Col. F: Is this department taking any measures for integration?
Col. G: What is the level of integration of this department with other urban water departments given in Col. 2

ANNEXURE IV

TOOL IV: IMPACTS OF CLIMATE CHANGE ON URBAN WATER SECTORS

Guidance question		Response
What are the climate change trends being experienced by the city?	Precipitation: amount, timing, intensity	
	Temperature: minimum, maximum, average	
	Extreme events: floods or cyclones or droughts, etc.	
Are these trends increasing or decreasing?		
How can these trends impact water resources or urban water sectors?		
How can these trends impact other urban sectors?		
Are there any local adaptation measures practised in the city?		
Can these practices be replicated to combat climate change in future?		

Step by Step Process for IUWM

STAGE – II

ANNEXURE

ANNEXURE V
TOOL V: INTEGRATION TARGETS FOR THE CITY (DRAFT)

Integration Indicator	INTEGRATION TARGET		
	EXISTING STATUS	SHORT TERM TARGET (For next 3 years or earlier)	LONG TERM TARGET (For target year)
	%/ Numbers/ Others	%/ Numbers/ Others	%/ Numbers/ Others
KEY INDICATORS			
Municipal water supply			
Demand-Supply Balance			
NRW loss reduction			
Per capita consumption reduction (lpcd or %)			
Urban water sector infrastructure coverage/availability for urban poor (for selected focus sector)			
Alternative water use in the city			
Wastewater reuse			
Storm water reuse/ recharge (while ensuring ecological flow in water bodies)			
Status of water quality management			
Pollution reduction of surface water sources			
Biological indicators in & around major water bodies (like floral & faunal biodiversity: presence of fish, phytoplankton, benthic/ riverbed biodiversity)			
Pollution reduction of ground water sources (% of total samples monitored)			
Water quality of drinking water supply (% samples from supplied water)			
Institutional Integration			
Institutional Integration (within urban water sectors and between urban water sectors and other urban sectors like land use, etc.)			
Climate change: Adaptation measures			
Local adaptation measures: Traditional water management practices			
Preparedness/local adaptation measures for dealing with extreme events and disasters (floods, droughts, cyclones, epidemic, etc.)			
Financial sustainability			
Financial sustainability of urban water sectors (key sources of revenue generation /key sources of expenditure reduction)			
Cost recovery from sale of reusable water (treated wastewater, storm water, etc)			
Private sector involvement (for service provision related to urban water sectors)			
INDICATORS BASED ON FIRST INTEGRATION ASSESSMENT MATRIX			
Indicator based on 'Weakness(es)' of the city (Tool IIb)			
Indicator based on 'Quick Improvement Area(s)' of the city (Tool IIb)			
Indicator based on 'Strength(s)' of the city (Tool IIb)			

Integration Indicator	INTEGRATION TARGET		
	EXISTING STATUS	SHORT TERM TARGET (For next 3 years or earlier)	LONG TERM TARGET (For target year)
	%/ Numbers/ Others	%/ Numbers/ Others	%/ Numbers/ Others
City-specific indicator (Tool IIb)			
ADDITIONAL INDICATORS (OPTIONAL)			
Water supply coverage (% population covered)			
Status of metering			
Status of illegal connections			
Status of tariff collection/ cost recovery			
Dependence on groundwater with the aim of reducing groundwater consumption (as % of total water consumption)			
Sewerage or other wastewater treatment network coverage (% population covered)			
Complaint redressal for water supply, wastewater, drainage and sanitation related issues (selected focus sector)			
Any other indicator required to attain the IUWM-based Vision for the city			

ANNEXURE VIA

TOOL VIA: URBAN WATER BALANCE - DATA ON STATUS OF DEMAND-SUPPLY GAP

S. No.	Parameter	Amount (MLD unless unit is specified)	Amount (MLD unless unit is specified)	Description	
		EXISTING SCENARIO	FUTURE SCENARIO	EXISTING SCENARIO	FUTURE SCENARIO
A. MUNICIPAL WATER SUPPLY					
1	Population (nos)			Population of the city. If the city does not have more recent data, figures from Census 2011 can be used	Target year should be same as that taken for Integration Targets. Projected population for target year from Master Plan or CDP or other Vision documents
2	Total abstraction from source(s) for Municipal water supply: **Surface water (MLD)**			Water being abstracted for Municipal supply from surface water source(s). This would include water abstraction from dam or lake or other water source(es). Only water being taken for supply to city should be included here. Additional water being taken from same source for horticulture, irrigation, etc. is not included here	Municipality might have secured additional sources for abstraction in future. Add that water availability to the existing water availability (given in the left cell). If exact amount is not known, use estimates

S. No.	Parameter	Amount (MLD unless unit is specified)	Amount (MLD unless unit is specified)	Description	
		EXISTING SCENARIO	FUTURE SCENARIO	EXISTING SCENARIO	FUTURE SCENARIO
3	Water being supplied after treatment from WTP (MLD)			This is the total water being treated at the WTP. This includes primarily surface water sources.	With increase in abstraction, increase in WTP capacity might be planned
4	Leakage losses till water reaches WTP (MLD)			The transmission losses from source to WTP **(before water is supplied to the city)**	
5	Total abstraction from source(s) for Municipal water supply: **Ground water (MLD)**			In addition to supply from surface water source(s), the Municipality might also be using certain ground water sources for direct supply or for supply through tankers. Some cities have their water supply totally dependent on ground water. The total amount of groundwater used by Municipality for supply should be noted here. Put an estimate here if the exact amount is not known	If increase or decrease in groundwater abstraction is planned or is likely to happen in future, the total should be changed accordingly
5a	Total Municipal supply (surface water and ground water)				
6	NRW losses within city (%)			Leakage losses due to transmission and distribution in the city, thefts and illegal connections (as per Service Level Benchmarks)	If Municipality plans to reduce these losses, the reduced % can be indicated
6a	NRW losses within city (MLD)			As % of (5a)	
7	Actual Municipal water supply reaching users (MLD)			This is the amount of water that will actually reach the consumers for use (total municipal supply - losses)	

STEPS TO FILL TOOL VIA

Existing Status of Demand-Supply Gap
Step 1: Fill in the boxes in Tool VIa. Data in **green** boxes will appear (based on calculations) in the web tool
Step 2: Information in Tool VIb will appear (based on calculations) in the web tool and would summarize the existing status of annual and summer demand-supply gap in the city

After integration status of Demand-Supply Balance
Step 3: Tool VIc will give the Integration Targets for these 5 Integration Indicators will appear in the webtool (from data entered in Tool V). This table will give the additional water availability from alternative sources for bulk uses (after integration).
Step 4: Tool VId will give the Integration Targets for Municipal water supply indicator in the webtool (from data entered in Tool V). This will give the additional water that can be made available for Municipal water supply (from existing sources) without additional abstraction
Step 5: Results in Tool VIe show how the demand-supply gap scenario would change post integraton (making more water available for the city) to bring about a shift from a demand-supply gap scenario to a demand-supply balance scenario.

Technical Committee should discuss and fill the information in the **yellow** cells. Information in the green cells would be calculated in the webtool automatically in the webtool

S. No.	Parameter	Amount (MLD unless unit is specified)	Amount (MLD unless unit is specified)	Description	
		EXISTING SCENARIO	FUTURE SCENARIO	EXISTING SCENARIO	FUTURE SCENARIO
ALTERNATIVE WATER USE IN THE CITY					
8	Bulk water use (raw water) from alternate sources like private bores, ponds or private tankers for the following uses (MLD): # Horticulture # Industries # Fire fighting # Urban agriculture # Construction # Other bulk uses			**Bulk uses like horticulture, industries, fire fighting, construction, etc. use raw water in most cities But nearly all of these uses can be catered to using recycled water Hence, this amount of raw water consumption can be saved using an IUWM-based approach Water consumption under this head can be estimated if exact usage by bulk consumers is not known.** These uses can be gradually encouraged to use recycled water to reduce potable water consumption and/or ground water depletion This head does not include alternative water use at household level (being covered under water supply provision for urban poor (A19) and increase in summer demand for Municipal water supply (A23))	Projected increase based on increase in population, potential industries, construction activity, etc. can be estimated based on projected economic growth of the city. Exact figures for this category might not be available, so estimates can be used.
9	Raw water supply from Municipality for bulk uses (MLD)			Any water being supplied for industries, horticulture, etc. by Municipality	Water planned to be supplied for horticulture, industries, etc by Municipality
10	Demand-Supply Gap for bulk uses (MLD)			Gap between Municipal supply for bulk uses and water consumption by bulk uses	
11	Per capita supply (lpcd)			Per person supply reaching the consumers Calculated as **(A7 X 1000000)/ (A1)**	
12	Water supply standard for the city (based on population) lpcd			Based on UDRPFI guidelines, water supply standards for cities are defined	**Based on projected population and sewerage connectivity, the standard for the city might change in future**
13	Total Municipal water demand (MLD)			Based on city population, per capita standard and NRW losses, this is the total amount of water that should be supplied to the city City's water demand should be calculated as per the standards (A12) or the existing per capita supply, whichever is higher.	For future projecctions, city's demand should be calculated based on standards

S. No.	Parameter	Amount (MLD unless unit is specified)	Amount (MLD unless unit is specified)	Description	
		EXISTING SCENARIO	FUTURE SCENARIO	EXISTING SCENARIO	FUTURE SCENARIO
14	Total wastewater generation in the city (MLD)			75% to 80% of total water use in the city (% of A7)	
15	Total wastewater treatment in the city (MLD)			This would be the total functional STP capacity in the city. If the city has 4 STPs all with 75% efficiency, then the total wastewater obtained after treatment from STPs should be included here	If the city plans to increase the treatment capacity of STPs in future, note the total increased capacity here
16	Untreated wastewater flow from city (MLD)			Wastewater not treated at STP	
17	Recycled or reused water (MLD)			Indicate the amount of water being recycled or reused in the city at present. If the exact amount is not known estimates can be used	Municipality might plan to reuse water in future. Give estimated reuse here
18	Runoff potential of the city (catchment/city area x Rainfall intensity x Coefficient of runoff)			Runoff generation from the city This is calculated based on percentage of pervious, semi pervious and hard surfaces in the city, runoff coefficient and average annual rainfall in the city This runoff is generated over a limited time period (mostly during monsoons in Indian cities) and would have to be stored or recharged and made available for use during non-monsoon months	Is this runoff is likely to increase or decrease in future (due to urbanization or competing uses or climate change)? Give estimates here
19	Urban poor in the city not covered by water supply (nos)			Total population of urban poor in the city that are not connected to Municipal water supply network or are not catered to by Municipal water supply (through tankers or other sources).	If the city plans to be a slum-free city with complete infrastructural coverage, this number can be zero.
	SUMMER MUNICIPAL WATER SUPPLY DEFICIT				
20	**Percentage decrease in summer water supply (%)**			This has to be estimated as a % of **(A7).** The percentage should be estimated by Technical Committee. Say 15% of **(A7)** Due to increased pressure on water resources and increased demand of conflicting uses, less water might be available for the city (surface + groundwater) during summers	In view of climate change and conflicting uses, this percentage might further increase in future. This has to be estimated as % of (A7) and should be estimated by the Technical Committee. Say 20% of A7

S. No.	Parameter	Amount (MLD unless unit is specified)	Amount (MLD unless unit is specified)	Description	
		EXISTING SCENARIO	FUTURE SCENARIO	EXISTING SCENARIO	FUTURE SCENARIO
21	**Summer water supply (MLD)**			Reduced supply available during summers (based on A20 and A7)	
22	**Percentage increase in summer water demand for municipal supply (%)**			This is the percentage increase in demand for Municipal water supply during summers due to increase in consumption patterns (as % increase in A13). This percentage should be estimated by the Technical Committee. It is important to include this indicator as water consumption from private sources and alternate sources can be quite high in Indian cities during summers like private tankers, bore wells, ponds, wells, hand pumps, etc. This amount can be approximately 10 to 30% more than annual demand (A13)	In view of climate change, especially change in temperatures, this amount might increase in future. Give an estimate here
23	**Summer water demand (MLD)**			Water supply demand during summers (based on A22 and A13)	

ANNEXURE VIB

TOOL VIB: URBAN WATER BALANCE: EXISTING AND FUTURE DEMAND-SUPPLY GAP UNDER BUSINESS AS USUAL SCENARIO

BUSINESS AS USUAL SCENARIO	Parameter		Value (MLD)	
			EXISTING SCENARIO	FUTURE SCENARIO
	MUNICIPAL SUPPLY			
	B	Total Municipal water supply		
	C	Total Municipal water demand		
	D	Demand and supply gap: Municipal water supply		
	ALTERNATIVE WATER USE IN THE CITY			
	E	Supply for bulk uses		
	F	Demand for bulk uses		
	G	Demand-Supply Gap for bulk uses		
	TOTAL			
	H	Total Demand-Supply Gap		
	I	Summer water supply		
	J	Summer Municipal water demand		
	K	Summer: Demand-Supply Gap		

ANNEXURE VIC

TOOL VIC: URBAN WATER BALANCE: INTEGRATION TARGETS FOR BULK USES

Parameter		EXISTING SCENARIO		FUTURE SCENARIO		Unit	Calculation
		Target (%)	Amount	Target (%)	Amount		
ALTERNATIVE WATER USE IN THE CITY							
Wastewater reuse	L	%				MLD	% of (A15)
Storm water reuse/recharge (Focus sector)	M	%				MLD	% of (A18)
Additional water available for reuse (for bulk uses) This water can be used for supply to industries, for horticulture, construction, fire fighting, etc.	N					MLD	L+M
Demand-Supply gap for bulk uses after integration	O					MLD	A9a + N

ANNEXURE VID

TOOL VID: URBAN WATER BALANCE: INTEGRATION TARGETS FOR MUNICIPAL WATER SUPPLY (FROM TOOL V)

Parameters			EXISTING SCENARIO		FUTURE SCENARIO		Unit	Calculation
			Target (%)	Amount	Target (%)	Amount		
CLOSING THE URBAN WATER LOOP	**MUNICIPAL WATER SUPPLY**							
	P	NRW loss reduction	%				MLD	% of (A10)
	Q	If present per capita supply in the city is below standards, this exercise is not mandatory Cities with per capita supply more than standards should consider reducing supply to a level below standards through voluntary reduction, awareness and water efficiency						
		a. Consumption reduction (lpcd) For cities exceeding standards	% Resultant lpcd		% Resultant lpcd		LPCD	% of (A11) Lpcd after reduction
		Resultant demand due to consumption reduction	b. Existing municipal water demand				MLD	(A13)
			c. IF PER CAPITA MORE THAN STANDARDS Resultant demand after consumption reduction				MLD	Based on A13 and Q
			d. Saving				MLD	Existing demand - Resultant demand
	R	a. Additional coverage/ availability for urban poor	%				Nos	% of (A 19)
		b. Resultant demand for urban poor					MLD	As per standards
			lpcd	MLD	lpcd	MLD		
Additional water available for Municipal supply		S					MLD	P+Qd
Demand-Supply gap after integration (Municipal supply		T					MLD	D+P+Qd-Rb

ANNEXURE VIE

TOOL VIE: URBAN WATER BALANCE: DEMAND-SUPPLY BALANCE AFTER INTEGRATION

AFTER INTEGRATION		Parameter	Business As Usual Scenario Value (MLD)	After Integration Value (MLD)	Business As Usual Scenario Value (MLD)	After Integration Value (MLD)
			EXISTING SCENARIO		PROPOSED SCENARIO	
	U	Total Municipal supply available				
	V	Total supply available for bulk uses				
	W	Demand-Supply balance: municipal supply				
	X	Demand-Supply balance: bulk uses				
	Y	Total Demand-Supply balance				
	Z	Summer: Demand-Supply balance				

ANNEXURE VII

KEY TOOL VII: KEY USERS AND KEY POLLUTERS

Category	Name of Water Resource	Key Users	Key Polluters	Critically Polluted	
				Yes/No	If Yes, Area/Stretch
Upstream water resources					
Water source for the city					
Water resources within city					
Downstream water resources					
Groundwater					

ANNEXURE VIII

KEY TOOL VIII: URBAN WATER LOOP MAPPING (CRITICAL AND POTENTIAL AREAS/WARDS)

S. No.	INTEGRATION INDICATORS	PARAMETERS TO BE MAPPED AND DISCUSSED (GUIDANCE QUESTIONS)	CRITICAL/ POTENTIAL AREAS/WARDS	APPROACH
	(A)	(B)	(C)	(D)
KEY INDICATORS				
		Municipal water supply		
1	Demand-Supply balance Short term target: Long term target:	Where are we getting our water supply from? (Amount and location)		
		How far is it from the city?		
		How much water are we taking from this source(s) ?		
		Does this source dry out in summers?		
		Where do we get the summer supply from?		
		Are there any water conflicts?		
		With whom? Why?		
		Are we leaving enough water for non urban and ecological uses?		
		Where is our WTP located? What is the capacity of WTP?		
		What is the surface water groundwater ratio in our supply?		
		Is any additional treatment required?		
		Which areas are not covered by water supply network?		
		Based on findings of Urban Water Balance exercise,		
		What interventions are required to cater to bulk uses?		
		What interventions are required to reduce summer deficit?		
		What interventions are required to reduce demand-supply gap?		
		Impacts of climate change on water resources and future water security (Refer to Tool IV)		
		a. What trends are being observed over last 10 or more years for # Rainfall/precipitation # Temperature # Extreme events		
		b. Do these impacts match the predicted impacts for your region (based on 4x4 Assessment Report of Government of India)?		
		c. How is climate change impacting water availability?		
		d. Will water availability worsen in future due to climate change?		
		e. What measures should we take for future water security?		
		f. Do the sources within or near our city have enough water for our future requirement?		
		g. How can we reduce our requirement to match water availability?		
	E	SUMMARY OF KEY ISSUES		
	F	SUMMARY OF POTENTIALS		
	G	KEY STAKEHOLDERS		

STEPS TO FILL TOOL VIII

Step 1: Refer to Tool V on Integration Targets and fill the short and long term targets for each Integration Indicator in Coloumn 'A'

Step 2: Technical Committee should refer to the guidance questions given in column 'B' for each Integration Indicator. Data collected at the beginning of Stage II in Data Collection Sheet 1 on existing status of urban water sectors and Data Collection Sheet 3 on municipal budget for urban water sectors (given in handout on Support Tools) will guide the Technical Committee in answering these guidance questions

Step 3: Based on discussions on guidance questions, Technical Committee should summarize the key issues and potentials for each Integration Indicator in rows 'E' and 'F' at the end of each Integration Indicator. Also note key stakeholders in row 'G' at the end of each indicator table

Step 4: Based on discussions and information in rows 'E', 'F' and 'G', Technical Committee should discuss and identify critical and potential areas/wards for each Integration Indicator and note these under Column 'C'

Step 5: Map these identified critical and potential areas on a city ward map or any other city map/image

Step 6: Refer to Support Tool 1 on Approaches and Technologies (given in handout on Support Tools) and identify the approach that best suits the city (from a compilation of national and international case examples) to address the identified issues and tap the identified potentials under rows 'E' and 'F' for each indicator. Note this selected approach under Column 'D'.

S. No.	INTEGRATION INDICATORS	PARAMETERS TO BE MAPPED AND DISCUSSED (GUIDANCE QUESTIONS)	CRITICAL/ POTENTIAL AREAS/WARDS	APPROACH
	(A)	(B)	(C)	(D)
2	Non-Revenue Water loss reduction Short term target: Long term target:	Which are the areas with high density and high NRW losses?		
		What measures can we take in these areas to reduce NRW losses? (minimum intervention for maximum impact)?		
		How can the community be involved in these interventions?		
	E	SUMMARY OF KEY ISSUES		
	F	SUMMARY OF POTENTIALS		
	G	KEY STAKEHOLDERS		
3	Per capita consumption reduction Short term target: Long term target:	Which wards or land uses with high density consume maximum water?		
		What measures (hard measures like water efficient fixtures or soft measures like awareness) can we take to reduce per capita consumption?		
		How can we involve youth and women in awareness generation?		
	E	SUMMARY OF KEY ISSUES		
	F	SUMMARY OF POTENTIALS		
	G	KEY STAKEHOLDERS		
4	Urban water sector infrastructure coverage/ availability for urban poor (selected focus sector Short term target: Long term target:	Locate slum pockets on city map (notified and non notified)		
		Which are the critical slum pockets in terms of infrastructure provision? # Identify critical slum pockets for water supply # Identify critical slum pockets for wastewater # Identify critical slum pockets for storm water # Identify critical slum pockets for waste/sanitation # Which slum pockets are critical for all/most of the above parameters?		
		Which slum pockets are vulnerable to impacts of climate change? # Droughts? # Floods? # Other extreme events?		
		Which slum pockets are vulnerable to pollution?		
		Who are the most vulnerable stakeholders?		
		What are the key water and sanitation related issues faced by women and marginalized in slum areas?		
		What are the impacts of climate change on these vulnerable stakeholders?		
		How can we address these issues?		
	E	SUMMARY OF KEY ISSUES		
	F	SUMMARY OF POTENTIALS		
	G	KEY STAKEHOLDERS		

S. No.	INTEGRATION INDICATORS	PARAMETERS TO BE MAPPED AND DISCUSSED (GUIDANCE QUESTIONS)	CRITICAL/ POTENTIAL AREAS/WARDS	APPROACH
	(A)	(B)	(C)	(D)
Alternative water use in the city				
5	Wastewater reuse Short term target: Long term target:	How much wastewater is being generated in our city?		
		Which areas in the city are covered by sewerage network?		
		Which areas are covered by septic tanks/soak pits?		
		Which areas are not covered by any wastewater treatment options?		
		Where is the wastewater from these areas going?		
		What are the impacts of this discharge?		
		What is the total treatment capacity of all our wastewater treatment plants?		
		Where are our wastewater treatment plants located (MLD and efficiency)		
		What quality of treated effluent are we achieving? Is it fit for reuse?		
		For what purpose can we reuse it?		
		Where are we discharging treated effluent presently?		
		How much untreated wastewater are we discharging?		
		What are the impacts of this untreated wastewater discharge?		
		Are there any wetlands in the city that can be used for natural treatment of wastewater?		
		INTERACTIONS BETWEEN WATER AND SANITATION		
		What percentage of households have individual household toilets?		
		What percentage of households are covered by community toilets/ public toilets?		
		What percentage of households resort to open defecation? Where are these households located?		
		What are the sanitation related issues being faced?		
		INDUSTRIAL AREAS IN THE CITY		
		Which are the key polluting or water consuming industries?		
		Source of water and intake (MLD)		
		Treatment capacity of ETP/ CETP (MLD)		
		Outfall point		
		Is any untreated industrial effluent being discharged?		
		Where is the untreated industrial effluent being discharged?		
		What is the impact of this discharge?		
		Are industries reusing treated effluent?		
	E	SUMMARY OF KEY ISSUES		
	F	SUMMARY OF POTENTIALS		
	G	KEY STAKEHOLDERS		

S. No.	INTEGRATION INDICATORS	PARAMETERS TO BE MAPPED AND DISCUSSED (GUIDANCE QUESTIONS)	CRITICAL/ POTENTIAL AREAS/WARDS	APPROACH
	(A)	(B)	(C)	(D)
6	Storm water recharge/ reuse Short term target: Long term target:	From the soil and geology map of the city, which are the most suitable recharge areas in the city?		
		From topographic map of the city, trace path of surface and ground water flow in the city		
		Map key/critical/potential water bodies within and around the city # Rivers and tributaries # Nallahs/ Streams/ Irrigation canals, etc. # Ponds/ Lakes # Buffers along water bodies and nallahs/streams		
		From the topographic map of the city, mark # Areas generating maximum runoff? # Low lying water logging prone areas		
		What is causing waterlogging? # clogged drains? # Hard surfaces # Poor solid waste management # Others? _____		
		How would climate change impact runoff generation in the city?		
		Are there any areas where waste management is impacting draiange network? # Areas with high risk of clogging # Areas with high risk of contamination # Others		
	SUSTAINABLE URBAN DRAINAGE SYSTEMS (SUDS): "Approaches to manage surface water that take account of water quantity (flooding), water quality (pollution) biodiversity (wildlife and plants) and amenity are collectively referred to as Sustainable Drainage Systems (SuDS). SuDS mimic nature and typically manage rainfall close to where it falls" (Susdrain)	Do we want to reduce runoff generation by increasing infiltration (if it is leading to downstream flooding)? OR Do we want to divert runoff to storage areas (for use during summers)?		
		SUSTAINABLE URBAN DRAINAGE SYSTEMS		
		Where can SUDS be integrated with drainage channels and water bodies to prevent flooding/water logging or to provide storage to meet the water requirements during lean periiod?		
		Which existing SUDS need conservation?		
		Are there missing links in the network of drainage channels, water bodies and storage areas that we can fill?		
		Map the potential areas for SUDS provision		
		CATCHMENT AREA OF WATER SOURCES		
		Mark catchment area of major water bodies, especially of water supply source(s)		
		Prominent human settlements/activities impacting catchment area		
		Can partnerships be developed with catchment level stakeholders for improved quality and quantity at water source?		
		Identify and map potential catchment level interventions required		
		INTERLINKAGES BETWEEN WATER AND TRANSPORT		
		How is the drainage network and flow linked to the transportation network?		
		What are the issues related to interactions between transport and drainage network?		
		How can we address these issues?		
		How can the interactions between drainage and transportation network be strengthened?		
	E	SUMMARY OF KEY ISSUES		
	F	SUMMARY OF POTENTIALS		
	G	KEY STAKEHOLDERS		

S. No.	INTEGRATION INDICATORS	PARAMETERS TO BE MAPPED AND DISCUSSED (GUIDANCE QUESTIONS)	CRITICAL/ POTENTIAL AREAS/WARDS	APPROACH
	(A)	(B)	(C)	(D)
Status of water quality management				
7	Pollution reduction of surface water sources Short term target: Long term target:	Which are the most contaminated water bodies?		
		Are any wastewater nallahs entering major water bodies?		
		Which are the major pollutants?		
		Is heavy metal contamination an issue?		
		Do these water bodies have water during summers?		
		Is the pollution intensity increasing during summers?		
		What is the impact of this pollution on: # Water availability # Humans # Ecosystem services # Others		
		What is the source of pollution?		
		Are the floodplains, drainage channels and catchment area of the water bodies secured under Master Plan?		
		Who is monitoring water quality? # How frequently? # Where? # Do they have required equipment and staff for monitoring? # Any additional interventions required for monitoring?		
		INTERLINKAGES BETWEEN WATER AND WASTE/SANITATION		
		Is our city segregating waste?		
		Is our city recycling waste?		
		Does our city have a sanitary landfill?		
		Is leachette from sanitary landfill or trenching ground leading to contamination of water bodies?		
		Is inadequate waste management leading to pollution of water bodies or their catchment areas?		
		Is inadequate waste management leading to clogging of drains and nallahs?		
		Is inadequate toilet coverage leading to open defecation around water bodies?		
	E	SUMMARY OF KEY ISSUES		
	F	SUMMARY OF POTENTIALS		
	G	KEY STAKEHOLDERS		
8	Biological indicators in and around major water bodies Short term target: Long term target:	Are there fish in these water bodies?		
		Do birds and animals frequently visit the water body?		
		Is the water body subject to algal growth or eutrophication? What is causing this?		
		What is the reason for absence of floral or faunal or benthic/ riverbed biodiversity # Pollution/ Drying up of water body # Only seasonal flora/fauna # Others		
		How can we address these issues?		
		Any migratory species?		
		Any rare or endangered species?		
	E	SUMMARY OF KEY ISSUES		
	F	SUMMARY OF POTENTIALS		
	G	KEY STAKEHOLDERS		

S. No.	INTEGRATION INDICATORS	PARAMETERS TO BE MAPPED AND DISCUSSED (GUIDANCE QUESTIONS)	CRITICAL/ POTENTIAL AREAS/WARDS	APPROACH
	(A)	(B)	(C)	(D)
9	Pollution reduction for ground water sources Short term target: Long term target:	Which are the most contaminated groundwater blocks or pockets in the city?		
		What is the cause of this pollution? # Industrial contamination # Geological # Domestic wastewater related contamination # Others?		
		Where is this pollution coming from? Mark the spatial area		
		Which are the most critical water quality parameters?		
		What are the impacts of this pollution?		
		Is leachette from waste dump leading to contamination of groundwater?		
		What is the depth of water table?		
		Is the water table declining or is the depth to water table reducing?		
		Is this leading to any issues?		
		Who is monitoring groundwater? # How frequently? # Where? # Do they have required equipment and staff for monitoring? # Any additional interventions required for monitoring?		
	E	SUMMARY OF KEY ISSUES		
	F	SUMMARY OF POTENTIALS		
	G	KEY STAKEHOLDERS		
10	Water qualitty of drinking water supply Short term target: Long term target:	Any source of pollution upstream of water abstraction point? Is STP discharge point upstream of water intake?		
		What is the impact of this pollution on: # Water availability # Humans # Ecosystem services # Others		
		What is causing pollution of drinking water supply? # Leakage in lines? # Inadequate functioning of WTP # Mixing of water with sewer line? # Other?		
		Map location of these contamination points		
		How frequent is this contamination? # Annual? # Seasonal # Occassional		
		Any diseases caused due to contamination?		
		How can we address this issue?		
	E	SUMMARY OF KEY ISSUES		
	F	SUMMARY OF POTENTIALS		
	G	KEY STAKEHOLDERS		
Institutional Integration				

S. No.	INTEGRATION INDICATORS	PARAMETERS TO BE MAPPED AND DISCUSSED (GUIDANCE QUESTIONS)	CRITICAL/ POTENTIAL AREAS/WARDS	APPROACH
	(A)	(B)	(C)	(D)
11	Institutional Integration Short term target: Long term target:	Refer to the outputs of Tool III on Existing status of Institutional integration # Key departments for urban water sectors # Roadblocks for integration # Capacity and data related issues # Measures by these departments towards integration # Existing level of integration between departments		
		Which department can be the Nodal department for IUWM?		
		What interventions are required to initiate institutional integratio?		
		Is the community involved in the decision making process for urban water sectors?		
		Is the community involved throughout the decision making process: from planing to maintenance?		
		Is the community adequate represented in Core Team and Stakeholder Committee?		
		What interventions are required to ensure community participation?		
		How can we institutionalize integration of urban water sectors?		
	E	SUMMARY OF KEY ISSUES		
	F	SUMMARY OF POTENTIALS		
	G	KEY STAKEHOLDERS		
Climate change: Adaptation measures				
12	Local adaptation measures: Traditional water management practices	Are there any traditional water management structures or systems in our city (like rain water harvesting structures)?		
		How can we revive these? Who owns these structures?		
		Map key traditional water management structures for revival		
		Identify projects for revival of traditional water management structures		
		Are there any other local adaptation measures that can help combat impacts of climate change?		
		Are these adaptation measures scalable/replicable?		
		How can these adaptation measures help deal with impacts of climate change?		
	E	SUMMARY OF KEY ISSUES		
	F	SUMMARY OF POTENTIALS		
	G	KEY STAKEHOLDERS		

S. No.	INTEGRATION INDICATORS	PARAMETERS TO BE MAPPED AND DISCUSSED (GUIDANCE QUESTIONS)	CRITICAL/ POTENTIAL AREAS/WARDS	APPROACH
	(A)	(B)	(C)	(D)
13	Preparedness/local adaptation measures for extreme events and disasters (floods, droughts, cyclones, epidemic, etc)	Which extreme event is the most critical threat to our city?		
		Which stakeholders and areas are most likely to be impacted by these extreme events?		
		What would be the biggest threat in case of an extreme event? # Epidemic # Loss of livelihood # Fatalities # Malnutrition # Others _____		
		Which natural or anthropogenic disasters pose the greatest threat for our city?		
		Do we have a disaster preparedness plan?		
		Which nodal agency would be in charge in case of an extreme event or disaster?		
		What measures are required to combat the disaster or extreme events?		
	E	SUMMARY OF KEY ISSUES		
	F	SUMMARY OF POTENTIALS		
	G	KEY STAKEHOLDERS		
Financial sustainability				
14	Financial sustainability of urban water sectors (key sources of revenue generation / key sources of expenditure reduction)	What is the largest source of income for: water supply, wastewater, storm water?		
		What is the largest source of expenditure for: water supply, wastewater, storm water?		
		Which urban water departments are facing maximum financial issues?		
		What are the key financial issues being faced by these organizations?		
		How can these issues be addressed through integration?		
		How can we involve private sector in service provision?		
	E	SUMMARY OF KEY ISSUES		
	F	SUMMARY OF POTENTIALS		
	G	KEY STAKEHOLDERS		
15	Cost recovery from sale of reusable water	Is treated wastewater fit for reuse?		
		Can excess runoff be diverted and stored for utilization during lean period?		
		How much potentially recyclable water (wastewater, storm water, etc) do we have?		
		Is there potential for sale of recycled water in our city?		
		Which are the key target groups who would be interested in purchase of recycled water (like industries, farmers, etc)		
		Does our city have a potential to develop a market for recycled water?		
	E	SUMMARY OF KEY ISSUES		
	F	SUMMARY OF POTENTIALS		
	G	KEY STAKEHOLDERS		

S. No.	INTEGRATION INDICATORS	PARAMETERS TO BE MAPPED AND DISCUSSED (GUIDANCE QUESTIONS)		CRITICAL/ POTENTIAL AREAS/WARDS	APPROACH
	(A)	(B)		(C)	(D)
16	Private sector involvement	Is private sector involved in service provision for urban water sectors?			
		Who are the key private sector players in our city?			
		Where can we involve informal sector in service provision?			
		Where can we create a revenue generation model on PPP basis?			
		It is important to provide adequate subsidy or other alternatives to ensure that revenue generation models don't impact basic access to services for urban poor			
	E	SUMMARY OF KEY ISSUES			
	F	SUMMARY OF POTENTIALS			
	G	KEY STAKEHOLDERS			
INDICATORS BASED ON FIRST ASSESSMENT MATRIX					
17	Indicators based on First Integration Assessment Matrix	Identified Weakness of city (say water quality)	Which are the key spatial areas related to the identified 'Weakness' of the city?		
			What is the cause of this Weakness?		
			Which are the key stakeholders impacted by this Weakness?		
			How can this cause be addressed?		
			What interventions can be taken to achieve targets?		
		Identified Quick improvement Area (say Reduction in reported cases of Malaria and Dengue)	Which are the spatial areas related to the identified 'Quick Improvement Areas' of the city?		
			Which are the key stakeholders?		
			Which is the main factor that needs to be addressed to convert this indicator into a Strength?		
			How can we address this factor?		
			What interventions can be taken to achieve targets?		
		Identified Strength of city (say climate change and water resources)	Which are the spatial areas related to the identified 'Strength'?		
			What is the key factor that makes this parameter our Strength?		
			How can we ensure that this factor is sustained in the long term?		
			What interventions can be taken to achieve targets?		
	E	SUMMARY OF KEY ISSUES			
	F	SUMMARY OF POTENTIALS			
18	City-specific indicator	Which are the spatial areas related to the city-specific indicator'?			
		Why is this indicator unique to our city?			
		What are the key factors impacting this city-specific indicator?			
		How can these factors be addressed?			
		Who are the key stakeholders?			
		What interventions can be taken to address these factors?			

S. No.	INTEGRATION INDICATORS	PARAMETERS TO BE MAPPED AND DISCUSSED (GUIDANCE QUESTIONS)	CRITICAL/ POTENTIAL AREAS/WARDS	APPROACH
	(A)	(B)	(C)	(D)
ADDITIONAL INDICATORS (OPTIONAL)				
19	Water supply coverage (% population)	How many households are covered by water supply network? How many households are dependent on sources of water other than Municipal supply? Which are the critical areas with high density that need to be provided with water supply coverage? How can we meet cost of infrastructure provision?		
20	Status of metering	Are we charging tariff on flat slab basis or meter basis? What are the slab rates? When were the rates revised last? How many connections are metered (% of total connections)? Which areas can be provided metering on priority basis? Are our metering slabs providing adequate relief/subsidy to urban poor? Is there a need to increase the subsidy or quantity of water under this slab? Who are the key stakeholders involved?		
21	Status of illegal connections	How many illegal connections are there in the city? What % of total connections are illegal? Which are the areas with highest number of illegal connections? Who are the key stakeholders involved? What loss is this causing?		
22	Status of tarriff collection/cost recovery	How much expense are we incurring on water supply provision? How much % are we able to recover? What are the reasons for low cost recovery? How can we increase the % recovery?		
23	Dependence on groundwater	How much % of total supply comes from groundwater? Are we recharging enough water to ensure sustainable withdrawal? Is our city/district classified as critical or overexploited by Ground Water Board? Is the water table depleting at an alarming rate? Is this leading to increased pollution of groundwater? How can we shift from groundwater to alternative water sources?		
24	Sewerage or other wastewater treatment network coverage (% population)	How many households are covered by sewerage network? How many households are without any connectivity to sewerrage network or soak pits/septic tanks? Which are the critical areas with high density that need to be provided with sewerage network coverage? How can we meet cost of infrastructure provision?		
25	Targeted complaint redressal for water supply, wastewater, storm water	How many complaints do we receive annually? Which sector gets maximum complaints? Which sector has least rate of complaint redressal? What is the average duration of complaint redressal? What are the reasons for low complaint redressal? How can we address these issues?		
26	Any other indicator required to attain the IUWM-based Vision			
	E	SUMMARY OF KEY ISSUES		
	F	SUMMARY OF POTENTIALS		

Step by Step Process for IUWM

STAGE – III

ANNEXURE

ANNEXURE IX

TOOL IX: URBAN WATER LOOP MAPPING (POTENTIAL PROJECTS)

S. No.	INTEGRATION INDICATORS	CRITICAL/POTENTIAL AREAS/WARDS	APPROACH	POTENTIAL PROJECTS	LAND USE INTERVENTIONS REQUIRED
	(A)	(B)	(C)	(D)	(E)
KEY INDICATORS					
Municipal water supply					
1	Demand-Supply Balance Short term target: Long term target:				
	Key issues				
	Key potentials				
	Key stakeholders				
2	Non Revenue Water loss reduction Short term target: Long term target:				
	Key issues				
	Key potentials				
	Key stakeholders				
3	Per Capita Consumption reduction Short term target: Long term target:				
	Key issues				
	Key potentials				
	Key stakeholders				
4	Urban water sector infrastructure coverage/ availability for urban poor (selected focus sector) Short term target: Long term target:				
	Key issues				
	Key potentials				
	Key stakeholders				
Alternative water use in the city					
5	Wastewater reuse Short term target: Long term target:				
	Key issues				
	Key potentials				
	Key stakeholders				

S. No.	INTEGRATION INDICATORS	CRITICAL/POTENTIAL AREAS/WARDS	APPROACH	POTENTIAL PROJECTS	LAND USE INTERVENTIONS REQUIRED
	(A)	(B)	(C)	(D)	(E)
6	Storm water recharge/reuse Short term target: Long term target: Sustainable Urban Drainage Systems (SUDS)				
	Key issues				
	Key potentials				
	Key stakeholders				
	Status of water quality management				
7	Pollution reduction of surface water sources Short term target: Long term target:				
	Key issues				
	Key potentials				
	Key stakeholders				
8	Biological indicators in and around major water bodies Short term target: Long term target:				
	Key issues				
	Key potentials				
	Key stakeholders				
9	Pollution reduction for ground water sources Short term target: Long term target:				
	Key issues				
	Key potentials				
	Key stakeholders				
10	Water qualitty of drinking water supply Short term target: Long term target:				
	Key issues				
	Key potentials				
	Key stakeholders				
	Institutional Integration				

S. No.	INTEGRATION INDICATORS	CRITICAL/POTENTIAL AREAS/WARDS	APPROACH	POTENTIAL PROJECTS	LAND USE INTERVENTIONS REQUIRED
	(A)	(B)	(C)	(D)	(E)
11	Institutional Integration Short term target: Long term target:				
	Key issues				
	Key potentials				
	Key stakeholders				
	Climate change: Adaptation measures				
12	Local adaptation measures: Traditional water management practices Short term target: Long term target:				
	Key issues				
	Key potentials				
	Key stakeholders				
13	Preparedness/local adaptation measures for extreme events and disasters (floods, droughts, cyclones, epidemic, etc) Short term target: Long term target:				
	Key issues				
	Key potentials				
	Key stakeholders				
	Financial sustainability				
14	Financial sustainability of urban water sectors (key sources of revenue generation / key sources of expenditure reduction) Short term target: Long term target:				
	Key issues				
	Key potentials				
	Key stakeholders				
15	Cost recovery from sale of reusable water Short term target: Long term target:				
	Key issues				
	Key potentials				
	Key stakeholders				

S. No.	INTEGRATION INDICATORS	CRITICAL/POTENTIAL AREAS/WARDS	APPROACH	POTENTIAL PROJECTS	LAND USE INTERVENTIONS REQUIRED
	(A)	(B)	(C)	(D)	(E)
16	Private sector involvement Short term target: Long term target:				
	Key issues				
	Key potentials				
	Key stakeholders				
	INDICATORS BASED ON FIRST INTEGRATION ASSESSMENT MATRIX				
17	Indicators based on First Integration Assessment Matrix Short term target: Long term target:				
	Key issues				
	Key potentials				
	Key stakeholders				
18	City-specific indicator Short term target: Long term target:				
	Key issues				
	Key potentials				
	Key stakeholders				
	ADDITIONAL INDICATORS (OPTIONAL)				
19	Water supply coverage (% population)				
20	Status of metering				
21	Status of illegal connections				
22	Status of tariff collection/cost recovery				
23	Dependence on groundwater				
24	Sewerage or other wastewater treatment network coverage (% population)				
25	Targeted complaint redressal for water supply, wastewater, storm water				
26	Any other indicator required to attain the IUWM-based Vision				

ANNEXURE X

TOOL X: TECHNICAL FEASIBILITY ASSESSMENT OF POTENTIAL PROJECTS

S. No.	INTEGRATION INDICATORS	POTENTIAL PROJECTS	LAND USE INTERVENTIONS REQUIRED	TECHNICAL FEASIBILITY	FINANCIAL FEASIBILITY	CRITICALITY	RISK
	(A)	(B)	(C)	(D)	(E)	(F)	(G)
	KEY INDICATORS						
	Municipal water supply						
1	Demand-Supply balance Short term target: Long term target:						
2	Non Revenue Water loss reduction Short term target: Long term target:						
3	Per Capita Consumption reduction Short term target: Long term target:						
4	Urban water sector infrastructure coverage/ availability for urban poor (selected focus sector) Short term target: Long term target:						
	Alternative water use in the city						
5	Wastewater reuse Short term target: Long term target:						
6	Storm water recharge/reuse Short term target: Long term target:						
	Status of water quality management						
7	Pollution reduction of surface water sources Short term target: Long term target:						
8	Biological indicators in and around major water bodies Short term target: Long term target:						
9	Pollution reduction for ground water sources Short term target: Long term target:						
10	Water qualitty of drinking water supply Short term target: Long term target:						
	Institutional Integration						
11	Institutional Integration Short term target: Long term target:						

S. No.	INTEGRATION INDICATORS	POTENTIAL PROJECTS	LAND USE INTERVENTIONS REQUIRED	TECHNICAL FEASIBILITY	FINANCIAL FEASIBILITY	CRITICALITY	RISK
	(A)	(B)	(C)	(D)	(E)	(F)	(G)
	Climate change: Adaptation measures						
12	Local adaptation measures: Traditional water management practices Short term target: Long term target:						
13	Preparedness/local adaptation measures for extreme events and disasters (floods, droughts, cyclones, epidemic, etc) Short term target: Long term target:						
	Financial sustainability						
14	Financial sustainability of urban water sectors (key sources of revenue generation / key sources of expenditure reduction) Short term target: Long term target:						
15	Cost recovery from sale of reusable water Short term target: Long term target:						
16	Private sector involvement Short term target: Long term target:						
	INDICATORS BASED ON FIRST ASSESSMENT MATRIX						
17	Indicators based on First Integration Assessment Matrix Short term target: Long term target:						
18	City-specific indicator Short term target: Long term target:						
	ADDITIONAL INDICATORS (OPTIONAL)						
19	Water supply coverage (% population)						
20	Status of metering						
21	Status of illegal connections						
22	Status of tariff collection/cost recovery						
23	Dependence on groundwater						
24	Sewerage or other wastewater treatment network coverage (% population)						
25	Targeted complaint redressal for water supply, wastewater, storm water						
26	Any other indicator required to attain the IUWM-based Vision						

ANNEXURE XI

TOOL XI: LAND USE IMPLICATIONS, IMPLEMENTING AGENCY AND POTENTIAL SOURCE(S) OF FUNDING

S. No.	INTEGRATION INDICATORS	POTENTIAL PROJECTS	LAND USE INTERVENTIONS REQUIRED	POTENTIAL FOR COMMUNITY INVOLVEMENT	ESTIMATED COST	IMPLEMENTING AGENCY	POTENTIAL SOURCES OF FUNDING
	(A)	(B)	(C)	(D)	(E)	(F)	(G)
KEY INDICATORS							
Municipal water supply							
1	Demand-Supply Balance Short term target: Long term target:						
2	Non Revenue Water loss reduction Short term target: Long term target:						
3	Per Capita Consumption reduction Short term target: Long term target:						
4	Urban water sector infrastructure coverage/ availability for urban poor (selected focus sector) Short term target: Long term target:						
Alternative water use in the city							
5	Wastewater reuse Short term target: Long term target:						
6	Storm water recharge/ reuse Short term target: Long term target:						
Status of water quality management							
7	Pollution reduction of surface water sources Short term target: Long term target:						
8	Biological indicators in and around major water bodies Short term target: Long term target:						
9	Pollution reduction for ground water sources Short term target: Long term target:						

S. No.	INTEGRATION INDICATORS	POTENTIAL PROJECTS	LAND USE INTERVENTIONS REQUIRED	POTENTIAL FOR COMMUNITY INVOLVEMENT	ESTIMATED COST	IMPLEMENTING AGENCY	POTENTIAL SOURCES OF FUNDING
	(A)	(B)	(C)	(D)	(E)	(F)	(G)
10	Water qualitty of drinking water supply Short term target: Long term target:						
	Institutional Integration						
11	Institutional Integration Short term target: Long term target:						
	Climate change: Adaptation measures						
12	Local adaptation measures: Traditional water management practices Short term target: Long term target:						
13	Preparedness/local adaptation measures for extreme events and disasters (floods, droughts, cyclones, epidemic, etc) Short term target: Long term target:						
	Financial sustainability						
14	Financial sustainability of urban water sectors (key sources of revenue generation / key sources of expenditure reduction) Short term target: Long term target:						
15	Cost recovery from sale of reusable water Short term target: Long term target:						
16	Private sector involvement Short term target: Long term target:						
	INDICATORS BASED ON FIRST ASSESSMENT MATRIX						
17	Indicators based on First Integration Assessment Matrix Short term target: Long term target:						
18	City-specific indicator Short term target: Long term target:						
	ADDITIONAL INDICATORS (OPTIONAL)						
19	Water supply coverage (% population)						

S. No.	INTEGRATION INDICATORS	POTENTIAL PROJECTS	LAND USE INTERVENTIONS REQUIRED	POTENTIAL FOR COMMUNITY INVOLVEMENT	ESTIMATED COST	IMPLEMENTING AGENCY	POTENTIAL SOURCES OF FUNDING
	(A)	(B)	(C)	(D)	(E)	(F)	(G)
20	Status of metering						
21	Status of illegal connections						
22	Status of tariff collection/ cost recovery						
23	Dependence on groundwater						
24	Sewerage or other wastewater treatment network coverage (% population)						
25	Targeted complaint redressal for water supply, wastewater, storm water						
26	Any other indicator required to attain the IUWM-based Vision						

Step by Step Process for IUWM

STAGE – IV

ANNEXURE

ANNEXURE XIIA

TOOL XIIA: PROJECT PRIORITIZATION TOOL (SCREENING)

Project Prioritization Tool

Step 1: Short and long term targets for each Integration Indicator would be given in Column 'A' of Tool XIIa on Project Prioritization (screening) in the webtool. This information will appear from Tool V on Integration Targets.

Step 2: Shortlisted projects identified for each integration Target from Tool X on Technical Feasibility Assessment would appear in Column 'B'

Step 3: Technical Committee should discuss positive impacts of each project on Urban Water Loop. It is mandatory for any potential project to demonstrate positive impacts on at least 2 urban water sectors, of which one should be the selected focus sector for the city. Any positive impacts on waste sector would be an additional advantage.

Technical Committee should discuss the impacts of each project on all urban water sectors. If the impact is likely to be positive, write 'yes' and if the impact is likely to be negative, write 'no' under column 'C', 'D', 'E' or 'F', as applicable.

Step 4: The projects that score 'Yes' under minimum two urban water sectors (column 'C', 'D', 'E') of which one is the selected focus sector, would be shown as qualified projects under Column 'G' in the webtool.

S. No.	INTEGRATION INDICATORS (A)	POTENTIAL PROJECTS (B)	PROJECTS DEMONSTRATING POSITIVE IMPACTS ON URBAN WATER SECTORS				PROJECTS DEMONSTRATING INTEGRATION
			MANDATORY (MIN 2)			ADDITIONAL	
			WATER SUPPLY (selected focus sector)	WASTE - WATER	STORM WATER	WASTE	
KEY INDICATORS							
Municipal water supply							
1	Demand-Supply Balance Short term target: Long term target:						
2	Non Revenue Water loss reduction Short term target: Long term target:						
3	Per Capita Consumption reduction Short term target: Long term target:						
4	Urban water sector infrastructure coverage/ availability for urban poor (selected focus sector) Short term target: Long term target:						
Alternative water use in the city							
5	Wastewater reuse Short term target: Long term target:						
6	Storm water recharge/reuse Short term target: Long term target: Sustainable Urban Drainage Systems (SUDS)						
Status of water quality management							
7	Pollution reduction of surface water sources Short term target: Long term target:						
8	Biological indicators in and around major water bodies Short term target: Long term target:						

S. No.	INTEGRATION INDICATORS (A)	POTENTIAL PROJECTS (B)	PROJECTS DEMONSTRATING POSITIVE IMPACTS ON URBAN WATER SECTORS				PROJECTS DEMONSTRATING INTEGRATION
			MANDATORY (MIN 2)			ADDITIONAL	
			WATER SUPPLY (selected focus sector)	WASTE - WATER	STORM WATER	WASTE	
9	Pollution reduction for ground water sources Short term target: Long term target:						
10	Water qualitty of drinking water supply Short term target: Long term target:						
	Institutional Integration						
11	Institutional Integration Short term target: Constitution of IUWM Committee Long term target: Institutionalization of IUWM hour in Municipal Council meetings						
	Climate change: Adaptation measures						
12	Local adaptation measures: Traditional water management practices						
13	Preparedness/local adaptation measures for extreme events and disasters (floods, droughts, cyclones, epidemic, etc)						
	Financial sustainability						
14	Financial sustainability of urban water sectors (key sources of revenue generation / key sources of expenditure reduction)						
15	Cost recovery from sale of reusable water						
16	Private sector involvement						
	INDICATORS BASED ON FIRST ASSESSMENT MATRIX						
17	Indicators based on First Integration Assessment Matrix						
18	City-specific indicator						

S. No.	INTEGRATION INDICATORS (A)	POTENTIAL PROJECTS (B)	PROJECTS DEMONSTRATING POSITIVE IMPACTS ON URBAN WATER SECTORS				PROJECTS DEMONSTRATING INTEGRATION
			MANDATORY (MIN 2)			ADDITIONAL	
			WATER SUPPLY (selected focus sector)	WASTE - WATER	STORM WATER	WASTE	
ADDITIONAL INDICATORS (OPTIONAL)							
19	Water supply coverage (% population)						
20	Status of metering						
21	Status of illegal connections						
22	Status of tarriff collection/cost recovery						
23	Dependence on groundwater						
24	Sewerage or other wastewater treatment network coverage (% population)						
25	Targeted complaint redressal for water supply, wastewater, storm water						
26	Any other indicator required to attain the IUWM - based Vision						

REFERENCE TABLE 3: WEIGHTAGE ASSIGNED BY STAKEHOLDERS (EXAMPLE)

Parameter	Weightage for each parameter given by stakeholders during the workshop
Social benefits	
Environmental benefits	
Economic feasibility	
Participatory approach	

REFERENCE TABLE 4: PROJECT PRIORITIZATION SCORING

SOCIAL BENEFITS

Score	Details
10	**Project benefits most sections of society with special focus on urban poor**
	Or
	Urban poor centric project
5	**Project benefits most sections of society, no specific emphasis on urban poor**
1	Project benefits only few
	Or
	Has indirect social benefits
0	**No significant impacts** on urban poor or other sections of society
	Or
	Adverse impacts

ENVIRONMENTAL BENEFITS

Score	Details
10	**Has long term positive impacts on environment and focuses on environmental conservation**
	Or
	Has positive impacts on living environment of urban poor over a large area
5	**Has short term positive environmental impacts**
	Or
	Has positive environmental impacts over a small area
1	Might have some environmental benefits over a small area
	Or
	Indirect environmental benefits
0	**No positive impacts**
	Or
	Adverse impacts

ECONOMIC FEASIBILITY

Score	Details
10	**Funding can be secured internally within the city through multiple sources**
	Can be funded by municipality in association with citizens or community contributions/ CSR/ NGOs or Shramdan or PPP or other options
5	**Internal funding within the city from single source**
	Can be funded by Municipality or any other single source within the city
1	**Accessible external funding**
	Can be funded through state or central government funding or international or other funding schemes which can be accessed in near future
0	**External funding sources, not easily accessible**

PARTICIPATORY APPROACH

Score	Details
10	**Involvement of stakeholders from the beginning of the project till the end, including implementation**
	Community consultations at all stages
	Involvement of all related government departments
	Involvement of urban poor in decision making
5	**Stakeholder consultation before finalization of project**
	Involvement of all related government departments and stakeholders in final decision making
	Or
	Community mobilization before project commencement
1	**No stakeholder consultation but plan/project is put in public domain for comments**
	Stakeholder comments are invited before finalization
	Or
	Involvement of very select stakeholders (site specific)
0	**No stakeholder involvement**

ANNEXURE XIIB

TOOL XIIB: PROJECT PRIORITIZATION TOOL (RANKING)

S. No.	INTEGRATION INDICATORS	POTENTIAL PROJECTS AFTER SCREENING	SCORING BY STAKEHOLDERS				TOTAL WEIGHTED AVERAGE	RANK
			WEIGHTED AVERAGE					
			SCORE					
			SOCIAL BENEFITS	ENVIRONMENTAL BENEFITS	ECONOMIC FEASIBILITY	PARTICIPATORY APPROACH		
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
KEY INDICATORS								
Municipal water supply								
1	Demand-Supply Balance Short term target: Long term target:							
2	Non Revenue Water loss reduction Short term target: Long term target:							
3	Per Capita Consumption reduction Short term target: Long term target:							
4	Urban water sector infrastructure coverage/ availability for urban poor (selected focus sector) Short term target: Long term target:							
Alternative water use in the city								
5	Wastewater reuse Short term target: Long term target:							
6	Storm water recharge/reuse Short term target: Long term target: Sustainable Urban Drainage Systems (SUDS)							
Status of water quality management								
7	Pollution reduction of surface water sources Short term target: Long term target:							
8	Biological indicators in and around major water bodies Short term target: Long term target:							

S. No.	INTEGRATION INDICATORS	POTENTIAL PROJECTS AFTER SCREENING	SCORING BY STAKEHOLDERS				TOTAL WEIGHTED AVERAGE	RANK
			WEIGHTED AVERAGE					
			SCORE					
			SOCIAL BENEFITS	ENVIRONMENTAL BENEFITS	ECONOMIC FEASIBILITY	PARTICIPATORY APPROACH		
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
9	Pollution reduction for ground water sources Short term target: Long term target:							
10	Water qualitty of drinking water supply Short term target: Long term target:							
	Institutional Integration							
11	Institutional Integration Short term target: Long term target:							
	Climate change: Adaptation measures							
12	Local adaptation measures: Traditional water management practices Short term target: Long term target:							
13	Preparedness/local adaptation measures for extreme events and disasters (floods, droughts, cyclones, epidemic, etc) Short term target: Long term target:							
	Financial sustainability							
14	Financial sustainability of urban water sectors (key sources of revenue generation / key sources of expenditure reduction) Short term target: Long term target:							
15	Cost recovery from sale of reusable water Short term target: Long term target:							
16	Private sector involvement Short term target: Long term target:							

S. No.	INTEGRATION INDICATORS	POTENTIAL PROJECTS AFTER SCREENING	SCORING BY STAKEHOLDERS				TOTAL WEIGHTED AVERAGE	RANK
			WEIGHTED AVERAGE					
			SCORE					
			SOCIAL BENEFITS	ENVIRONMENTAL BENEFITS	ECONOMIC FEASIBILITY	PARTICIPATORY APPROACH		
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
INDICATORS BASED ON FIRST ASSESSMENT MATRIX								
17	Indicators based on First Integration Assessment Matrix Short term target: Long term target:							
18	City-specific indicator Short term target: Long term target:							
ADDITIONAL INDICATORS (OPTIONAL)								
19	Water supply coverage (% population)							
20	Status of metering							
21	Status of illegal connections							
22	Status of tariff collection/ cost recovery							
23	Dependence on groundwater							
24	Sewerage or other wastewater treatment network coverage (% population)							
25	Targeted complaint redressal for water supply, wastewater, storm water							
26	Any other indicator required to attain the IUWM-based Vision							

ANNEXURE XIII

TOOL XIII: IUWM ACTION PLAN

S. No.	INTEGRATION INDICATORS	IUWM ACTION PLAN TOP RANKING PROJECTS
	(A)	(B)
KEY INDICATORS		
1	Municipal water supply	1. 2. 3. 4. 5. 6. 7.
2	Alternative water use in the city	
3	Status of water quality management	
4	Institutional Integration	
5	Climate change adaptation measures	
6	Financial sustainability	
INDICATORS BASED ON FIRST INTEGRATION ASSESSMENT MATRIX		
7	Indicators based on First Integration Assessment Matrix	8. 9. 10.
8	City-specific Indicator	
ADDITIONAL INDICATORS (OPTIONAL)		
9	Additional indicators	11. 12. 13. 14. 15.

Step by Step Process for IUWM

STAGE – V

ANNEXURE

ANNEXURE XIV

ANNEXURE XIV: BASELINE ASSESSMENT OF PROJECT AREA (INDICATIVE)

PRIORITIZED PROJECT FROM IUWM ACTION PLAN	RESPONSE
UNDERSTANDING THE URBAN WATER LOOP AT THE LOCAL LEVEL	
What is the source of water for this area? Is it surface water or groundwater or a mix of both?	
How many people are covered by the water supply network?	
Where is the lean period supply coming from?	
Which are the key water bodies in the area? What is the condition of these water bodies?	
Do these water bodies dry out during summers?	
Are water bodies facing extensive pollution?	
Who are the key water users? Do all these users need fresh water?	
Is the water table depleting at an alarming rate?	
Is groundwater contamination common in the area?	
What is causing this pollution of surface and/or groundwater?	
How is storm water flowing through the area and which are the key drainage channels?	
Which are the key water logging areas?	
Does your area have any prominent greens? What is the condition of these greens?	
How many households are connected to the sewerage network or have septic tanks/soak pits?	
How many households are without any wastewater treatment facility? Do people from these households resort to open defecation?	
Where is wastewater from these areas going? Are there any negative impacts due to this untreated discharge?	
What are the key issues related to urban water sectors faced by the area?	
What is the cause of these issues?	
INTERLINAKGES BETWEEN WATER SECTORS AND WITH OTHER URBAN SECTORS	
Interlinkages between water sectors	
How can we recycle wastewater?	
Where can we store runoff?	
Can we undertake rain water harvesting?	
Are water tankers being supplied in the area for construction purposes, horticulture purposes, fire fighting or aquaculture?	
Can these tankers supply treated wastewater or storm water for secondary uses?	
Who are the key stakeholders who can reuse water for secondary purposes?	
Would any stakeholders be willing to pay for this reusable water?	
How much per litre can they pay?	
How can the Urban Water Loop in the project area be closed?	
Interlinkages with waste	
How is waste being managed in the area? Is waste dumping leading to issues related to clogging of drains or pollution of water bodies?	
What are the interlinkages between waste and water in the project area?	
How can these interlinkages be managed?	

PRIORITIZED PROJECT FROM IUWM ACTION PLAN	RESPONSE
Interlinkages with land use	
What are the development plans for the area in the next 20 years?	
Is the development plan for the area sensitive towards water issues?	
Have the key drainage channels and water bodies been provided with green buffer?	
Are there any greens or abandoned pits/quarries that can be used for diverting water during monsoons?	
Interlinkages with energy and transport	
How much energy is being spent on transporting water to the area?	
How can these costs be reduced by taking measures towards integration of decentralized water sources and using energy efficiency and renewable energy based measures?	
How can we reuse sludge and waste generated in the area?	
Is the runoff flow along roads significant?	
Can this flow be diverted and treated?	
STAKEHOLDER MAPPING	
Who are the key stakeholders related to urban water sectors in the area?	
Who are the key stakeholders from other urban sectors that are relevant for teh project?	
Which are the main agencies working for urban water sectors in this area?	
Are any private or informal entities also involved in service provision related to urban water sectors? If so, are these services charged?	
What is the role of each agency: formal and informal?	
Who are the key service providers during lean period?	
Do these agencies work in an integrated manner?	
Who are the key stakeholders at the community level?	
Which are the key agencies or stakeholders responsible in case of disasters or extreme events like floods?	
Who are the most vulnerable stakeholders? Women/children/marginalized communities/senior citizens/ social groups, etc.	
What makes these stakeholders vulnerable?	
Who would represent marginalized community, women, senior citizens and youth in the Committee?	
What will be the role of each member of the Project Committee?	
Who could act as a local Champion to head the Project Committee should be identified. Example: Councillor.	
IMPACTS OF CLIMATE CHANGE	
What changes have the stakeholders observed over years in the project area with respect to temperature, precipitation and extreme events?	
Are these trends increasing or decreasing?	
What is the impact of these trends on Urban Water Loop and water resources in the area?	
How does the community combat these impacts of climate change?	
Are there any local adaptation measures for water management in the area?	
Have you faced extreme events or disasters in the past?	
What kind of damages have these extreme events caused?	

PRIORITIZED PROJECT FROM IUWM ACTION PLAN		RESPONSE
Who are the most vulnerable stakeholders impacted or likely to be impacted by such events?		
Which spatial areas are most susceptible to these disasters or extreme events?		
Are any measures planned to tackle extreme events or disasters in future?		
What additional measures are required for climate preparedness?		
RESTRUCTURE SELECTED PROJECT TO SUIT THE LOCAL CONTEXT		
Does the selected project address the key urban water sector issues that have been identified for the project area?		
How can this project help achieve Integration Targets in the selected area?		
Scope of the project	What components need to be included for the project to meet the Integration Target?	
	How will these components address concerns of the local level issues related to urban water sectors?	
	How will the project components address key stakeholders in the area?	
	Are the project components adequately incorporating co-benefits between urban water sectors?	
	Are the project components adequately incorporating co-benefits between urban water sectors and other urban sectors?	
	How will the project address the vulnerable and marginalized stakeholders?	
	What kind of community mobilization is required for project implementation?	
	Who are the marginalized stakeholders in the area that can provide employment under the project? Any BPL stakeholders or stakeholders registered under National Urban Livelihood Mission?	
	How does the project address the existing Master plan and other schemes proposed for the area?	

ANNEXURE XV

ANNEXURE XV: GUIDANCE QUESTIONS FOR FINALIZATION OF PROJECT SCOPE

PRIORITY PROJECT 1	FINALIZATION OF PROJECT SCOPE AND DETAILS	
	Is the project adequately addressing the IUWM-based Vision for the city?	
	Would the project be able to achieve the Integration Targets set for the city?	
	Are any modifications required to the project to adequately address: ● Issues related to Urban Water Loop at the local level ● Requirements of urban poor and marginalized ● Impacts of climate change on water ● Local adaptation measures ● Gender balance ● Local context ● Environmental concerns ● Any additional aspects or interventions or stakeholders not addressed already?	
	PROJECT IMPACTS	
	Can the project have any negative impacts? ● On which area? ● On which stakeholders? ● What would be the nature of this negative impact?	
	Any negative environmental impacts?	
	What is the extent of these negative impacts (low/medium/high)?	
	How can these impacts be addressed?	
	How can the community help in mitigation of these impacts?	
	PROJECT SUSTAINABILITY	
	Are there any existing government schemes that can be used for project implementation?	
	Are there any private sector players who can invest in project implementation?	
	Can the community give in kind or other contributions towards the project?	
	How will the project generate revenue? Or is the project completely meant for social upliftment?	
	What are the O&M requirements related to the project?	
	What resources are required to undertake O&M activities?	
	How much would it cost?	
	Where can we get these funds from?	
	Is the project resilient to disasters and extreme events?	
	Is there a disaster mitigation plan in place?	
	Which department would be the Nodal Agency in case of a disaster?	
	Any risks associated with project implementation?	
	Any additions or modifications to be made to the financial sustainability plan of project?	
	INSTITUTIONAL INTEGRATION, CAPACITY BUILDING AND TRAINING	
	How will we ensure Institutional Integration for this project?	
	Which are the key departments related to the project?	
	What would be the role of Project Committee?	
	What would be the role of the community?	
	What would be the complaint redressal mechanism?	
	What are the training requirements needed for project implementation?	
	What awareness generation activities are required?	
	What approvals or clearances would be required for the project?	
	Which are the Nodal departments for these clearances?	
	What would be role and responsibility of each government department involved?	

ANNEXURE XVI

ANNEXURE XVI: O&M FRAMEWORK

Project	What aspects require O&M	Who will undertake O&M	Who will fund O&M activities	How frequently is O&M required	Complaint redressal system

Step by Step Process for IUWM

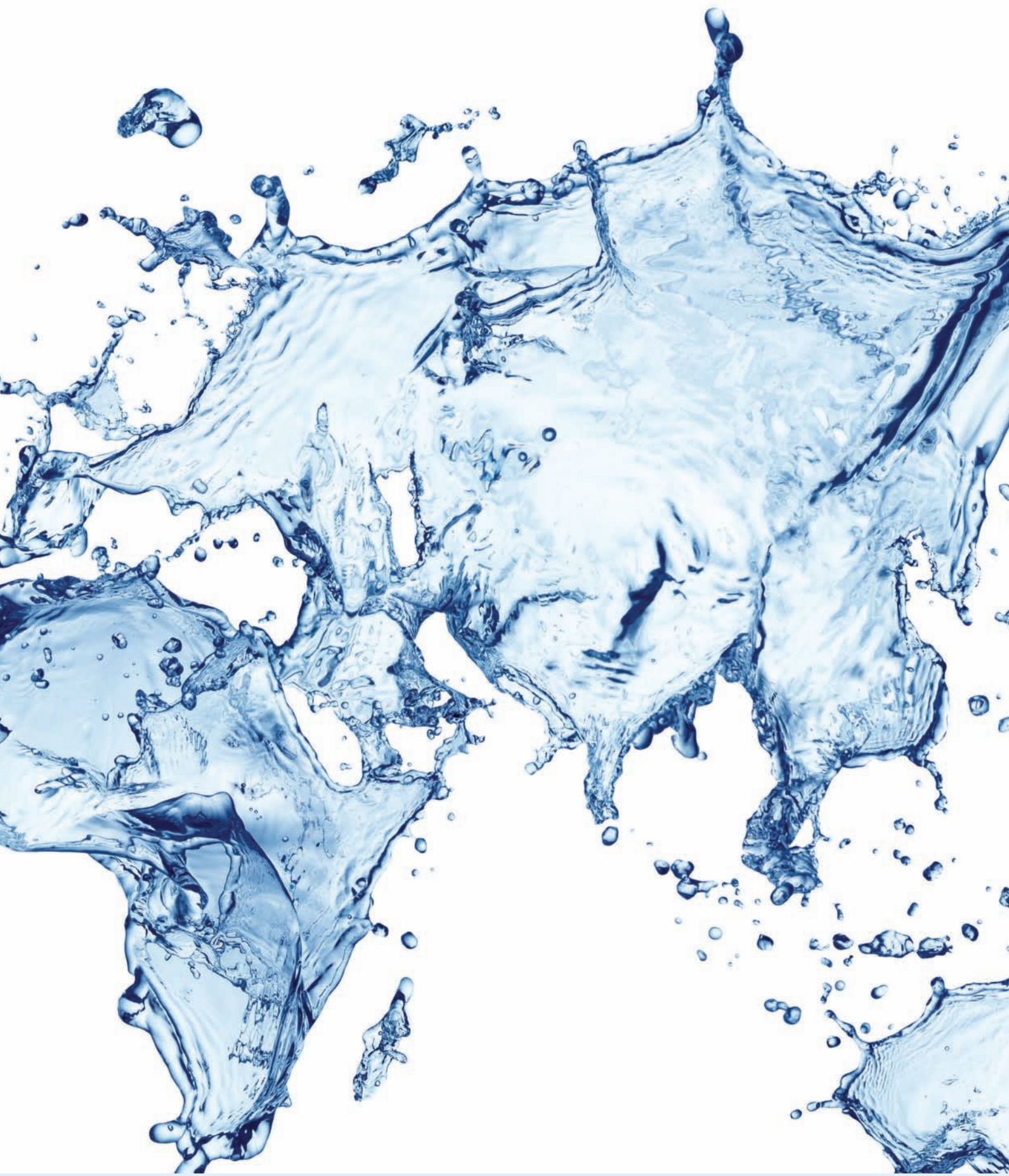
STAGE – VI

ANNEXURE

ANNEXURE XVII

TOOL XVII: MONITORING FRAMEWORK

IUWM-BASED VISION FOR THE CITY	INTEGRATION TARGET FOR SELECTED PROJECT	PARAMETER	MONITORING FRAMEWORK				
			INDICATOR TO BE MONITORED	AGENCY RESPONSIBLE FOR MONITORING	HOW TO MONITOR	FREQUENCY OF MONITORING	ROLE OF PROJECT COMMITTEE IN MONITORING
		Technical soundness					
		Social inclusiveness					
		Environmental sustainability					
		Financial feasibility					



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