

# Enabling Integrated Urban Water Management in Indian Cities Through Statutory, Regulatory, And Administrative Frameworks

## Case of Mumbai, Maharashtra

SAYANTANI SIKDAR

Global South Academic Conclave on WASH and Climate linkages

2<sup>nd</sup> - 4<sup>th</sup> February 2024, Ahmedabad

**CWAS** CENTER  
FOR WATER  
AND SANITATION  
**CRDF** CEPT  
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FACULTY OF PLANNING  
AHMEDABAD

# Water Stress



If per capita water availability keep decreasing then there will be a negative impact on the country's GDP by 2050,

Source : Adobe Stock, Hidden Waters Blog, World Bank,

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With **MUMBAI** contributing **6.16%** to India's current GDP

And What started of as a conglomeration of seven islands, gradually kept undergoing land reclamation, and transformed into the financial capital of India,

Source : Adobe Stock, Hidden Waters Blog, World Bank,

## MUMBAI - FINANCIAL CAPITAL OF INDIA LAND RECLAMATION



# Water Stress



If per capita water availability keep decreasing then there will be a negative impact on the country's GDP by 2050,

With **MUMBAI** contributing **6.16%** to India's current GDP

,Where the major reclamation was along the mithi river basin

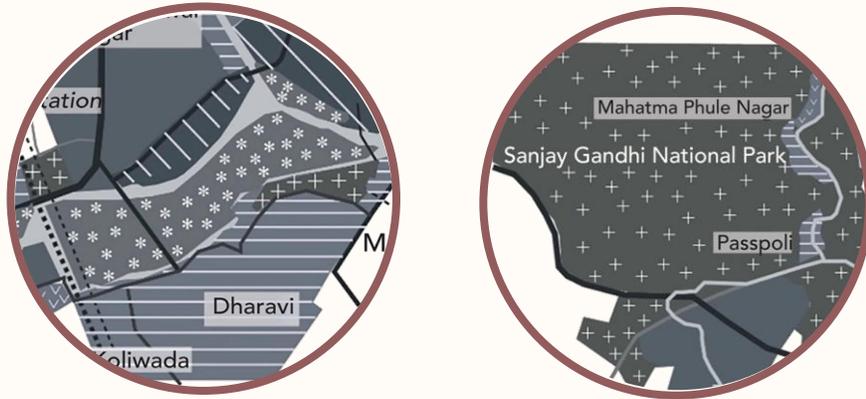
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## MUMBAI - FINANCIAL CAPITAL OF INDIA LAND RECLAMATION



# Mumbai- Mithi River Basin

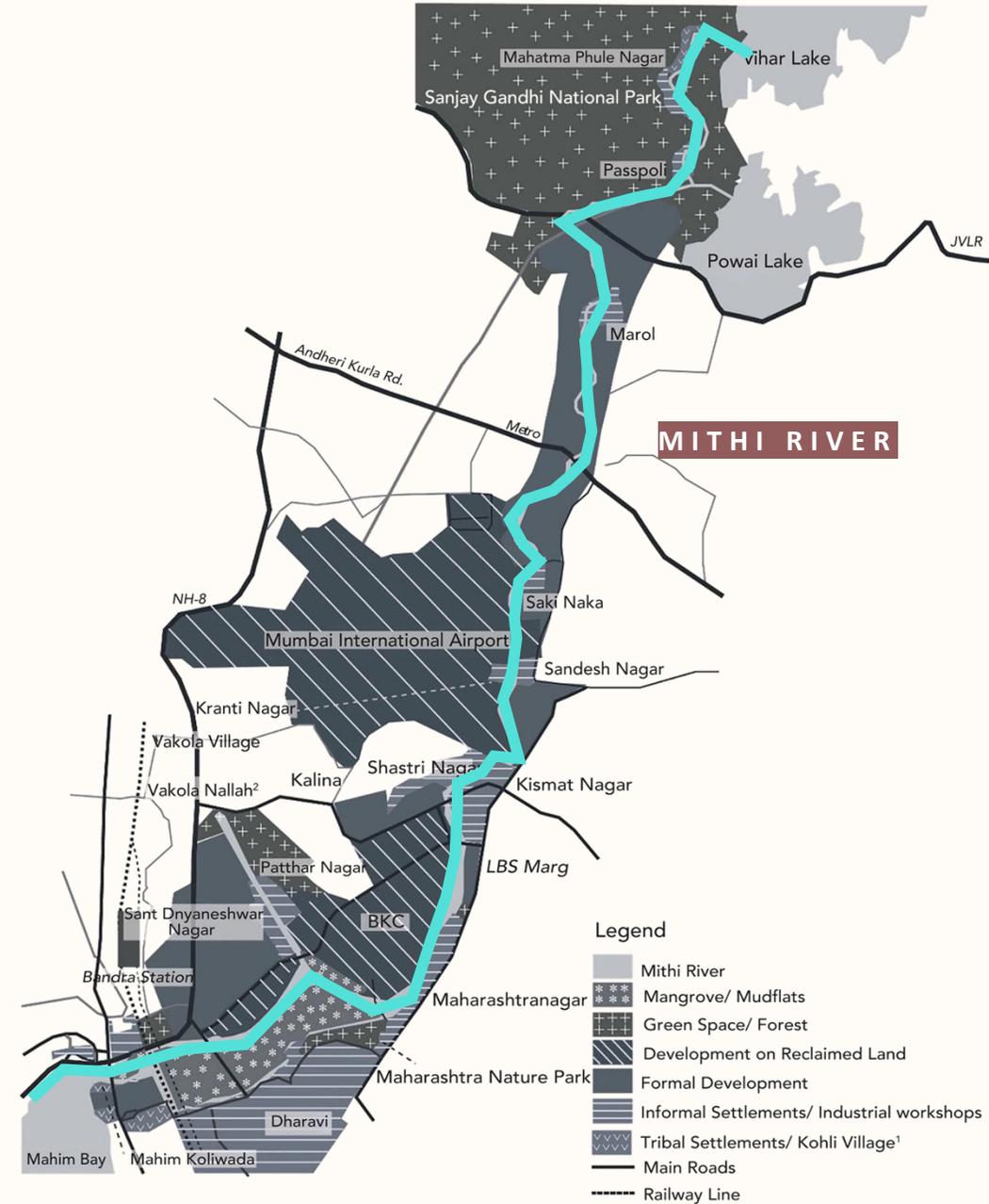
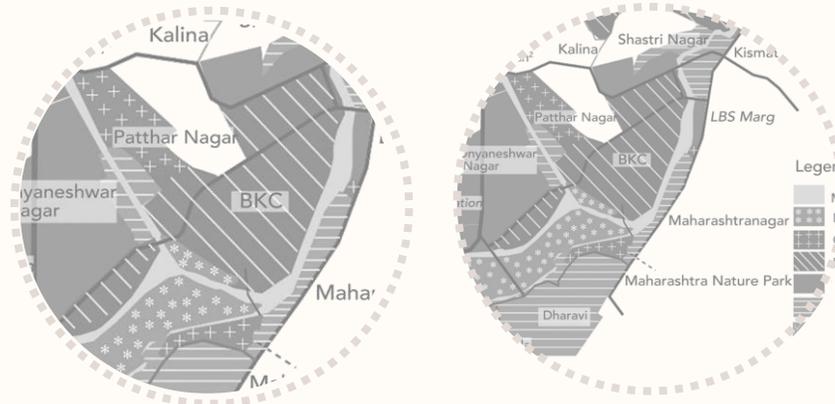
Mangroves & green spaces



Development on reclaimed land



Informal settlements / industries

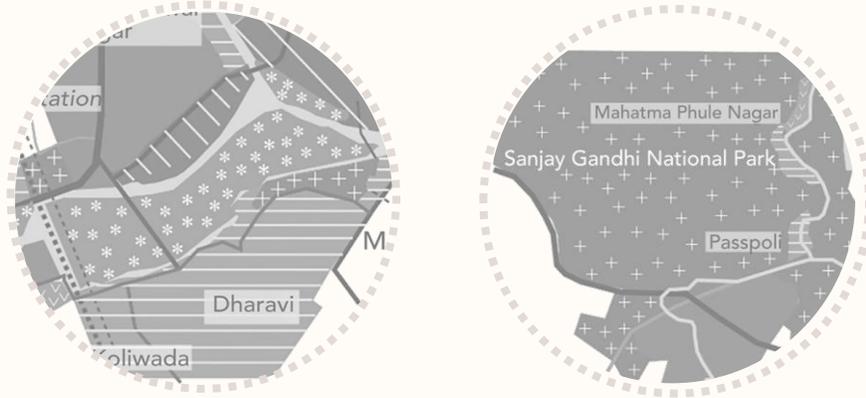


1. Aboriginal fishing community  
2. Tributary of Mithi

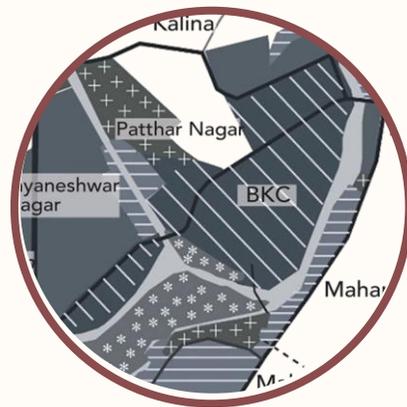
Source : Adapted from IJURR

# Mumbai- Mithi River Basin

## Mangroves & green spaces



## Development on reclaimed land



## Informal settlements / industries



### Legend

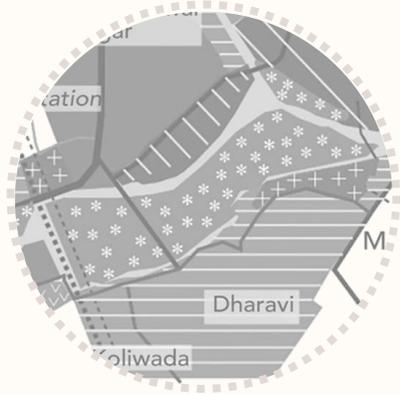
- Mithi River
- Mangrove/ Mudflats
- Green Space/ Forest
- Development on Reclaimed Land
- Formal Development
- Informal Settlements/ Industrial workshops
- Tribal Settlements/ Kohli Village<sup>1</sup>
- Main Roads
- Railway Line

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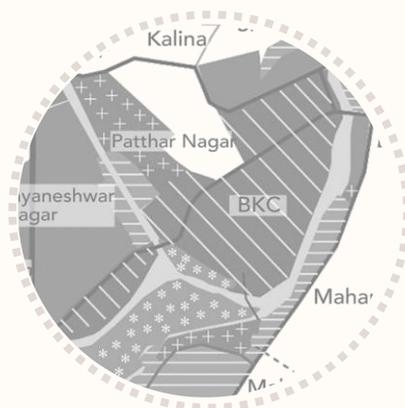
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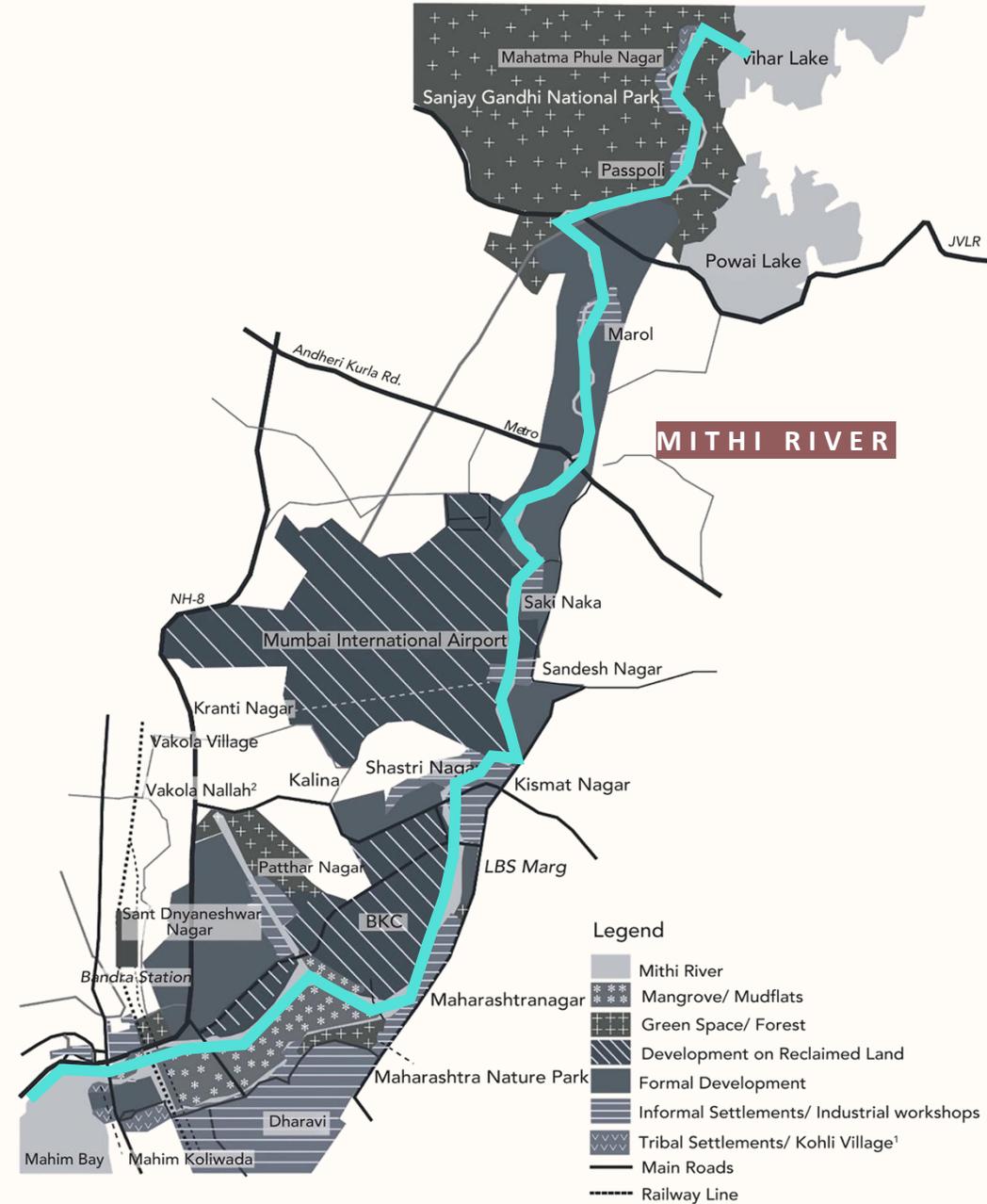
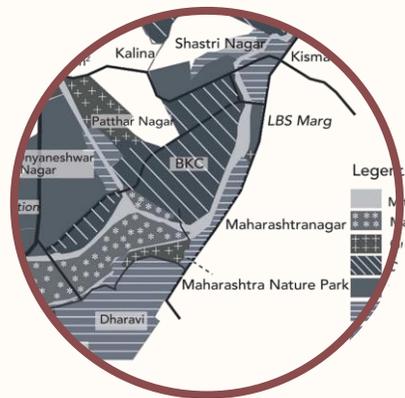
## Mangroves & green spaces



## Development on reclaimed land



## Informal settlements / industries



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Source : Adapted from IJURR

# MUMBAI- Stormwater, Sewage & Water supply, Groundwater And Surface Water On Ground Issues

**31.3%** of the area in informal settlements are at risk of flooding

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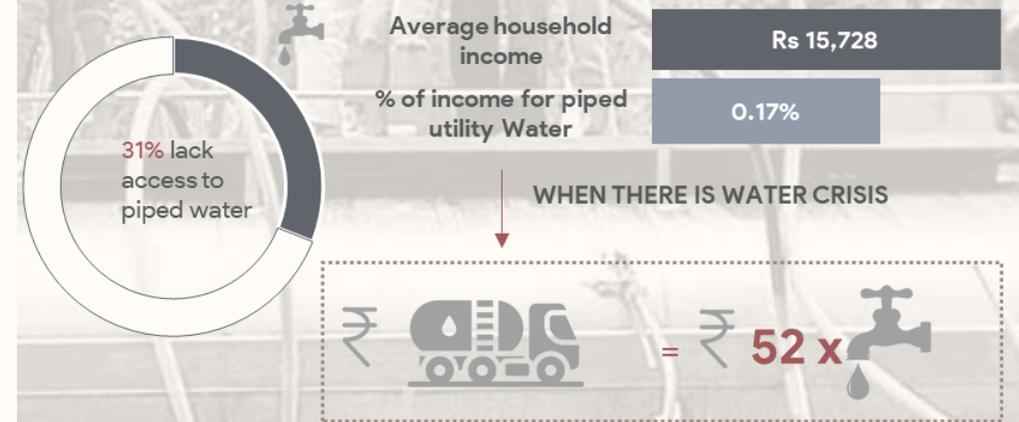
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# Mithi River Basin



Change in water colour of Mithi river was visible as it passes different zones

LAKE

RIVER + GARBAGE

RIVER + GARBAGE + INDUSTRIAL WASTE



“Mithi is the most polluted river in the state” - MPCB

# Mithi River Basin



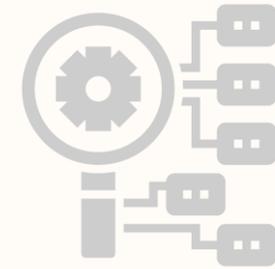
commercial, residential and industrial areas of Mumbai

- LAKE
- RIVER + GARBAGE
- RIVER + GARBAGE + INDUSTRIAL WASTE



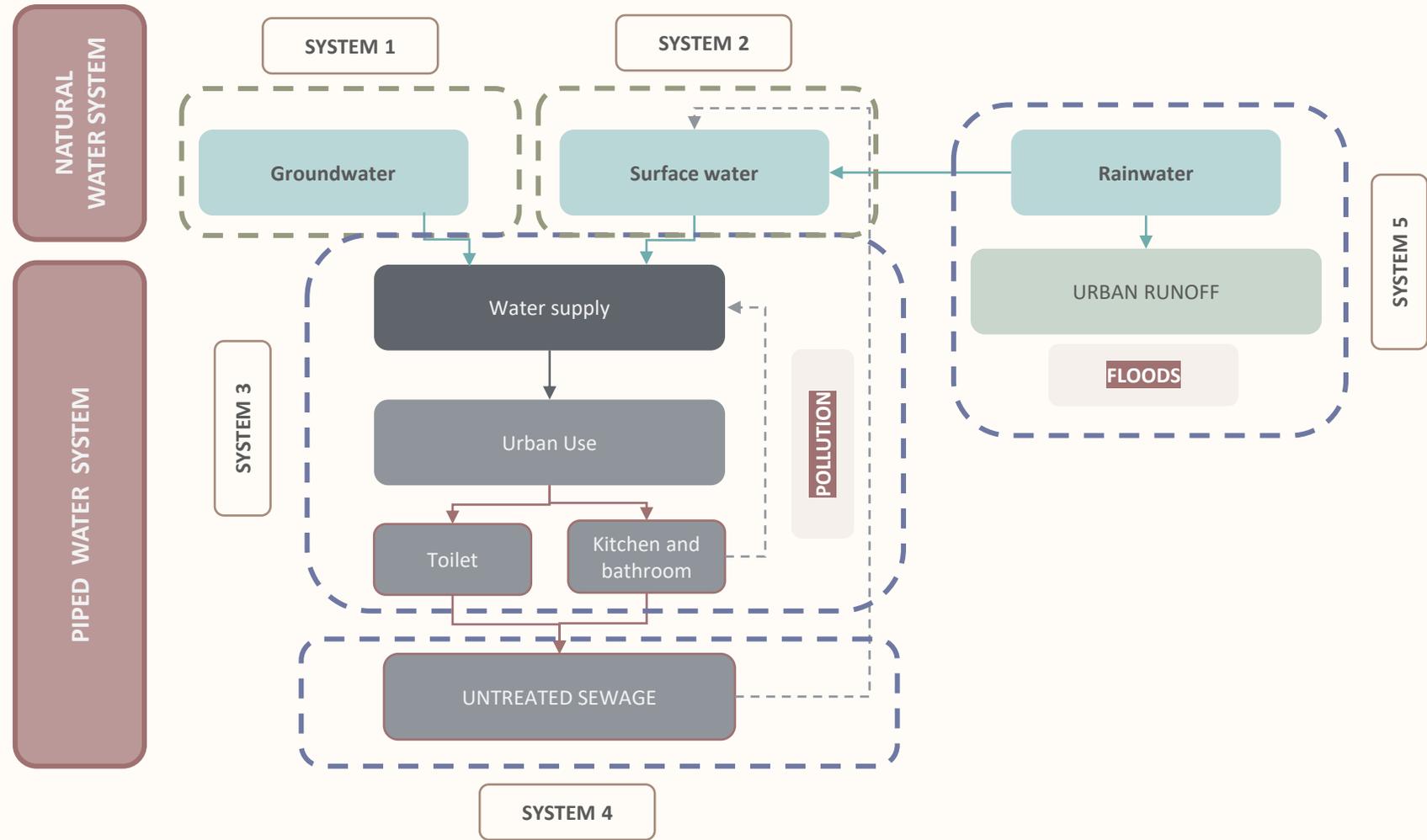
“Mithi is the most polluted river in the state” - MPCB

**Why are such  
issues  
occurring ?**



# Mumbai Water Management

## "SILO" WATER MANAGEMENT STYLE



Source : Author

the 5 water systems under natural water system and piped water system, are managed in a "SILO" WATER MANAGEMENT STYLE

**How can we  
solve the  
management  
issue**

# Need of the Study

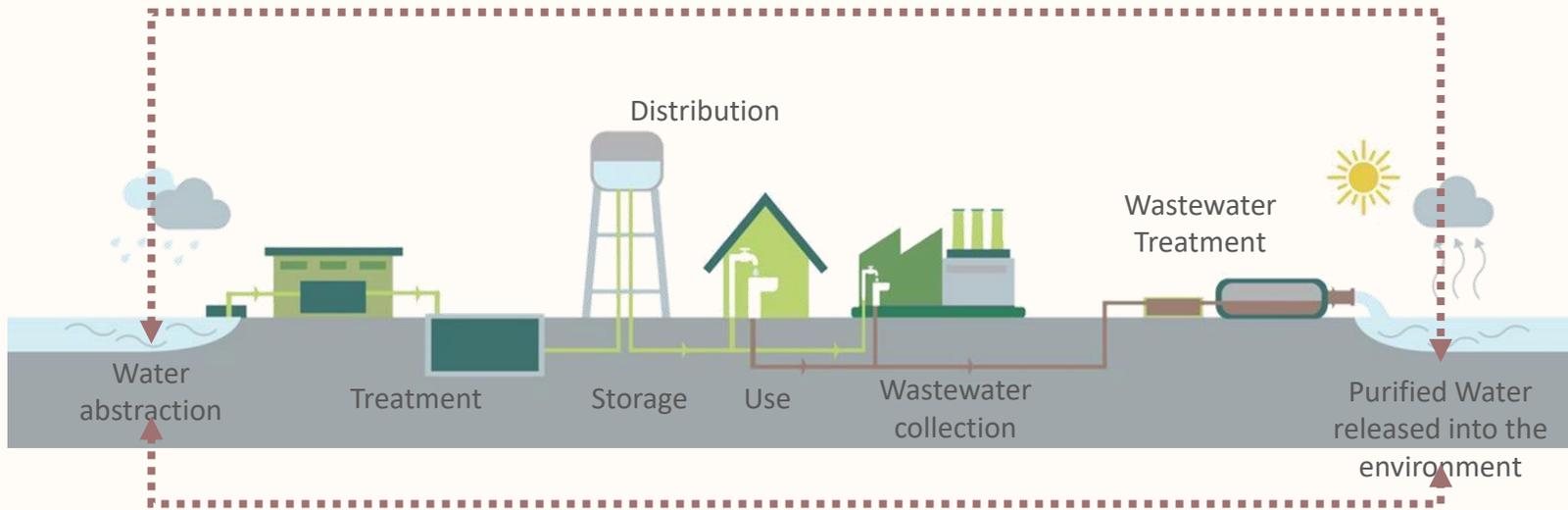
SYSTEMS STRATEGY



URBAN WATER CYCLE



WATER SHOULD BE TREATED AS ONE



URBAN WATER LOOP

– SDG GOAL 6

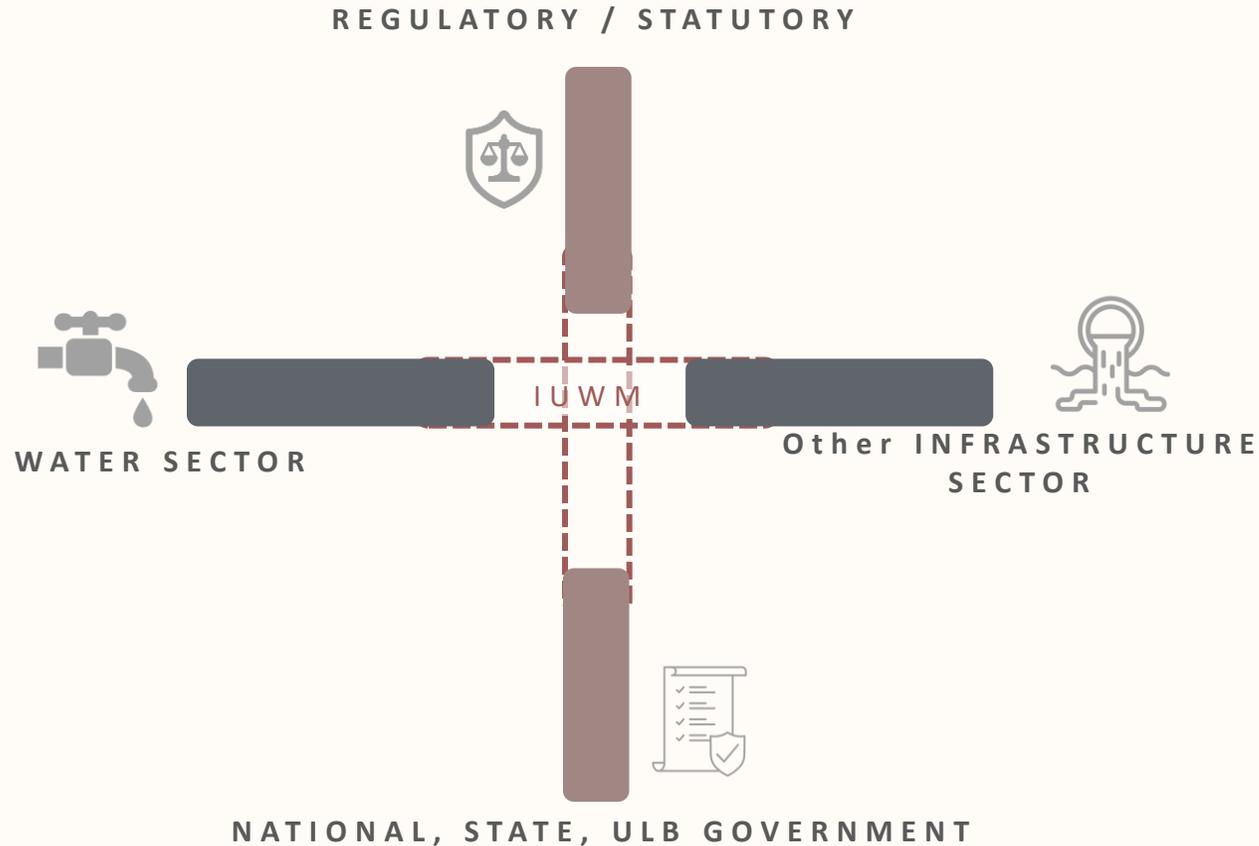


SDG GOAL 6

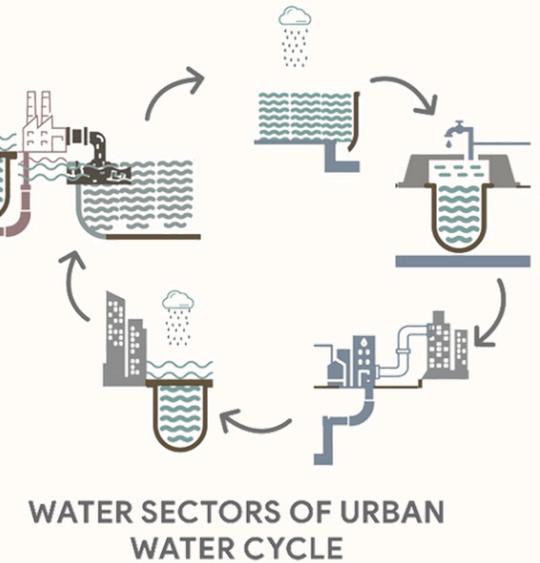
water is needed To be a "systems" strategy that takes the entire urban water cycle into account which can be dealt through sustainable urban water management,

# Integrated Urban Water Management

Requirement of horizontal and vertical coordination



ALL LEVELS OF GOVERNANCE



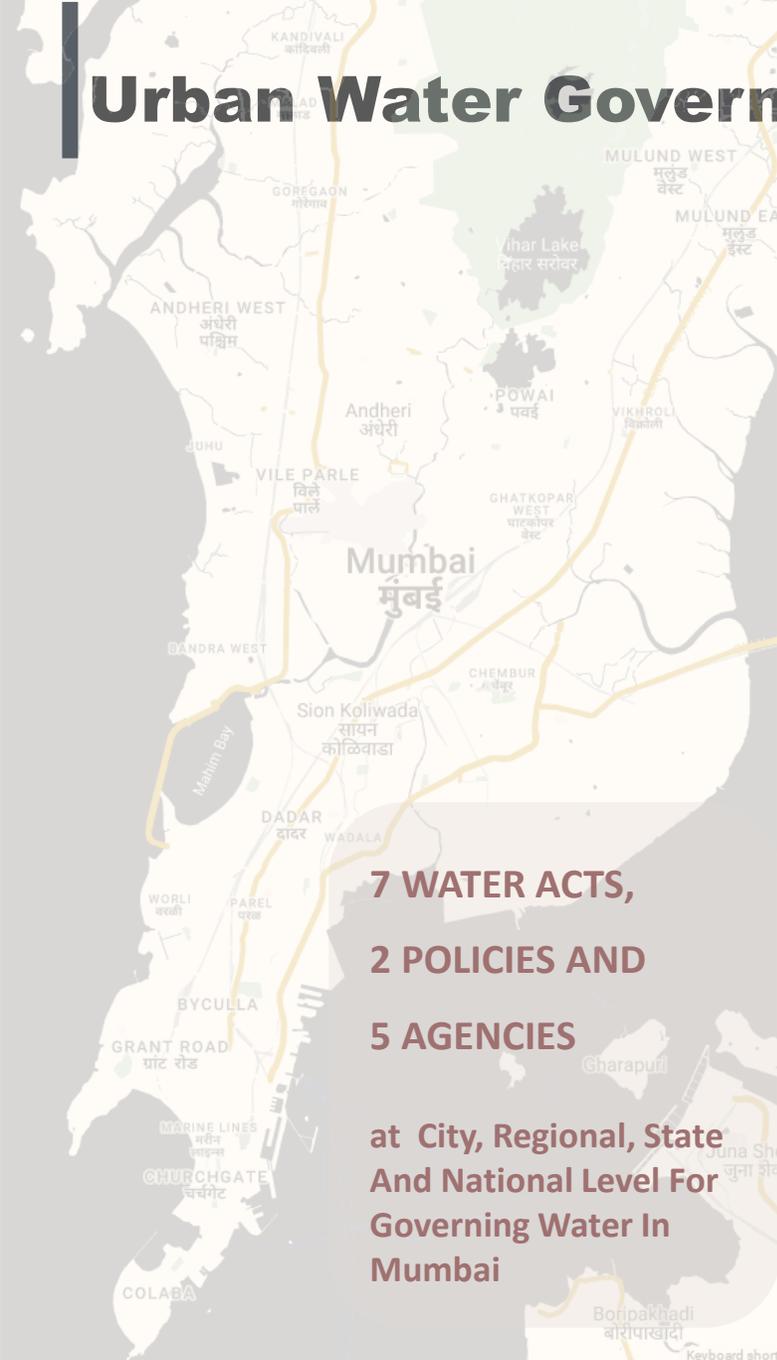
= INTEGRATED URBAN WATER MANAGEMENT

Which is Integrated Urban Water management through vertical coordination across all levels of governance and horizontal coordination among the water sectors.

Source : Author

# **How to enable Integrated Urban Water Management in Mumbai ?**

# Urban Water Governance of Mumbai



**7 WATER ACTS,  
2 POLICIES AND  
5 AGENCIES**

**at City, Regional, State  
And National Level For  
Governing Water In  
Mumbai**

7. The water (prevention and control of pollution) act, 1974

3. Maharashtra municipal corporation act, 1949

4. Maharashtra groundwater (development and management) act, 2009

5. Maharashtra groundwater (regulation for drinking water purposes) act, 1997

6. Maharashtra water resources regulatory authority act, 2005

2. The Mumbai metropolitan region development authority act, 1974

1. Mumbai municipal corporation act, 1888

3. Central ground water board, ministry of jal shakti

1. Maharashtra pollution control board

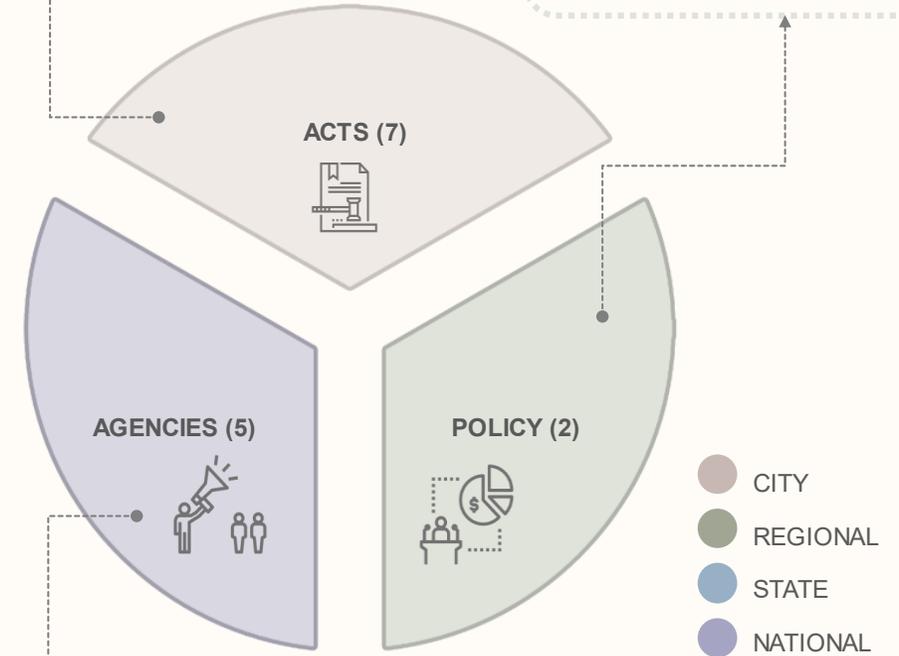
2. Maharashtra water resources regulatory authority

2. Mumbai Metropolitan Regional Development Authority

1. Municipal Corporation for Greater Mumbai

2. National water policy 2012

1. Maharashtra state water policy 2011



Source : Author

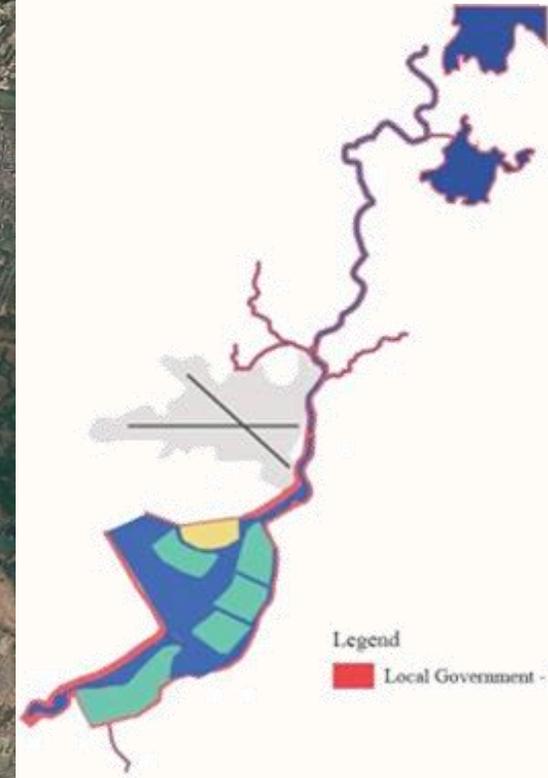
# Mithi River Basin



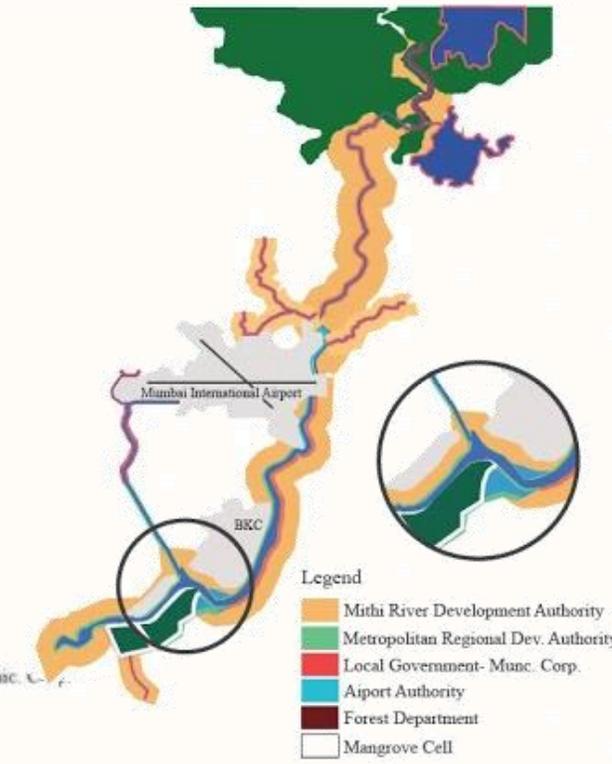
Source : Author

And mithi river, the SAME SURFACE WATER is UNDER VARIOUS AUTHORITIES under different levels of governance,

Mithi river governance during 1960s



Mithi river governance post 2005 floods



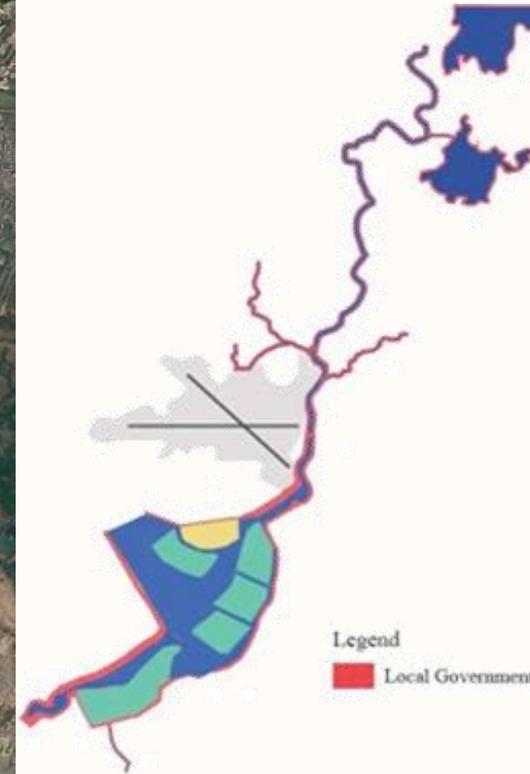
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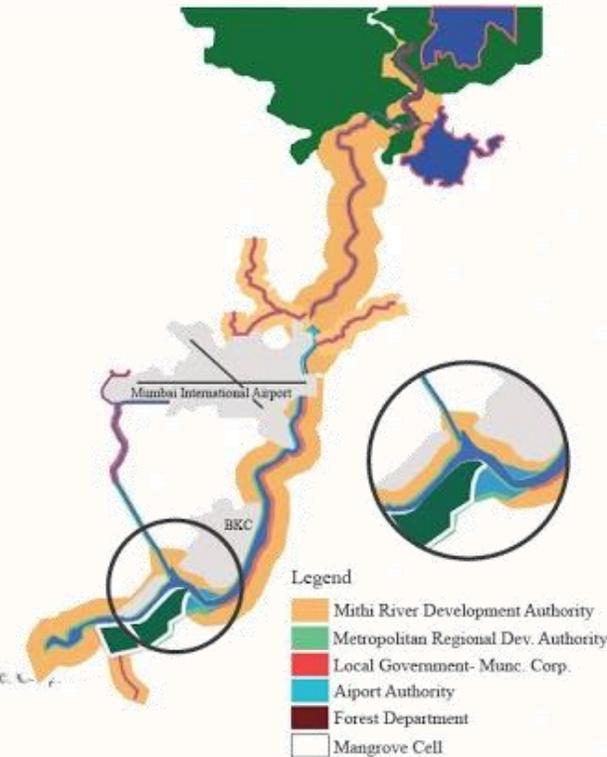


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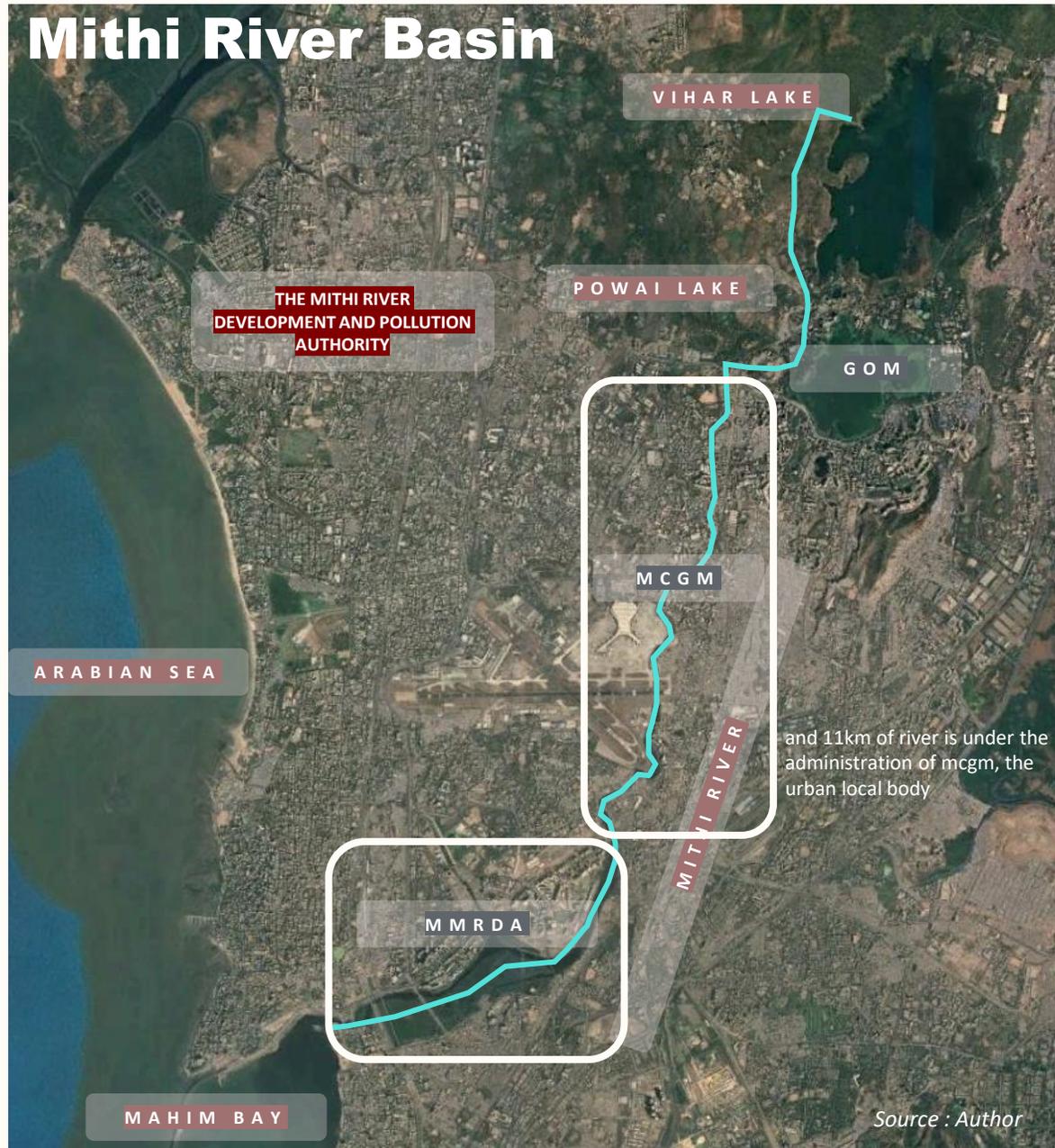


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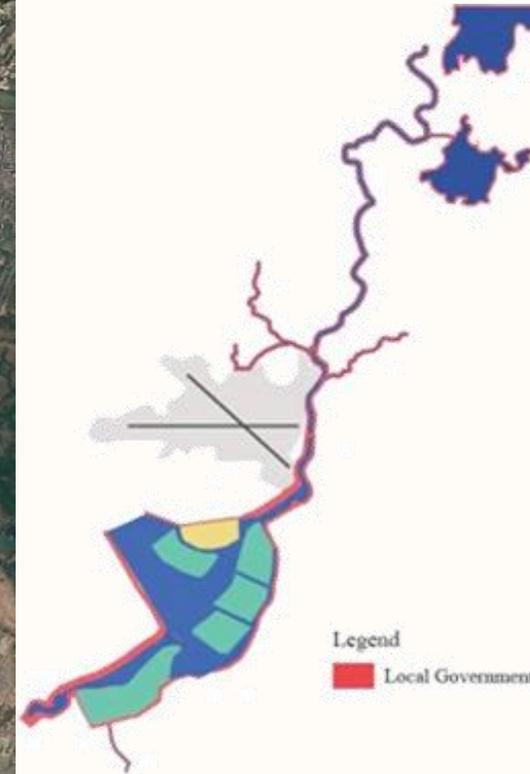
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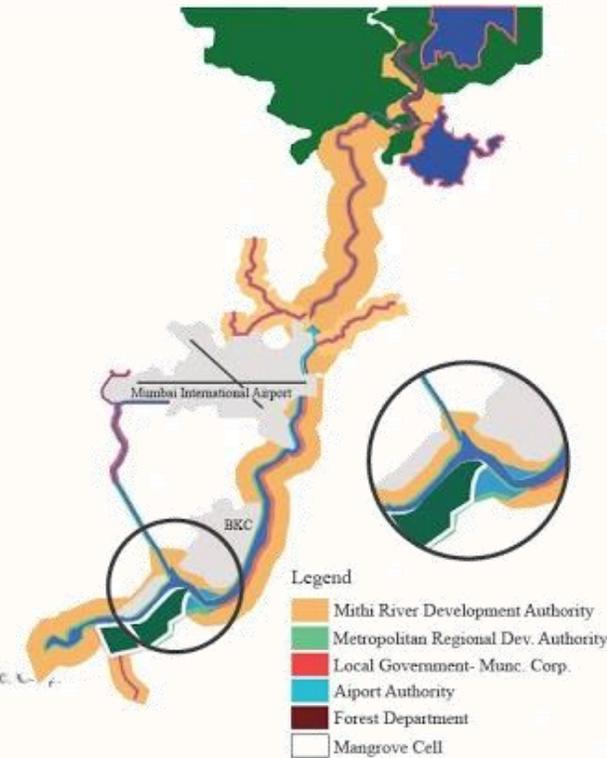


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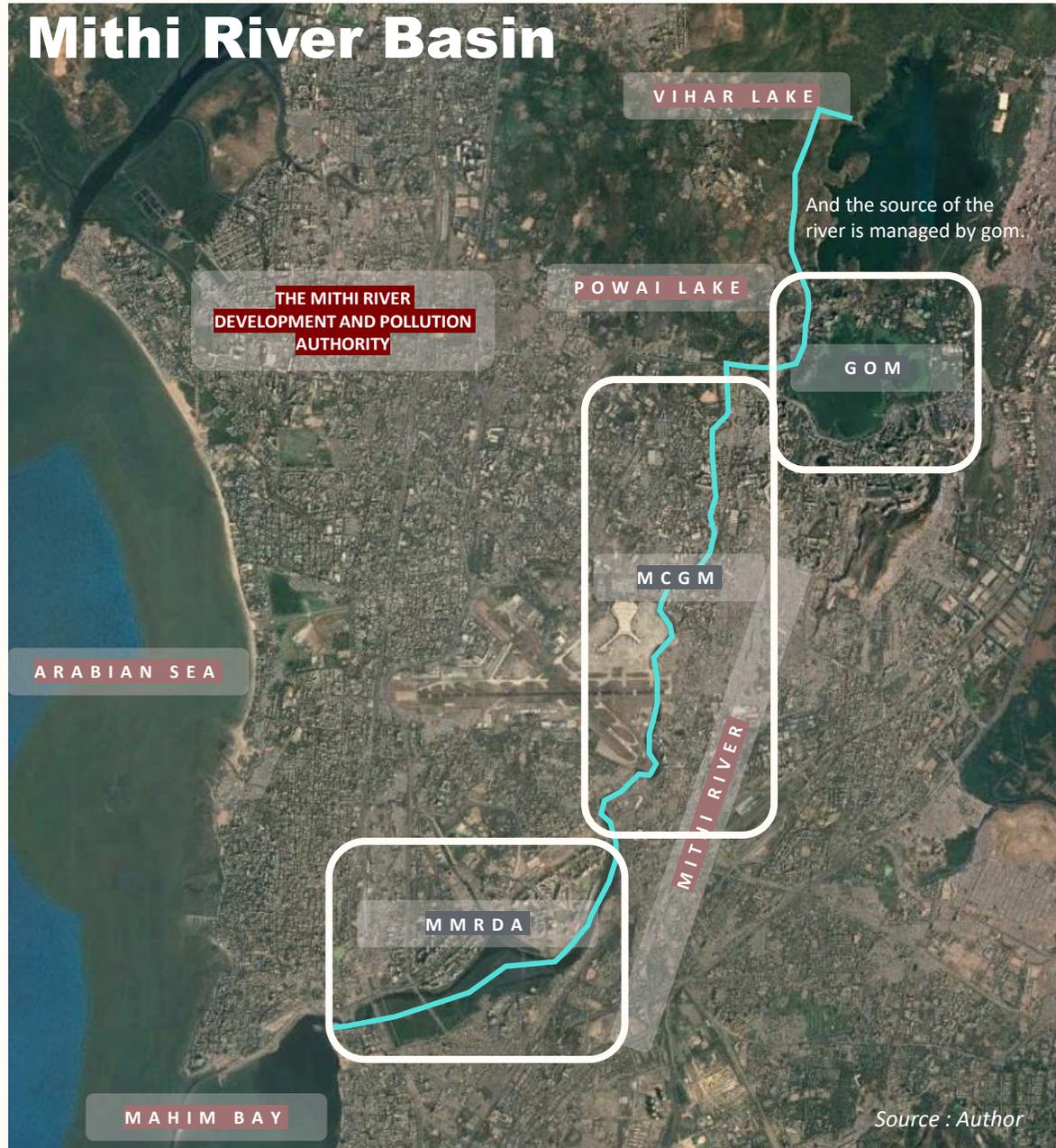


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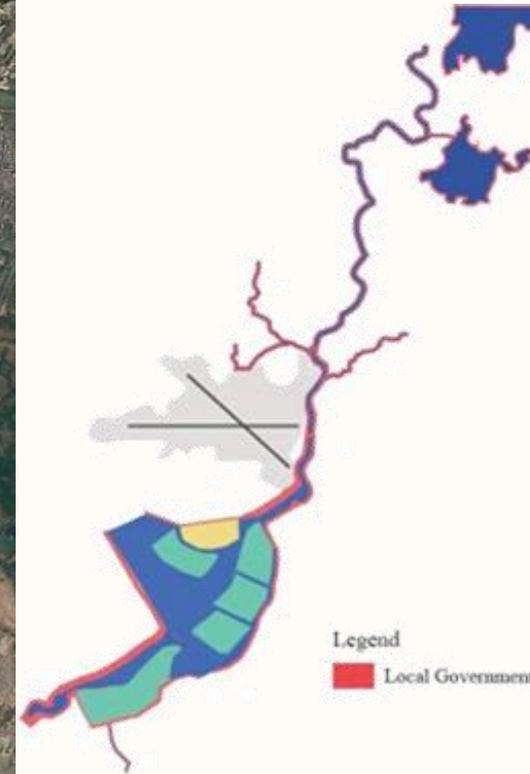
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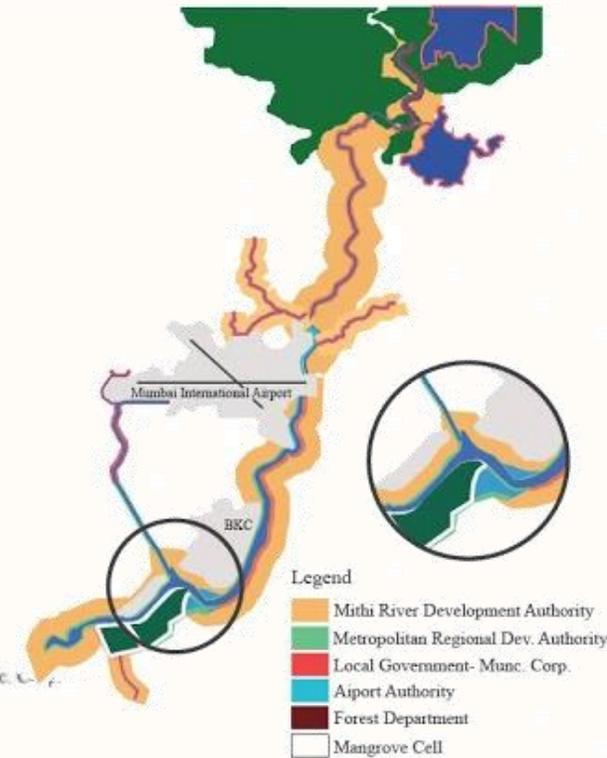


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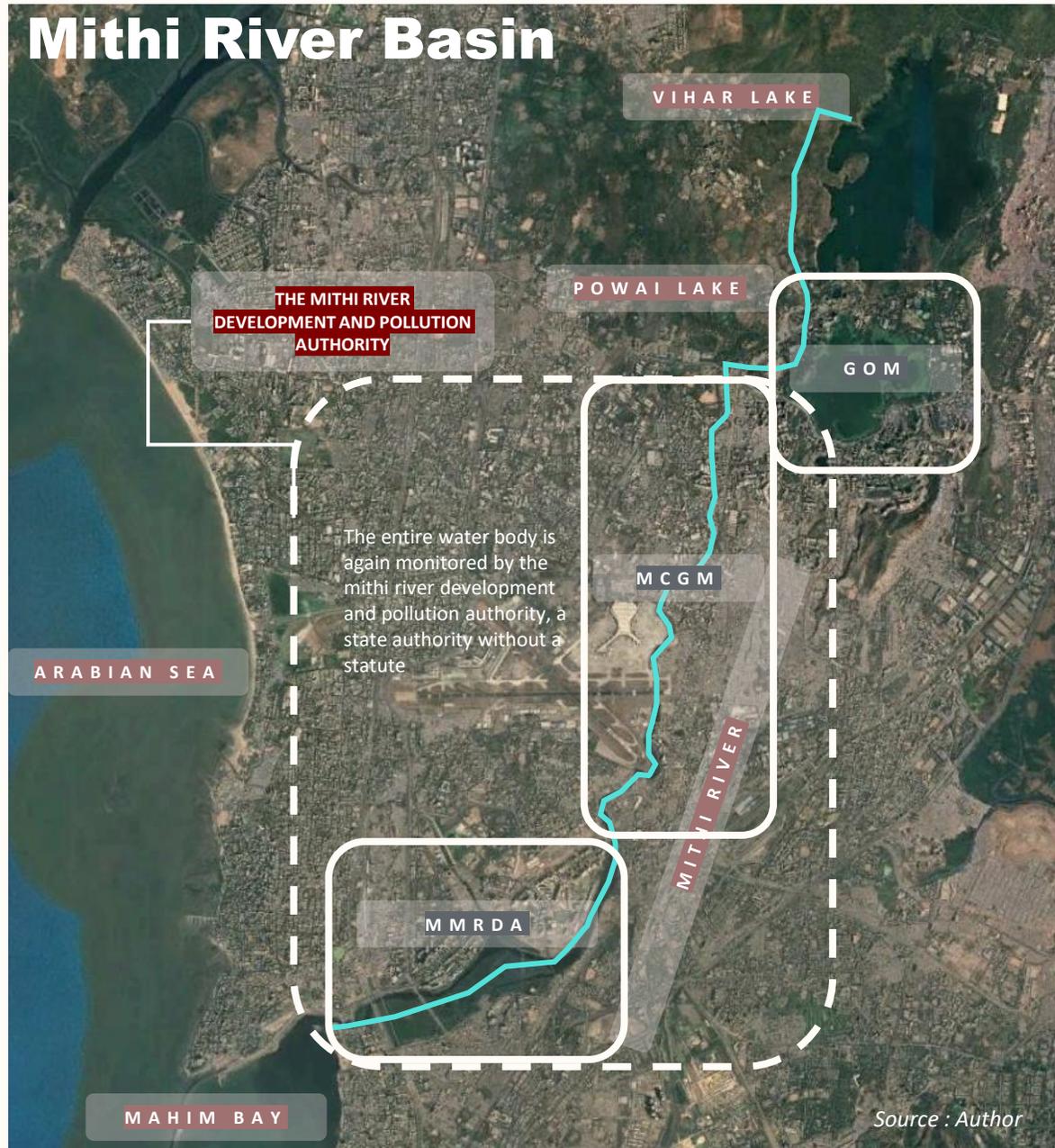


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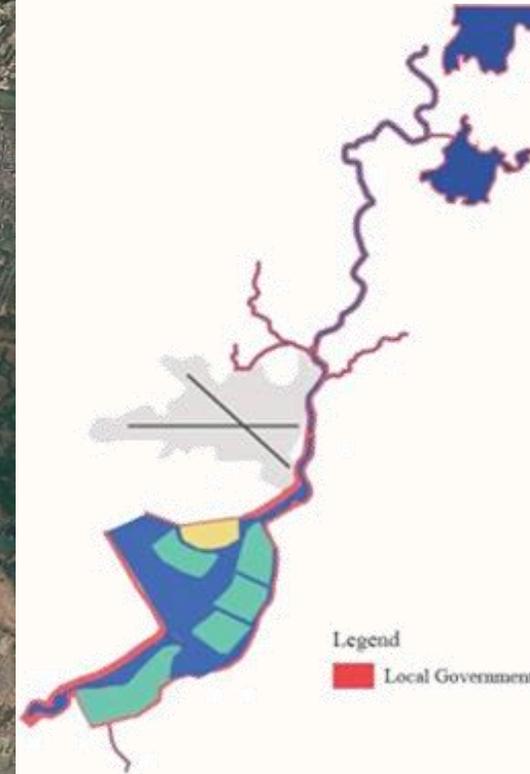
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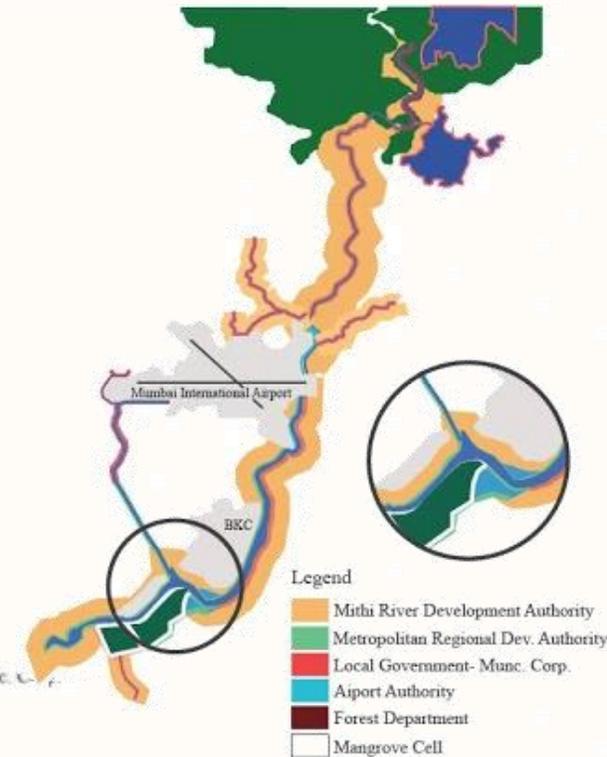


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# ISSUES IN STATUTORY, REGULATORY, ADMINISTRATIVE, INSTITUTIONAL FRAMEWORK through primary & secondary studies

WATER SECTOR	ISSUES IN FRAMEWORK			
	Statutory	Regulatory	Administrative	Institutional
				
SURFACE WATER				
SEWAGE	✓	✓	✓	
STORMWATER		✓		
WATER SUPPLY	✓		✓	
GROUNDWATER	✓		✓	

-  Issues in S/R/A/I Framework
-  Issues in P/I/M

S – Statutory  
 R – Regulatory  
 A – Administrative  
 I – Institutional

P – Planning  
 I – Implementation  
 M – Monitoring

on meeting various stakeholders of MCGM, water tankers, people of gated communities, this table was mapped to note that there are issues in s/r/a/i framework

Source : Author

# ISSUES IN STATUTORY, REGULATORY, ADMINISTRATIVE, INSTITUTIONAL FRAMEWORK through primary & secondary studies

WATER SECTOR	ISSUES IN FRAMEWORK				ISSUES IN NATURE OF WORK		
	Statutory	Regulatory	Administrative	Institutional	Planning	Implementation	Monitoring
							
SURFACE WATER							
SEWAGE	✓	✓	✓				
STORMWATER		✓				✓	
WATER SUPPLY	✓		✓			✓	
GROUNDWATER	✓		✓			✓	

which are leading to issues in the nature of work of p/i/m across all the water sectors of mumbai.

-  Issues in S/R/A/I Framework
-  Issues in P/I/M

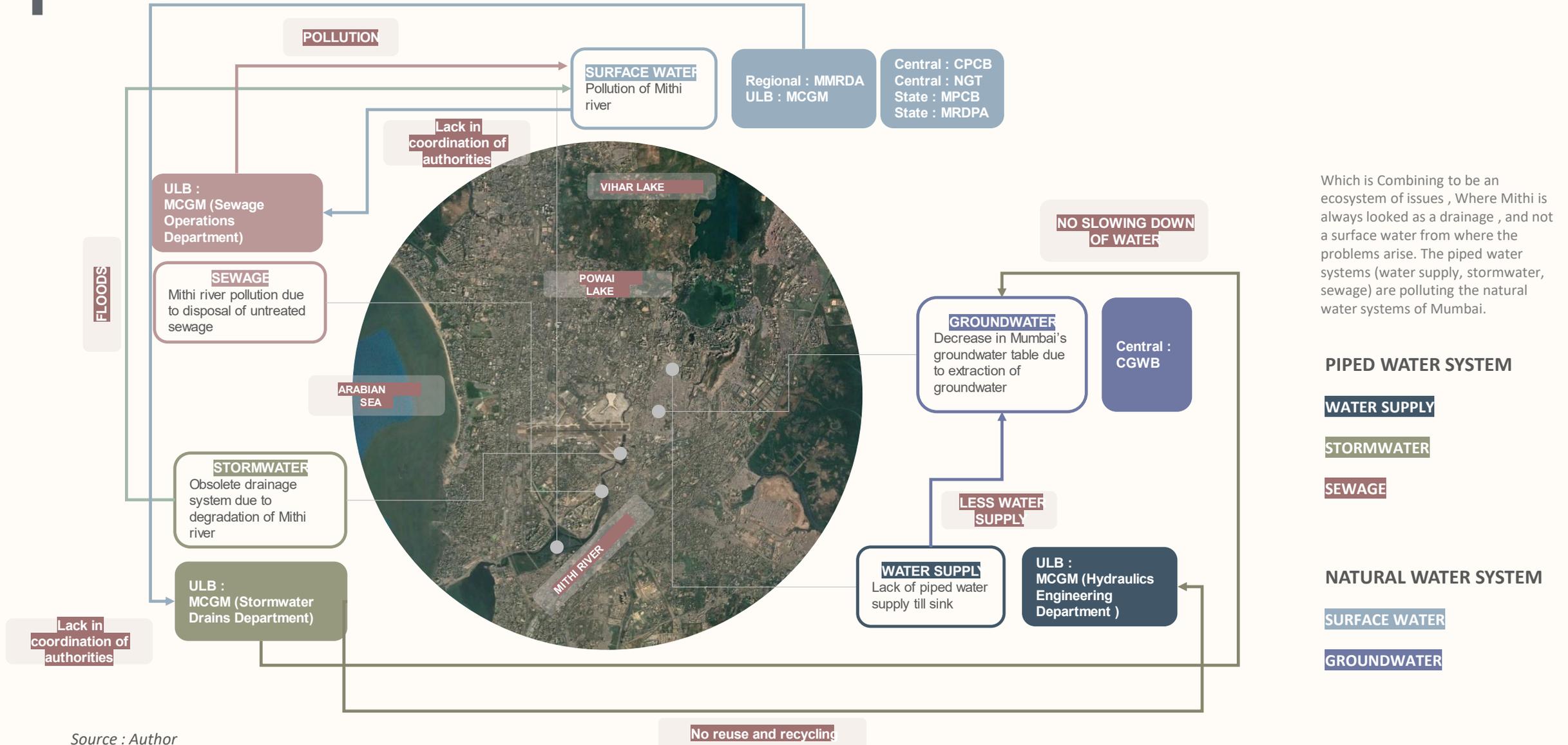
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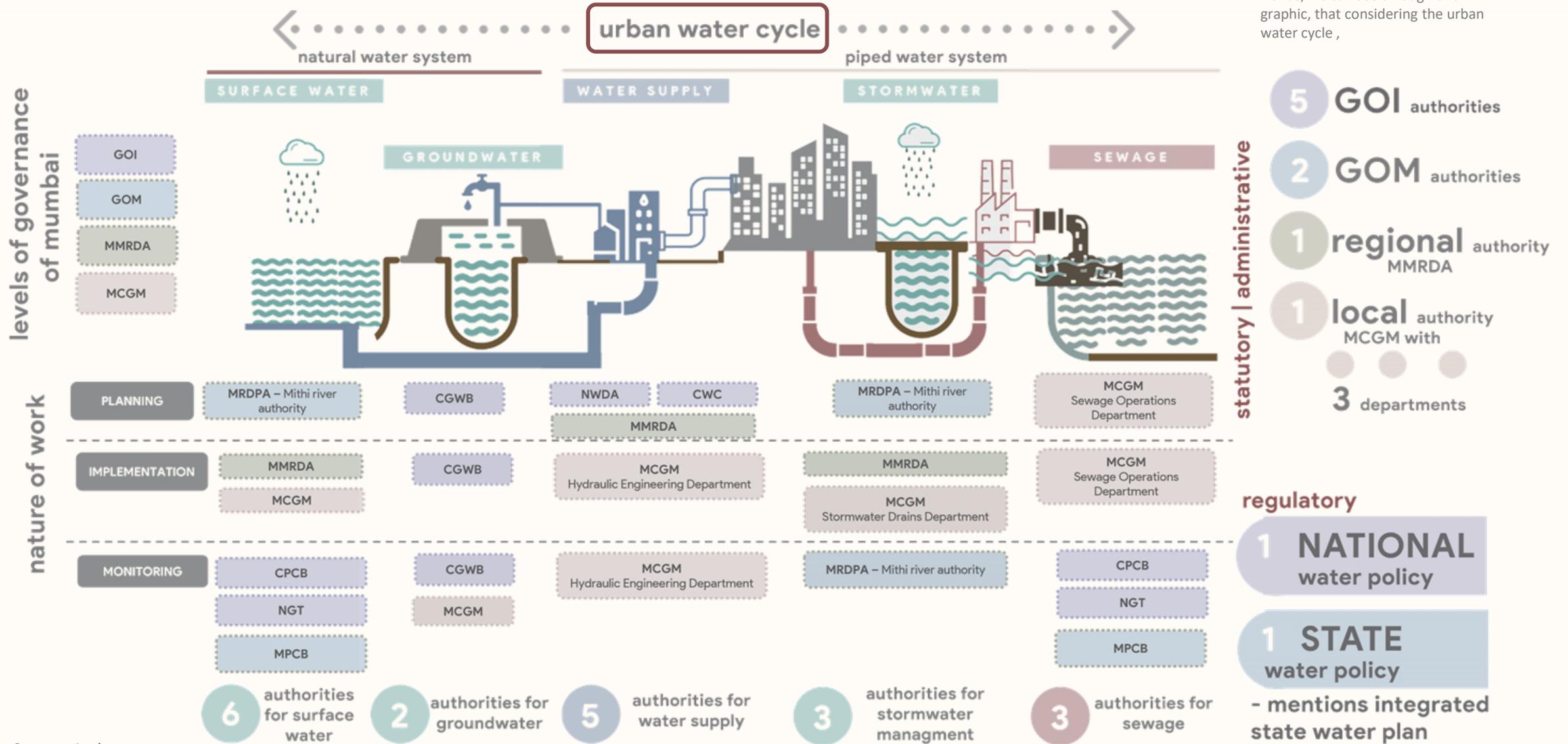
# Ecosystem Of Issues

Mithi is always looked as a DRAINAGE , and not a surface water



Source : Author

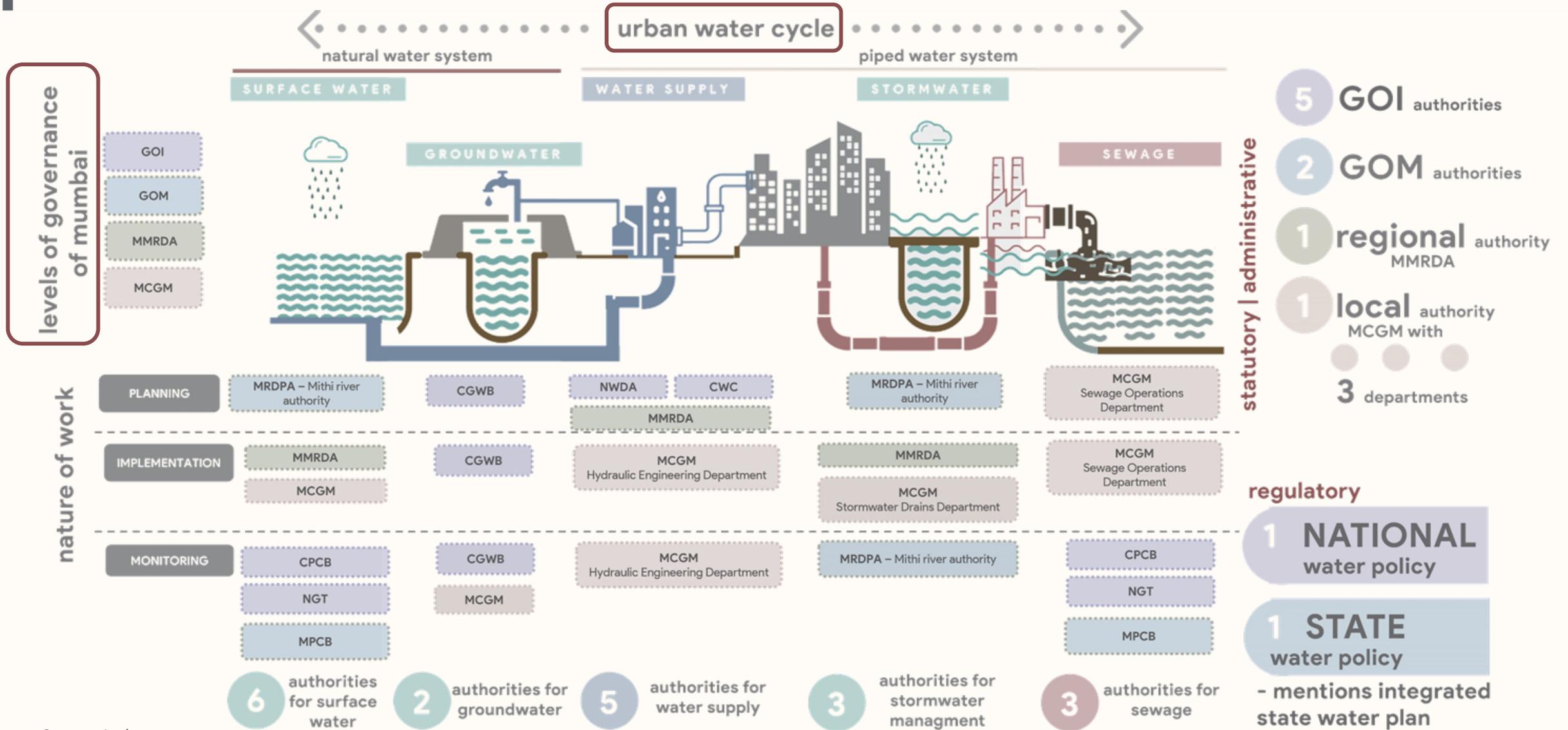
# Existing Urban Water Framework For Mithi River



Hence, we can see through this graphic, that considering the urban water cycle,

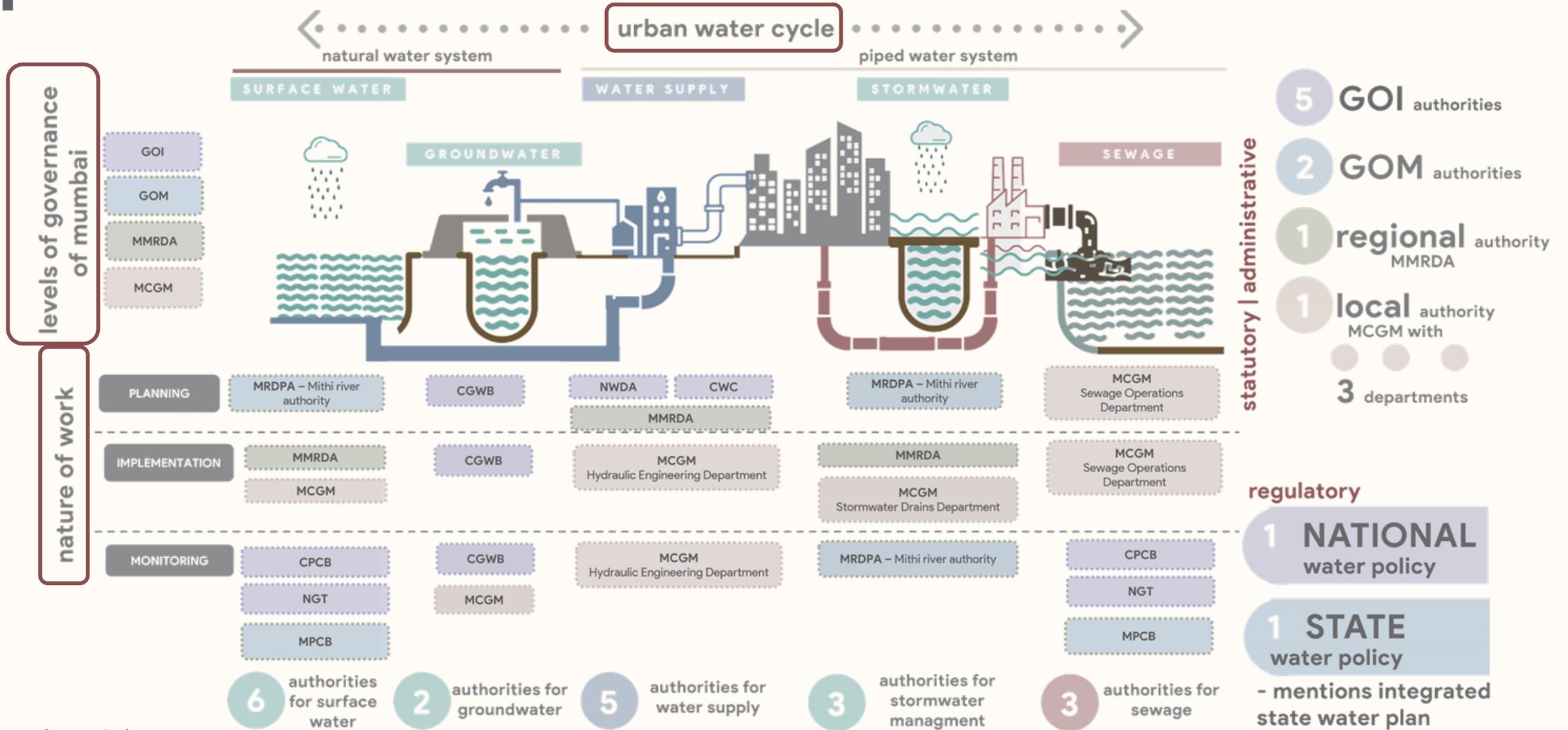
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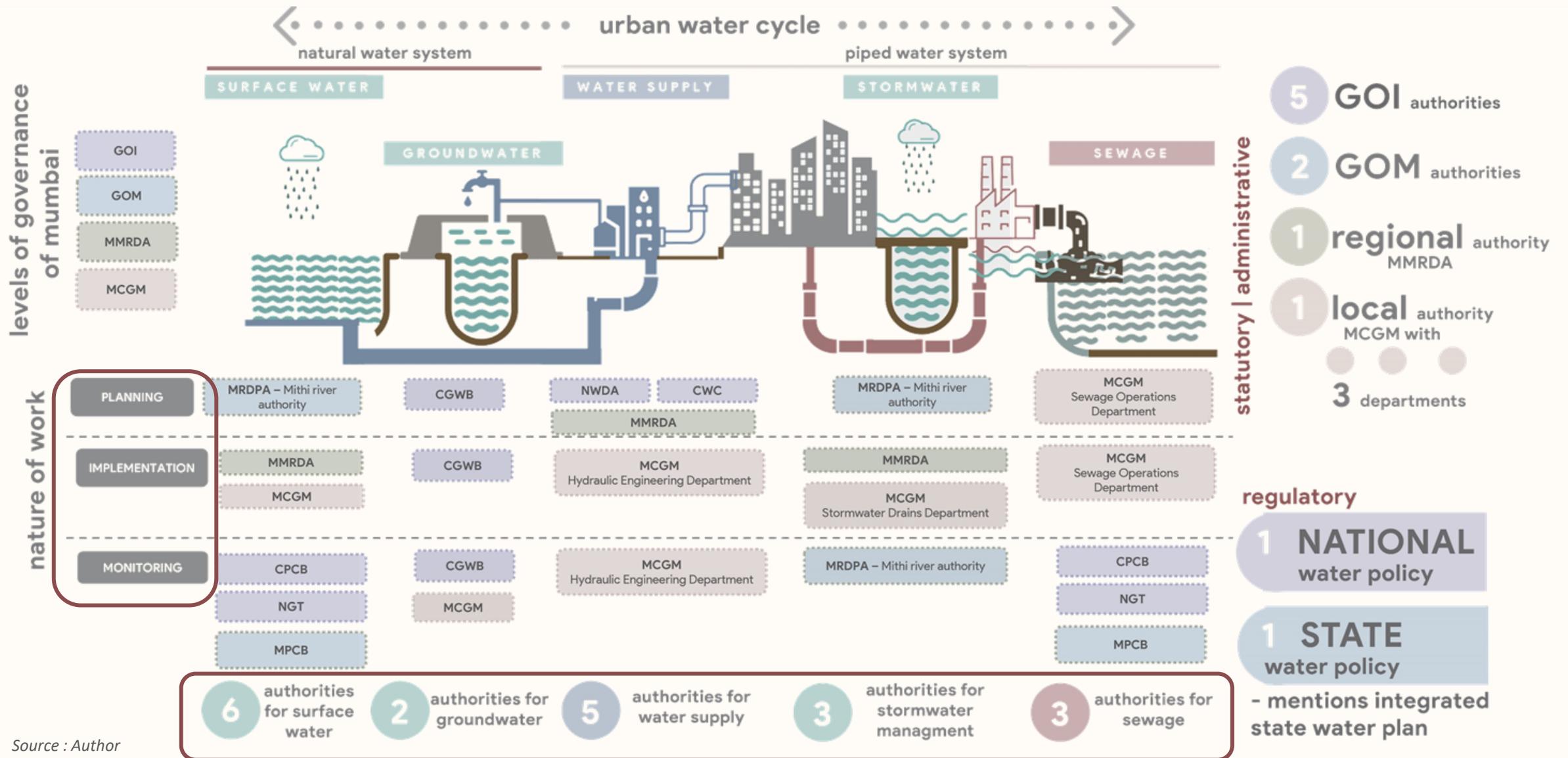
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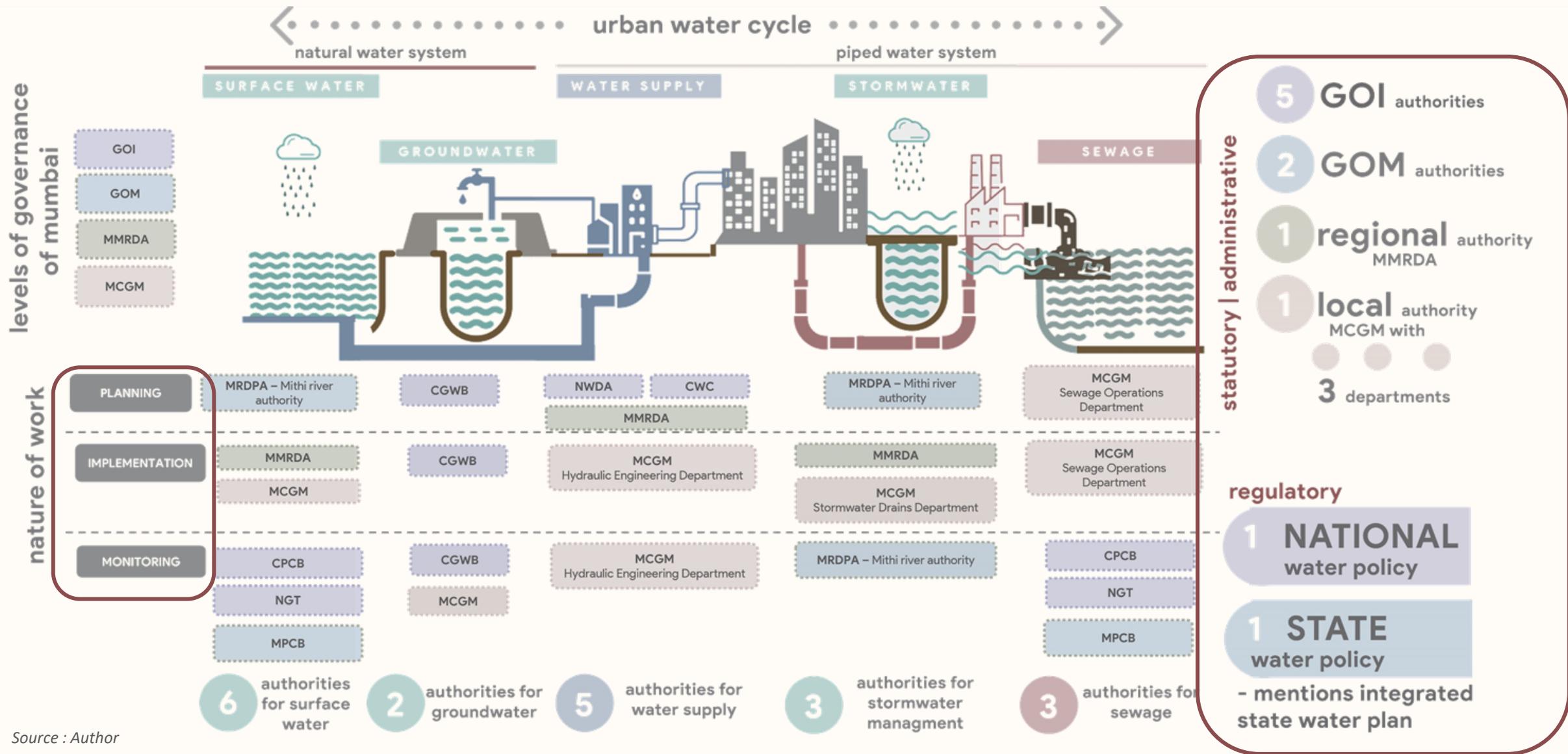
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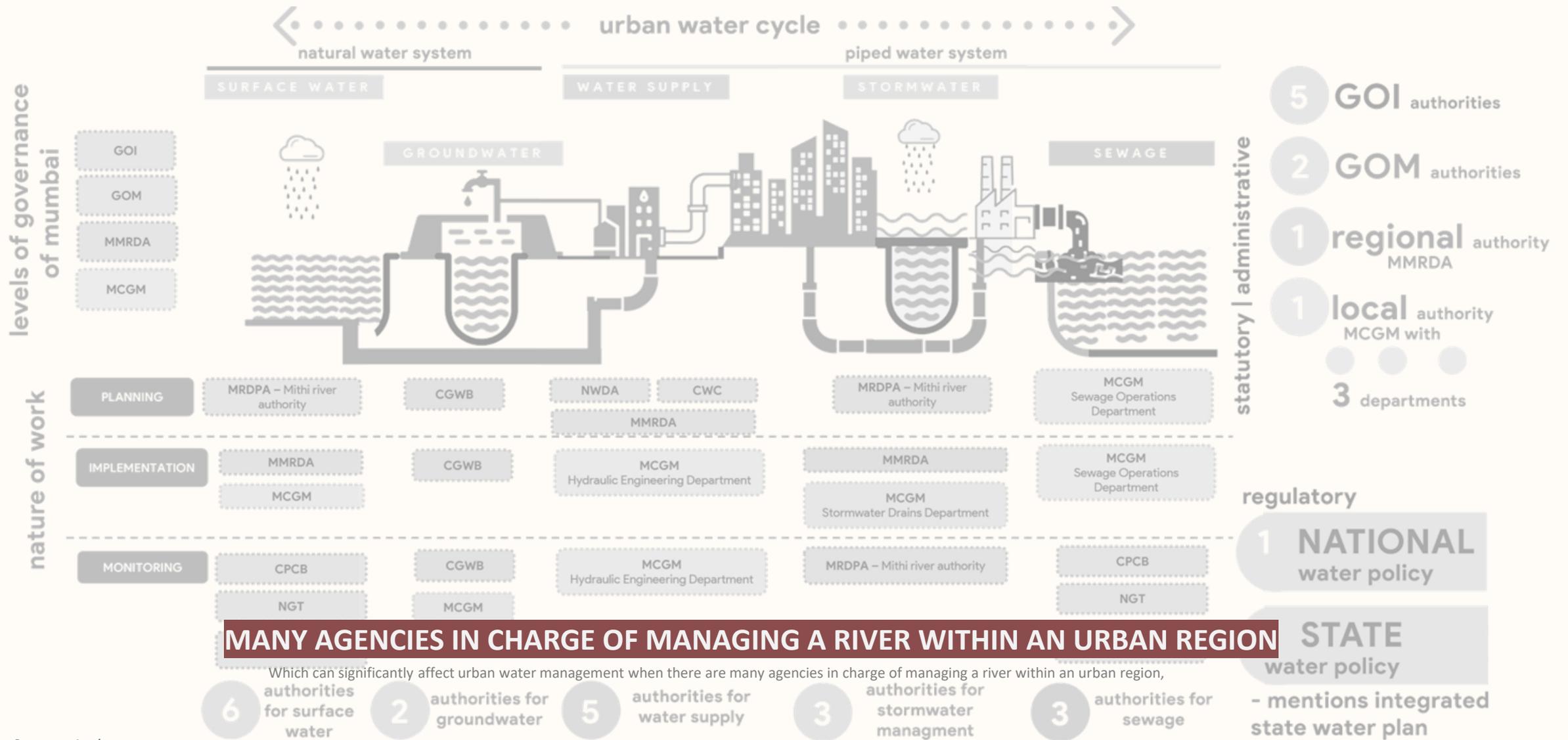
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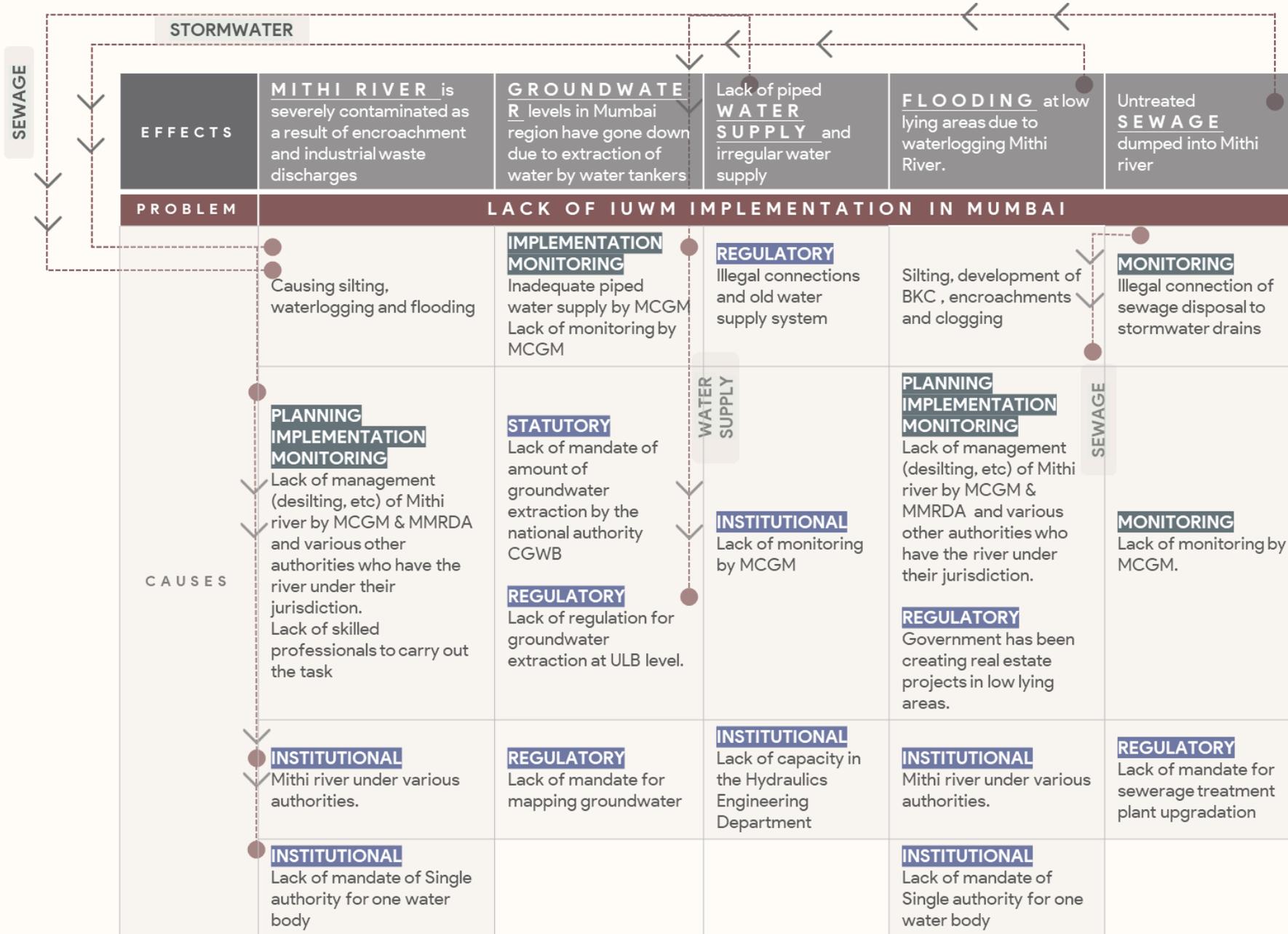
Source : Author

# Existing Urban Water Framework For Mithi River



Source : Author

# Barriers



The problem tree shows how the water crisis is affecting IUWM's effectiveness

Numerous authorities for one water body of Mithi river  
 There is no mention of surface water groundwater in the development plan for 2034  
 There is no mandate for surface water in the statute of MCGM capacity issues  
 Lack of monitoring by MCGM resulting lack of regulations addressing the illegal sewage connections to stormwater drains

Enabler : All the piped water systems departments are under one municipal authority of MCGM.

Source : Author

**How can we  
deal with gaps  
and barriers ?**



# Recommendations To Enable IUWM In Mumbai

4

1

2

3

IUWM PRINCIPLES	Participation of national, local and state government	FRAMEWORK	PLANNING	IMPLEMENTING	MONITORING
Treating piped and natural water system as one	NATIONAL	POLICY (NWP)	Guidelines for one integrated urban water management and authority for IUWM		
	CITY	Statutory	Act for Authority for IUWM		
	CITY	Administrative	Authority for IUWM		
“fit-for-purpose” water – treating water as a resource	CITY	Regulatory – Mumbai DCPR	Recycle and reuse water in the neighbourhood level		water conservation tax - Financial incentive – to be free of tax if greywater recycled and reused
	STATE	POLICY (MSWP)	Guidelines for Water Sensitive Urban Design (which can be reused an recycled)		
	CITY	Regulatory – Mumbai DCPR	Use of Nature Based solutions for slowing down stormwater		Providing incentives to developers - Adoption of such solutions (fr eg WSUD)
	STATE	POLICY (MSWP)	guideline for the local government (MCGM) to hold public information campaigns and workshops to raise awareness about IUWM		
Integrating urban planning and water management	NATIONAL	Statutory	mandate Water Master Plan for the implementation of integrated urban water management		Incentivizing water Master plan preparation under a scheme/ program
	STATE	Administrative	Integration of Water Master Plan with Mumbai’s Development Plan		
	CITY	Administrative			

The recommendation are made across all levels of governance through s/r/a/l approaches by allowing planning, implementing and monitoring so that all the iuwm principles shall be achieved.

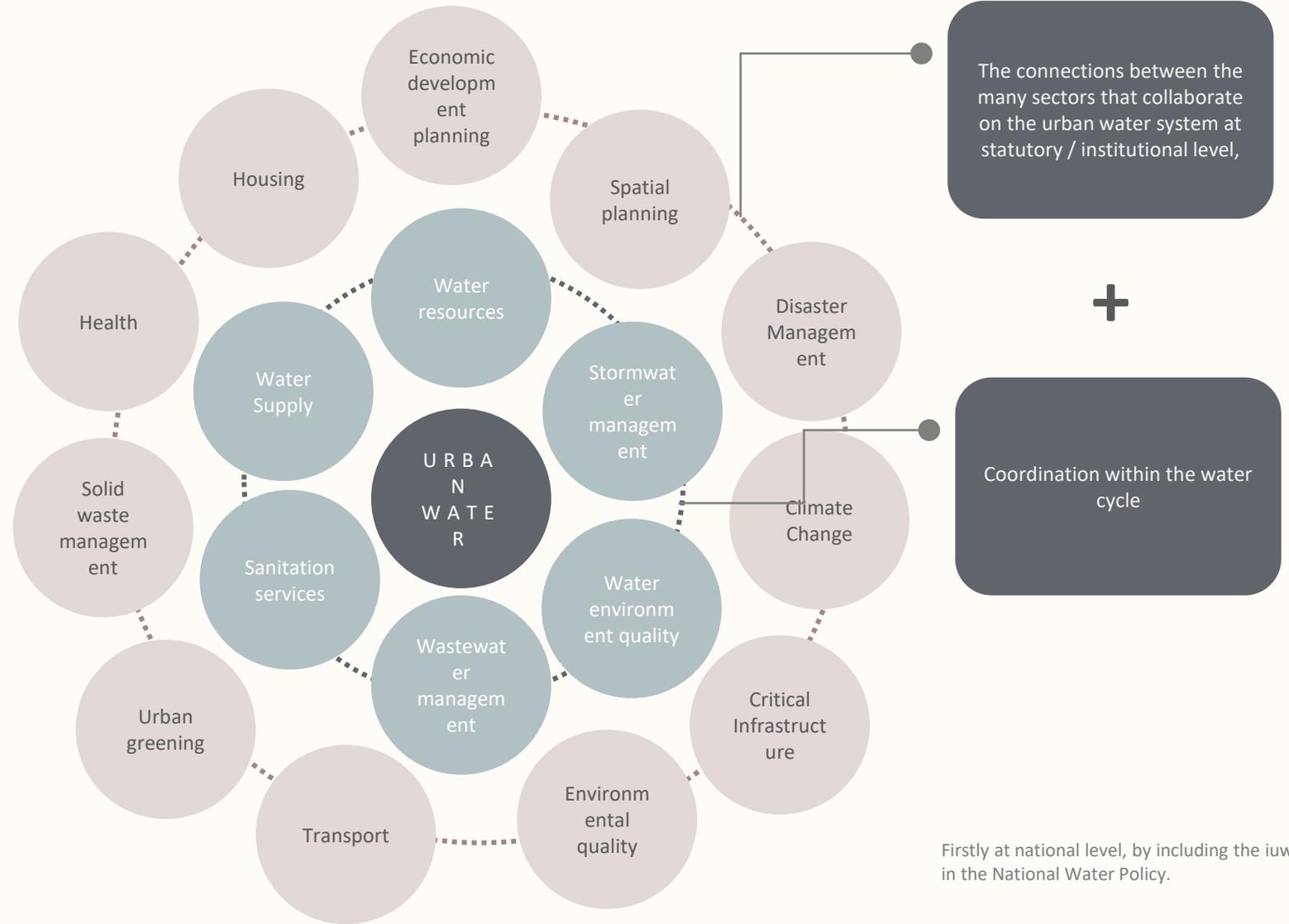
Source : Author

# Recommendations To Enable IUWM In Mumbai

Treating piped and natural water system as one

To include the integrated urban water management as a necessary practice by all the cities, and required authorities to be created for the same in the National Water Policy.

1



Firstly at national level, by including the iuwm in the National Water Policy.

Source : Author, Adapted from World Bank

# Recommendations To Enable IUWM In Mumbai

Treating piped and natural water system as one

2

By IUWM AUTHORITY



3

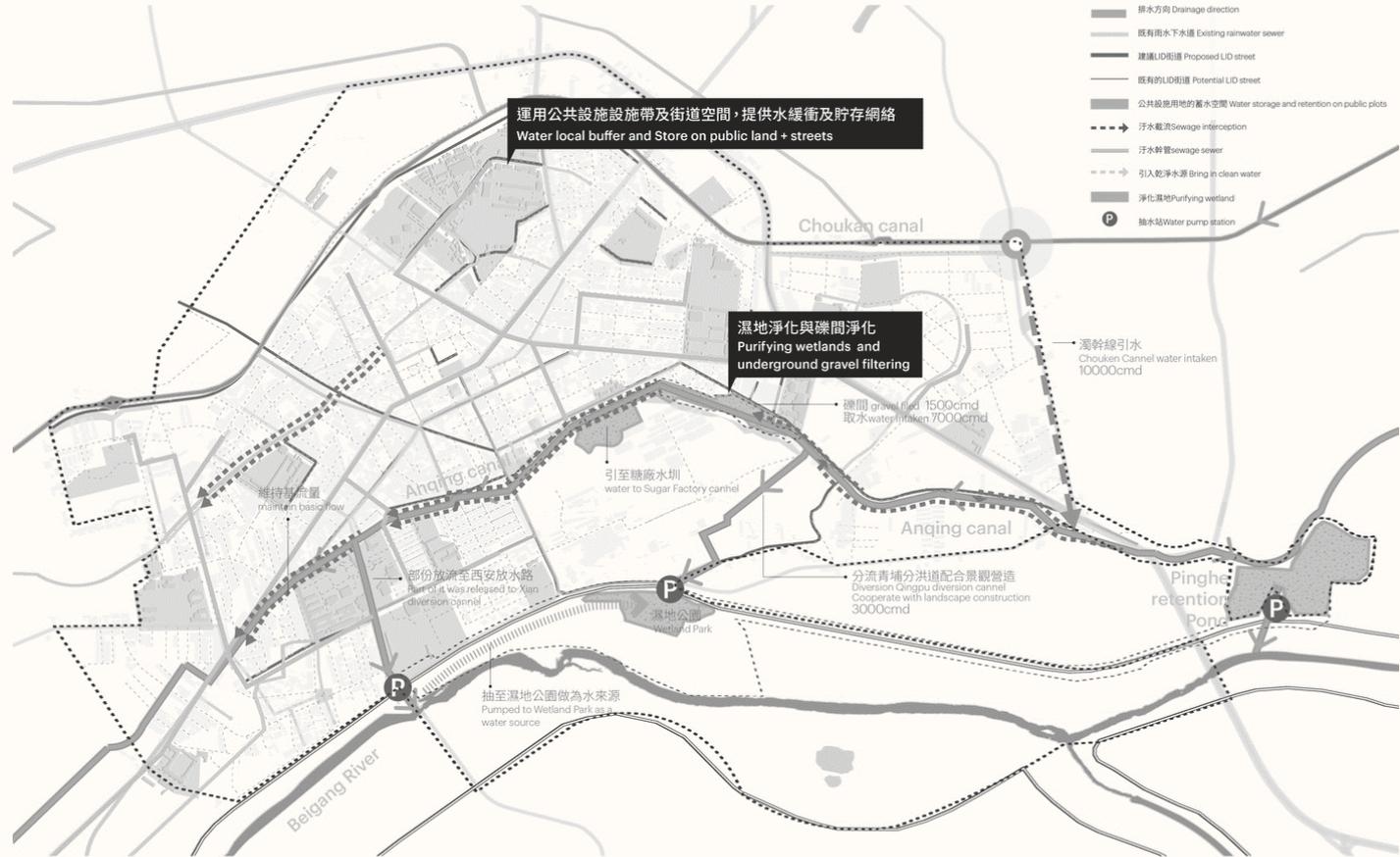


Need to **MANDATE WATER MASTER PLAN** for the implementation of integrated urban water management

**INTEGRATION** OF water master plan with the Mumbai Development Plan

**INCENTIVIZED** under the National Water Mission

Mandating Integrated Urban Water Management authority at local level Mumbai



Taiwanese Town's Water Network

Mandating Water Master Plan for the implementation of iuwm which could be integrated with the Mumbai Development Plan carried out by MCGM along with IUWM authority, This could be incentivized under the National Water Mission.

Source : Author, Archdaily

# Recommendations To Enable IUWM In Mumbai

“fit-for-purpose” water – treating water as a resource

Usage of **WATER CONSERVATION TAX** recycling water

Maharashtra State water policy and Mumbai DCPR can be developed at the city or state level to require **WSUD (WATER SENSITIVE URBAN DESIGN)** in new development and redevelopment projects

**STATE WATER POLICY CAN CREATE A GUIDELINE** for the local government (MCGM) to hold public information campaigns and workshops to raise awareness about importance of IUWM

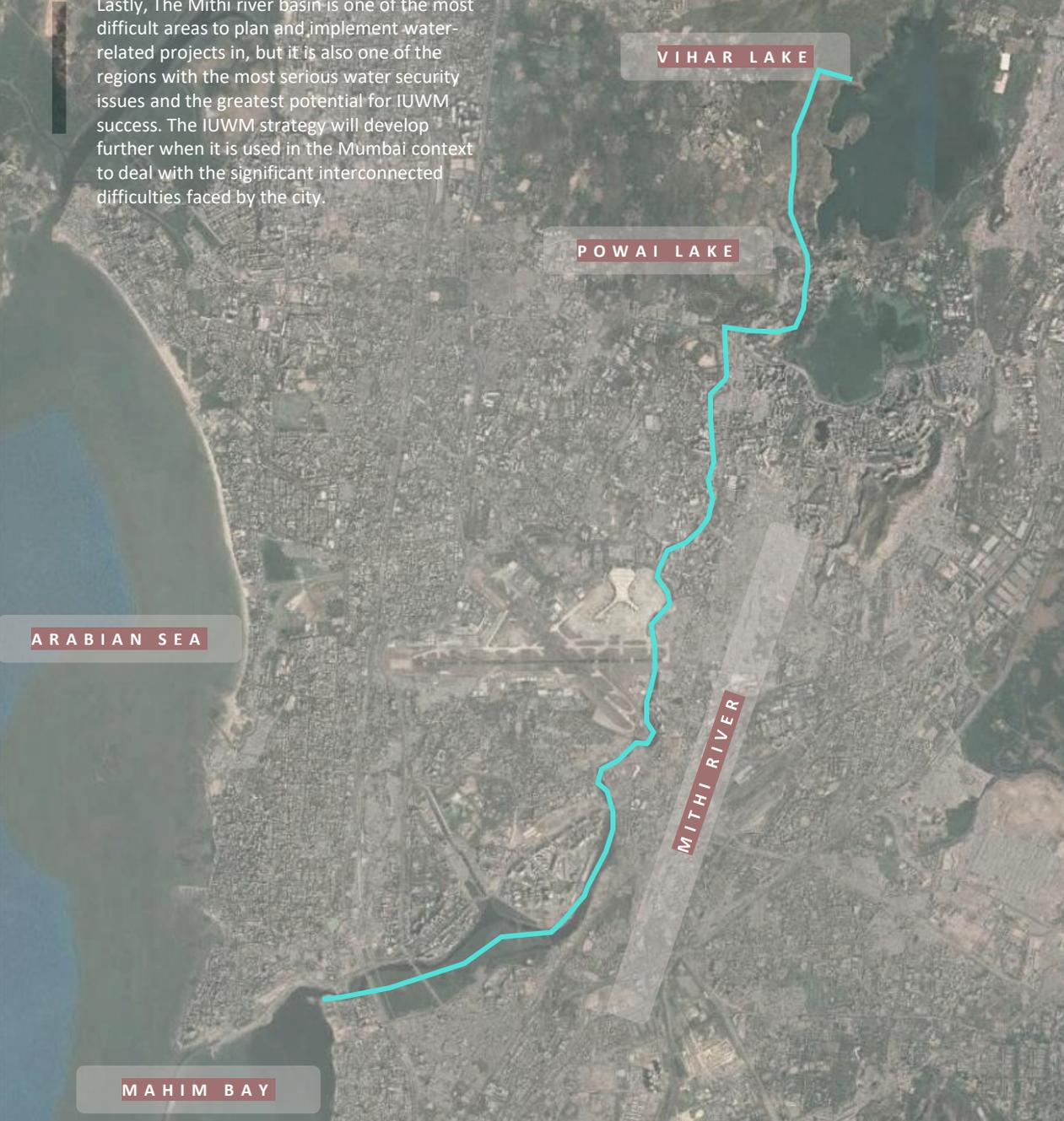


And The state water policy can create a guideline for the local government (MCGM) to hold public information campaigns and workshops to raise awareness about importance of iuwm. This will encourage MCGM to be more transparent in their operations.



Source : Author, Blactown City Council, Blogspot

Lastly, The Mithi river basin is one of the most difficult areas to plan and implement water-related projects in, but it is also one of the regions with the most serious water security issues and the greatest potential for IUWM success. The IUWM strategy will develop further when it is used in the Mumbai context to deal with the significant interconnected difficulties faced by the city.



**MOST SERIOUS WATER  
SECURITY ISSUES**

**AND**

**THE GREATEST  
POTENTIAL FOR IUWM  
SUCCESS**

# Thank You

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